

INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI

**A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor MI 48106-1346 USA
313/761-4700 800/521-0600**

THE EARLY TO MIDDLE ARCHAIC TRANSITION IN THE GEORGIA-CAROLINA PIEDMONT: A VIEW FROM THE GREGG SHOALS SITE

by

V. Ann Tippitt

A Dissertation submitted to the faculty of The University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Anthropology.

Chapel Hill

1996

Approved by:

Charles C. Beatty Advisor

J. Speer L. Coe Reader

Richard A. Yoncos Reader

Albert C. Goodyear Reader

B. W. Mintzhaber Reader

UMI Number: 9730616

**Copyright 1997 by
Tippitt, V. Ann**

All rights reserved.

**UMI Microform 9730616
Copyright 1997, by UMI Company. All rights reserved.**

**This microform edition is protected against unauthorized
copying under Title 17, United States Code.**

UMI
300 North Zeeb Road
Ann Arbor, MI 48103

© 1997
V. Ann Tippitt
ALL RIGHTS RESERVED

This dissertation is dedicated to the late J. Robert Butler, Professor of Geology and Roy S. Dickens, Professor of Anthropology at the University of North Carolina at Chapel Hill.

VERMA ANN TIPPITT The Early To Middle Archaic Transition In The Georgia-Carolina Piedmont: A View From The Gregg Shoals Site (under the direction of Carole L. Crumley)

ABSTRACT

Prehistoric sites of the Archaic Period are one of the most numerous archaeological features of the Carolina-Georgia Piedmont. However, until recently, these sites received little research attention other than attempts at temporal association of projectile point stylistic patterns. The majority of the research attention was given to the larger, more "productive" sites, such as the large shell mound sites of the Late Archaic Period. While these are certainly important sources of information, they represent only one aspect of a much broader and more diverse subsistence adaptation and settlement pattern.

Stratified sites with intact, separated components or single component sites provide good opportunities to address questions of site specific importance, such as changes in occupation or use. These sites can also contribute to knowledge of the subsistence-settlement system when comparisons are made at the drainage and regional level. Stratified sites are of major importance when occupations encompass a major shift in adaptation, changes in resource availability, or major environmental changes. Therefore, chronology, subsistence, and settlement information are vital bases for the interpretation of cultural change.

The research conducted at the Gregg Shoals-Clyde Gulley sites focused on understanding the character of the riverine subsistence-settlement system through time in this section of the Savannah River basin. Research problems addressed at the Gregg Shoals-Clyde Gulley group are divided into four interrelated domains: chronology, subsistence, adaptive change, and cross-areal comparison for settlement pattern recognition.

The archaeological and geological investigations of the Early and Middle Archaic components at the Gregg Shoals site produced information on interassemblage variability in the riverine/interriverine environment, and the relationship of this variability to changes in exploitative strategies and mobility patterns. Changes in the subsistence-settlement system, adaptation to changes in the environment and resource distribution, and population size and density, are most productively approached by understanding organization of the exploitative strategy and mobility pattern. The level of mobility and the organization of the exploitative strategy will determine the content and structure of the lithic assemblage. Therefore, the main focus of the lithic analysis is the definition of aspects of the technological organization that will reflect changes in the subsistence strategy and mobility pattern rather than depending upon traditional cultural-historical typologies to define interassemblage variability. While use of the morphologically based typologies play an important role in the preliminary assessment of occupation zones, it is necessary to move beyond this to the identification of tool attributes and tool kit organization patterns that are both functional and reflective of the exploitative strategy, cultural adaptation, and social context in which they are embedded.

This thesis combines the use of data from large area archaeological surveys and the excavation of stratified sites from the Carolina-Georgia Piedmont region to reveal aspects of transition and continuity in the regional patterns of the Middle Archaic period. Aspects of tool assemblage and technological organization revealed between the Early and Middle Archaic occupations at the Gregg Shoals site are compared to recently proposed models of Archaic adaptation, settlement, and mobility in the southeast.

Acknowledgments

Along the way many teachers, professors and colleagues have directly and indirectly contributed to this work. At a very critical juncture at the University of Arkansas, Allen P. McCartney, Mary Jo Grinstead-Schneider, William Schneider, Bernal Green, Michael P. Hoffman, Martha Rollinston, Hester Davis, and Robert McGimsey provided guidance for which I will always be very grateful.

A sojourn at the University of Missouri brought valuable lessons and important anthropological associations. Clyde Wilson, Rex Campbell, Donna Roper, and Homer Thomas have all contributed to my theoretical perspective and research approaches. A special place in my heart will always be held by the late Carl and Eleanor Chapman. I am forever thankful for Carl's full support and encouragement to take on the field project at Gregg Shoals.

While at the South Carolina Institute of Archaeology and Anthropology, I received support and assistance from Stanley South, Bruce Rippeteau, and the late Robert Stephenson. To Val Canouts I am grateful for friendship and valuable input and perspective on all those "red clay wonders". To Albert Goodyear, I owe a very large debit. Al's love of archaeology and the excitement he brings to scientific inquiry

continue to inspire me. Gail Wagner from the Department of Anthropology provided very valuable assistance with ethnobotanical identification of the radiocarbon samples. To Tom Charles. I am particularly indebted. He has shared his knowledge of raw materials and points types gained from looking at hundreds of collections from across South Carolina. Tom also contributed a special skill to the excavation at Gregg Shoals during the second season. His skillful operation of the heavy equipment allowed the careful, accurate removal of overburden at the Gregg Shoals and Clyde Gulley sites.

Through the years, I have benefited from many conversations on the Early and Middle Archaic with a number of individuals but the following deserve very special acknowledgment: David Anderson, Ken Sassaman, Chris Judge, Randy Daniel, Dan Simpkins, Mark Mathis, Steve Claggett, and Dennis Blanton.

I also want to acknowledge the support of the National Park Service and the Corps of Engineers in the work conducted in the Russell Reservoir. Jim Cobb and the late Victor Carbone ably facilitated the work at Gregg Shoals.

At the University of North Carolina, I found a creative academic environment and North Carolina became my adopted home. Fellow graduate students have enriched this experience. Very special thanks are given to Linda Carnes-McNaughton, Pasty Evans, Julia Hammett, and David Moore.

My friend and colleague Janet Levy has provided good advice, encouragement, and greatly assisted by reading this thesis. I am very grateful for all her contributions and support.

My committee members Joffre L. Coe, Richard A. Yarnell, Bruce Winterhalder, and Albert Goodyear have generously given of their time to enhance this thesis and encourage my efforts. I regret so much the loss my committee member, the late Robert Butler. Bob was and a friend and colleague and I had not finished asking him questions about rocks.

My associations Vin Stephonaitis, Trawick Ward, and Steve Davis with the Research Laboratories of Anthropology are gratefully acknowledged. They have contributed both to my graduate school endeavors but also to my activities as a museum curator.

When I entered UNC, Roy Dickens was the chair of my committee. Roy and I shared many productive conversations about the Gregg Shoals site and I acknowledge his influence on my work. After Roy's death, Carole Crumley became the chair of my Ph.D. committee. At a time of great stress, Carole was a strong, positive force. Carole has been my mentor and friend. She has contributed greatly to my professional development and for this I am profoundly grateful.

To William H. Marquardt, my co-principal investigator on the Gregg Shoals project, I give my deepest gratitude and appreciation for guidance and inspiration. Bill both artfully managed the bureaucratic administration on this project and made major contributions to the fieldwork and analysis.

With great pleasure, I acknowledge the support and unflagging encouragement contributed to the completion of this thesis by David S. Brose, Director of the Schiele Museum of Natural History. To the Board of Directors of the Schiele Museum and

President. Ernest Sumner. I extend my deep appreciation for their consistent interest and support. The City of Gastonia, my employer, contributed greatly to the completion of this thesis by providing educational leave time and I gratefully acknowledge the importance of this contribution.

To my dear friends and colleagues at the Schiele Museum, Kay Moss, Suzanne Simmons, Michael Eldredge, and Melissa Turney I owe a great deal. They have supported my efforts without question and taken on extra museum projects to allow the completion of this thesis. To Steve Watts I extend my deep appreciation for long conversations on prehistoric technologies, the Middle Archaic, and many other esoteric anthropological topics. He has freely shared his knowledge of lithic technology and been a most patient flint knapping instructor.

There are two individuals that deserve special recognition, for without their caring and extra effort many a graduate student would have floundered in a sea of rules and forms. To Suphronia Creek and Estella Stansbury I extend my deepest regard and appreciation.

The long journey that has led to my career in archaeology and this thesis began with my parents. Their intellectual curiosity, love of history and reading marked me very early. For their unconditional love and support throughout the course of this project and, more importantly my life, I most gratefully acknowledge Margaret Ann Evans Tippitt and Calvin Coolidge Tippitt.

To Alan May I owe the greatest debt. Alan never let me lose faith in the completion of this work. He has given me the support, advice, and understanding that

only a comrade in the field can provide and the unflinching love and comfort that only a life mate can give. I am forever extremely grateful.

TABLE OF CONTENTS

	Page
LIST OF TABLES	xiv
LIST OF FIGURES	xv
 Chapter	
1. INTRODUCTION	1
EARLY TO MIDDLE ARCHAIC TRANSITION.....	2
RESEARCH DOMAINS.....	10
 2. ENVIRONMENTAL AND ARCHAEOLOGICAL MODELS	 16
ARCHAEOLOGICAL BACKGROUND.....	26
 3. ARCHAEOLOGY OF THE UPPER SAVANNAH RIVER VALLEY	 48
RICHARD B. RUSSELL ARCHAEOLOGY PROGRAM	53
ARCHAEOLOGICAL AT THE GREGG SHOALS SITE.....	56
<i>Site Description</i>	58
 4. EXCAVATION AND ANALYTIC METHODS	 76
FIELD AND EXCAVATION METHODS.....	77
ANALYTIC METHODS.....	84
 5. GEOARCHAEOLOGY AND SITE STRATIGRAPHY	 99
SEDIMENTATION UNIT I.....	102
SEDIMENTATION UNIT 2	105
SEDIMENTATION UNIT 3	108
 6. ARTIFACTS AND INTRASITE SPATIAL ANALYSIS	 114
DESCRIPTION OF ARTIFACTS BY ZONE IN OPERATION A.	114
<i>Zone I</i>	116
<i>Zone II</i>	120
<i>Zone III</i>	124
<i>Zone IV</i>	133
<i>Zone V</i>	134
<i>Zone VI</i>	139
<i>Zone VII</i>	140

TABLE OF CONTENTS (continued)

<i>Zone VIII</i>	147
<i>Zone IX</i>	148
<i>Zone X</i>	158
DESCRIPTION OF ARTIFACTS FROM OPERATION B.....	158
SUMMARY.....	159
7. SUMMARY AND CONCLUSIONS	172
GREGG SHOALS.....	172
EARLY TO MIDDLE ARCHAIC REGIONAL PATTERNS.....	178
REFERENCES CITED	173

LIST OF TABLES

Table	Page
6.1 Zone I, Randolph Biface Dimensions.....	118
6.2 Caraway Triangular Dimensions.....	119
6.3 Zone I Pottery by Surface Treatment.....	119
6.4 Zone I, Yadkin Large Triangular Dimensions.....	121
6.5 Zone II, Badin Dimensions.....	122
6.6 Zone II, Caraway Triangular Dimensions.....	122
6.7 Zone II Pottery by Surface Treatment.....	124
6.8 Zone III, Category 1 Biface Dimensions.....	126
6.9 Zone III, Category 2 Biface Dimensions.....	126
6.10 Zone III, Category 3 Biface Dimensions.....	127
6.11 Zone III, Category 4 Biface Dimensions.....	128
6.12 Zone III, Yadkin Large Triangular Dimensions.....	129
6.13 Zone III, Biface Frequencies by Raw Material.....	129
6.14 Zones I, II, III Pottery.....	131
6.15 Zone V, Category 1 Biface Dimension.....	135
6.16 Zone VI, Category 2 Biface Dimension.....	137
6.17 Zone VI, Feature 5 Debitage.....	139
6.18 Zone VII, Morrow Mountain 1 Biface Dimension.....	141
6.19 Zone IX Debitage.....	149
6.20 Zone IX, Stanly Stemmed Biface Dimensions.....	150
6.21 Zone IX, Category 6 Biface Dimension.....	151
6.22 Density of Artifacts by Zone.....	162
6.23 Frequency of Artifacts by Zone V.....	164
6.25 Frequency of Artifacts by Zone VII.....	165
6.25 Frequency of Artifacts by Zone IX Artifacts.....	165
6.26 Frequency of Artifacts in Zone IX by Raw Material.....	166
7.1 Sites by Time Period in the Little Tennessee River Valley.....	177
7.2 Richard B. Russell Reservoir Archaeological Sites by Time Period.....	178
7.3 Richard B. Russell Reservoir Artifacts Recovered by Time Period.....	178
7.4 Distribution of Artifacts by Raw Material.....	179
7.5 Richard B. Russell Distribution of Biface Types by Raw Material.....	181

LIST OF FIGURES

Figure		Page
1.1	Location of Gregg Shoals Project Area	3
3.1	Gregg Shoals Site Map.....	58
3.2	Erosion at Gregg Shoals.....	60
4.1	Excavation Design	80
4.2	Gregg Shoals Final Excavation Depth.....	81
5.1	Archaeological and Geological Profiles.....	103
6.1	Final Profile at the Gregg Shoals Site (9EB259)	115
6.2	Hafted Bifaces from Zones I, II, and III.....	117
6.3	Features and artifacts from Zone III	132
6.4	Hafted Bifaces from Zone V.....	136
6.5	Hafted Bifaces in Zones VII and IX.....	142
6.6	Middle Archaic Features and Artifacts.....	144
6.7	Density of Middle Archaic Artifacts in Zone VII.....	146
6.8	Artifacts from Zone IX.....	153
6.9	Early Archaic Features in Zone IX.....	155
6.10	Zone IX Artifacts	156
6.11	Density of Early Archaic Artifacts	163
6.12	Distribution of Firecracked Rock by Zone	168
6.13	Distribution of Cores by Zone	169

Chapter 1

INTRODUCTION

Prehistoric sites of the Archaic Period are the most numerous archaeological features of the Carolina-Georgia Piedmont. However, until recently, these sites received little research attention on a regional scale. Research was directed at chronology building and temporal associations of projectile point stylistic patterns. The majority of the research attention was given to the larger, more “productive” sites, such as the large shell mound sites of the Late Archaic Period. While these are certainly important sources of information, they represent only one aspect of a much broader and more diverse prehistoric subsistence adaptation and settlement pattern.

Over the last 20 years, the development of federally mandated and funded Cultural Resource Management (CRM) projects required the investigation of all sites in areas threatened by development. Survey and excavation were conducted in several major drainages in the Piedmont. This has resulted in an increased awareness of the large number of sites referred to as “lithic scatters” or “red clay wonders” (Canouts and Goodyear 1985). This growing data base was used by investigators to demonstrate the great variability in the topographic location and artifact assemblage content of these

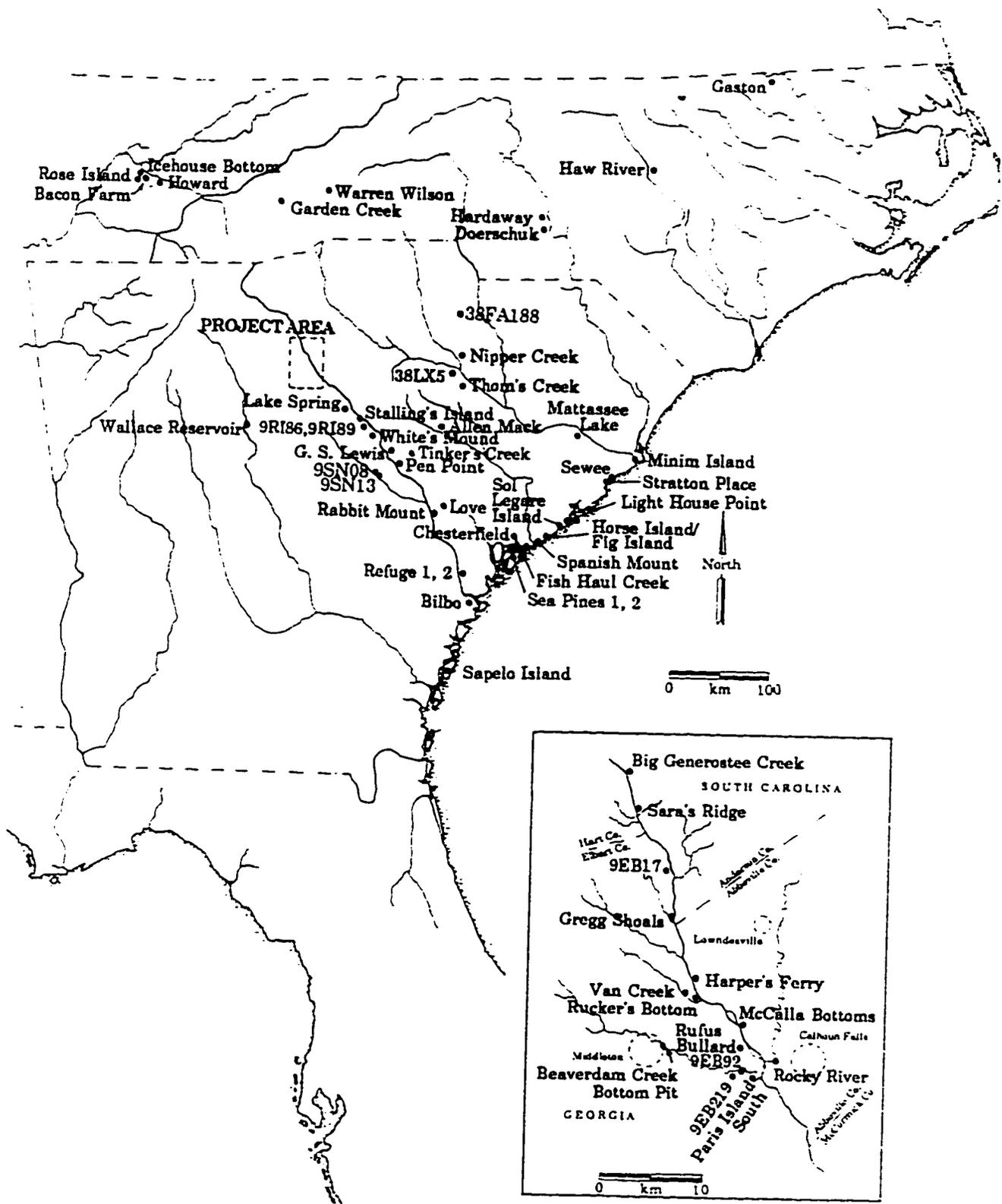
sites. It was generally observed that populations seemed to have decreased both the range and frequency of their movements through time as population size increased.

This research undertaking is based on an interest in extending the results of the geological and archaeological investigations at a stratified site (Gregg Shoals, 9EB259) along the upper part of the Savannah River (Figure 1.1), conducted as part of the mitigation of the Richard B. Russell Lake Project, to analysis of multi-scale models of the environment, settlement pattern, and mobility. Prior to these investigations, the majority of the information from this area came from limited surveys and a few excavated upland sites.

EARLY TO MIDDLE ARCHAIC TRANSITION

In the eastern woodlands and along the Atlantic Slope, the Early Archaic period (10,000-8,000 BP) is traditionally viewed as a time when human groups adapted to the post-glacial climatic conditions of the early Holocene. The 2,000 year span of the Early Archaic is usually characterized by cultural adaptations that reflect a shift from the emphasis on large herd animal hunting during the Paleoindian period to a more generalized lifeways of hunting and gathering.

The diagnostic artifacts used to identify Early Archaic sites and components include several different side and corner notched and bifurcate hafted biface forms. The side and corner notched include Dalton, Hardaway-Dalton, Taylor, Big, Sandy, Bolen, Palmer and Kirk. MacCorkle, St. Albans, LeCroy and Kanawah. The end of the Early Archaic is marked by climatic changes referred to as the Hypsithermal or Altithermal episode and by the replacement of notched and bifurcate forms with more square



(adapted from Anderson and Joseph 1988)

Figure 1.1 Location of Gregg Shoals Project Area

bifurcate and contracting stemmed forms of Stanly, Morrow Mountain, and Kirk Stemmed hafted biface types. These hafted biface forms and associated dates are presented in Chapter 2.

In 1952, James B. Griffin published a description of the major cultural periods in the eastern United States (Griffin 1952:354-355). Early Archaic groups were characterized as small, exogamous, probably patrilineal and patrilocal, egalitarian bands living within specific hunting territories with seasonal movements being linked to resource procurement and ceremonial gatherings. This remained the prevalent view of Early Archaic settlement systems in the 1950s and 1960s and, in some instances, to the present day (Anderson and Joseph 1988).

In *Trend and Tradition in the Prehistory of the Eastern United States*, Joseph Caldwell (1958) presented a different view on the nature of cultural development which has had a major impact on archaeological interpretation for many years. According to Caldwell, the Archaic period was a time of increased hunting efficiency and “with the progressive discovery of new food resources the seasonal economic cycles became established” (primary forest efficiency), resulting in “an increasingly settled and materially richer life” (Caldwell 1958:18). Adaptation to the deciduous forests of the Holocene was seen as a long, gradual process, taking several thousands of years to development “primary forest efficiency.” However, over the last thirty years, an increased interest in prehistoric diet and subsistence combined with the development and widespread use of flotation methods have produced research results that challenge this

model (Cleland 1966; Asch et al. 1972; Asch and Asch 1985; Ford 1977, 1985; Cowan 1985; Chapman and Shea 1981; and Smith 1986).

Cleland (1976) presented a very different explanation and argued that prehistoric cultural adaptations are more profitably considered as occurring along a continuum, ranging from focal (highly specialized) to diffuse (generalized). Focal adaptations concentrate energy on a few resources and tend to be specialized. Diffuse adaptations focus on a wide variety of different resources. It was also proposed that through time adaptive strategies would move between these two extremes in response to changes in distribution of resources, climate or social conditions arose.

More recently, several Early Archaic settlement models for the Piedmont and lower Atlantic Slope have been outlined. Claggett and Cable (1982) proposed that differences in the technological organization of Paleoindian and later Archaic adaptations were the result of responses to the effects of post-glacial warming. Their work is based on excavations at two deeply stratified sites along the Haw River. The "effective temperature/technological organizational" model predicts a shift from logistical strategies with site specialization to a foraging strategy with an increase in residential mobility and decrease in site intervariability. The model indicates that the response to an increase in temperature during the early Holocene would be a shift from logistical to residential mobility. According to this model, the organization of the tool assemblage would, therefore, shift from a highly curated or logistical, collector based technology, to the highly expedient, situational technology of a foraging adaptation. This shift from curated to expedient tool organization was documented at both sites. However, it was earlier in

the temporal sequence than predicted, occurring between the Hardaway-Dalton and Palmer occupations (Claggett and Cable 1982: 686-687, 761-763).

Anderson and Schuldenrein (1983) used published information on 98 Early Archaic assemblages from Georgia and the Carolinas to examine the Haw River model. Their review revealed that Early Archaic assemblages were characterized by highly expedient technologies, with only a low incidence of formal, curated tools. Based on a measure of local vs. non-local raw material, they also concluded that high levels of group mobility along rather than across drainages was indicated (Anderson and Schuldenrein 1983:205).

Using archaeological data from the Savannah River basin, Anderson and Hanson (1988) proposed the "band/macroband" model of Early Archaic settlement on the South Atlantic Slope. The impetus for the construction of this model came from an attempt to interpret Early Archaic assemblages at the Rucker's Bottom and the G. S. Lewis East sites. Two levels of social-settlement organization structures were described: bands (local) and macrobands (regional). Within this model, individual bands foraged within large river drainages while larger macrobands provided organizational structures or networks that promoted the flow of information and exchange across sections of several watersheds.

The Band/Macroband model describes a settlement system that contains both logistical and foraging types of sites, taking into account seasonal and geographic variation in food and other resource distribution patterns (Anderson and Hanson 1988). Logistical base camps were located in the Coastal Plain during the winter while a variety

of foraging camps would be located in the Piedmont, Coastal Plain and Inner Coastal Plain during the spring, summer, and fall. Aggregation loci, located along the Fall Line would provide information exchange, mating network maintenance, and social interaction.

Anderson and Hanson (1988) offer as a test of this model an analysis of artifact assemblages from seven sites along the Savannah River and Fall Line. These analyses include an examination of the ratios of expedient to curated tools and the distribution of raw materials and biface types recorded by Charles as part of the South Carolina Institute of Archaeology and Anthropology's (SCIAA) collections survey (Charles 1981, 1983, 1986; Goodyear and Charles 1984).

Daniel's (1994) investigations of the Hardaway site addressed several questions concerning site function and the role of the Hardaway site in a regional settlement system. The analysis combines a functional study of the stone tool assemblage with an analysis of data from a survey of raw material types using a number of private artifact collections. This work makes a significant contribution to archaeology in the Southeast by providing a systematic study of several metavolcanic quarries in the Uwharrie Mountains of North Carolina (Daniel 1994; Daniel and Butler 1996). The petrographic characterizations reported by Daniel and Butler (1996) provide a much needed baseline for the identification of metavolcanic stone types found in artifact assemblages across the Carolinas and parts of eastern Georgia.

Daniel (1994) also compares the results of the Hardaway analyses with the expectations of the Anderson and Hanson band/macroband model. According to Daniel,

the band/macrobanded model fails to account for the range of artifact types at the Hardaway site. He proposes a settlement model that give primacy to the location of high quality raw material outcrops. The Uwharrie-Allendale model resembles Gardner's Flint Run model (1974, 1977, 1983, 1989) by featuring "the limited availability of high quality knappable stone as a significant factor influencing settlement" (Daniel 1994:266).

The transition from the Early Archaic to the Middle Archaic period is not well understood in the Piedmont or the South Atlantic slope (Anderson and Joseph 1988; Anderson 1991; Anderson, Sassaman, and Judge 1992; Sassaman and Anderson 1994, 1996). While the pattern of replacement of side and corner notched biface forms by stemmed biface forms and bifurcates has been documented in the Little Tennessee River basin and the Carolina Piedmont, bifurcate biface forms are scarce and the distribution across the Piedmont is uneven (Charles 1981, 1983, 1986; Anderson 1991). Therefore, some researchers have questioned their usefulness as a primary indicator of the terminal Early Archaic (Anderson and Joseph 1988; Anderson 1991).

In the Georgia-Carolina Piedmont, the Middle Archaic (8,000 to 5,000 B.P.) is defined by the appearance of stemmed as opposed to notched hafted bifaces. Traditionally viewed as a period of gradually increasing population and reduction in the size of home territory, the period overlaps the middle Holocene climatic interval or Hypsithermal. Across the Piedmont, Middle Archaic occupations have been characterized as uncomplicated assemblages that are present in most environmental zones (Anderson and Joseph 1988).

The Middle Archaic diagnostic hafted bifaces include Stanly Stemmed, Morrow Mountain Types I and II, and Guilford Lanceolate as defined by Coe (1964:37-44). Further description of these hafted biface forms and their associated dates are provided in Chapter 2. Compared to the information available on Middle Archaic adaptations in the Illinois River Valley, Tennessee, and Kentucky, little is known about Middle Archaic lifeways in the Georgia-Carolina Piedmont (Tippitt and Marquardt 1982, 1984; Anderson and Joseph 1988; Sassaman 1988; Blanton 1983; Blanton and Sassaman 1989). Middle Archaic Piedmont sites have not produced large tool kits, house patterns, or burials and it has been assumed that this pattern indicates small, residentially mobile foraging groups (Tippitt and Marquardt 1984; Anderson and Joseph 1988; Sassaman and Anderson 1994a, 1994b; Sassaman 1983, 1985; Blanton and Sassaman 1988). Several trends that develop during the Middle and Late Archaic have been identified for the broader eastern United States and for the Piedmont, including increased sedentism, intensified procurement of local resources, and increasingly complex sociopolitical organization (Stoltman 1972, 1974; Stoltman and Baerreis 1993; Ford 1966; Brose 1979; Brown and Vierra 1983; Smith 1986; Blanton and Sassaman 1988).

The preceding review of Early Archaic settlement-adaptation models contained many examples of proposed models and supporting analyses. As pointed out above, the information on the Early to Middle Archaic period transition is very sparse. The same is true for models of Middle Archaic settlement systems in the Piedmont. However, a few models have been formulated to account for changes in adaptation during the Middle and Late Archaic, including the "adaptive flexibility" model (Sassaman 1983, 1985; Blanton

and Sassaman 1988) and Goodyear's "riverine-interriverine" Archaic settlement model (Goodyear et al. 1979).

RESEARCH DOMAINS

Initial excavations at the Gregg Shoals site (near Elberton, Georgia) documented an occupation sequence spanning 10,000 years, from Early Archaic to Late Prehistoric, identifying ten occupational zones and their temporal associations. Further work identified activity areas within the Middle and Early Archaic zones. Research questions focused on assemblage characterization, raw material changes through time, and interassemblage variation. At Gregg Shoals, the Early Archaic materials exhibit a wide range of raw materials and a high quality of raw material. The Early Archaic tool kit contains a wide variety of tool types and tools constructed for a long use-life. The Middle Archaic tool kit contains very few distinct tool types and a low diversity of raw material. The Middle Archaic tool kit is also characterized by a low instance of curation and a high level of expedient tools. The archaeological and geological investigations at Gregg Shoals resulted in the identification of several significant cultural components and the generation of a preliminary model of the site depositional processes for this section of the floodplain of the Savannah River.

Stratified sites with intact, separated components or single component sites provide good opportunities to address questions of site specific importance, such as changes in occupation or use. These sites can also contribute to knowledge of the subsistence-settlement system when comparisons are made at the drainage and regional level. Stratified sites are of major importance when occupations encompass a major shift

in adaptation, changes in resource availability, or major environmental changes.

Therefore, chronology, subsistence, and settlement information are vital bases for the interpretation of cultural change.

The research conducted at the Gregg Shoals-Clyde Gulley sites focused on understanding the character of the riverine subsistence-settlement system through time in this section of the Savannah River basin. Research problems addressed at the Gregg Shoals-Clyde Gulley group are divided into four interrelated domains: chronology, subsistence, adaptive change, and cross-areal comparison for settlement pattern recognition. As a first step, it was necessary to establish:

1. depth of the deposits,
2. chronological periods represented in the deposits,
3. nature and structure of the deposits,
4. vertical placement of occupations, and
5. identification of assemblage structure and content.

The backhoe testing and first excavation phase were designed to provide information on the structure and content of the chronological periods represented. It was then possible to refine the research questions specific to the occupational episodes represented and the artifact classes preserved. These goals required well-controlled excavation of intact assemblages from good natural stratigraphic context.

The implementation of the research design required the structuring of the field methods (such as selection of unit size, level thickness, etc.) and artifact analyses to yield data that could be used to address specific questions of:

1. changes in function of the site during the lengthy span of occupation,
2. evaluation of the subsistence information for each occupation,
3. choice of site location,
4. changes in raw material selection through time,
5. identification of any spatial patterning of artifacts or features, i.e. activity areas, or differences in artifact distribution,
6. debitage as an indicator of the reduction stages represented and the activities performed.

The research domains outlined for the Early and Middle Archaic components at the Gregg Shoals site produced information on interassemblage variability in the riverine/interriverine environment, and the relationship of this variability to changes in exploitative strategies and mobility patterns. Changes in the subsistence-settlement system, adaptation to changes in the environment and resource distribution, and population size and density, are most productively approached by understanding organization of the exploitative strategy and mobility pattern. The level of mobility and the organization of the exploitative strategy will determine the content and structure of the lithic assemblage. Therefore, the main focus of the lithic analysis is the definition of aspects of the technological organization that will reflect changes in the subsistence strategy and mobility pattern rather than depending upon traditional cultural-historical typologies to define interassemblage variability. While use of the morphologically based typologies play an important role in the preliminary assessment of occupation zones, it is necessary to move beyond this to the identification of tool attributes and tool kit

organization patterns that are both functional and reflective of the exploitative strategy, cultural adaptation, and social context in which they are embedded.

The foundation for addressing several research questions that require information at the regional scale is provided by the current ethnographic literature on hunter and gatherer subsistence-settlement, and the growing body of data on both the Archaic settlement of the Southeast and the mid-Holocene environment. How will the structure of the exploitative strategy and resultant mobility pattern be reflected in the technological organization of the stone tool kit? How will this be reflected in the site structure and variability?

Current research on the relationship of hunter-gatherer subsistence settlement patterns and technological organization contains significant implications for the analysis of interassemblage variability (Binford 1980:17). Through cross-cultural analysis and his work among the Nunamiut, Binford (1980:17) has identified two basic hunter-gatherer subsistence strategies: .. mapping on" and "logistical." The "mapping on" strategy involves moving consumers to resources, whereas "logistical" strategies move resources to consumers (Binford 1980:17). An assemblage that is the result of an accumulation of debris from activities over a year is said to be coarse grained: that is, the resolution between the archeological remains and the activities resulting in their deposition is poor (Binford 1980:17). The opposite is true for assemblages with fine-grained resolution. Those assemblages accumulated over a short period of time will show a finer resolution between remains and behavior. The determining factor of the grain of resolution is the degree of residential mobility as a response to environmental change, and in distribution

of resources, population density, or competition, will be reflected in the technological organization --assemblage content and structure.

If the subsistence-settlement system is structured by the organization of the exploitative strategy and mobility pattern, then indications of changes in adaptation can be seen in the logistical/residential patterns and organization of the technological system (Binford 1979). If we assume that changes in the technological organization are responses to changes in the effective environment, distribution of resources, and cultural variables, such as increases in population size and density, and that these changes are reflected in the lithic technology, then interassemblage variability can be used as one indicator of subsistence-settlement change. These changes in the technological organization may take several forms: the number of expedient tools, the quality of raw materials, the source of raw materials (local, non-local), the sequence of manufacture, and the use-life of tools. The technological organization of a logistically organized exploitative strategy with high mobility would be characterized by: larger tools that indicate planned maintenance, use of higher quality raw materials, and more variety in the type of raw materials used (Binford 1979:80). A residentially organized system with low mobility would produce a different technological pattern: an increased number of expedient tools, fewer specialized tools, little emphasis on resharpening, and use of a predictable, locally available raw material (Binford 1979, 1980).

This thesis combines the use of data from large area archaeological surveys and the excavation of stratified sites from the Carolina-Georgia Piedmont region to reveal aspects of transition and continuity in the regional patterns of the Middle Archaic period.

Aspects of tool assemblage and technological organization, revealed between the Early and Middle Archaic occupations at the Gregg Shoals site, are compared with recently proposed models of Archaic adaptation, settlement, and mobility in the Southeast.

Chapter 2

ENVIRONMENTAL AND ARCHAEOLOGICAL HISTORY AND MODELS

"...the road this day had led me over an uneven country, its surface undulated by ridges or chains of hills, sometimes rough with rocks and stones, yet generally productive of forests, with a variety of vegetables of inferior growth..."

William Bartram 1775

In the relatively short duration of human occupation on the North American continent, there have been many changes in the climate, content and distribution of animal species, and fluvial systems. The anthropogenic impact or role in some of these environmental changes has been receiving greater attention. The late Pleistocene hunting practices of early human groups following large herd animals probably had a great effect on the environment by disrupting the elephant based ecological system. As human populations increased they probably began to have a wider and more sustained effect on the nature and distribution of plants and animals. For example, the use of fire allowed the maintenance of open prairie areas bringing about significant changes in the environment by enlarging or sustaining prairie plant and animal regimes.

The Archaic period is traditionally characterized as the time when human groups adapted to essentially modern environmental conditions. The study of prehistoric

environments involves not only understanding the interaction of physical (geology, topography, drainage) and biological (faunal, floral) components but also the temporal aspect or dimension of the study of natural changes and cultural modifications to the landscape. Just as the depth of excavation levels within a site may greatly effect the interpretation of the data, matters of scale are important considerations in paleoenvironmental studies. Evidence of paleoenvironmental changes tend to be recorded on a large, course-grained scale whereas archaeology seeks greater temporal resolution to human cultural response to a smaller, fine-grained scale of environmental change.

A wide variety of techniques and methods are used in the interdisciplinary study of paleoenvironments: geography, geology, geomorphology, soil science, botany, zoology, meteorology, and other natural sciences. Stratigraphy and chronology provide important temporal and spatial controls. However, paleoenvironmental interpretation is based on evidence provided by such indices as: vegetation (through pollen profiles and macrofossils), soils, geomorphological processes, and hydrological studies. Pollen studies of pond and lake sediments from sites in Florida, Georgia, and South Carolina have been used to provide a broad general framework for the reconstruction of zonal biotic and climatic gradients and the understanding paleoenvironmental change during the Holocene (Carbone 1983:3; Watts, Grimm, and Hussey 1996). The use of palynology to address specific archaeological questions does have limitations because pollen studies generally produce a broad regional picture of the development of forest cover. (Carbone et. al 1983; Sheehan et. al 1982; Watts, Grimm, and Hussey 1996). The

finer grained studies of alluvial sequences in specific localities needed to produce data on short term events and changes are still few in number in the archaeological literature. If future palynology investigations continue to focus on increasing radiocarbon dates, data on less common species, and the study of plant macrofossils, it will be possible to begin to identify distinctive local characteristics in the paleoenvironmental record (Watts, Grimm, and Hussey 1996).

"This is all that matters in archaeology: objects and contexts, all else is secondary" (Thomas 1982:12). During the last two decades in North American archaeology, the definition of the "context" of an artifact, an assemblage, a site, or a settlement pattern has been expanding. It has increasingly transcended a focus on specific artifacts and a view of sites in isolation, now incorporating into the analysis an understanding and appreciation of the environmental matrix. In 1982, Butzer argued for "contextual archaeology rather than anthropological archaeology" (1982:12). This contextual approach is dependent upon the integration of information from other disciplines such as geology, botany, geomorphology, and zoology.

The majority of archaeology studies today focus on three major concerns: chronology, lifeway reconstruction, and the determination of cultural processes. Chronology is concerned with questions of when and where, lifeway reconstruction is concerned with questions of what and who, and the determination of cultural processes attempts to approach the questions of how and why. How these questions and objectives are pursued vary. The techniques used for the reconstruction of lifeways must go beyond the detailing of normative, shared aspects to include (at least an

approximation) the systemic/ environmental matrix in which people actually live. One of the questions that is most often a part of this reconstruction is an attempt to answer a basic question: how people get their groceries (Thomas 1982). However, I feel that it is more than a question of what resources were used; the question must include what resources were available and how they were distributed. Only then do subsistence remains provide any understanding of how life was carried out in a particular environment. Carbone (1983:1) notes that detailed reconstruction of the environmental history of an area serves as a "backdrop" for the study of changing human-land relationships. The paleoenvironment was more than a "backdrop"; it was an integral part of the systemic matrix, affecting and being affected by human populations.

Paleoenvironmental studies of the last 25 years have produced a wide variety of information on climate, faunal, and floral changes in the last 25,000 years. This review provides an overview of the paleoenvironmental evidence in general, and the vegetation data specifically, for the southeastern United States. An emphasis is placed on the southwestern part of the Piedmont in South Carolina and Georgia to provide an environmental framework for this work and to illustrate how paleoenvironmental evidence has been used to generate a model of vegetation succession from the Full Glacial to the present. This section will deal only with the vegetation evidence, but data on climate models and the effects of climatic change can be found in Bryson and Wendland (1967), and Wright (1983). Although more scarce and scattered than climatic or vegetation studies, there is limited evidence to construct the faunal record in the Southeast (Voorhies 1974; Styles and Klippel 1996).

The vegetation information will be arranged by time periods using the general framework, based on climatic periods, constructed by Whitehead (1967) from his work in southeast Virginia and North Carolina: Full Glacial 25,000-15,000 B.P., Late Glacial 15,000-10,000 B.P., and Post Glacial 10,000-present. The majority of the information comes from pollen profiles and macrofossils.

Full Glacial 25,000 - 15,000 B.P.

For the southeastern United States, Delcourt and Delcourt (1981) propose a warm temperate forest characterized by hickory, oak, and southern pine. While hardwood forests predominated along the large river valleys, the northern edge of this area is characterized as a mixture of hardwood (northern) and boreal conifer forest, providing a proposed transition to the Middle Atlantic region's forest of boreal jackpine spruce. This general characterization would indicate similar forest composition in North Carolina, South Carolina, and the highlands of Georgia. Work by Whitehead (1967), and Watts (1970, 1975) provides additional information for specific environments. Watts's (1970) reconstruction for Georgia emphasizes pine species with spruce and small numbers of fir in conjunction with open herb communities. Oak and hophornbeam are also indicated. Watts has also reported a pollen column from Pigeon Marsh.

Pigeon Marsh is located on a plateau on Lookout Mountain in Georgia and contains evidence of pine, spruce, deciduous trees and herbs. According to Watts (1975:287), this suggests that the pollen came from the valley below and that the plateau was not forested during the Full Glacial. Watts (1980) has also described a pollen

sequence from the Full Glacial through the Late Holocene from White Pond, located in South Carolina at the edge of the inner Coastal Plain, where it meets the Piedmont. Radiocarbon dates ranging from 19,100 to 12,810 B.P. were obtained in a zone labeled Pinus/Picea/Herb (Watts 1980). This zone contained not only pollen but macrofossil evidence for Pinus banksiana (jack pine), pollen evidence for Picea rubens (red spruce), and a small amount of P. glauca (white spruce).

Cain (1944) and Whitehead and Barghoorn (1962) reported pollen profiles from Spartanburg County in the South Carolina Piedmont. Although no absolute dates are available for these sequences, Cain and Whitehead believe that the deposits date to an interstadial of the Pleistocene of more than 35,000 B.P.

Pollen, macrofossil, and geological information have been recovered for two sections of the Southeast (Tennessee-Alabama and Georgia-South Carolina) as the result of the mitigation efforts connected with the Tombigbee project and the Richard B. Russell Lake Project (Sheehan, Whitehead, and Jackson 1982). According to Carbone et. al (1983), the data from the Piedmont and south central Georgia indicate local stands of boreal conifers and areas of more mesic hardwood forests, supporting the interpretation of a patchy environmental mosaic. Based on this work, the Full Glacial vegetation of the Georgia South Carolina Piedmont is characterized by Sheehan, Whitehead, and Jackson (1982) as:

"Spruce and fir were not common in the vegetation but were present on the Piedmont, probably in special microhabitats. Oak was uncommon as were most deciduous trees. Herbs were much more important in the vegetation than in modern times ... their abundance and diversity, and the presence of several taxa with boreal affinities, give the impression of a park like vegetation, interrupted frequently by patches of trees and shrubs."

Late Glacial 15,000 - 10,000 B.P.

The period designated as the Late Glacial is usually characterized by an amelioration of Full Glacial climate conditions, resulting in a northward expansion of mixed conifer/hardwood forests. It is seen as a time of transition from Glacial to Holocene or modern conditions.

The Pigeon Marsh sequence for the Late Glacial is described by Watts (1975:290) as a Fagus-Ostrya (beech-hophornbeam/ironwood) zone. There is no absolute dating for this zone and there is no analog in modern plant communities.

For the southwestern Piedmont, Sheehan, Whitehead, and Jackson (1982) describe this transition,

..a decrease in pine dominance, accompanied by a decline in the fir and spruce populations. Oak and hickory replaced these species to some extent, reflecting increased warmth. The continuation of high percentages of herbs and shrubs suggest that the increased warmth was not accompanied by increased precipitation. Shrubs become somewhat less important, but herbs remained a prominent feature of the generally open vegetation."

Whitehead (1967:430) details this change in North Carolina as proceeding from forests of boreal pine-spruce to areas of "oak, hickory, birch, hemlock, beech, elm and other thermophilous species". In addition to the trend of increasing warmth without increase in precipitation, Delcourt and Delcourt (1981) maintain that it is important to also take into account another development taking place during this time. They point to the importance of the sea level rising and its concomitant reduction in open xeric habitats (in Florida).

A pattern similar to the transition described above can also be seen from other areas of the southeast. The sequence at Singletory Lake in North Carolina has a beech dominated profile by about 11,000 B.P. Watts and Stuvier (1980) report a pollen profile of oak, hickory, hackberry from northern Florida at about 14,000 B.P. They report that about 40 percent of the pollen are various herbs and the interpretation offered is a biotic community of dry oak hickory stands, local prairies, and a warm, dry climate (Watts and Stuvier 1980). After 14,000 B.P. this changes and the pollen profile shows a marked increase of mesic trees with beech predominate. This is interpreted as the result of an increase in precipitation (Carbone 1983:8).

At White Pond in South Carolina, Watts reports expansion in the pollen profile of beech and hickory, oak, and ironwood in a zone dated between 12,810 and 9,550 B.P. (1980:197). The argument is again made that this expansion is related to wetter, cooler climatic conditions. It is also suggested that this mesophytic forest (for which there is no modern counterpart) was gone in the Southeast by the Holocene. Watts proposes a climatic change during the end of the Late Glacial resulting in drier conditions (1975).

Post Glacial 10,000 - present

10,000 B.P. is the date usually accepted for the beginning of the Holocene and is defined by the establishment of essentially modern climatic and biotic regimes. Most of the relevant information comes from pollen profiles taken mainly from lacustrine sediments across the Southeast. Ethnobotanical information from archaeological sites is available from many areas, especially from the mid to later part of the Holocene. While the use of these botanical remains from archaeological sites is extremely valuable, their

use in paleoenvironmental studies must be approached with caution because of the impact of human selection (Yarnell 1982).

As with the Full Glacial and Late Glacial periods, pollen profiles from Pigeon Marsh and White Pond provide good information. This zone representing the Holocene is called the Nyssa- Castanea zone at Pigeon Marsh (Watts 1975: 290). *Quercus* accounts for half the pollen represented in the lower section of the profile. Even though Pine is 12 percent in the lower section, it increases to 20 percent in the upper part of the section (Watts 1975: 290). This zone represents a group of related species that continue to modern times. The upper section from Pigeon Marsh also contains *Zea* pollen and pollen from other herbaceous plants common to disturbed ground, giving evidence possibly of prehistoric land use.

This pattern is again repeated at White Pond with some slight difference, even though it is a different topographic region from Pigeon Marsh. The White Pond profile shows the loss (after 10,000 B.P.) of Carya, Fagus, and Ostrya-Carpinus, the increase of *Pinus*, the constancy of oak, and the addition of sweetgum and blackgum (Watts 1980:194). As noted also at Pigeon Marsh, Watts recognizes within this zone an earlier oak zone and a later pine zone. Watts considers the vegetation after 7,000 B.P. to be essentially similar to the modern plant community.

The information from the Carolina-Georgia Piedmont indicates that by 10,000 B.P., oak-hickory-southern pine forest are more dense in the uplands, with hemlocks and chestnuts present along the floodplains of northern Georgia (Sheehan et. al 1982).

After 5,000 B.P., the pollen data indicate a replacement of the oak-hickory-pine forests with forested areas dominated by pine in the Coastal Plain. During this time in the Coastal Plain of the Southeast, sea level was continuing to rise and there was a development of swamps, bays, and hammocks with cypress and other water-tolerant broad-leaved trees (Goodyear et. al 1979). The pollen, macrofossils, and geologic data reported by Sheehan et. al (1982) and Carbone et. al (1983), indicate the maintenance of an oak-hickory-pine climax from the early Holocene through early historic times.

Trimble (1974) has documented the effect of the early historic cultivation methods on the forests and soils of the Piedmont, producing an area today vastly different from the prehistoric landscape. This is not at all to say that prehistoric and historic Indian groups did not bring about changes in the landscape. Work by Chapman et. al (1983) represents a good example of the use of archaeological, ethnobotanical, and geological evidence to investigate the impact of Indian groups on the native ecosystems in the Little Tennessee River Valley.

Through the work of many individuals including Watts, Grimm, and Hussey (1996), Whitehead (1967; 1981), Delcourt and Delcourt (1981; 1987), Sheehan, Whitehead, and Jackson (1982), Carbone (1983), Foss, Wagner, and Miller (1985), and Segovia (1985), the broad picture of the successive changes in the vegetation from the Full Glacial to modern plant communities have been documented for the Southeast. This impressive data base provides the framework for future work and considerations for the use of this information. In using environmental reconstructions it must be remembered that there are no modern counterparts or analogs for the early floral and faunal

communities. Another important point is made by Delcourt and Delcourt (1981:24) when they place importance on the transitional features (in the construction of vegetation maps), "...more than 60 percent of the last 40,000 years conditions have been transitional between extreme glacial and non-glacial."

This section has reviewed the current evidence for vegetation succession in the Southeast and provides a framework for future work on the understanding of cultural adaptations over time. Future studies will require resolution at a finer scale and draw from specialized studies in pedology, geomorphology, and hydrology in specific localities. The overall trends have been established, and future work will be aimed at fine tuning the picture.

ARCHAEOLOGICAL BACKGROUND

Culture Historical Framework

The prehistory of the immediate region of the South Carolina-Georgia Piedmont is reviewed in this section. Placing these findings within the broader, previously recognized culture-historical regularities of the Southeast provides a framework for the research results presented. A review of the culture-historical terminology is also desirable for comparisons to work conducted in other regions.

Joffre Coe's (1964) excavations at the Hardaway and Doerschuk sites in the Piedmont of North Carolina (Figure 1.1) demonstrated the relative temporal placement and diagnostic utility of several hafted biface forms. This work still provides the chronological foundation for the Piedmont and much of the Atlantic Slope. Work

conducted over the last fifteen years has increased the potential for chronology building in the Georgia Carolina Piedmont by confirming Coe's sequence in other areas of the Southeast. In addition, excavations at stratified sites have provided chronological refinements and radiometric dates (Michie 1969, 1971; Anderson et al. 1979, 1982; Goodyear 1982; Claggett and Cable 1982; Tippitt and Marquardt 1982, 1984).

While efforts directed at chronological refinement and component characterization has tended to dominate Southeastern archaeological research, some investigations have reached beyond these goals to include regional analyses of site location, indicators of mobility patterns, and markers of paleoenvironmental change (Goodyear et al. 1979; Anderson and Joseph 1988; Anderson and Hanson 1988; Davis and Daniel 1990; Anderson and Schuldenrein 1983; Schuldenrein 1996; Anderson, Sassaman, and Judge 1992; and Sassaman and Anderson 1994 and 1996).

This review is not intended as an in-depth culture-historical synthesis of the archaeological record for the Southeast, however, it does provide a summary of information on: (1) chronological data, radiocarbon dates, stratigraphic sequences, and diagnostic artifact forms; (2) assemblage contents; and (3) settlement/subsistence patterns.

Paleoindian Period (ca. 11,500 - 10,000 B.P.)

The earliest evidence of human occupation in the Southeast is fluted lanceolate points and other tools of the Paleo-Indian period. It should be noted, however, that several artifact assemblages, composed of core and flake tools without fluted projectile

points, have been identified in North America, characterized by Krieger (1964) as the pre-projectile point stage. Many problems, such as few radiocarbon dates, ambiguous geological and stratigraphic conditions, and small artifact samples have led to many questions being raised concerning the existence of a pre-projectile period.

In eastern North America, the work conducted in southwestern Pennsylvania at Meadowcroft Rockshelter represents the earliest documented pre-fluted point occupation. Investigations at Meadowcroft Rockshelter have revealed a stratigraphic record radiocarbon dated between 14,000 B.C. and 17,000 B.C. (Adavasio et al. 1977). The artifact assemblage is characterized by flake tools, such as knives, unifaces, graters, micrograters, blades, and bifaces (Adavasio et al. 1977:152-153). Even though many problems surround the context and interpretation of the pre-projectile period sites, these occupations must be considered in a discussion of evidence for early occupations in the Southeast.

The identification and understanding of the Paleo-Indian period in the East, as recently as fifteen years ago, was primarily based on radiocarbon dates from the Southwest and on technological and stylistic similarities between the two areas. However, distributional studies and excavation of Paleo-Indian occupations in the Southeast have contributed to our understanding of the period in general and clarified some temporal and stylistic variation (MacDonald 1968, 1971; Fitting, et al. 1966; Gardner 1974; and Newman and Salwen 1977).

The Paleo-Indian period in the east spans 11,500 B.P. to 10,000 B.P. with the end of the period coinciding with the end of the Pleistocene and the establishment of an

essentially modern biota and climate (Goodyear et al. 1979). The Paleo-Indian period is usually defined by the presence of the fluted lanceolate biface. However, unfluted lanceolate bifaces, such as the Suwannee and Simpson, are recognized in the Southeast as Paleo-Indian.

The nature of subsistence practices during the Paleo-Indian period continues to be debated (Williams and Stoltman 1965; Gardner 1974; Griffin 1977). While directly associated with the exploitation of extinct megafauna in the West, a different and more varied pattern of Paleo-Indian subsistence is likely in the East (Griffin 1977; MacDonald 1971). These studies provide a picture of the exploitation of a variety of animal species, possibly including nuts, chenopod, and hawthorn (Adavasio 1977; McNett et al. 1977; MacDonald 1971; Funk 1977). Paleoenvironmental reconstructions (Watts 1980; Voorhies 1974; Fitting et al. 1966; Carbone 1983) have demonstrated ecological and climatic diversity that makes it possible to infer a broad based Paleo-Indian subsistence.

Several survey and testing programs were conducted in the Richard B. Russell project during the 1970s. However, no Paleo-Indian occupations were identified, and no fluted lanceolate points were recovered. However, during the mitigation operations in the project area, fluted points were recovered from excavation context at 38AN8, from excavation context at 38AN8 (Wood et al. 1981), 9EB91 (Anderson and Schuldenrein 1983) and 9EB387. In addition, several fluted points from the project area have also been recorded in private collections in Georgia, North Carolina, and South Carolina.

Distributional studies indicate that fluted lanceolate points are rare in the Georgia-South Carolina Piedmont (Michie 1977; Wauchope 1966). The fluted points recorded

by Michie in the Piedmont were mainly from the river valleys of the lower Piedmont (Michie 1977:94). This can be contrasted with the distribution of fluted points in North Carolina. Perkinson (1973) reports the greatest number of fluted points in the piedmont, with fewer points in the Coastal Plain and in the Blue Ridge province. As part of a statewide survey of South Carolina private artifact collections, Charles has recorded 176 fluted points in addition to the 100 recorded by Michie (Charles 1982, 1983). Goodyear et al. (1979) and Gardner (1974) have noted the correlation of fluted point densities and the availability of cryptocrystalline raw materials. Therefore, the differences in distribution may be found in the distribution of cryptocrystalline raw materials, according to Goodyear et al. (1979). However, Charles (1983) records a number of fluted points made of other types of raw materials. The Paleoindian period research for South Carolina has also recently been summarized (Anderson, Sassaman, and Judge 1992).

Archaic Period (10,000 - 3,000 B.P.)

The Archaic, first defined by Ritchie (1932) at the Lamoka Lake site in New York, has come to be used as both a temporal designator and as a description of adaptive pattern. According to various summaries of the prehistory of the eastern United States, the Archaic stage occupies the longest segment of time and usually contains three subdivisions (Griffin 1967; Willey and Phillips 1958; Caldwell 1958). This period shares and is separated from the Paleo-Indian on the basis of changes in the lithic technology and the settlement-subsistence systems, and is generally considered to be a period of adaptation to Holocene environments. These changes coincide with the

establishment of Holocene climatic and biotic conditions, with the evidence suggesting a trend toward regionalization (Caldwell 1958; Broyles 1971). This trend is seen in the increased diversity of tool kits. The excavation of stratified sites, such as Doerschuk, Hardaway, and Gaston in North Carolina (Coe 1964) and Modoc Shelter (Fowler, 1959), and Graham Cave (Logan 1952) in the Midwest, and stratified sites along the Lower Tennessee River (Chapman 1975, 1977), and the increased use of C-14 dating provide the foundation for present chronological divisions and trends in adaptation. The following temporal divisions are now recognized: Early Archaic 8,000 - 6,000 B.C.; Middle Archaic 6,000 - 4,000 B.C. ; and Late Archaic 3,000 - 1,000 B.C.

In this culture historical review, three divisions within the Archaic will be used based on diagnostic artifacts dated through radiocarbon and stratigraphic studies, changes in technology, subsistence, and societal organization.

Early Archaic (10,000 - 8,000 B.P).

Many definitions and taxonomic formulations have been proposed for the Archaic. Traditionally, the Early Archaic has been seen as the shift from the fluted lanceolate of the Paleo-Indian period to a succession of notched points. The beginning of the Early Archaic has been widely accepted as coinciding with the beginning of the Holocene and involving a technological and subsistence shift away from the Paleo-Indian period and the late Pleistocene. It has been assumed that this period initiates a long trend of seasonal mobility based on a mixed strategy of hunting and gathering seasonally available resources and exhibiting variability due to regional adaptations. The Paleo-Indian

subsistence and paleoenvironmental information from the Southeast indicates that there may not be a clear division or distinction between Paleo-Indian and Early Archaic (Goodyear et al. 1979; Claggett and Cable 1982).

While there are similarities between the Paleo-Indian and the Early Archaic tool kit, changes in biface morphology and method of hafting have been used to characterize the Early Archaic. Information on the Early Archaic occupation of the Piedmont has been summarized by Goodyear et al. (1979) and Claggett and Cable (1982). According to Goodyear et al. (1979), the Early Archaic occupation of the Piedmont reflects the larger regional pattern and the general expression of the Early Archaic in the eastern United States. Three subdivisions of the Early Archaic are recognized: Dalton, Palmer-Kirk, and Bifurcate. Found throughout the Southeast and the Midwest, the Dalton biface demonstrates a technological continuity with the Paleo-Indian period. The Dalton biface form is basically a resharpened lanceolate that has been basally thinned and exhibits basal and lateral grinding (Goodyear et al. 1979). Goodyear (1982) has argued for placement of the Dalton in a transitional phase, dated from 8,500 to 7,900 B.C. Placement in this transitional phase is based on both technological attributes and an analysis of radiocarbon dates.

The taxonomic and chronological placement of the various Early Archaic notched points that succeed the Dalton phase in eastern North America is a .. “ problem still undergoing analysis and revision” (Goodyear et al. 1979:100). These taxonomic and chronological problems coincide not only with an increase in the number of forms but with morphological changes resulting from increased curation of hafted bifaces

(Chapman 1977:2). Radiocarbon dates and stratigraphic information point toward corner-notched forms succeeding side-notched forms, such as Hardaway side-notched (Coe 1964; Goodyear et al. 1979).

Coe's (1964) work at the Hardaway site revealed a corner-notched point, Palmer, preceding a large corner-notched point referred to as Kirk. The biface forms of the Palmer and Kirk both have a triangular blade form, corner-notching, and serration. The Bifurcate forms, St. Albans and LeCroy, demonstrate the morphological trend of a stemmed hafted biface. At Rose Island, Tennessee, radiocarbon dates between 7,000 B. C. and 7,500 B.C. document side notching being replaced by the Kirk corner-notched cluster (Chapman 1976:2).

During the 1977 survey of the Russell Reservoir, 43 Early Archaic components were identified (Taylor and Smith 1978) based on the presence of the following diagnostic artifacts: Dalton, Hardaway, Palmer, Kirk, LeCroy, and Kanawha. This was 7.1% of the total number of components identified (Taylor and Smith 1978:317). A wide variety of diagnostic hafted bifaces was recovered during the survey--Dalton, Hardaway, Kirk corner notched, Kirk stemmed, Palmer, LeCroy, and Kanawha (Taylor and Smith 1978:317). Taylor and Smith (1978:318) also noted that this range of variability in Early Archaic forms is greater than those represented in Wallace Reservoir or in the I-77 survey conducted by House and Ballenger (1976). In the survey conducted by Goodyear, House, and Ackerly (1979) in Laurens and Anderson counties, only Dalton and Palmer bifaces were recovered. The significance of the variability in distribution for understanding the initial Archaic adaptation in the Piedmont will require

more complete assemblage definition. House and Ballenger (1976) proposed a model to account for assemblage variability. They suggested that base camps will be located in the riverine zone and extraction camps will be located in the interriverine zone. The assemblage variability would be greater in the riverine base camps due to the greater number of activities performed (House and Ballenger 1976:79). The test of this model must come from the characterization of Early and Middle Archaic assemblages from riverine sites with good stratigraphic clarity. Once the structure of these assemblages is known, comparison with upland sites will be possible.

The testing and mitigation phases of the Russell project, documented several Early Archaic components. The excavations at 9EB91, Rucker's Bottom, have provided good stratigraphic and spatial information on the Early Archaic occupation of the upper Savannah River (Anderson and Schuldenrein 1983). The recovery of 28 Palmer points and associated debitage, one Hardaway-like form, and one Clovis from a sealed context provide good information not only on assemblage variation but greatly increase our sample of area sites of this time period (Anderson and Schuldenrein 1983).

Recently, a number of publications on Early Archaic settlement patterns, distributions of raw material types, prehistoric quarries, and paleoenvironmental conditions during the early Holocene (Anderson and Hanson 1988; Anderson 1994, Anderson, Sassaman, and Judge 1992; Daniel 1994, Daniel and Butler 1996; Goodyear and Charles 1984) have broadened the content and theoretical perspective of Early Archaic research.

Middle Archaic (8,000 B.C. - 5,000 B.P.)

The identification of the Middle Archaic is based primarily on the appearance of stemmed projectile point forms, ground stone tools, and the establishment of modern biotic communities. Although a continuum of a technological trend can be seen in the tool forms from the late Early Archaic to the Middle Archaic, there are important changes in the non-projectile point tool classes that reflect changes in resource exploitation and economic organization. Characterizations of the Middle Archaic economic organization (Caldwell 1958; Cleland 1976) have placed emphasis on regional patterns of resource utilization: "broad spectrum" or "diffuse" economies. This period is also characterized by an increase in the number of sites, midden accumulation, occupation of a wide variety of environments, and stabilization of residential patterns. Goodyear (1979), Chapman (1975), and Gardner (1974) have documented a decrease in the use of high quality cryptocrystalline materials.

The Middle Archaic occupation in the Piedmont is represented by the Stanly, Morrow Mountain, and Guilford phases. As with any attempt to break a continuum into segments, the distinction between the end of the Early Archaic and the beginning of the Middle Archaic remains somewhat arbitrary. This distinction is usually based on the appearance of stemmed rather than notched bifaces. The Stanly point has the basal notching of bifurcate bifaces, but the technology of removing the shoulder area to create the stem is created more in the manner of the later stemmed points (Goodyear et al. 1979). It should be pointed out that Coe (1964) notes many morphological similarities between the Kirk stemmed and the Stanly level at the Doerschuk site, and Chapman

(1979: 32-33) has documented Kirk Stemmed points stratigraphically overlying Bifurcate points; in turn, the Bifurcate points overlie Kirk Corner-Notched points. The same situation obtains in the Maryland Archaic (Wesler 1983: 22; Vitelli 1975). There are no radiocarbon dates for Stanly at either Hardaway or Doerschuk. Chapman has reported two dates for Stanly components: Icehouse Bottom, 5840 ± 215 B.C. , and the Patrick site 5860 ± 175 B.C. Both Stanly and Kirk stemmed are rare in the South Carolina-Georgia Piedmont (Kelly 1972; Goodyear et al. 1979; DePratter 1975).

Morrow Mountain contracting stem bifaces were first described by Coe (1964) and were based on material from Zone IX of the Doerschuk site in the North Carolina Piedmont. Coe (1964) described two varieties of the contracting stemmed points: Morrow Mountain I and II. While Morrow Mountain types I and II were stratigraphically separated at Doerschuk, there was no stratigraphic difference at Gaston or Hardaway (Coe 1964). Chapman (1976) has also reported a Morrow Mountain component at Icehouse Bottom and a date of 5045 ± 245 B.C.

Work at the Rae's Creek site in Georgia near August has produced the best information on Morrow Mountain chronology to date. This site is deeply stratified multicomponent site is located on a relict point bar of the Savannah River. The Middle Archaic dates are from the Morrow Mountain stratum and range from 7400 - 6000 B.P. Work conducted by Ruth Wetmore and Albert Goodyear at the Nipper Creek site has also yielded the densest Morrow Mountain component known for North or South Carolina (Wetmore and Goodyear 1986). This site is located on the Fall Line near

Columbia, South Carolina. There are also several Early and Middle Archaic sites in the immediate vicinity of Nipper Creek.

Other radiocarbon dates on Morrow Mountain components are very scarce. Excavations at a site near Macon, has produced one Morrow Mountain date of 6390 B.P. from a deeply buried stratum (Espenshade 199)

The Guilford phase was defined by Coe (1964) from Zone VI at Doerschuk, and South's (1959) work at Gaston. The Guilford biface has a lanceolate blade form, with small stems or shoulders and a diamond-shaped cross-section. Guilford bifaces are common surface finds in the South Carolina Piedmont (Goodyear 1979) but Chapman (1977) notes that they are absent from eastern Tennessee.

Middle Archaic sites represented 16.6% of the components recorded during the 1977 survey by Taylor and Smith (1978:320). This same pattern can be seen in the results of several other surveys conducted in the region (House and Ballenger 1976; Goodyear et al. 1979). The range of traditional biface forms from the Russell survey includes Stanly, Morrow Mountain, Guilford, and Halifax. Taylor and Smith (1978:320) point out that this is consistent with the range of biface types recovered during other surveys in this region and in contrast with the Early Archaic pattern. Most of these hafted bifaces are made of quartz, while the Early Archaic bifaces exhibit a wider range of raw materials (local and non-local).

The information from these surveys and excavations is beginning to be used to address regional questions concerning settlement patterns and raw material use. Sassaman (1983, 1991) has analyzed lithic assemblage information and environmental data from sites in the South Carolina Piedmont to approach changes in assemblage

content and organization, and settlement patterns in the Middle and Late Archaic. Through his analysis at a regional scale, it is possible to begin to model site location differences between the Middle and Late Archaic (Sassaman 1983:179; Blanton and Sassaman 1989). Drawing on data from the same general area, Blanton (1983) has investigated patterns of lithic raw material use in the Morrow Mountain phase in South Carolina. Focusing on patterns of lithic raw material procurement and technological demands, Blanton (1983:112) demonstrated a pattern of procurement and use characterized by: (1) localization in focus, (2) low degree of specificity, and (3) low degree of dispersal.

The only radiocarbon date recorded for Guilford bifaces comes from the Copperhead Hollow site (38CT58). This site is located on an upland margin overlooking the Lynches River and was excavated by Joel Gunn in 1992. The site contained components representing Paleoindian/Early Archaic, Morrow Mountain, Guilford, and Savannah River. A radiocarbon date of 5350 ± 60 B.P. was obtained on calcined bone found in association with a rock cluster (Gunn and Wilson 1993).

Late Archaic (5,000 - 3,000 B.P.)

The recognition of the Late Archaic is much less of a problem due to the technological and chronological integrity of the Late Archaic artifact assemblages, subsistence strategies, and settlement patterns all along the Atlantic Slope than those encountered in the previously discussed periods. Stoltman (1972) refers to the distinctive Late Archaic manifestation in the Savannah River region as the Stalling's

Island Culture. The Late Archaic along the Savannah River shares technological and subsistence attributes with both the Shellmound Archaic (Lewis and Kneberg 1959) and the Broadpoint horizon defined by Turnbaugh (1975). The major technological attribute shared is the appearance of the Savannah River point, a large, square stemmed biface (Coe 1964). Other artifacts that are diagnostic of the Late Archaic are stemmed scrapers, winged atlatl weights, chipped adzes, celts, steatite artifacts ("netsinkers"), and steatite vessels. Late Archaic sites also reveal an increase in firecracked rock and grinding stones.

This period is also characterized by the intensive exploitation of riverine and coastal resources (Williams 1968). This occupation is well documented along the Savannah River by sites such as the Bilbo site (Waring 1968), Rabbit Mount (Stoltman 1974), Stalling's Island (Clafin 1931; Bullen and Greene 1970), and Lake Spring site (Miller 1949). Within these sites, hearths, pits, and firecracked rock are common but evidence for structures is rare, consisting of a few scattered postholes.

Fiber-tempered ceramics are found in Late Archaic sites along the Savannah River. The Savannah River point appears in both ceramic and preceramic contexts. However, the stemmed points from Stalling's Island that are in association with fiber tempered pottery are slightly smaller bifaces with contracting stems (Bullen and Greene 1970). The radiocarbon date associated with Bullen and Greene's (1970) Type 3 is 3730 ± 150 B.C. Savannah River bifaces occur in a non-ceramic context at the Gaston site in North Carolina and at the Warren Wilson site. Steatite vessel sherds, however, occur in both of these occupations (South 1959; Coe 1964; Keel 1976). Keel (1976:194) identifies a

small biface, called Otarre stemmed, in association with the Savannah River broad blade point. Goodyear et al. (1979: 114) have called attention to the similarity between the Otarre stemmed and the "Type 3" of Bullen and Greene (1970).

The temporal relationship between fiber-tempered pottery and steatite or soapstone vessels the focus of research being conducted by Ken Sassaman (1995). Sassaman is conducting radiocarbon dating on sooting residues found on sherds and his findings thus far indicate that fiber-tempered pottery and stone vessels maybe coeval in many areas.

As characterized by Caldwell (1958), the Late Archaic is a time of regionalization and increasing cultural complexity. It has been suggested that the Late Archaic is a trend toward specialization within certain habitats, a time of increasing sedentism and population growth (Goodyear et al. 1979; Taylor and Smith 1978; Sassaman 1983; Sassaman and Anderson 1994a, 1994b). Late Archaic sites do contain a more diverse tool assemblage, more non-portable artifacts, such as grinding stones, larger middens, and more diverse utilization of plants than earlier.

Woodland Period (3,000 - 1,000 B.P.)

Traditionally, the Woodland has been defined by the appearance of three attributes: (1) pottery, (2) horticulture, and (3) burial mounds (Griffin 1964, 1967; Willey 1966). Until recently, information on the appearance and distribution of these attributes in the South Carolina-Georgia Piedmont was rare. Data from several large areal surveys, the

Wallace Reservoir project, and the Richard B. Russell Reservoir Project, will contribute to the understanding of the Woodland in the Piedmont.

The Woodland and the later Mississippian periods appear with a complexity of ceramic types. The sequence of ceramic types from the adjoining provinces of the South Carolina Piedmont has been dealt with by various authors, who have synthesized much of this information. For discussions of this subject matter, the reader is directed to Chapman (1973) Coe (1964), Dickens (1975,1976), Faulkner (1975), Ferguson (1971), Keel (1975, 1976), McCollough and Faulkner (1973), and South (1973).

Early Woodland (3,000 - 2,300 B.P.)

Fabric impressed pottery is found throughout much of the South Appalachian region and appears as part of a much wider distribution of fabric impressed ceramics. Caldwell (1958) referred to this as the "Middle Eastern Tradition." As part of the Kellogg focus, Dunlap Fabric Impressed ceramics were recovered with charred acorn, hickory nut, and walnut (Caldwell 1950). Wauchope (1966) reported 54 sites with Dunlap Fabric Impressed ceramics widely distributed across northern Georgia. In South Carolina, fabric impressed ceramics were recovered from 38OC47, the Chauga site. According to Kelly and Neitzel (1961), the fabric impressed ceramics were associated with the lower levels of the village area. During the survey of the Trotter's Shoals (later renamed Richard B. Russell) Reservoir, Hutto (1970) recorded two sites in Georgia containing fabric impressed ceramics. Five sites containing fabric impressed ceramics were recorded by Goodyear et al. (1979) as part of the Laurens-Anderson survey.

The recognition of Early Woodland components has been challenging in Georgia, North Carolina, and South Carolina (Anderson and Joseph 1988). The bifaces most commonly used to identify this time period are Plott Short Stemmed, or Gypsy Stemmed (Keel 1976; Oliver 1981) Large triangular projectile points resembling Badin Triangulars, and Yadkin Triangulars are also characteristics of this time period (Coe 1964; Keel 1976; Anderson and Joseph 1988).

Middle Woodland (2,300 - 1,500 B.P.)

During the Middle Woodland, the South Appalachian ceramic tradition becomes firmly established and fabric impressed ceramics are replaced by simple stamped and check stamped wares (Taylor and Smith 1978). Cartersville check and simple stamped vessels with tetrapodal supports are common (Wauchope 1966). In the Appalachian Summit, Keel (1976) has designated this the Pigeon phase, with crushed quartz temper, conical jars, open bowls, and shouldered tetrapodal vessels.

Characterized by brushed, simple stamped, cordmarked, and check stamped surface treatments, the Connestee phase follows the Pigeon phase and dates between A.D. 100 and 600 (Keel 1976). The temper is a fine to medium sand and the thin-walled vessels are conoidal or hemispherical with constricted necks and flaring rims. There are examples of Connestee ceramics in association with ceremonial structures, such as the platform mound at the Garden Creek site in North Carolina (Dickens 1975). Connestee ceramics are associated with Hopewellian-style zoned rocker stamped pottery and

prismatic blades at the Icehouse Bottom site (Chapman 1973) and Garden Creek (Keel 1976).

Late Woodland (1,500-1,000 B.P.)

As reported by several researchers (Taylor and Smith 1978; Goodyear et al. 1979; Claggett and Cable 1982), this time period is very poorly known in the South Appalachian and Piedmont areas. Keel (1976:218) states that the complex succeeding Connestee and preceding Pisgah in the Appalachian Summit is as yet "empirically unknown."

Wauchope (1966:163) refers only to "transitional wares such as Late Swift Creek" during this time period. Although Caldwell left this area blank on the chronology charts for northern Georgia, in the text he comments that Late Swift Creek and Napier ceramic types may fall into this period (Caldwell 1958:47).

The Woodland sites identified and investigated as part of the Russell Reservoir investigation was summarized by Anderson and Joseph (1988). According to Anderson and Joseph (1988:245), the nature of the Woodland occupation of the upper Savannah River will remain ambiguous until an effective local chronology defining the temporal range of Swift Creek and Cartersville assemblages emerges.

Mississippian Period (1,000 - 500 B.P.)

The Mississippian period is traditionally defined by the intensive cultivation and storage of maize, small triangular arrow points, shell tempered ceramics, pyramidal

mounds, and a more complex social and political organization. There is evidence for larger populations, and habitation sites are usually located on floodplain soils suitable for hoe agriculture (Smith 1975).

According to Griffin (1967:189), Mississippian cultures show "a wide variety of adaptations made by societies which developed a dependence on agriculture for their basic, storable food supply." As one of these regional variants of this pattern, Griffin (1967) defined the South Appalachian Mississippian. Ferguson (1971) provides a comprehensive synthesis of the South Appalachian Mississippian.

Within the Coastal Plain and Piedmont of the Carolinas, Ferguson (1971) reports that the initial occurrence of complicated stamped ceramics and platform mounds appears to occur later and later as one proceeds east. This progression suggests an expanding frontier of a Mississippian society further to the west of the project area. The Etowah ceramics series is the first widely seen ceramic complex in the South Appalachian region and several earth lodges with Etowah ceramics underlie later Mississippian platform mounds (Ferguson 1971). Etowah components have been recorded at Chauga (Kelly and Neitzel 1961) and at the Rembert Mounds (Caldwell 1953). Within the Russell Project area, both Etowah and Savannah II ceramics are represented at Beaver Dam Creek Mound, 9EB85.

Archaeological investigations have concentrated on the large impressive mound sites. Therefore, our understanding of the relationships between different Mississippian groups, the degree of population dispersal, and the regional interrelationships of villages is very limited. The data available on the diversity of Mississippian sites and the density

of smaller sites are sparse and scattered. Oliver's (1992) work at the Leak site in North Carolina is an example of the investigation of smaller sites near large mound complexes. The Leak site is near the Town Creek Indian Mound site.

Early Mississippian (1,000 - 500 B.P.)

The early Mississippian in northern Georgia is characterized by the Woodstock phase (Taylor and Smith 1978). The surface treatment associated with the Woodstock ceramic assemblage is a complicated stamp, emphasizing a nested diamond pattern (Wauchope 1966:60-62). The vessel forms associated with this assemblage include a wide-mouthed conoidal jar and a tall "vase" (Wauchope 1966:60-62). Sites associated with this phase include small settlements and larger fortified villages. The Summerour site, in Georgia, contains a temple mound and maize kernels were also recovered (Hally 1975:39).

The ceramic assemblage of the succeeding phase, Etowah, is also characterized by complicated stamped design of nested diamonds and line block designs. This phase has been divided into four subphases (Sears 1958). The most common design elements in Etowah I assemblages is a nested bisected-diamond and a lined-block complicated stamp (Wauchope 1966:65). Etowah II and III contain traits considered characteristic of east Tennessee Mississippian sites, such as shell temper, incising, red filming, effigy bowls, and jars with handles (Taylor and Smith 1978). Most of the sites known for this phase are large, fortified towns with platform mounds and earth lodges (Hally 1975:41).

Curvilinear complicated stamped designs characterize the Savannah Wilbanks phase (Sears 1958: 175) , such as concentric circles, filfot crosses, and multiline figure-eights. In the project area, this phase is represented at 9EB85 and 9EB86 (Taylor and Smith 1978; Hutto 1970). Sites of this time in northern Georgia contain temple mounds, evidence of the Southern Ceremonial Complex and other evidence of ranked societies (Larson 1971). Based on work in northern Georgia, Hally (1975:42) considers the Savannah Wilbanks phase to be related to the development of Lamar.

Late Mississippian

The arrival of Europeans and the spread of the early settlement marks the last phase of aboriginal occupation of the South Appalachian area. The stylistic attributes of this Late Mississippian period include pinched rim strips and bold incising (Taylor and Smith 1978). In the Georgia Piedmont this period is represented by the Lamar ceramic assemblage. In addition to bold incising, Lamar ceramics include a complicated stamped type, a cross centered between four sets of nested rectangles, and check stamping (Wauchope 1966:80).

The majority of the excavated Lamar sites are large palisaded towns and platform mounds. Until recently, little systematic research has focused on the smaller Mississippian sites, hamlets, and farmsteads. Smith (1978) suggested that a dispersed settlement pattern would be the most energy-efficient form in terms of spatial distribution given a society based on horticulture. To test this model, more information on the smaller Mississippian sites is necessary. Shapiro (1983) has proposed a model of

a " Mississippian adaptive niche" based on the excavation of four small Lamar sites in the Oconee Province and a comparison of these data with those from the larger, better known Lamar sites. In northern Georgia, Wauchope reports that many Lamar sites are single component and had not previously been occupied. He attributes this as a flight into this area in response to European expansion (Wauchope 1966: 441). In the Wallace Reservoir, Rudolph and Blanton (1981) , in an analysis of Mississippian settlement patterns, report an increase in the number of Lamar sites over the preceding Etowah phase. A total of 824 Lamar sites were recorded in the Wallace Reservoir (Rudolph and Blanton 1981).

Taylor and Smith (1978) characterize the Mississippian activity in the project area as relatively limited and non-intensive. The exceptions are two mound sites, 9EB85 and 9EB86. Even though a number of Etowah and Lamar components were identified from surface information during the 1977 Russell survey, this is a relatively small number of Mississippian sites when compared to the 110 Lamar sites reported by Wauchope and the 824 from the Wallace Reservoir.

Anderson (1994) draws on the Mississippian occupation of the upper Savannah River to provide a broader view of Mississippian chiefdoms along the Savannah River. Also along the Savannah river, excavations at the Clyde Gulley site (EB387), south of the Beaver Dam mound group, produced house pattern information on small a hamlet associated with a larger mound center (Tippitt and Marquardt 1984).

Chapter 3

ARCHAEOLOGY OF THE UPPER SAVANNAH RIVER VALLEY

"...the wild country now almost depopulated, vast forest, expansive plains and detached groves; then chains of hills whose gravelly, dry, barren summits present detached piles of rocks, which delude and flatter the hopes and expectations of the solitary traveller, full sure of hospitable habitations; heaps of white gnawed bones of ancient buffaloe, elk, and deer, indiscriminately mixed with those of men, half grown over with moss..."

William Bartram 1775

A summary of previous prehistoric archaeological investigations in the upper Savannah River valley is included here to provide a general framework and perspective for the work conducted at the Gregg Shoals site as part of the Richard B. Russell Reservoir project. It is intended only as an overview. Anderson and Joseph (1988) and Elliott (1994) can be consulted for more detailed descriptions of the archaeological investigations within the Savannah River valley.

In 1775, naturalist William Bartram traveled from Charleston to the Savannah River near Augusta and then followed the river up into the Cherokee territories. At the confluence of the Savannah and Broad rivers, Bartram stopped at Ft. James and the nearby town of Dartmouth. In the company of the garrison's surgeon, he made a trip four or five miles up the Savannah to see the "remarkable Indian monuments"(Bartram

1792:324-325). Bartram's descriptions of the Rembert Mounds provide probably the earliest descriptions of archaeological remains in the upper Savannah River valley. These descriptions are particularly important because many of the sites Bartram described were all but destroyed by historic farming and are now under the waters of three major reservoirs. The Rembert Mounds were inundated by the formation of Clarks Hill Lake in the early 1950s. Bartram's narrative of his travels through the area that is now Lake Russell, unfortunately, is brief and lacks the detail he provides for other areas.

During the late 1800s, archaeological excavations along the Savannah River were conducted by the Mound Division of the Bureau of Ethnology. In 1886, John Rogan excavated two of the Rembert Mounds. There was no other excavation in the area until the 1950s, prior to the archaeological survey and excavation conducted in conjunction with the beginning of reservoir construction. Further down river, work was also undertaken in the 19th century at several other mounds, including Hollywood Mound, below the fall line on the Savannah. Clarence B. Moore explored the lower Savannah River in 1897/1898, excavating a number of mound sites, including the Irene Mound near Savannah.

Moore did not extend his explorations up the Savannah to Augusta. The investigation of large, rich shell midden sites at Stallings Island and the Lake Spring site would not take place until 1929 by William Clafin (1931) and the Peabody Museum of Harvard University. The special preservation environment created by the presence of shell produced sites rich in artifacts and features, providing the data for the first detailed descriptions of fiber tempered pottery, one of the earliest known ceramic complexes in

North America, dating between ca. 2,500 and 1,000 B.C. (Anderson & Joseph 1988). Work at these shell middens along the Savannah formed the basis for definition of the Stallings Island culture. Archaeological excavations over the next 50 years focused on further explorations of the Late Archaic occupations and the “shell midden” culture in the middle and lower sections of the Savannah River valley.

The impact of the Roosevelt era, the New Deal, and the WPA on the growth of archaeology in the Southeast was significant (Lyon 1996). Extensive excavations of Late Archaic, Woodland, and Mississippian sites in the lower Savannah River were conducted through the WPA. Work at Bilbo, Deptford, Irene provided the basis for a prehistoric ceramic sequence for the lower Savannah drainage developed by Caldwell (1954) and Warring (1968).

While the majority of the WPA archaeological investigations were conducted in the lower reaches of the Savannah drainage, one significant survey project was undertaken in the upper areas of the drainage by Robert Wauchope from 1938 to 1940. In 1966, the survey results were synthesized in *Archaeological Survey in Northern Georgia* (Wauchope 1966).

After the end of the WPA projects, little work was conducted in the Savannah River drainage until work began on the first major reservoir on the Savannah River (Anderson & Joseph 1988:11). Since 1948, the archaeological investigation of the upper Savannah River has been intimately tied to reservoir construction. Between 1948 and the late 1980s, three major reservoirs, Clarks Hill (Thurmond), Hartwell, Russell, were constructed on the Savannah River by the U. S. Army Corps of Engineers. The

construction of these reservoirs brought both site destruction and the first systematic archaeological investigation of the upper Savannah River.

Working for the Smithsonian Institution's River Basin Survey, Carl Miller and Joseph Caldwell conducted survey and excavation in areas later inundated by Clarks Hill Lake (Thurmond) and Lake Hartwell (Caldwell n.d., 1951, 1952, 1954, 1974a, 1974b; Miller 1948, 1949, 1974). Given the size of the area inundated, very limited archaeological investigations were conducted prior to the construction of these two reservoirs (Stephenson 1974:25). During the Clarks Hill Reservoir survey, Caldwell and Miller recorded 128 sites (Miller 1974). Test excavations were completed at several sites including the Rembert Mounds and Lake Spring. Particularly significant are the stratified Middle and Late Archaic assemblages revealed by the excavations at Lake Spring. The lower occupation levels contained quartz Morrow Mountain bifaces and debitage. The stratigraphic levels above the Middle Archaic materials contained Savannah River Stemmed points and Stalling fiber tempered pottery. This stratigraphic sequence and the predominance of quartz were the basis of Caldwell's Archaic "Old Quartz Industry" (Caldwell 1954:37).

Recently, Dan Elliott (1994:42) has attempted to locate and reexamine artifacts and field notes from several of these investigations. This effort is particularly heartening because there was no formal report of Caldwell's 1951 work at the Lake Springs site, where he defined the Old Quartz culture. While the artifacts have not yet been located, the excavation plan has been reconstructed from the field notes (Elliott 1994:43).

Following the construction of Clarks Hill, Caldwell and Miller surveyed the area that was to become Hartwell Lake in 1953. In the following years, major excavations would be conducted at three Mississippian mound sites, Chauga, Tugalo, and Estatoe by Caldwell, A. R. Kelly (1958) and R. S. Neitzel (1961).

Over the last fifteen years the number of survey and excavation projects conducted in the southeast and the Savannah River drainage have continued to increase as a result of mandated cultural resources management (CRM) projects (Steponaitis 1986). These projects have produced much valuable information through surveys conducted over very large areas encompassing a wide variety of environmental zones and landforms.

The impetus for many of these CRM projects, highway or powerline construction, have required survey and testing in areas that had long been neglected archaeologically, forcing work in the interriverine areas of the piedmont. In South Carolina surveys conducted by House and Ballenger (1976), Cable et al. (1978), and Goodyear et al. (1979) and excavations at Windy Ridge (House and Wogaman 1978) made significant contributions to our understanding of the content and structure of archaic sites in the interriverine piedmont. In the Georgia piedmont, survey and excavation were conducted from 1974 to 1977 in the upper Oconee River drainage by the University of Georgia as part of the Wallace Reservoir (Fish and Halley 1983). The information from the upper Oconee has been used by O'Steen (1983) to develop models for the Paleo Indian and Early Archaic in northeast Georgia.

Much of the early work in the southeast had been concentrated in the major river valleys and archaeology benefited from the local and regional cultural sequences that were produced by these efforts. However, the variety and diversity expressed within these cultural sequences had to come from work in the uplands and interriverine ridges. While the riverine cultural sequences produced many of the time lines and diagnostic artifact classes, it took data from a broader areal scope to begin to consider some of the more complex questions of population size, social interaction, and cultural boundaries.

RICHARD B. RUSSELL ARCHAEOLOGY PROGRAM

A brief review of the Russell Reservoir archaeology program as it pertains to the Gregg Shoals site will provide perspective on the development of the research at that site. As noted above, in 1944 plans were made for three reservoirs on the upper Savannah River. Clarks Hill and Hartwell were completed in the 1950s. Authorized in 1966, Trotter's Shoals Lake was to fill the area between Clarks Hill and Hartwell lakes. In 1973, the projected lake was renamed the Richard B. Russell Dam and Lake.

Anderson and Joseph (1988) provide an excellent discussion and critical evaluation of the overall research program and compliance framework that shaped the cultural resources investigations undertaken by the National Park Service through the Interagency Archaeological Service (IAS) and the Savannah District, U. S. Army Corps of Engineers in the Richard B. Russell Reservoir. Elliott (1994) also provides an overview and evaluation of the Russell Reservoir project.

The project study area, now Lake Russell, is located in the piedmont section of the upper Savannah River in northeast Georgia and northwest South Carolina (Figure 1.1). The construction of the dam and reservoir had a significant impact on the floodplain and adjoining ridges and ridge slopes in portions of Elbert and Hart Counties in Georgia and Abbeville and Anderson counties in South Carolina. Russell Dam is 29.9 miles below Hartwell Dam, 37.4 miles above the Clarks Hill Dam, and 275.1 river miles upstream from the mouth of the Savannah River. Lake Russell inundated over 11,750 acres in Elbert and Hart counties in Georgia and 14,900 acres in Abbeville and Anderson counties in South Carolina, creating over 546 miles of shoreline at an elevation of 144.8 meters (457 feet) above sea level (Taylor and Smith 1978:1).

With Thurmond Lake to the south and Hartwell Lake to the north, the closing of the floodgates in 1983 for the Russell Dam flooded the last undammed stretch of the Savannah River above the fall line (Anderson 1988:3). Therefore, the archaeological and geological investigations conducted prior to inundation provided a last chance to study the prehistoric settlement of the piedmont section of the Savannah River drainage in the foreseeable future.

The University of South Carolina's Institute of Archaeology and Anthropology (SCIAA) was involved in the site survey, testing, and mitigation phases of the Richard B. Russell Project. This research involvement began with the first archaeological survey conducted by Hemmings in 1970 on the South Carolina side of the proposed lake. During this period, archaeological survey was also conducted on the Georgia side by the

University of Georgia (Hutto 1970). There was no overall survey plan and no systematic subsurface testing was undertaken; therefore, both surveys produced limited information.

In 1977, the SCIAA conducted an intensive survey of the proposed reservoir and recorded 490 sites (Taylor and Smith 1978). This survey was followed by a testing program to examine and evaluate 84 of these recorded sites for National Register eligibility. The Gregg Shoals (9EB259) and Clyde Gulley (9EB387) sites were both recorded during this survey. Gregg Shoals was one of the 84 sites selected for testing. Deep auger tests were done at regular intervals to evaluate depth of deposits and stratification of artifacts. The auger testing at Gregg Shoals indicated three things: artifact stratification, deposits with some depth, and possible separation of deposits.

To further evaluate the possibility of deeply buried deposits in the floodplain, IAS contracted with Thunderbird Research Corp. (Gardner et al. 1983; Thompson and Gardner 1983) to evaluate selected floodplain areas. A series of 1 x 1 meter units was excavated by hand at Gregg Shoals site. These units averaged an excavated depth of 1.5 to 2 meters. These units were later relocated and mapped during the data recovery phase of work at Gregg Shoals. A report of the findings of the 1 x 1 meter units was not available until 1983, after the data recovery work was completed. A report of the 84 sites testing program was not available either when Phase III began. However, the artifacts were curated at the University of South Carolina's Institute of Archaeology and Anthropology and it was possible to analyze the materials and prepare a summary of the data to guide the excavation plan design.

The results of the 1977 intensive site survey were incorporated into the Site Specific Mitigation Plan (Carbone et al. 1980) which detailed the process by which cultural resources would be evaluated and determinations for further work would be made. Paleoenvironmental investigations were also begun in conjunction with the deep site testing program. These studies focused on reconstructing soils (Foss et al. 1985), geomorphology (Segovia 1985), and vegetational histories and palynology (Sheehan et al. 1985). Within the Site Specific Mitigation Plan, Phase III included all site data recovery activities. Between 1980 and 1982 the SCIAA conducted Phase III activities at Gregg Shoals (9EB259) and at Clyde Gulley (9EB387).

ARCHAEOLOGICAL INVESTIGATIONS AT THE GREGG SHOALS SITE

Site Description

During the early 1980s, archaeological and geological investigations were undertaken at the Gregg Shoals site by the South Carolina Institute of Archaeology and Anthropology as part of the mitigation activities associated with the construction of the Richard B. Russell Dam and Lake. These efforts were funded by the U. S. Army Corps of Engineers, Savannah District and administered by the Archaeological Services Branch of the National Park Service, Southeast Region, Atlanta, Georgia.

The Gregg Shoals site is located on a triangular piece of land formed by the confluence of Pickens Creek and the Savannah River (Figure 3.1). The majority of the site is on a high terrace or levee that had been greatly reduced by erosion. The erosion was the result of fluctuations of water flow from power generation at Hartwell Dam. At least 50 meters of the river bank and, therefore, the site had been lost to erosion by 1980.

A dam was built across the Savannah River at Gregg Shoals between 1906 and 1908. This was the first hydroelectric project constructed on the Savannah River. With the completion of the Hartwell Dam in the late 1950s, it was necessary to remove the Gregg Shoals Dam. However, only a section in the center of the dam was removed and the flow of water was then directed at the section of the riverbank where the site is located. Daily power generation often resulted in a three meter rise in level of the river. At times

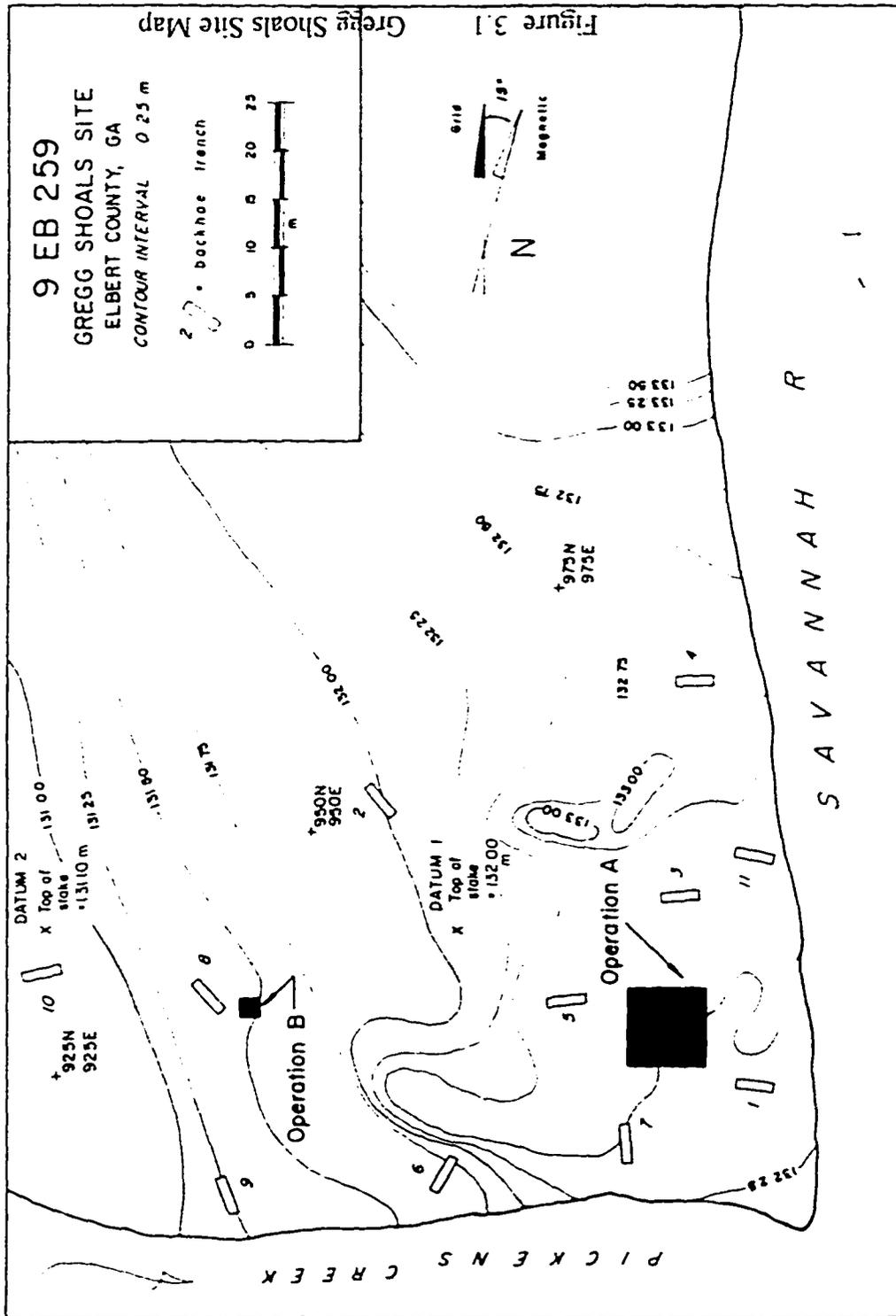


Figure 3.1 Gregg Shoals Site Map

of full power generation, the water level would rise very quickly increasing the undercutting of the bank and causing severe slumping (Figure 3.2). Even though a large part of this site had been lost to erosion, cultural deposits with a stratified, undisturbed sequence was discovered and documented at this locality.

Gregg Shoals had been a popular local recreation area for many years and once the erosion of cultural material began, it quickly became widely known. Numerous collectors visited the site daily once the level of the water began to go down after a power generation cycle. Several very large artifact collections were amassed from the wealth of artifacts visible on the new "beach" that was formed daily. Needless to say, this greatly increased local interest and visitation to Gregg Shoals.

The Gregg Shoals site lay in an area of rolling hills, lacking sharp breaks between hilltops, hillslopes, and river valleys, which characterizes the Piedmont physiographic province (Fenneman 1938:131). Moist, tropical air from the Gulf of Mexico persistently covers this area along the Savannah River, producing long, hot summers with average daily maximum temperatures of 89°F in August. The winters are cool and short, with an average temperature of 44.2°F (Frost 1979:2).

Soils

Archaeological interpretation has benefited from understanding the soils in which archaeological materials are deposited for several reasons. Soils are complex structures that reflect present and past climatic regimes, differences in slope and drainage, and differences in parent material. Understanding the processes of upland pedogenesis is



Figure 3.2 Erosion at the Gregg Shoals Site

important because the degree of colluvial contribution from upland deposits is related to both the weathering and stability of floodplain terraces and levees.

The soils in the area of the Gregg Shoals site have been described by Frost (1979) and Foss et al. (1981). Foss et al. (1981) identify and describe the factors relevant to soil development in the section of the river where the Gregg Shoals site is located. These soils have developed in both upland and alluvial environments.

The soils of the upland area above the site are ultisols developed in regolith weathered from the igneous and metamorphic rocks of the Inner Piedmont Belt. The Inner Piedmont Belt contains mica gneiss, hornblende gneiss, mica schist, massive and weakly foliated granite, and gabbro. Diorite is also a common component of the Inner Piedmont Belt. These ultisols are highly weathered and contain significant amounts of clay, iron, and aluminum oxhydroxide accumulations. Reactive rocks, such as amphibolites and biotite schists, weather rapidly and deeply, while quartz-rich rocks, such as the granitoid gneisses and pegmatoids, tend to resist weathering, often resulting in the development of shallow soils. Where quartz-rich veins or dikes have formed in rock that is more susceptible to weathering, the veins of quartz remain as distinct structures in the soils. Therefore, the more resistant quartz-rich material forms large blocks in colluvial soils. It has been proposed that the soil profile horizon structure, color, thickness, and the percent of clay are influenced by the proportion of felsic and mafic minerals and quartz (Foss et al. 1985).

The uplands near the site were dominated by moderate to steeply sloped ridges, ridgetoes, and saddles. Therefore, the soils tend to move down slope by creep

processes. The resulting colluvium retains the textural properties of the ultisols upslope. Where vegetation retards the creep of soils downslope, the colluvium may develop secondary structures and distinct zones. Frost (1979) mapped the upland soil components of the upper Savannah River valley. The Upland Residuum (Unit U) was dated at 400,000 to 1,000,000 years old and described as being strongly argillic with a typical Munsell color of 2.5YR. Within the Upland Residuum, a typical solum is two to five meters in thickness, continuous with a strong structure, and acid.

The soils that have formed near the Savannah River are much more complex and range from inceptisols to ultisols. These soils developed from terrace and floodplain deposits from the river with contributions from the colluvium from the adjacent slopes.

Foss et al. (1981), Sevogia (1981), and Foss (1981), identify several episodes of deposition of alluvium followed by varying degrees of pedogenesis. These authors have indicated that soil horizons can be correlated and related to the climatic history of the upper Savannah River valley.

Foss (1981) identified and described four soil units in the Savannah River floodplain. He assigned an age of less than 250 years to Unit I. Unit I has either no B horizon or a weak cambic zone, which can be up to 0.5 meters in thickness. Unit II is divided into three subunits and assigned the following ages: Unit IIa, 250-2050 B.C., Unit IIb, 2050-4050 B. C., and Unit IIc, 4050-6050 B. C. Unit IIa, has a cambic or weak argillic B horizon; the oldest (Unit IIc) has an argillic B zone. Foss describes all three units as thin, discontinuous, with weak to moderate structure. Unit III is thought to be 6050 to 8340 B. C. with a well-developed argillic B horizon that is thin, but

continuous in areas where it is preserved. Unit IV includes two horizons. A date of 8340 to 28,050 B. C. is assigned to Unit IVa which contains an argillic horizon that is thin and continuous. Unit IVb, 98,050 to 248,050 B. C., is thick and continuous and has a very strongly developed argillic B zone.

Two soil associations have been mapped in the area surrounding the Gregg Shoals site: the Toccoa-Cartecay association and the Cecil-Madison association. The Toccoa soil association is found on the levee and the Madison soil association is restricted to the uplands on the western edge of the site. The Toccoa association consists of mainly level to nearly level soil on the floodplains of the small creeks and rivers (Frost 1979:3). The surface of the Toccoa soils is a 20 cm. thick layer of brown loam that is mottled with strong brown (Frost 1979:3). This soil is also characterized by "thin bedding planes of sand, silt loam, and clay loam" (Frost 1979:3). The Toccoa soil is low in organic content and is strongly to moderately acidic throughout (Frost 1979:3).

The Cecil-Madison association is composed of gently sloping, well drained soils that have a red, clayey subsoil (Frost 1979:4). The Madison soil is a deep, well drained micaceous sandy loam on 15 to 25 percent slopes next to streams in the Piedmont upland (Frost 1979:23). The Madison soils have a surface layer of reddish brown sandy loam and a subsoil of yellowish red sandy clay loam, red clay, and red clay loam. Under this soil is a weathered, micaceous saprolite (Frost 1979:4). Madison soils are low in organic content and strongly to very strongly acidic (Frost 1979:23).

The Gregg Shoals site is within the Oak-Pine forest region (Braun 1950; Waggoner 1975). The loblolly pine, yellow pine, and red oak are found in the uplands

on the Cecil-Madison association. The lower, more level areas of the Toccoa-Cartecay association contain loblolly pine, sweetgum, black walnut, and yellow poplar (Frost 1979:27). In cultivated fields that have been fallow for many years, such as Gregg Shoals, yucca and holly are part of the understory.

Geology

The Gregg Shoals site is located within the Piedmont physiographic province, a complex and dissected terrain underlain by Paleozoic and possibly Pre-Cambrian metamorphic and igneous rocks that have been highly altered by deformation. Regional geology has been described by Overstreet and Bell (1965) and an excellent summary of the bedrock geology of the Loundesville Quadrangle (Georgia) is provided by Griffin (1974). However, the detailed study of the structural and lithological character of the metavolcanic formations of the Piedmont is complex and not well represented in the geological literature. Several factors have complicated the study of Piedmont metavolcanic rock types. The lack of large outcrops of metamorphic and sedimentary rock types and the high degree of weathering have impeded intensive geological study. Archaeological research questions focused on patterns of raw material use through time require information on the distribution and characteristics of conchoidal fracturing rock types within formations.

Sedimentary and metamorphic rocks have been mapped on the South Carolina side of the Savannah river in northeast trending belts (Overstreet and Bell 1965). These include the Carolina Slate Belt, Charlotte Belt, Kings Mountain Belt, Inner Piedmont Belt, Brevard Belt, and the Blue Ridge Belt. The Inner Piedmont Belt, Charlotte Belt,

and the Kings Mountain Belt all cross the Lake Russell project area at some point. The Charlotte Belt contains metamorphosed granitoid gneiss, magmatite; and albite, epidote, and amphibolite schists. The Kings Mountain Belt contains hornblende gneiss, sericite schist, quartzite and marble. The immediate site area is part of the Inner Piedmont Belt, a structurally complex series of high rank metamorphic rocks (Griffin 1974) with numerous intruded plutons, such as the well-known Elberton Granite, which is quarried nearby. The town of Elberton calls itself the “granite capital of the world.” It is interesting to note that near the source of the granite you find it being used for purposes that it would not be used for further away --such as posts for mailboxes, and signs for schools, churches, and businesses.

Overstreet and Bell also note that intrusive igneous formations are present in the Piedmont. Quartz chunks are found scattered throughout the Piedmont. It is also suggested that the metamorphic rocks were formed through three stages of sedimentary deposition (Overstreet and Bell 1965). Moving from north to the west, there is a general increase in the quality of the metamorphic rocks in the Inner Piedmont Belt. The intrusive igneous formations are represented by andesite, diabase, and basalt.

On the Georgia side of the Savannah River, metamorphic rock underlies most of the area. The northern part of Elbert County is underlain by biotite, gneiss, and schist, while the eastern part is underlain by hornblende, gneiss, and slate (Frost 1979:47). the west-central part of Elbert County, near the town of Elberton, is underlain with igneous rocks including biotite, muscovite, granite, and porphyritic granite (Frost 1979:47).

At the Gregg Shoals site, the Inner Piedmont Belt contains granitoid gneisses interbedded with biotite, gneiss, amphibolite, and thin pegmatoids. The metamorphic rock has a regional strike that is northeast and the pegmatoids follow regional strike and local foliations. Bedrock was exposed in the shoals at the site and the alterations of iron-rich biotite schist and amphibolite are thick enough and persistent enough to affect the magnetic flux on the site. The granitoid gneisses and pegmatoids contain large areas of macrocrystalline quartz and microcrystalline felsic rocks that served as sources of raw material for the manufacture of stone tools found at the Gregg Shoals site. Samples of these raw materials and selected artifacts were analyzed by thin section.

Excavation design

Stratified sites with intact, separated components and single component sites both provide good opportunities to address site specific questions, such as changes in occupation and use. They also can contribute to knowledge of subsistence-settlement systems when comparisons are made at the area or regional level. Stratified sites are of major importance when occupations encompass a major shift in adaptation, changes in resource availability, or major environmental changes. Chronology, subsistence, and settlement information are vital bases for the interpretation of cultural change.

Based upon the previous work of Taylor (1979) and Gardner and Barse (1980), it was clear that the research potential of the Gregg Shoals site lay in its deeply stratified, apparently well-preserved deposits. In addition to its potential contributions to chronology and cross-areal temporal comparisons, we were interested in the potential of the site to contribute to Late Pleistocene/Early Holocene paleoenvironmental

reconstruction. The research problems to be addressed at Gregg Shoals were divided into four interrelated domains: chronology, subsistence, adaptive change, and cross-areal comparison.

It is difficult to find an archeological report in the Georgia-South Carolina Piedmont that does not bemoan the lack of deeply stratified sites. There are problems, however, that make a deeply stratified site a mixed blessing: (1) differential overlap of occupation, (2) sampling comparability and (3) practical aspects of excavation strategy (Brown 1984:168; Chapman 1977:4). The maintenance of fine excavation control and safety were primary concerns. According to Brown, the problems of excavation and sampling have shifted attention away from deeply stratified sites (1975: 168). Although there are certainly problems, research potential and the continued loss of Gregg Shoals to erosion warranted an attempt to overcome or mitigate some of these problems.

The initial project design included data recovery at both the Gregg Shoals site (9EB259) and the Clyde Gulley sites (9EB387). However, due to problems in obtaining access to the property for testing at the Clyde Gulley site, the proposed work was redesigned to cover only the Gregg Shoals site. It was anticipated, however, that the permission would be forthcoming and that data recovery would be conducted at the Clyde Gulley site subsequently.

To provide the data needed to address research questions on the nature and depth of the deposits and to therefore guide the placement of excavation units in the most productive areas, the following four part testing program was designed

1. coring using a 6 inch bucket auger;

2. precision backhoe trenches and stratigraphic study;
3. a single, deep but stepped block excavation unit in a promising part of the site; and
4. preliminary analysis of the cultural and environmental information for determination of site potential.

These four steps made it possible to determine the vertical and horizontal limits of the cultural deposits, the cultural strata, and the floral and faunal preservation present in these strata. The backhoe testing and archeological profiling of the Gregg Shoals cutbank was conducted in conjunction with preliminary geological and pedological investigations carried out by Segovia and Foss during August, 1980.

Auger and backhoe testing

The first step involved the reanalysis of the systematic series of subsurface tests made under the direction of Taylor (1979) using a 6 inch bucket auger. The sediment descriptions and the materials recovered from these tests were reanalyzed in 1980. Fragments of quartz bifaces were recovered to a depth of 2.23 m. The analysis of the twenty-four auger tests revealed a continuous distribution of artifacts from the surface to 1.25 m below the ground surface. The density of artifacts dropped off, then resumed from 1.75 to 2.00 m. The analysis of the auger results were used to determine the placement of the backhoe trenches.

To determine the horizontal and vertical extent of the site and to aid in the placement of a block excavation unit, a series of backhoe trenches was dug. The cutbank profile, pedological analysis, auger testing, and previous limited test excavation

information were used to determine the placement of the backhoe cuts. A 3 foot (.9 m) wide toothless backhoe bucket was used. Each cut was 4 meters long and 3.50 to 4.0 meters deep. Each backhoe cut was limited to the arch inscribed between the top and bottom by the path of the backhoe bucket. The toothless bucket made it possible to make cuts that were 9-11 cm deep. About half the material from each bucket was screened, using an automatic sifter with 6 mm mesh screen. The material from each level was bagged separately.

Based on the results of the analysis of the auger tests and the need to understand the location of the interface of the alluvial and colluvial deposits, 4 trenches were placed perpendicular to the river front edge of the site, 3 perpendicular to Pickens Creek, and 4 moving west from the Savannah River edge to Pickens Creek on the west. The cutback profile done on the beach and the offset trenches moving to the west provided a long, although not continuous, profile. The cutback profile and the profiles of the trenches along the river provided a long profile of the north-south stratification.

The first backhoe cut was made into the site from the beach (Figure 3.1). In consultation with Jefferson Chapman, the bucket was used to clean a profile on the cutbank and a trench was dug into the beach. Two other trenches were placed on the beach near the edge of the river in an attempt to uncover the dark, terminal Pleistocene, organic layer, which could be seen at several points along the exposed bank.

Five features were identified, mapped, and photographed. Although no continuous distribution of cultural material was found in the trenches, there were some definable zones. The upper 40-50 cm contained a wide variety of raw material including quartz,

rhyolite, Ridge and Valley chert, and Coastal Plain chert. The pottery was confined to this upper level. A large number of sherds with curvilinear stamped designs were recovered. Cord marking or cord wrapped stick impressions, broad incised, and smoothed surfaces also occurred in this zone. Another zone was identified at 80-130 cm below the ground surface. This zone contained quartz chunks and flakes. There was a definite decrease in the raw material variety. A third zone was identified at 190-220 cm below ground surface. This zone contained quartz chunks and pieces of granite that may have been fire-reddened or firecracked. Quartz flakes and cores were also recovered from this zone, and one feature was mapped. At 1.98 m below the ground surface, the feature contained 7 fire reddened pieces of granite and 6 firecracked pieces of quartz cobbles. No charcoal was recovered. Another firecracked rock feature was recovered in trench #8. This feature was 1.15 m below the ground surface and contained quartz flakes and chunks.

Excavation unit design and placement

The results of the auger tests and the backhoe trenches revealed that the majority of the cultural material lay in the triangular portion of the river edge within 20 m of the edge of the bank. Based on this information, a large 8 x 8 m excavation unit (Operation A) was placed near the river and a 2 x 2 m unit (Operation B) was placed on the western edge of the site (Figure 3.1). These excavations were conducted from September to December 1980.

The original Gregg Shoals proposal contained several research questions centering around subsistence information. However, the first season's excavations at the Gregg

Shoals site yielded few subsistence data. Due to the soil chemistry, faunal and floral preservation was poor in the later components and non-existent in the earlier components. The first season's work also produced little evidence of preserved structures in the later occupations and none in the earlier.

As described earlier, erosion had been removing sediments and archeological materials for a number of years. The geological evidence indicates that, proportionally, more of the later time period's sediments had been lost to erosion.

Given the lack of structural and subsistence remains, the best information lay in the raw material patterns and the lithic assemblage characterizations. The greatest information, with the resources available, could be obtained from further work in the Middle and Early Archaic components.

The analysis of the archeological material, supported by the sediment analysis of Upchurch, Foss, and Segovia from the Gregg Shoals site, indicated that further data recovery in the Middle and Early Archaic zones would increase our sample of tool assemblage data from these two time periods.

Therefore, the second season of work at Gregg Shoals was designed to concentrate the hand excavation on the Middle and Early Archaic zones. The upper meter of the deposits were removed over an area 30 meters to the north of the phase I excavation and 40 meters to the west of this block unit. An end loader was used to remove 10-15 cm at a time from small areas. This method allowed controlled removal of the overburden and time for inspection of the cleared area.

During the removal of the upper meters, two whole vessels were uncovered between 40-50 cm below ground surface along the western edge of the Phase I block unit. The two vessels were found side by side. No pit outline was visible and there were no other artifacts recovered in the area surrounding the vessels. One of the vessels is a small jar with four reed-impressed nodes. The exterior of the vessel is plain. The other vessel is a small plain surfaced bowl. Both of these are similar in surface treatment and form to small bowls and jars illustrated and described for the Lamar Complex by Caldwell (1950:319, Figure 160 y, z, AA).

As this work reached a depth of 90-100 cm below ground surface (Late Archaic zone), nine features were uncovered, two large dark stains and 7 rock hearths. Although two of the hearths were scattered by the end loader, 5 were identified before damage was incurred. The two dark stains were cleaned by hand and cross sectioned. Each stain was also mapped and photographed. The rocks of each hearth were removed in layers and the features cross sectioned to determine internal structure. The area around each feature was shovel skimmed and any associated artifacts were mapped. Several of the hearths contained flakes and biface fragments, and one of the hearths contained 1 small Savannah River biface and 2 biface preforms. Flotation samples were taken from all features.

All the feature recording and excavation in the Late Archaic zone had been completed before stripping resumed. The end loader was also used to remove the 40 cm thick layer overlying the Middle Archaic zone. While several stains were mapped, no rock features or artifacts were encountered during the removal of this 40 cm thick layer.

Once the desired depth (1.70 m below ground surface) was reached, an area extending 10 meters to the north and 10 meters to the west of the Phase I excavation unit was shovel skimmed, a grid was established, and units were prepared for hand excavation. The excavation provenience was a 1 x 2 m unit, using 10-cm levels. Excavation began in the units adjoining the previous 5 x 5 m unit to provide excavation control and accuracy of artifact associations between the two seasons' excavations.

From the previous season's work it was known that the Middle Archaic deposits were 40 cm thick and that several of the features and one artifact concentration continued into the unexcavated areas to the south and to the west. The Phase II excavation produced two rock features (hearths), one large dark stain, and one Morrow Mountain biface associated with a quartz primary reduction activity area. A portion of one of the rock features was recovered during the Phase I excavation. A flake concentration and Morrow Mountain bifaces mapped during the Phase I season can also be associated with the primary reduction concentration, cores, and debris, providing spatial information on activity area structure in the Middle Archaic occupation.

Once the hand excavation of 48 cm² of earth in the Middle Archaic had been completed, the end loader was again used to remove the 40 cm overlying the Early Archaic competent. During the clearing of this 40 cm zone, three small shallow stains were mapped, however, no rock features were encountered that were established in the Phase II operation.

Based on the Phase I excavation, contact with the top of the Early Archaic component was expected at 2.50 m below ground surface. At 2.55 m below surface, a

rock feature was uncovered in an area adjacent to the southwestern corner of the Phase I excavation unit. This feature was immediately visible and sustained very little damage from the end loader. With the clearing completed, an excavation grid was established, again using 2 x 2 m provenience units.

Testing and excavation at Clyde Gulley (9Eb387)

By February, 1981, the Clyde Gulley property had been acquired by the U.S. Army Corps of Engineers and planning for data recovery began. The Clyde Gulley site had originally been identified as a scatter of lithic artifacts, complicated stamped pottery, and firecracked rock in the northeastern corner of the Gulley field by the Taylor and Smith survey in 1977. This survey indicated that cultural material extended to a depth of about 90 cm. Indications of buried cultural components were also suggested by Sam Upchurch (1994) in his initial inspection of the project area and subsequent geological interpretations. The presence of buried components was later corroborated with the use of a soil auger. Therefore, systematic precision backhoe testing of the deposits in the Clyde Gulley field was conducted in March, 1981.

The precision backhoe testing of the Clyde Gulley floodplain resulted in the identifications of six cultural components. It was necessary to select one of these components for excavation. Excavation strategies were designed for the Mississippian component at the Clyde Gulley site. The Mississippian midden area was defined using a soil probe and excavation was conducted in a large block unit after the one meter of sterile overburden was removed with a self-loading pan. These excavations were carried

out from October to December, 1981. The results of these excavations are described by Tippitt and Marquardt (1984).

Chapter 4

EXCAVATION AND ANALYTIC METHODS

This chapter presents the field, laboratory and analysis methods and techniques used in the excavation and study of archaeological and geological materials from Gregg Shoals. Laboratory methods, including artifact processing, lithic classification, and ceramic classification, and field methods, such as waterscreening, and flotation are also presented in this chapter.

The excavation methods used at Gregg Shoals were determined by several factors: depth of the deposits, depth of sterile overburden, and the time frame for the RBR mitigation phase. Specific excavation plans were developed for Phase I and phase II work at Gregg Shoals and Clyde Gulley. Excavation plans for both sites combined the use of mechanical and hand excavation. As described in Chapter 3, the heavy equipment used included backhoe, self-loading pan, and front-end loader. Careful consideration was given to the selection of the machine excavation method appropriate to the soil removal requirements at the site and the timing of tasks such as stripping of overburden, final exposure of soil, and the removal of screened soil.

Excavation

The excavation plan for the work at Gregg Shoals involved a combination of mechanical and hand excavation. The exact use of heavy equipment was detailed in the plan of work for each component. A large block excavation unit was placed as close to the riverbank edge as possible. This 8 m x 8 m block, Operation A, was divided into 64 1 m x 1 m excavation proveniences and excavated in 10 cm levels (Levels 1-36). Hand excavation was done by skim shovelling with flat shovels. Features or other horizontal subdivisions were excavated by trowel or other fine tools as needed. Spatial patterning and context of artifacts are very important to the research questions being addressed. Therefore, the excavation provenience was 10 cm levels within 1 x 1 meter units. Horizontal subdivisions of a provenience were labeled as loci and given consecutive numbers. A permanent datum was established for Gregg Shoals and mean sea level elevation was calculated. Measurements were made relative to this site datum. A transit level was used to record elevations of levels and to plot artifacts and features. The feet of the tripod were placed in the center of three wooden stakes that had been set in the ground to insure consistent placement of the instrument each day. Two-way radios provided an effective method of communication between transit reader and the excavator once a depth of 2 meters was reached.

All lithic tools and rim sherds were piece plotted. Flake concentrations, firecracked rock concentrations, charcoal stains, pits, and other features were mapped and photographed, and appropriate samples were taken. All levels, features, piece plotted artifacts, and special samples were assigned consecutive field numbers. This

number, and the provenience information and description was recorded on the level sheet and in a master field number book. This field number was also used in the labeling of level bags, artifact bags, and samples. The fill from each excavation provenience was placed in #2 washtubs for transportation to the waterscreens. The fill from one 10-cm level in a square meter required 4 to 5 tubs. A card with the provenience information and tub number for that level was placed in each tub to maintain provenience control.

All excavation fill, except special samples, were processed in the field by waterscreening. The waterscreens consisted of two sections: a lower enclosed tub with sloped bottom and an upper insert fitted with screen. The lower section was made of galvanized tin and was fitted with a plastic elbow discharge pipe. The elbow section was connected to 2 m of plastic pipe to carry the discharge away from the work area. The upper section is fitted with 1/2 inch screen (for reinforcement) and 1/8 inch mesh. The upper screen section is attached by hinges to the lower section to provide easy cleaning after each provenience unit has been processed.

To provide safety in an excavation that would extend over 4 m below the ground surface in a fine sandy loam matrix, it was necessary to design a stepped excavation unit (Figure 4.1). The 8 x 8 block unit was excavated to a depth of 1.00 m below the ground surface. Then excavation proceeded in a 5 x 5 m unit until a depth of 2.00 m below ground surface was reached. Within the 5 x 5 m unit, a 3 x 3 m unit was excavated to a depth of 3.40 m. Since no cultural material had been recovered below 3.10 m, excavation then continued in a 1 x 1 m section until to a depth of 4.25 m. A 3 inch bucket auger was then used to determine the depth of the deposits below that point. Contact with granite bedrock occurred at 6.28 m below surface (Figure 4.2).

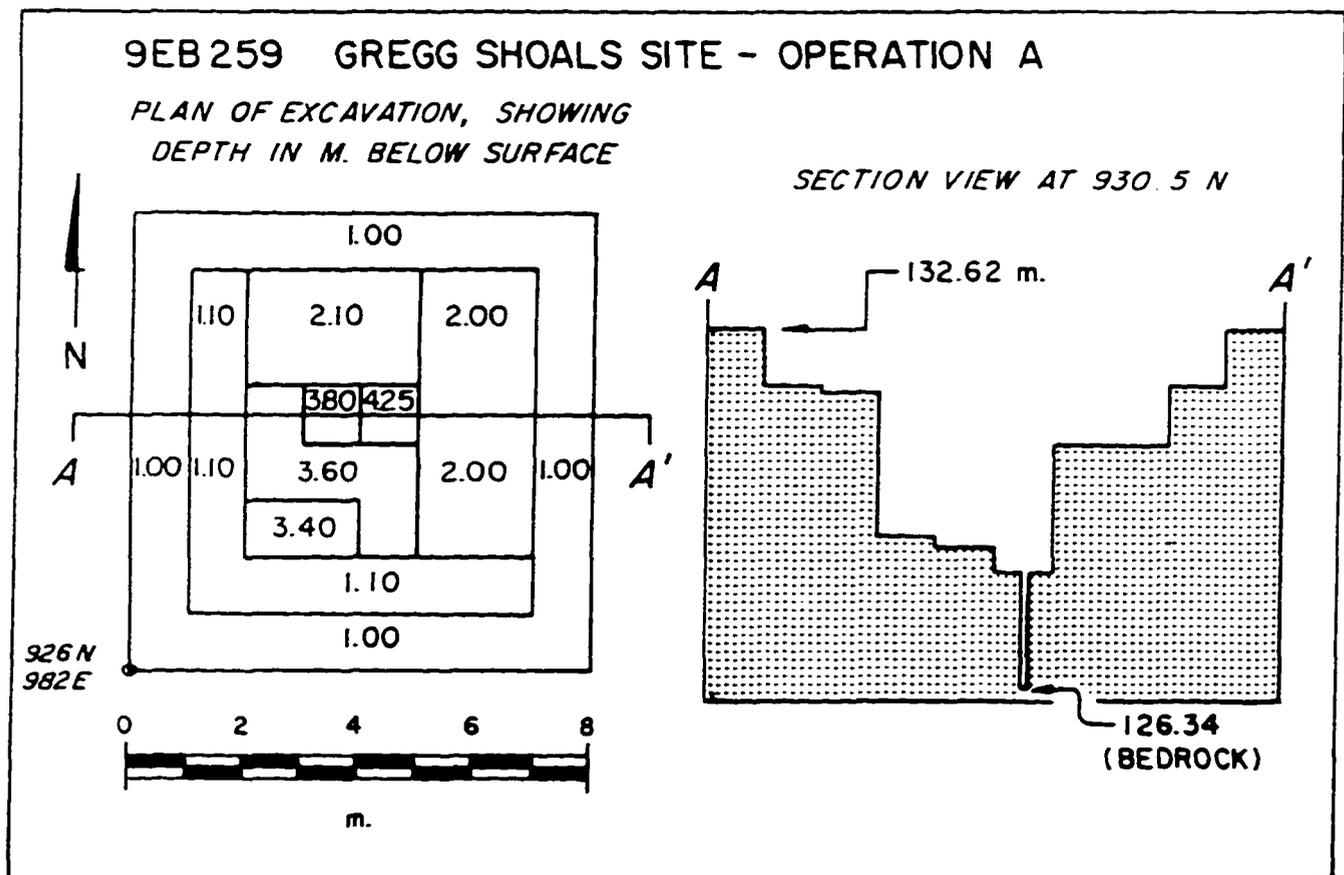


Figure 4.1 Excavation Design



Figure 4.2 Gregg Shoals Final Excavation Depth.

The excavation of the 8 x 8 m unit presented a number of challenges. The task of excavation and soil removal in a large unit over 2 m deep required a technology unfamiliar to most archeologists. Movement in and out of such a unit must be controlled, yet always available. A movable ramp was designed in such a way that it could be adjusted to the deepening excavation. The movable ramp became a stationary ladder after each step in the size of the excavation area was reduced. The ramp could be raised while the proveniences under it were being excavated.

A soil removal boom made of large metal pipes and equipped with a hand-turned winch provided a safe, effective way to remove soil from the excavation. The soil was shoveled into #2 wash tubs, the hook of the winch cable was attached, and the tub raised up and out of the excavation area. The boom was constructed so that it could be turned 360 degrees and lower the tubs onto the ground near the waterscreens. To accelerate the removal of the tubs, a bar with a hook on each end was added to the cable and it was then possible to lift two #2 wash tubs at a time, each of the two tubs weighing about 35-40 kg when full. The waterscreens, ladders, mechanical boom, and other engineered facilities were designed and constructed by James L. Michie.

Flotation

Flotation samples were taken systematically from all excavation proveniences. One four liter sample was taken from the northeastern corner of all 10 cm levels in all excavation units. Additional flotation samples were taken from all features or other horizontal subdivisions defined within a level. These samples were placed in large plastic

bags. A label was placed inside the bag and another label was attached to the outside. Each flotation sample was given a field number.

A flotation operation was set up on the site and daily processing and monitoring of flotation samples provided additional excavation control and information. All flotation samples were weighed and provenience information entered into a log.

Flotation was conducted using a 55 gallon drum constructed along the lines of the SMAP machine (Watson 1976). Briefly, a gasoline pump is used to force water into the 55 gallon drum, the water being directed through a shower head installed in the center of the drum. The water flow is directed up toward the screened (1/8 inch) bottom of an insert which rests on supports inside the drum. When dirt is poured into the insert it is agitated by the water flow from the shower head. This agitation causes small, light particles, such as fish scales, bone, and charred seeds, to float to the surface. These particles are then carried by the flow of water through a sluiceway into a bucket fitted with two geological screens (2 mm^2 ; 0.7 mm^2). The light fraction recovered from the geological screens is wrapped in cheesecloth, labeled, and hung up to dry. The heavy fraction which is caught in the bottom of the insert is removed and placed on screened (window screen) wooden frames to dry. Labels are attached to the frames by clothespins. After the light and heavy fractions are dry they are bagged and labeled. The geological screens and the insert are thoroughly cleaned between the processing of each sample. The sludge that accumulates in the bottom of the drum is easily removed by turning off the flow of water into the drum and washing the sludge out of a drain with a water hose. This drain is effectively controlled by a gate valve and the sloping bottom of

the drum facilitates desludging. Watson (1976) provides a line drawing of the SMAP machine, a discussion of the flotation procedure, and some comparative figures on processing rates. The recovery rate of the flotation process was assessed through the insertion of a known number of charred poppy seeds into randomly selected samples prior to flotation. Wagner (1982) details this procedure and presents examples of its use.

Artifact Analysis

To address the research problems set forth, it is necessary to first characterize the content and structure of the artifact assemblage. The attributes used in the debitage analysis and the artifact typology were chosen for their potential relevance to the hypotheses being tested. The assemblage characterization focused on chronology, technology, functional aspects of manufacturing, and the raw materials utilized. Included in this section is a description of the variety, distribution, and density of the artifacts, and an interpretation of assemblage variation. One of the major values of a stratified site is the potential for isolation and definition of assemblages. This is useful for documenting change, or lack thereof, through time in subsistence, settlement patterns, and adaptations, seen through lithic technology, container and storage systems, and patterns of raw material use and procurement.

Lithic Artifacts

The objective of the lithic debitage and artifact analysis was to produce characterizations at the assemblage level. The three variables of major importance in the debitage analysis are: raw material, stage of reduction, and size. The debitage from each excavation level was sorted by raw materials, then by size, and finally by reduction stage. The raw material classes and the reduction stage groups are defined and described below. There were 11 size groups ranging from .5 cm² to greater than 5.0 cm². A total of 13,346 pieces of debitage (8,399 flakes and 4,947 pieces of shatter) was processed.

Lithic Artifact Categories

Many of the categories used in the description of the lithic assemblages from Gregg Shoals follow those used by previous researchers in the Georgia-Carolina Piedmont (House and Ballenger 1976; House and Wogaman 1978; Taylor and Smith 1978; Goodyear et al. 1979). As others have recognized, the division of a continuous reduction process, such as biface manufacture, into separate categories introduces a certain amount of error. One of the goals of this kind of artifact typology is to isolate significant technological and cultural attributes. The categories were chosen for this analysis as possible indicators, direct or indirect, of the manufacturing processes or of the production processes. In the absence of well controlled, systematic replication studies of the predominant raw material, quartz, determination of reduction stage, extent of retouch, orientation of retouch flake scars, and modification of edges by use are often tenuous. Several of the artifact categories reflect the difficulty in determining stage of reduction and use wear on quartz.

As with any attribute recording system, the very attempt to measure certain attributes produces new information and in the end the categories do not reflect what is then known concerning the data set. Ideally, this produces new information for the formulation of designs for further analysis. In the Piedmont, refinement of the analysis of quartz debitage and artifacts cannot proceed until further work has been done to measure the relationship between grain size and texture of quartz and its responsiveness to conchoidal fracturing. Experimental replicative studies are needed to develop means of detecting use wear, retouch, and measuring changes in debitage structure during reduction processes.

The lithic artifacts from Gregg Shoals included: cores, flakes, bifaces, flake tools, hammerstones, and cobble tools. The criteria used for identifying each of these artifact categories are described below.

Cores

Two types of cores for flake and biface production were identified: random cores and bipolar cores.

Random Cores

These cores are nodules or chunks of raw material exhibiting more than one negative bulb of percussion. Flake scars indicate apparently random removal of flakes for production of flake tools or to produce a flake suitable for the initial stages of biface production.

Bipolar Cores

Chunks of raw materials, nodules, or quartz crystals were used for the systematic removal of flakes using the bipolar technique. Battering and crushing are present on both ends and sometimes on the sides of the cores or quartz crystals.

Chunks

Representing unused raw materials, these large to medium sized pieces of the raw materials used in tool production exhibit no negative bulbs of percussion or flake scars.

Flakes

The reduction process of lithic tool manufacture produces several types of debris. Flakes are the pieces of debitage that have striking platforms, bulbs of percussion, and cortex or dorsal flake scars.

Primary flakes

These are usually large, broad flakes detached during the initial reduction stage. Cortex is present on the dorsal surface and the platform.

Secondary flakes

These are flakes removed in the early stages of reduction. Cortex is present on the dorsal surface but not on the platform.

Tertiary flakes

These flakes are produced during the thinning or shaping of tools and bifaces. Tertiary flakes are usually thin and flat, and exhibit a flat striking platform that is perpendicular to the longitudinal axis of the flake. These flakes do not exhibit cortex on the dorsal surface and have the scars of previous flakes removed on the dorsal surface, which generally are few and unpatterned.

Bifacial thinning flakes

Bifacial thinning flakes are removed during the thinning or resharpening of bifaces. These flakes are “relatively flat, have broad shallow flake scars (from detachment of previous thinning flakes) on the dorsal face, and tend to exhibit ‘feathering out’ of lateral margins” (House and Ballenger 1976:89). The proximal end of the flake often retains the edge of the biface and, if retained, the platform has a low angle with crushing and grinding.

Bipolar flakes

These flakes retain characteristics that indicate removal from a core, quartz crystal, or nodule using a bipolar technique. Bipolar flakes exhibit crushing or battering in both the distal and proximal ends, resulting from hammer and anvil retouch. The ventral face is usually sheared and primary and secondary bulbs are removed. These flakes are generally straight and there is no noticeable bulb of force; if a bulb is present, it will be very diffuse. Bipolar flakes may be difficult to recognize because secondary bulbs of percussion are not always formed and distal ends may shatter or hinge-fracture (Chapman 1978:31).

Other flakes

Flakes are classified as primary, secondary, or tertiary when this determination is possible. Most of the raw materials used in tool manufacture do have cortical surfaces but identification of this cortex is often difficult. This category is used for flakes that are usually flat, and have bulbs of percussion and dorsal flake scars, but do not have cortical surfaces that make a determination of position in the reduction sequence possible.

Shatter

These pieces of debitage are blocky, angular fragments of flaking debris and do not have bulbs of percussion, striking platforms, or dorsal flake scars.

Bifaces

This category of chipped stone artifacts with two faces, created by removal of flakes from both sides of a flake or core, is divided into three groups: hafted bifaces, preforms, and other bifaces.

Hafted bifaces

Characterized by overall longitudinal symmetry, consistent thickness, and thin, well-formed edges, these bifaces have been modified by bifacial retouch to produce a pointed distal end and a proximal element (stemmed or notched) that is suitable for hafting. Recent studies in the Piedmont (House and Wogaman 1978; Taylor and Smith 1978; Goodyear et al. 1979) have used the term to avoid any functional associations that may accompany the term projectile points. Based on analyses of edge damage and resharpening, it appears that many of these tools functioned as hafted knives (Goodyear et al. 1979).

Preforms

These bifaces are not well thinned and do not have well shaped, retouched lateral margins. Representing unfinished hafted bifaces, some of these preforms may be associated with hafted biface categories. Some of these bifaces represent either biface blanks that were discarded during manufacture or preforms broken in the final stages of manufacture.

Other bifaces

Irregular in outline and of varying thickness, the bifaces included in this general category may represent artifacts that broke during manufacture or bifaces that were discarded. Many of the specimens in this group are small and cannot be identified beyond the category "biface fragment".

Flake tools

These flakes have been modified along the lateral or distal margins. Flake tools are divided into two categories: use-modified flake tools and retouch flake tools. The use-modified flakes exhibit small flake scars and "nibbling" in limited areas, whereas retouched flakes have longer, more regular flake scars, higher edge angle, and a larger more systematically arranged areas of retouch (House and Ballenger 1978:93).

Hammerstones

Hammerstones are small to medium-sized river cobbles with distinct areas of battering on corners or rounded ends. All specimens recovered are quartz river cobbles.

Cobble tools

These cobbles have areas of pecking and battering located along the edge or on the flat face of the stone. Most of these cobble tools are quartz river cobbles. The pecked areas were probably produced by using the cobble as an anvil for either nut cracking or bipolar flaking

Raw Material Categories

The work of several researchers in South Carolina Piedmont has resulted in the recognition of some patterns of raw material use. The predominant use of certain raw materials has become associated with different cultural-historical periods (Kelly 1972; House and Ballenger 1976:126-127; House and Wogaman 1978:52; Goodyear et al. 1979). Data on lithic resource utilization and procurement are necessary to testing hypotheses concerning technological change, inter-regional exchange, settlement patterning, and mobility.

Fourteen types of raw materials were identified in the Gregg Shoals lithic assemblages. The identification of raw materials was based on macroscopic characteristics, such as texture, color, and the type and density of inclusions, and on previous thin section and geological analyses conducted by House and Ballenger (1976), House and Wogaman (1978), and Novick (1978), the type collections available at the Institute of Archaeology and Anthropology, and consultation with Keith Derting and Tommy Charles. Goodyear, Derting, and Charles are refining and expanding the type collection, and compiling information on prehistoric quarries and raw material distributions in South Carolina. Additional information on raw material description and occurrence was obtained from conversations with Dr. Whitney, Department of Geology, University of Georgia. Further characterizations of raw material from the Gregg Shoals-Clyde Gulley sites were obtained by thin section analyses conducted by Sam Upchurch. Informal workshops sponsored by IAS in Atlanta for project archaeologists provided much needed exchange of data on the distribution of certain raw material groups and the correlation of certain raw material groups and tool types.

The following section includes a description of the geological origin, texture and inclusions, and range of color for the 14 raw material types identified in the stone tool assemblage at the Gregg Shoals site.

Quartz

Two types of quartz were identified: vein quartz and crystal quartz.

Vein Quartz

This raw material is abundant throughout the Piedmont in Georgia, South Carolina, and North Carolina, and the majority of the artifacts from this area are made of this milky, white quartz. Harder and more resistant to weathering than the surrounding rock mass, it is usually seen as residual chunks in the soil matrix (House and Ballenger 1976). This quartz is formed in veins of varying thickness. Unweathered quartz can be seen in outcrops throughout the project area (Taylor and Smith 1978).

Vein quartz is usually milky white or slightly translucent, but other colors such as rose, gray, and yellowish brown occur. The white quartz often referred to as “cold cream jar” or “milk glass” was formed in an environment of numerous water bubbles in hydrothermal veins (Blatt et al. 1972:276-277). The yellowish-brown quartz often has a darker cortex or weathered exterior and may result from being immersed in water. According to Blatt, the grayish quartz is produced by radiation-generated crystal defects (Blatt et al. 1972:277).

The vast majority of the quartz artifacts are made of milky white quartz from outcrops rather than from residual quartz in the soil matrix. Taylor and Smith (1978:231) characterize the residual quartz as having “brown or gray matrix which

interferes greatly with conchoidal fracturing.” The by-products of artifact production on milky white quartz are recognizable and standard observations (striking platform, bulbs of percussion, flake scars) can be made. The grain structure of the residual quartz “inhibits recognition of those characteristics, making the identification of retouched flakes or retouch scars extremely difficult” (Taylor and Smith 1978:231).

Crystal Quartz

While not as abundant as vein quartz, individual crystals and clusters of crystals are found through the area. Most of these crystals are transparent and have a very fine glassy texture. Taylor and Smith reported finding only a few finished tools of this material during their survey. Crystal quartz tools, cores, and debitage were recovered from two major occupation zones at Gregg Shoals. The glassy structure of the quartz crystal aids in the recognition of bulbs of percussion, flake scars, and striking platforms and retouch areas, allowing for a more detailed description of the reduction process.

Argillite

One of the major constituents of the Carolina Slate Belt is argillite (Overstreet and Bell 1965). Argillite is light grayish-green, soft or chalky, and laminated (Novick 1978:31). Conchoidal fracturing is often interfered with by the laminated nature of argillite (Novick 1978:431). It is formed from “siltstone, claystone, or shale, that had undergone a somewhat higher degree of induration than is present in those rocks” (American Geological Institute 1962:23). The raw material recognized as argillite is probably the ‘slate’ described by Kelly (1972:32) and others.

Chert

Chert is defined as a “compact, siliceous rock formed of chalcedonic or opaline silica, one or both, and of organic or precipitated origin (American Geological Institute 1962:82). Novick (1978:32) notes that in addition to organic sources of chert, cherts of inorganic origin should be of special interest in South Carolina because of the volcanic origin of the Carolina Slate Belt. It is probable that carbonate-rich sediments containing chert are present in the Piedmont. House and Ballenger (1976:127) refer to an opaque light to dark gray chert from 38FA118. This chert contains tiny crystal-filled seams and may have originated in these deposits. Although there are no known outcrops of chert in the project area, two types of chert with known sources outside the area have been identified: Coastal Plain chert and Ridge and Valley chert. Specimens that could not be identified or were too small to be identified were assigned to the category of “other” chert.

Coastal Plain Chert

The several cherts identified as Coastal Plain chert are part of the Oligocene Flint River Formation, which extends from northern Florida and southern Alabama to western South Carolina (Taylor and Smith 1978:232). This formation is exposed at several points along the Savannah River. Several prehistoric quarries are known in Allendale County in South Carolina and Georgia. The Rice site (38AL14) in South Carolina and the Theriault site (9BK2) in Georgia are good examples of Coastal Plain chert quarries downstream from the Gregg Shoals site.

Coastal Plain chert from the Allendale quarries varies from a mottled light gray-white to buff, yellow, or brown. The cortex is chalky and fossiliferous and small fossils

are also present within the nodules (House and Wogaman 1978:55). The effects of heat treatment on Coastal Plain chert were assessed by Anderson (1977) in a series of systematic experiments using samples of chert from 56 sites. Anderson found that as a result of thermal alteration, the flaking qualities of chert were greatly enhanced. This improvement in the knapping quality of chert may be due to the effect of heat on the fossiliferous inclusions (Taylor and Smith 1978:233). As a result of the thermal alteration, the chert may change color to include red, pink, dark brown, green, and blue tints (House and Wogaman 1978:55). Anderson's (1977) experiments demonstrated that this color change was variable.

Ridge and Valley Chert

This chert varies from light translucent gray to lustrous black. Cherts of similar structure and color are known from the Ridge and Valley physiographic province that runs along the Appalachian Mountains from northwestern Georgia and runs northeasterly through Tennessee to Pennsylvania (Taylor and Smith 1978:233). According to Faulkner and McCullough (1973:52-53), the Duck River, Fort Payne, and Cannon Limestone formations have weathered and chert is available in small nodules in outcrops, streams, or alluvial deposits.

In intensive work along the Little Tennessee River and the lower part of the Tellico River, Chapman and Kimball have begun to identify and classify various cherts of the Ordovician Knox Group (Chapman 1979:5). These cherts are fine grained, ranging from light gray to black. While thermal alteration appears to have improved the chipping quality of the Coastal Plain chert, experiments by Barbara Purdy suggest that thermal

alteration of Knox chert did not improve its workability (Chapman 1975:98-99).

However, further analysis of the lithic assemblages from the Howard and Calloway sites in the Tellico Reservoir sites suggests thermal alteration of artifacts (Chapman 1979:6).

Rhyolite

Formed from volcanic molten material or magma, rhyolite is also one of the common rocks of the Carolina Slate Belt (Butler and Ragland 1969:701). Flow banded, porphyritic, and plain rhyolite are identified.

Flow banded rhyolite

This material is characterized by bands of varying thickness. These bands vary from buff and gray to green in color (Novick 1978:427). Most of the bands are only a few millimeters thick and were formed by the flow of molten rhyolite. The bands are straight or undulating and become more visible as the material weathers (Novick 1978:427).

Porphyritic rhyolite

Dark to light gray, this rhyolite contains numerous phenocrysts. These phenocrysts are mineral crystals of quartz, feldspar, and plagioclase (Novick 1978:427). Porphyritic rhyolite weathers to a light buff or gray.

Plain rhyolite

Lacking distinct flow bands and phenocrysts, this rhyolite is dark green or black when freshly broken. Weathering produces a chalky texture and a light gray or buff color (Novick 1978:428).

Tuff

Two types of tuff are recognized: dacitic tuff and welded tuff.

Dacitic tuff

This tuff is formed from the metamorphosis and compression of the ash from volcanic activity. The fine-grained texture contains phenocrysts of quartz, feldspar, plagioclase. Tuff also weathers to a buff or tan color. Novick (1978:428) notes that the phenocrysts and air spaces formed as the ash drops may decrease the knapping quality of this material.

Welded tuff

This very fine grained green material resembles chert, although, as Novick (1978:428) points out, the flake scars are not so distinct. Unlike felsic tuff, welded tuff are formed by the compaction of a forming magma, often containing extremely fine lines of quartz (Novick 1978:428). Although rare, this material is found in small nodular form in the project area. Possibly representing an impure chert, it is one of the minor fine-grained rocks in the Carolina Slate Belt formation. Silicates are usually yellowish to yellowish tan in color.

Other igneous

A few specimens could not be specifically identified beyond being igneous in origin.

Other metamorphic

This category was used for specimens that could not be specifically identified but were metamorphic or metavolcanic material.

Unidentified raw material

Raw materials from Gregg Shoals and Clyde Gulley that could not be assigned to one of the previously defined categories were labeled as unidentified. Many of these flakes, pieces of shatter, or biface fragments are either non-local materials or rock types that occur only rarely locally. Often these fragments were too small to identify the raw material.

Chapter 5

GEOARCHAEOLOGY AND SITE STRATIGRAPHY

This chapter presents the methods and results of the geoarchaeological study of the Gregg Shoals site and other relevant areas along the Savannah River. The development of sediments and the stratigraphy of the site are also discussed. The sedimentation sequence for the Gregg Shoals site is based on the work of Sevogia (1985), Foss et al. (1985), and Upchurch (Tippitt and Marquardt 1984). These investigations are combined with the archaeological stratigraphy to produce a preliminary model of paleoenvironmental change for the upper Savannah River valley.

The study of paleoenvironmental change relies on data from several disciplines: geomorphology, pedology, and geoarchaeology. Geoarchaeology is the application of the methods and concepts of the earth science, such as geology, geography, soil science, to archaeological research (Butzer 1982:35). Normally considered useful in both prehistoric (Gladfelter 1977) and historical (Stein et al. 1983) archaeology, geoarchaeology attained special importance at the Gregg Shoals locality; truly a keystone site for the understanding of Holocene climatic changes and human adjustments to them in the Russell project area. At this location, profiles towering four meters above

the Savannah River bore mute testimony to 10,000 years of Holocene natural and cultural processes (Tippitt and Marquardt 1984).

Located on well preserved soils next to a major southeastern river, the sediments at the Gregg Shoals locality result from a combination of pedogenic, colluvial, and alluvial processes. Colluvial sediments have crept downslope from deeply weathered, clayey, acidic ultisols. Nearer to the river, sediments of both colluvial and alluvial origin have been combined, acted on by pedogenic factors, including bioturbation and illuviation, and partially eroded away. In spite of the complexity of these interacting factors, a coherent and plausible model of depositional processes has emerged (Tippitt and Marquardt 1984).

The soils and geomorphology of the Gregg Shoals location have been studied by John Foss Anthony Segovia and Sam Upchurch. The geoarchaeological investigation of the Gregg Shoals site area drew on the following techniques: aerial photography , extensive study of a four meter river cutbank profile, soil samples taken from archeological excavation profiles, magnetometric survey, and systematic coring of deposits.

The investigations at Gregg Shoals were complimented by extensive paleoenvironmental and geoarchaeological research conducted at Rucker's Bottom, a stratified site located downstream from Gregg Shoals (Anderson and Schuldenrein 1983, Schuldenrein 1996). The results of this work are particularly informative for understanding the sedimentation regime of the upper Savannah River because Rucker's Bottom and Gregg Shoals represent two different types of depositional activity. The

sediments at Gregg Shoals were strongly influenced by the effect of the confluence of Pickens Creek and the Savannah River; whereas, the sediments at Rucker's Bottom were influenced more by the direct activity of the Savannah River.

Based on his work at several locations along the Savannah River within the Russell Reservoir project area, Segovia (1981, 1985) identified four main episodes of deposition in the Savannah River Valley, with corresponding periods of downcutting. The first period of deposition "is represented by a thin (10-20 cm) layer of gravel capped by up to six meters of red, medium to fine-grained sands" (1980: 30). The period of downcutting that followed "removed most of the previous deposits but left some terraces along the sides of the valley" (1981: 30). Segovia correlates this period of downcutting with the Wisconsinian. This downcutting was followed by a second depositional period. Segovia has divided these four meters of deposits into four sections: thin gravels, coarse micaceous sand, peat in depressions in the bedrock, and a "thick (80 cm) paleo-B horizon which, together with a high concentration of artifacts immediately above, indicates a fairly prolonged period of stability, possibly 2000-3000 years long (1980: 31). An age of 6,500 BP has tentatively been assigned to these deposits. Three meters of medium to fine grained sands account for the third period of deposition. The deposits contain a second "poorly developed B horizon" (1980: 31). The fourth depositional episode extends from A.D. 1700 to the present. This episode is represented by 120 cm of sediments which Foss and Segovia agree appear to have resulted from the clearing of the uplands and modern agricultural practices. According to Foss, the surfaces occurring below elevations of 5 m above the river are covered with up to 1 m of recent

deposits (1980: 31). This information indicates the potential for buried surfaces on the lower terraces and floodplains.

The sediments at the Gregg Shoals site were also investigated by Sam Upchurch, Department of Geology, University of South Florida. Field and laboratory investigations included: surveys of Gregg Shoals and the Clyde Gulley floodplain, detailed analyses of sediments obtained in test pits, vibracore samples, and profiling of exposures along the Savannah River. The sites studied are immediately north and south of the confluence of Pickens Creek and the Savannah River. Both sites are located on high terraces bounded on the west by colluvial slopes with well-developed ultisols and on the east by the Savannah River. The geology of the Gregg Shoals site was determined by a combination of influences from the river and from adjacent uplands.

Drawing on the work of Upchurch (1984), Foss et al. (1985), and Segovia (1981, 1985), the sequence of Holocene sedimentation at the Gregg Shoals locality is presented as three major sedimentation episodes (Figure 5.1): Unit I (earliest), Unit II, and Unit III (most recent).

Sedimentation Unit I

Sedimentation Unit I is composed mainly of floodplain sediments that represent the first definite record of Holocene events and indicate that the floodplain was near river level and more extensive than today (Upchurch 1984). This could only have been the case if the river was underfit for the valley and meandering slightly. Three radiocarbon dates were obtained by the Thunderbird Research Corporation on peat from a backwater

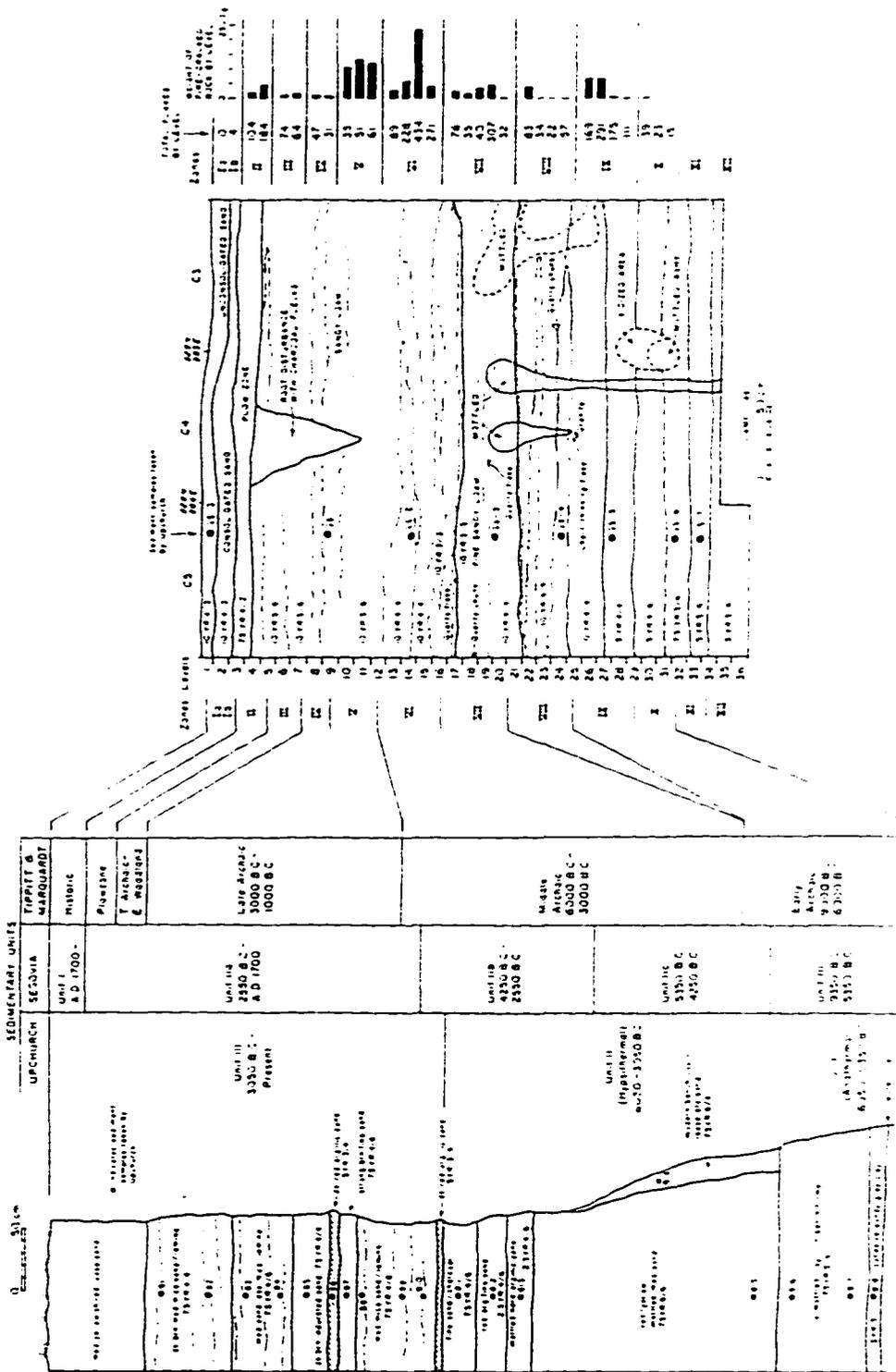


Figure 5.1 Archaeological and Geoarchaeological Profiles.

swamp remnant at the site of the Gregg Shoals Dam. These dates are: 10,370±140 BP and 10,000±140 (Segovia 1981. These dates are on Late Pleistocene organic sediment at the base of a profile a short distance upstream from the excavation unit. These dates marks the terminal Pleistocene and beginning of the Holocene. The associated boreal pollen suite (Sheehan et al. 1982) indicates a cool and moderately dry climate. In earliest Holocene times, occasional floods deposited sands, which gradually starved the peaty backwater swamp. As time passed, the river discharged more and more water, building up a higher floodplain and expanding the development of the levee.

In the Gregg Shoals site excavation, the early part of Sedimentation Unit I is represented by zones IX, X, XI, and XII (levels 25-36). Although cultural materials were sparse below Zone IX, and nonexistent below Zone X, good evidence for an Early Archaic horizon was found in Zone IX itself. The only significant amount of coastal plain chert known from the Gregg Shoals site excavations comes from Zones VIII, IX, and X.

Sediment analyses of samples from Unit I show a distribution typical of high-energy, back levee to fluvial deposition, and the archeological samples correlate well with comparable samples from the bank profile near the Gregg Shoals Dam. A small remnant of Unit I may appear at the bottom of backhoe trench 2 at the Clyde Gulley site, although it is possible that the coarse materials may result from alluvial processes associated with Pickens Creek. In short, Sediment Unit I, which includes the Early Archaic horizon at the Gregg Shoals site, results primarily from back levee to upper

terrace flood deposits, and may be attributed to the Anathermal episode as described by Antevs (1948, 1953).

Older sediments It is possible that sediments older than Sedimentation Unit I are preserved elsewhere in the upper Savannah River valley. Foss et al. (1985) report older soils, which are assigned to Units IVa, IVb, and U. None of these older soil units were definitely recognized on the floodplain at Gregg Shoals or Clyde Gulley. The upland soil and colluvium system would be assigned to Unit U according to their definitions and these older deposits represent the Pleistocene history of the valley.

During the Pleistocene, sea levels fluctuated greatly and the climate of the Carolina Piedmont undoubtedly fluctuated as much or more than it has in the last 10,000 years. Thus, with sea level lower and with periods of accelerated erosion during the latter part of the Pleistocene, the immediate area of Gregg Shoals was stripped of most of the record of these earlier deposits. The basal, cobble-rich sand at the dam site and in backhoe trench 2 may represent this erosional phase of the river (Upchurch 1984).

Sedimentation Unit II

The cool, relatively dry Anathermal represented by Unit I gradually gave way to the wetter, warmer Hypsithermal, a regime which dominated the mid-Holocene (ca. 7050-3,050 B.C.). There are ample data from sedimentation Unit II, suggesting it represents a wet, warm period (Upchurch 1984). First, the river continued to build increasingly higher terraces. Second, the levee and back-levee deposits are highly weathered and reflect a wet, warm, soil forming climate. Third, while present

throughout the Holocene, the colluvial fans are most extensive in sedimentation Unit II. Cultural material from sedimentation Unit II indicate Early to Middle Archaic occupation. Thus, the age indicated from cultural material and the climate indicated from the argillic horizons and colluvial fans suggest that sedimentation Unit II correlates with the warm, relatively wet Hypsithermal period of the Holocene (Upchurch 1984).

Geoarcheological studies have shown that the effects of the Hypsithermal differed markedly in different parts of the Eastern U.S. For example, in the Ozark Highlands, near the prairie-woodlands border, the Hypsithermal brought an increase in grassland communities at the expense of forests. Beginning about 7,050 B.C., at Rodgers Shelter, McMillan (1976:228) notes that faunal data "suggest that this trend peaked between 7,050 and 6,050 B.C., although it probably continued for another three millennia" In the Illinois River Valley, Brown and Vierra (1979) suggest that a shift in human occupation from uplands to the main river valley ca. 7,050 B.C. may represent reduced food supplies in upland environments. Neusius (1981, 1982) observes that a shift from the broad exploitation of small mammal species to an apparent concentration on white-tailed deer ca. 5,750 B.C. may be a reaction to increasing patchiness of resource distributions in the early stages of the Hypsithermal. Carlson (1979) explains the establishment of the first base camps at the Koster site ca. 5,350 B.C. by reference to deterioration of upland resources (see also Cook 1976; Lewis 1983:105). On the other hand, Asch et al. (1972) have argued that Hypsithermal effects would not have been very drastic in the Illinois River Valley due to the moderating influence of local relief.

It is clear that the Hypsithermal must be carefully documented and its real environmental effects projected with some confidence in each area before human adaptations can be put into perspective. Regional paleoenvironmental chronologies are as important as regional artifact chronologies if we are to advance our understanding of trends in mid-Holocene adaptations (Brown and Vierra 1983; Brown 1984).

During the time of deposition of Sedimentation Unit II, the river built increasingly higher terraces, and the levee and back levee deposits became heavily weathered in the warm, relatively wet climate. As noted, modern erosion of the Gregg Shoals site has probably removed over 50 m of horizontal deposits. Those sediments remaining may show more effects of colluvial fans and back levee deposits to the west of the site than would some of the lost deposits. Nonetheless, cultural materials are found throughout the argillic sandy loam deposits of archeological zones VI, VII, and VIII and are especially heavy in Zone VI (levels 12-15), which contain an abundance of firecracked rock, and in Zone VII (levels 16-22), which include diagnostic Middle Archaic bifaces. The most likely location for human habitation would have been the well drained levee crests. Although periodic floods would have affected the terraces and brought sheetwash down from nearby slopes, the most intense flood action would have been localized in back levee depressions, not on the riverfront levees.

Well developed B horizons characterize Unit II. These B horizons were formed by in situ weathering and illuviation (a process in which material is leached from one horizon and deposited in another). Parent materials for these sediments come from both colluvium and alluvium. Reddish brown bands of lamellae run horizontally throughout

the dark yellowish brown argillic sediments in the Gregg Shoals excavation (Figure 5.1). Sedimentation patterns are very similar at the Clyde Gulley site, where Unit II appears prominently as a layer of dark, cohesive sand and clay. A colluvial fan appears clearly in a section sampled perpendicular to the river near backhoe trenches 1, 2, and 3, where it overlies an earlier argillic, sandy sediment of riverine origin.

In summary, the influence of colluvial fans is pronounced in Unit II, and the warm, relatively wet climate of the mid-Holocene Hypsithermal produced weathered, illuvial soils in the riverside levee deposits. These sediments were occupied by Middle Archaic peoples who relied on local vein and crystal quartz for much of their tool manufacturing activities.

Sedimentation Unit III

Sedimentation Unit III is the most recent unit and developed in environmental conditions closely resembling those of today. This final sedimentation unit includes the present-day system of high terraces with well to moderately drained soils. The terraces include low levees; shallow, back-levee depressions; deep chutes and chute bars, and restricted colluvial fans. Soil development is moderate to poor in older sediments and non-existent in recent sediments. The terraces flood more frequently now than in the past because of alterations in the river system and watersheds, however, the impact of the flooding is similar. Sediment is transported onto the floodplain by erosion of terrace sediments downstream and it is deposited as thin veneers over the levees and in isolated sand waves in the back-levee depressions and chute system (Upchurch 1984).

Early human groups would have been able to occupy most of the terrace, but the levees would have been better drained during wet periods.

The sediments of Unit III may be generally called fine to medium micaceous sands. They represent levee deposition, but with less pronounced soil formation and fewer colluvial constituents than Unit II. They are yellowish brown in color, with some horizontal, reddish brown lamellae. However, the lamellae in Unit III are neither as thick nor as well defined as those of Unit II.

At the Gregg Shoals site, Unit III includes Zones I, II, III, IV, V, and possibly part of Zone VI, that is, the time period from the Late Archaic to the present. The attributing of Zone V to the Late Archaic is unambiguous because it contains diagnostic bifaces. Only Zones I, II, and III contain pottery, and in Zone III Terminal Archaic fiber-tempered ceramic sherds are found. Zone II (levels 3 and 4) is a dark brown sandy loam plowzone; cultivation ended at Gregg Shoals in the early 1930s. Early, Middle, and Late Woodland materials, both lithic and ceramic, are found in the plowzone. The 20 cm of brown, unconsolidated sand that constitutes Zone I have been deposited by means of alluviation in the historic period. Sediment analyses confirm a lack of fine grained components in Zone I; weathering processes have not had sufficient time to produce a fine fraction similar to those so well represented in Unit II.

At the Clyde Gulley site, Unit III is well represented as a zone of dark, cohesive homogeneous sand. It was also in Unit II that intact midden deposits of Woodland and Mississippian age were discovered. The thickness of these middens areas increases the relief in contours and appears to have influenced later sedimentation with well sorted

sand accumulating on top of the midden deposits. The cohesiveness of the compact, greasy, poorly sorted middens seems to have influenced the direction of deposition of sands being transported across the Clyde Gulley site within the flood chute located in the center of the terrace.

In general, these findings and interpretations are in accord with those of Foss (1981) and Segovia (1981). However, Segovia argues that the time period from ca. 5,350 B.C. to A.D. 1700 can be partitioned into three episodes of sedimentation separated by two interstadial discontinuities. In Segovia's model, a pulse of deposition ca. 5,350-5,150 B.C. is followed by a period of relative stability ca. 5,150 to 4,250 B.C., a unit he calls IIc (see Figure 5.1). In Unit IIb, a pulse of deposition ca. 4,250-3,850 B.C. is followed by a stable period of 1,300 years. Unit IIa follows, with a depositional pulse from 2,550 to 2,050 B.C. being followed by some 3,600 years of relative stability. The stability of Unit IIa was disrupted by greatly increased deposition as a result of post-contact agricultural practices; the historic period constitutes Unit I (see Segovia 1981:44-50).

The analysis by Upchurch agrees with the underfit stream valley depicted for late Pleistocene time and the increasing rate of river discharge. However, Segovia suggests that the terrace was deposited by the river while at a level higher than it is today. Since there is no textural difference between mid-Holocene terrace deposits and modern flood deposits that have been produced by the stream during modern conditions, such high permanent water levels may not have been necessary. Upchurch (1984) argues that if river levels were as high as predicted, more back-levee swamp deposits would be

preserved. The absence of these deposits, which indicate poorly drained, river levee deposition, and the presence of deposits similar to modern, well drained, high terrace deposits indicate that river levels are not normally at terrace level.

Upchurch (1984) agrees with Segovia as to the general climatic pattern represented, and his temperature curve shows a Hypsithermal event at the same stratigraphic time as predicted by the Gregg Shoals data. However, Upchurch (1984) indicates that the colluvial fans and textural modifications in sediments of those fans indicate a different precipitation pattern. Segovia predicts higher precipitation in the post-Hypsithermal interval than in the Hypsithermal, yet he indicates higher sedimentation rates during the dry intervals than during the wet. Upchurch's analysis interprets the textural data as indicating wetter climates in the Hypsithermal.

The absence of sedimentary structures in most of the strata, the absence of definite textural trends that might indicate systematic changes in stream velocity, level, or thalweg position, and the lateral facies relationships of colluvial fans and fluvial deposits suggest that flooding was episodic and not related to long term variations in water levels in the river (Upchurch 1984). Thus the lack of sedimentary structures would indicate intensive bioturbation within intervals of deposition, not between them. The lack of systematic trends in texture suggest that the bioturbation was intense and that the scale of fining-upward sequences is at a spacing near or smaller than the sample interval. The colluvial fans appear to show toes that are affected by slope wash and that grade into fluvial deposits. Thus, it appears that there may have been periods when the river carried more water than today, and thus, had a level higher than today, but the terraces were not

inundated. Instead, it appears that there were intervals of time when flooding was more frequent (Upchurch 1984).

The data from Gregg Shoals reveals no evidence of textural trends that would mark such long term variations, e.g., changes in stream velocity, stream level, or channel positioning. Furthermore, the data clearly document episodic activity of colluvial fans and fluvial deposition. Whereas it is quite likely that flooding was more frequent in some episodes than in others, in fact, it is argued here that the Hypsithermal episode in the Piedmont may have been periodically wetter as well as warmer than today. There is no conclusive evidence that would not confirm a hypothesis of episodic flooding. Intensive bioturbation working on each interval of deposition would account for the singular lack of sedimentary structures noted throughout the strata.

In summary, three major sedimentation units represent the past 10,000 years at the Gregg Shoals locality. During the first stage of sedimentation, the river was underfit for the valley, and could have meandered only slightly. The fact that deposits of sand gradually starved the backwater swamp indicates a transition to higher discharge and levee building ca. 8,350 B.C. At the Gregg Shoals and Clyde Gulley sites, the sequence begins with Unit I; no evidence of the peaty backwater swamp is found there, if it ever existed.

Sedimentation Unit II represents the Hypsithermal episode, a warmer and relatively wetter time relative to the preceding Anathermal of Unit I. Sediments of Unit II are characterized by very well developed B horizons, resulting from weathering and illuviation. The prominent effects of colluvial fans are revealed by sediment analyses.

The third and final episode, Unit III, represents a return to more restricted colluvial fans, low levees, and shallow, back levee depressions that also functioned as flood chutes. This unit represents environmental conditions closely resembling those of today.

Chapter 6

ARTIFACTS AND INTRASITE SPATIAL ANALYSIS

This chapter contains a detailed description of the cultural occupations identified and the associated artifact assemblages recovered during the field investigations at the Gregg Shoals site (9EB259). The temporal association of the cultural occupations and diagnostic artifacts used in their definition are discussed. This chapter also includes the debitage analysis, assemblage characterization, and the assessment of the density and diversity of the temporal occupations identified.

DESCRIPTION OF ARTIFACTS BY ZONE IN OPERATION A

The artifacts and features from the large block excavation unit (Operation A) are presented in this section, organized by natural, stratigraphically defined zones. Where possible, traditional point type names are used in the identification of hafted bifaces. Several hafted bifaces recovered do not easily fit clearly into any currently defined types. These bifaces have been assigned an arbitrary category, designated by a letter, and a description of the technological and morphological characteristics is provided. The diagnostic artifacts and associated dates used in the assignment of temporal association

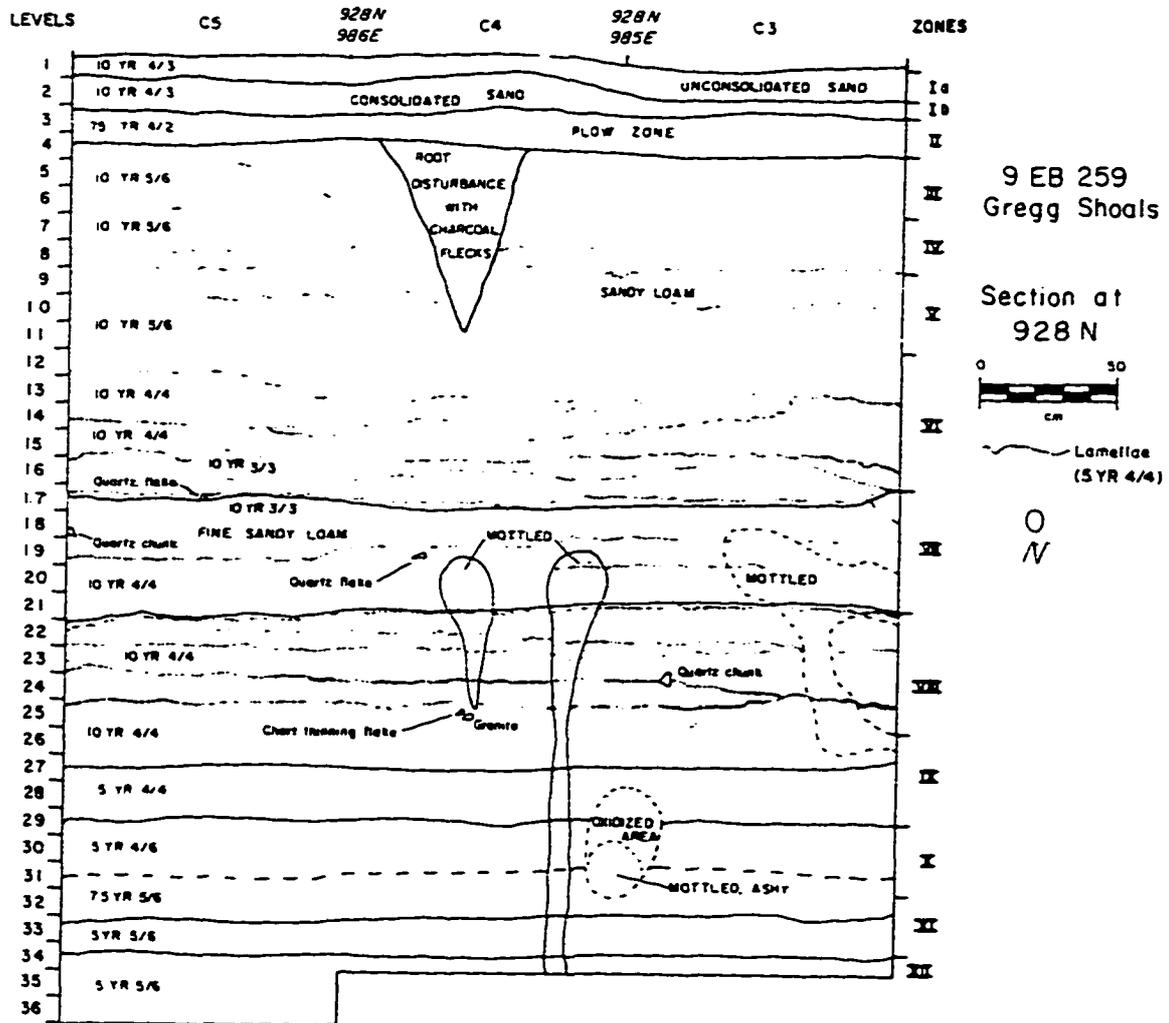


Figure 6.1 Final Profile at the Gregg Shoals Site (9EB259).

and cultural period can be found in Chapter 3. A description of the geological position and sedimentation for each zone is provided in Chapter 5. The position of each culturally and geologically defined zone and its relationship to the 10 cm arbitrary excavation levels can be seen in the 3 meter profile in Figure 6.1. Definitions and descriptions of lithic debris categories and raw material groups can be found in Chapter 4. All measurements presented are in millimeters.

Zone I

Zone I included arbitrary levels I and 2 and is subdivided into Ia and Ib (Figure 6.1). No cultural material was recovered from Ia, modern surface. In Ib, cultural material was very sparse and restricted to the lower five centimeters of this zone.

Lithics

Debitage The debitage from this zone consists of 55 small other flakes, 75% vein quartz and 25% crystal quartz.

Bifaces Only one biface fragment was recovered from this Zone I. This artifact was a vein quartz biface tip, was plotted at the bottom of this zone.

Randolph Stemmed

This hafted biface (Coe 1964: 49-50) is characteristically small, with a tapering stemmed haft element (Figure 6.2, A). Randolph bifaces are generally small and crudely manufactured. Flake removal is random and irregular. The method of manufacture often leaves evidence on both surfaces that the biface was constructed on an old flake or

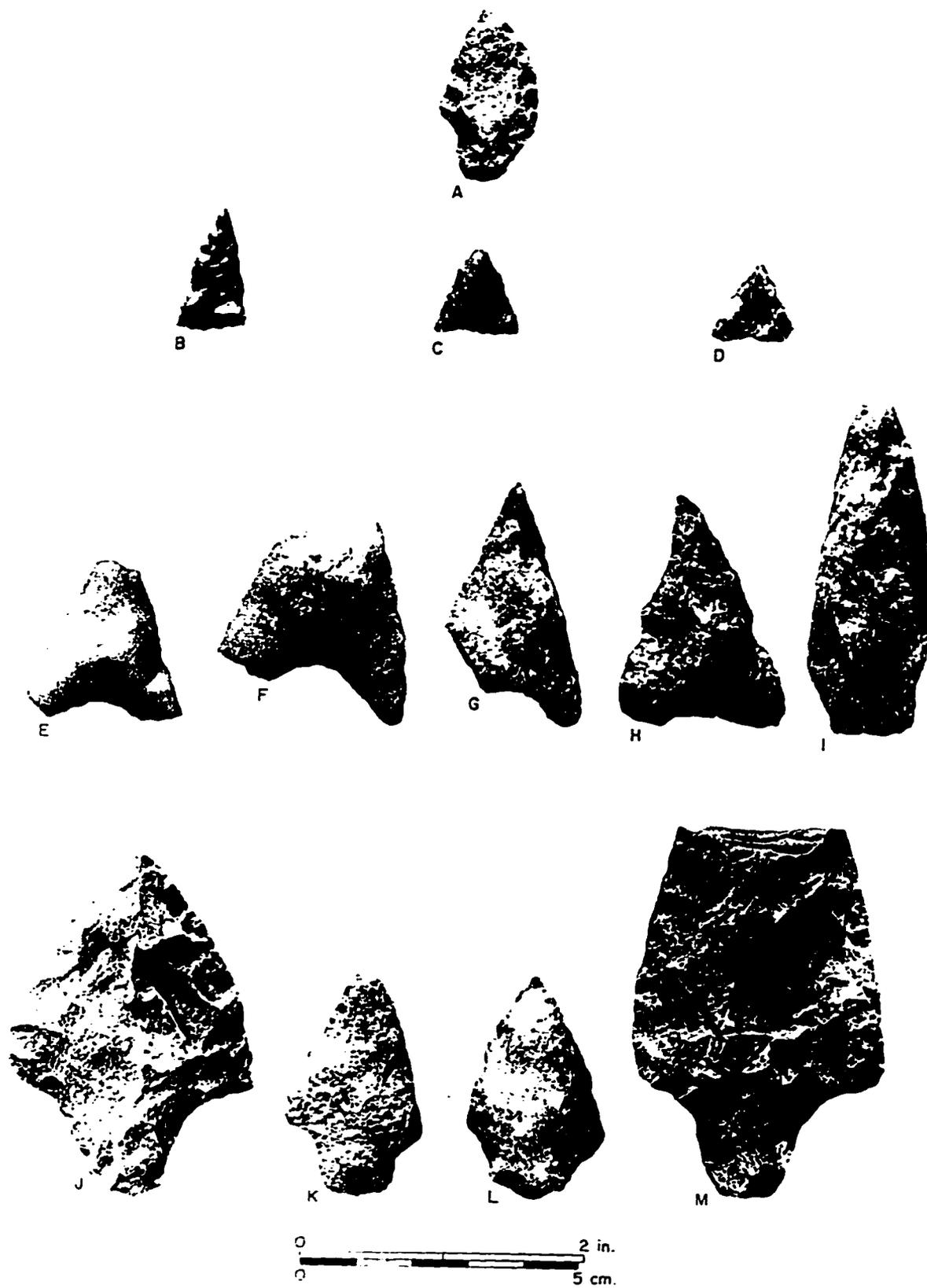


Figure 6.2 Hafted Bifaces from Zones I, II, and III.

biface fragment with weathered surfaces. Manufacture of this point may have continued into the eighteenth century (Coe 1964:50).

One Randolph biface made of view quartz was recovered from Zone I (Table 6.1). The temporal association for this biface is Late Woodland through A.D. 1700 (Coe 1964).

Table 6.1 Zone I, Randolph Biface Dimensions

Biface element	size in mm
Blade Length	20.8
Stem Height	11.1
Length	31.9
Width	17.1
Thickness	6.2

Caraway Triangular

These small, well made triangular points (Coe 1964:49) have straight sides and straight to slightly concave bases (Figure 6.2, A-D). The morphology of these points ranges from equilateral to isosceles triangles. The thin, well shaped lateral margins indicate that the points were probably manufactured on thin flakes, with final edge shaping accomplished by pressure flaking.

One Caraway Triangular made of crystal quartz was recovered from Zone I (Table 6.2). The temporal association for this biface type is Late Woodland to Early Historic (A.D. 500 - A.D. 1700).

Table 6.2 Caraway Triangular Dimensions

Biface element	size in mm
Blade Length	19.7
Basal Width	15.3
Thickness	4.1

Pottery

A total of 122 sherds was recovered from this zone (Table 6.3). The majority of these sherds were restricted to the lower five centimeters of this zone. All of the pottery contains coarse quartz temper. Only one small plain surfaced rim was recovered. Although 45% of the sherds are either indeterminate small or unidentifiable, decorated sherds with recognizable surface treatments were recovered Temporal Association: Late Woodland to Historic (A.D. 500 - A.D. 1700)

Table 6.3 Zone I Pottery by Surface Treatment

Surface Treatment	n	%
Complicated Stamped	9	7.0
Simple Stamped	2	2.0
Fabric Impressed	2	2.0
Plain Surface	53	44.0
Unidentifiable	20	16.0
Indeterminate Small	36	29.0
Totals	122	100.0

Zone II

Zone II (Figure 6.1) contained several charcoal stains and irregular stains associated with firecracked rock. Direct association of the artifacts with these areas is tenuous because this zone contains the plowzone. The artifacts were not evenly distributed throughout this zone and there were general areas of flake, core, and pottery concentrations. Zone II included arbitrary levels 3 and 4.

Lithics

Debitage: Zone II yielded 1,727 flakes and 1,333 pieces of shatter. The quantity and technological diversity of the flakes increase. The predominant raw material is quartz (71% vein quartz and 23% crystal quartz), but rhyolite and chert are also represented.

Cores: Both random and bipolar cores are found in Zone II. Twenty-one of the random cores and core fragments are vein quartz and 17 are crystal quartz. All 24 bipolar cores and core fragments are crystal quartz.

Preforms: There are four preforms in this zone and all are vein quartz. Two of these appear to be small triangular preforms and one is a Yadkin preform.

Other Bifaces: These four biface fragments (1 biface tip, 2 midsections, and 1 base) are portions of completed or nearly completed bifaces that were broken and discarded or were broken in the later stages of manufacture.

Yadkin Large Triangular

Four specimens were identified as Yadkin Large Triangular (Figure 6.2, E-H). These are large triangular bifaces with straight sides. The basal element varies from slightly concave to deeply concave. All four of these Yadkins are made of vein quartz and are uniform in size and thickness. The main variation is blade length (Table 6.4). These bifaces appear to have been produced from an ovate or triangular preform by random percussion flaking. The edges show evidence of some finer retouch or resharpening, which may account for the variation in blade length. The Yadkin is associated with the appearance of cordmarked and fabric impressed pottery in the Southern Piedmont (Coe 1964: 49). The temporal association of Yadkin Large Triangular bifaces is Early to Middle Woodland (200 B.C. - A.D. 500)

Table 6.4 Zone II, Yadkin Large Triangular Dimensions

Biface element	Range	Mean	S.D.
Blade Length	32.0 - 43.5	40.8	6.8
Blade Width	28.6 - 34.9	30.8	2.8
Thickness	7.6 - 12.1	10.1	1.9

Badin

The Badin (Coe 1964: 45) is a large, crude Early Woodland (1,000 B.C. - 200 B.C.) triangular biface. The lateral margins are straight to excurvate and the base is straight to slightly concave, possibly thinned (Table 6.5). While the one specimen from Zone II is triangular with a straight base, it is not large or crudely made. It is, however,

within the size range of similarly shaped bifaces recovered during the survey and identified as Badin by Taylor and Smith (1978:269). This biface appears to have been made on a large flake and shaped by pressure flaking. The raw material is classified as other igneous.

Table 6.5 Zone II, Badin Dimensions

Biface element	size in mm
Blade Length	33.4
Blade Width	20.2
Thickness	6.0

Caraway Triangular

There are three whole triangular points in Zone II. Two of these bifaces are made of crystal quartz and one is made of vein quartz. Several biface fragments (2 tips and 3 bases) are probably Caraway Triangulars that were broken or discarded during manufacture (Table 6.6). See type description above.

Table 6.6 Zone II, Caraway Triangular Dimensions

Biface element	Range	Mean	S.D.
Blade Length	15.0 - 25.0	18.7	5.5
Blade Width	14.7 - 17.5	15.8	1.5
Thickness	4.5 - 4.7	4.6	0.1

The morphology and method of manufacture of these small triangular bifaces are consistent. There is more variation in blade length than in the other measurements. This may be a result of raw material, flake preform size or, as Coe (1964:49) has suggested, it may be temporal variation.

Hammerstone: One small quartz cobble hammerstone was recovered in the lower section of this zone.

Pottery

Although most of the sherds are small (Table 6.7), Zones II and III both include a few large, well-preserved sherds that made surface treatment assessments more reliable and provided some information on many of the smaller sherds. Sherds with distinguishable surface treatment accounted for 16% of the pottery from this zone. The majority of the decorated sherds exhibited either curvilinear or rectilinear complicated stamped designs. In many cases it was possible to determine that only some type of complicated stamped design was present. Most of the curvilinear complicated stamped designs are similar to Early Swift Creek. The rectilinear complicated stamped designs are possible Late Swift Creek, dating to the Late Middle to Late Woodland, A.D. 200-800. The simple stamped pottery is very homogeneous in color, paste texture, temper material, and temper size. The medium texture paste is smooth, with quartz temper varying from .5 to 1 mm in diameter. The temper density varies from about 10 to 20%. Two tetrapods and several large body sherds indicate that most of the simple stamped pottery from this zone could have come from one Cartersville Simple Stamped

tetrapodal jar. A number of the Unidentifiable and Indeterminate Small and Plain surface specimens have similar paste and temper characteristics. Although composing only a small percent of the total number of sherds, two rims and several body sherds of Dunlap Fabric Impressed in very good condition were recovered from the lower part of this zone.

Table 6.7 Zone II Pottery by Surface Treatment

Surface Treatment	Frequency	Percentage
Complicated Stamped	277	11.5
Simple Stamped	69	2.9
Check Stamped	9	0.4
Cord Marked	13	0.5
Fabric Impressed	6	0.3
Plain Surface	991	41.4
Unidentifiable	346	14.5
Indeterminate	682	28.5
Totals	2,393	100.00

Zone III

Zone III (Figure 6.1) included arbitrary levels 5 and 6 and disturbances due to plowing is not visible in this zone. Several features and artifact clusters were mapped in the lower portion of this zone.

Lithics

Debitage: A total of 1,371 flakes were recovered from Zone III. Although vein quartz (70%) and crystal quartz (13%) are the predominant raw materials, the amount of rhyolite (13%) and argillite (3%) increases when compared with the raw material types in Zone II.

Category I: Contracting stem, broad blade

This category contains two large broad blade bifaces with straight to convex lateral edges and haft elements that are long and gently contracting (Figure 6.2, J, M). The bases of these haft elements are relatively straight and retain attributes of old striking platforms. The flat bases may also represent wear damage that occurred during use while the artifacts were hafted.

The blades exhibit numerous hinge fractures, indicating thinning and edge curation by percussion flaking. As the dimensions demonstrate, these two specimens are very similar except for blade length (Table 6.8). The lateral margins of the biface with the shorter blade have been reduced by resharpening, and hinge fractures are numerous on both faces. Under magnification, both bifaces show varying amounts of edge damage and small, shallow flake scars. Both of these bifaces are made of flow banded rhyolite.

Temporal Association: Late Archaic to Early Woodland (3000 - 1000 B.C.)

This category of bifaces is similar to the Gary type, as described by Suhm and Krieger (1954:430-431). Although these bifaces are larger, the overall morphology is also similar to Stalling's Island Type III (Bullen and Greene 1970:24). Bifaces similar to these have been found temporally associated with Early Woodland pottery (ca. 1350

B.C.) at the Allen Mack site in Orangeburg County, South Carolina (Parler and Lee 1981).

Table 6.8 Zone III, Category 1 Biface Dimensions

Biface element	Range	Mean	S.D.
Blade Length	41.1 - 75.2	58.65	23.40
Stem Height	17.9 - 18.1	18.0	0.14
Stem Width	9.0 - 10.1	9.5	0.77
Maximum Length	60.0 - 93.0	76.5	23.33
Maximum Width	43.3 - 43.5	43.4	0.14
Maximum Thickness	11.2 - 12.3	11.75	0.77

Category 2, Small, straight stem and base

The blade portion of these artifacts vary from slightly convex to straight (Figure 6.2, K). Some specimens also exhibit concave or asymmetrical lateral margins. The distinct haft element has parallel sides, producing a clear juncture between blade and stem. The base may be straight or slightly concave. Many of the bases are flat and unmodified, retaining a striking platform. The base of the specimen from Zone III is straight, and it appears to be made on a rhyolite flake. The blade is asymmetrical. One margin is straight and the other is concave, with step-fractures along both faces (Table 6.9).

Table 6.9 Zone III, Category 2 Biface Dimensions

Biface element	size in mm
Maximum Length	31.9
Maximum Width	17.1
Maximum Thickness	6.2

The morphology and method of manufacture of specimens assigned to this category are similar to small stemmed bifaces described by Keel (1976:126-127, 194-195) as Plott Short stemmed and Otarre stemmed. Chapman (1979) also reports similar small stemmed points from the Calloway Island site. The temporal association assigned to these bifaces is Terminal Archaic to Early Woodland (3,000 B.C. - 1,000 B.C.)

Category 3, Small, corner removed, short contracting stem

The majority of the bifaces assigned to this category have convex to slightly straight lateral margins (Figure 6.2, L). The specimen from Zone III has slightly convex blade edges. These small corner removed bifaces have weak shoulders with the lower portion of the blade gradually contracting to form a small short stem (Table 6.10). The proximal end of the contracting stem may be rounded or convex. Manufactured from preforms by percussion flaking, many of these bifaces exhibit irregular lateral margins. Hinge and step fractures are infrequent, seeming to indicate little apparent concern for maintenance of even blade edges. The specimen from Zone III is made of vein quartz.

Table 6.10 Zone III, Category 3 Biface Dimensions

Biface elements	size in mm
Blade Length	26.6
Stem Length	13.2
Maximum Length	39.8
Stem Width	13.4
Maximum Width	24.1
Maximum Thickness	10.0

The bifaces assigned to this category are similar to Swannanoa stemmed, as described by Keel (1976:196-198) and date to the Late Archaic to Early Woodland (3,000 - 1,000 B.C.)

Category 4, Short stemmed, lanceolate blade

This short, parallel-sided stem biface of rose vein quartz is not well formed and the juncture between stem and blade section is not distinct (Figure 6.1, I). The base is straight and has not been thinned. Although the lateral margins are straight, one margin does have more small, shallow flake scars and edge damage (Table 6.11). The blade has a moderate median ridge.

Table 6.11 Zone III, Category 4 Biface Dimensions

Biface element	size in mm
Maximum Length	60.0
Maximum Width	22.4
Maximum Thickness	11.2

Yadkin Large Triangular

Two bifaces classified as Yadkin Large Triangular (Coe 1964:49) were recovered in the upper 1-3 cm of Zone III (Table 6.12). Both of these bifaces are made of vein quartz and exhibit the same morphological and technological attributes as the Yadkin Large Triangular described for Zone II.

Table 6.12 Zone III, Yadkin Large Triangular Dimensions

Biface element	Range	Mean	S.D.
Blade Length	31.0 - 45.5	38.2	10.3
Blade Width	27.4 - 35.0	31.2	5.4
Maximum Thickness	7.0 - 10.8	8.9	2.7

Other Bifaces: All four biface fragments assigned to this category (Table 6.13) are portions of artifacts in the final stage of production or completed broken artifacts.

Table 6.13 Zone III, Biface Fragments by Raw Material

Biface element	Rhyolite	Quartz	Chert
Biface Tip	1		
Biface Midsection	1	1	
Biface Base			1

The well made biface basal portion is Coastal Plain Chert. This base is similar to several Woodland stemmed biface varieties. The maximum width is 12.9 mm and the maximum thickness is 5.0 mm. The rhyolite tip and midsection are of the same material and manufacture as the two contracting stem hafted bifaces from this zone.

Pottery

Zone III is the last pottery-bearing zone in the Gregg Shoals stratigraphic sequence (Table 6.14). The upper 10 cm of this zone contains fewer sherds but with relative

proportions of plain and decorated sherds similar to those of Zone II, levels 3 and 4. The lower 10 cm of the zone contains even fewer sherds. There is one very notable exception. That is the appearance for the first time of fiber tempered pottery. Eight fiber tempered, Stalling's Island Plain sherds were recovered in association with the contracting stem bifaces, steatite bowl fragments, hammerstones, cores, and charcoal stains mapped in the bottom of this zone. Two of the fiber tempered sherds are rims. Although the sherds are slightly thicker at the rim, the body sherds vary from 10.0 mm to 14.0 mm in thickness.

The lower part of this zone contained 5 pieces of a steatite bowl (2 basal sections, 1 rim and 2 body portions). Two of these large pieces are the sides and base of a bowl, and join to form three-quarters of the bowl base. The base is 13.6 mm thick. The rim section is small and represents the rounded lip of the bowl. The base, rim, and body portions indicate a well made steatite vessel 10 cm to 11 cm in diameter at the base.

Features

The features and artifacts mapped in Zone III are presented in Figure 6.3. Three of the charcoal stains are associated with firecracked rock. In association with one of these stains are three vein quartz cores, three chunks of good quality vein quartz, and a corner removed biface with a weak, short contracting stem. Two contracting stem hafted bifaces (flow banded rhyolite) and two biface fragments (also of flow banded

Table 6-14 Pottery Surface Treatment by Excavation Level

SURFACE TREATMENT	LEVEL												TOTALS	
	2		3		4		5		6				n	%
	n	%	n	%	n	%	n	%	n	%	n	%		
Plain Surface	53	43.4	458	43.7	533	39.6	202	35.4	16	30.8	1262	40.2		
Complicated Stamped	9	7.4	117	11.1	160	11.9	70	12.3	5	9.6	361	11.5		
Simple Stamped	2	1.6	31	3.0	38	2.8	14	2.4	2	3.8	87	2.8		
Check Stamped	0	0.0	2	0.2	7	0.5	4	0.7	0	0.0	13	0.4		
Cord Marked	0	0.0	6	0.6	7	0.5	7	1.2	0	0.0	20	0.6		
Fabric Impressed	2	1.6	0	0.0	6	0.4	0	0.0	0	0.0	8	0.3		
Plain Fiber Tempered	0	0.0	0	0.0	0	0.0	0	0.0	8	15.4	8	0.3		
Indeterminate Small	36	29.5	289	27.6	393	29.2	204	35.7	12	23.1	934	29.7		
Unidentifiable	20	16.5	145	13.8	201	15.1	70	12.3	9	17.3	445	14.2		
Totals	122	100.0	1048	100.0	1345	100.0	571	100.0	52	100.0	3138	100.0		

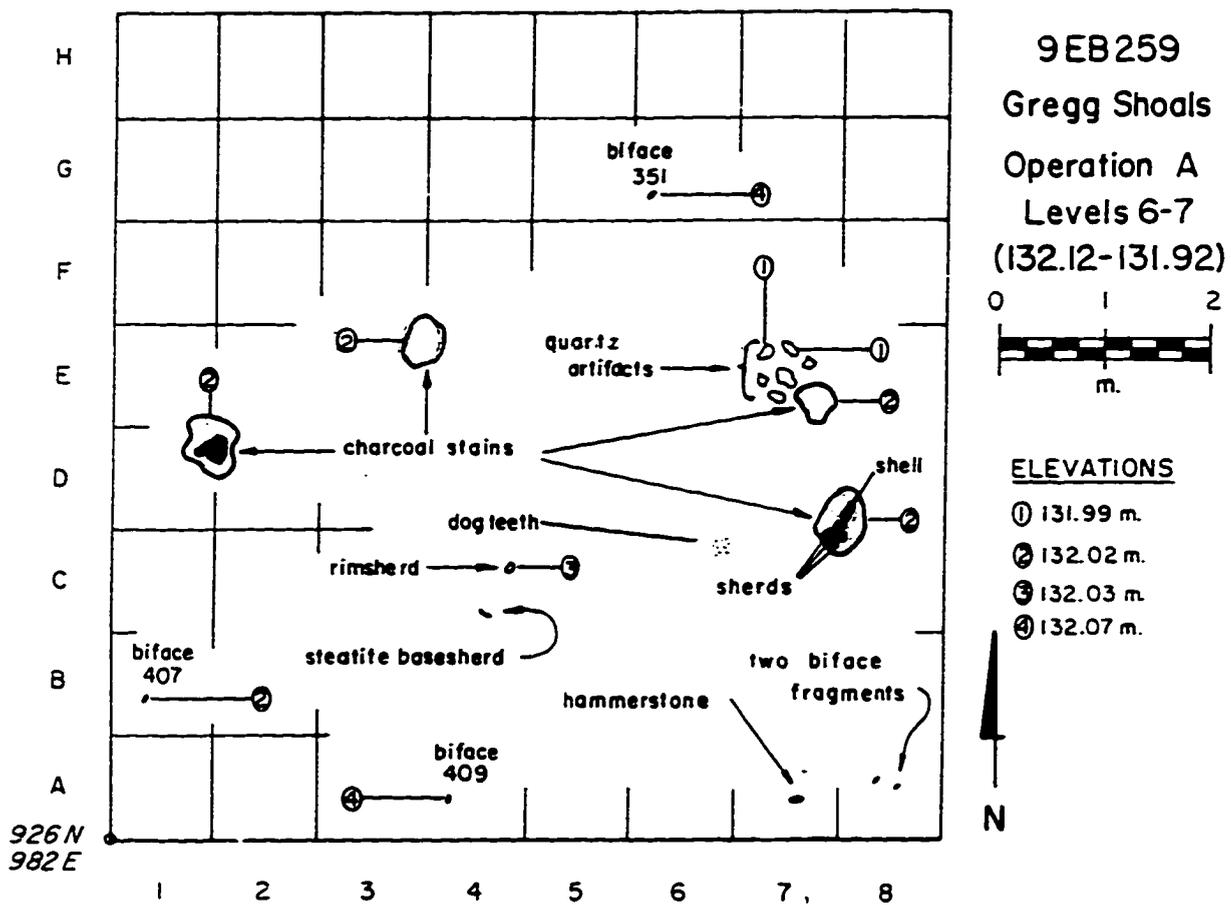


Figure 6.3 Features and artifacts from Zone III.

rhyolite) were mapped along the southern section of the 8 x 8 m unit. The small, straight stemmed biface was also plotted in this same area.

Other artifacts in association with these features are 8 fiber tempered plain sherds, 5 large pieces of a steatite bowl, 1 hammerstone, and several dog (*Canis familiaris*) teeth. The teeth represented are: 3 mandibular teeth, left mandible; 2 mandibular teeth, right mandible; and 1 maxillary tooth, left maxilla. Several fragments of premolars, a possible incisor, and portions of either the maxillary or mandibular alveolar were recovered as well as small fragments of unidentifiable bone. Comparative analysis with teeth of a contemporary dog skeleton of known size and weight suggests a medium sized dog, 25 to 30 pounds.

Zone IV

The artifact and debris density drops significantly in Zone IV (Figure 6.1). The majority of the debitage recovered in this zone came from the upper 4 to 5 cm. Zone IV consisted of arbitrary levels 7-8.

Lithics

Debitage While vein quartz remains a significant raw material (64%), the amount of crystal quartz is greatly reduced (6%).

Flake Tools: The debitage includes one utilized flake and one rhyolite flake with a small area of bifacial retouch.

Cores: Two vein quartz random cores were plotted in the upper part of this zone.

Other bifaces: Although no diagnostic bifaces were recovered in this zone, the tip of a well-made biface was recovered from a tree root disturbance that extended into this zone. All stains, root disturbances and any other questionable areas were assigned separate locus numbers and the excavation unit was horizontally subdivided until the nature and extent of the stains or disturbances became clear. These loci were excavated and water screened separately.

Steatite Vessel Fragments

Although no ceramic material was recovered from this zone, there were nine very small fragments of steatite in the upper portion of the zone.

Zone V

Zone V consisted of arbitrary levels 9, 10, and 11 (Figure 6.1). The majority of the artifacts, debitage, and all the features are contained within levels 9 and 10. The debitage density was very light in the lower part of the zone.

Lithics

Debitage: The raw material from this zone includes vein quartz (78%), crystal quartz (4%), rhyolite (12%), argillite (3%), and chert (3%). Of the 1,182 flakes recovered, 6% are biface thinning flakes and the remainder are classified as other flakes (Table).

Cores: Three vein quartz cores were plotted in association with a rock feature in this zone. All three cores exhibit random flake removal.

Hafted Bifaces: A total of 12 hafted bifaces were recovered from this zone (Figure 6.4).

Category 1 Small, straight stem, straight base

The attributes of the eight specimens in this category are described in the discussion of Zone III. The bases of two of these specimens (1 chert, 1 rhyolite) retain evidence of an old striking platform (Figure 6.4, A, C). Two of the quartz bifaces have flat bases that resulted from a lateral snap while hafted (Table 6.15). The small proximal end of a quartz biface stem was recovered from the one meter unit adjoining the unit where one of these quartz bifaces was plotted. The base joined perfectly with the flattened base of the biface. It is probable that the base snapped during use and was discarded.

Table 6.15 Zone V, Category 1 Biface Dimensions

Biface element	Range	Mean	S.D.
Blade Length	25.5 - 38.1	32.02	4.62
Stem Length	7.1 - 14.1	10.46	2.44
Maximum Length	34.5 - 49.0	42.42	5.34
Stem Width	12.4 - 18.7	15.08	1.54
Maximum Width	24.5 - 37.1	29.21	4.00
Maximum Thickness	6.4 - 11.0	8.96	1.61

Category 2, Small, corner removed, short contracting stem

The morphological and technological attributes of this category are described for Zone III. Three of the specimens from Zone V are whole (Figure 6.4, E). Most of the

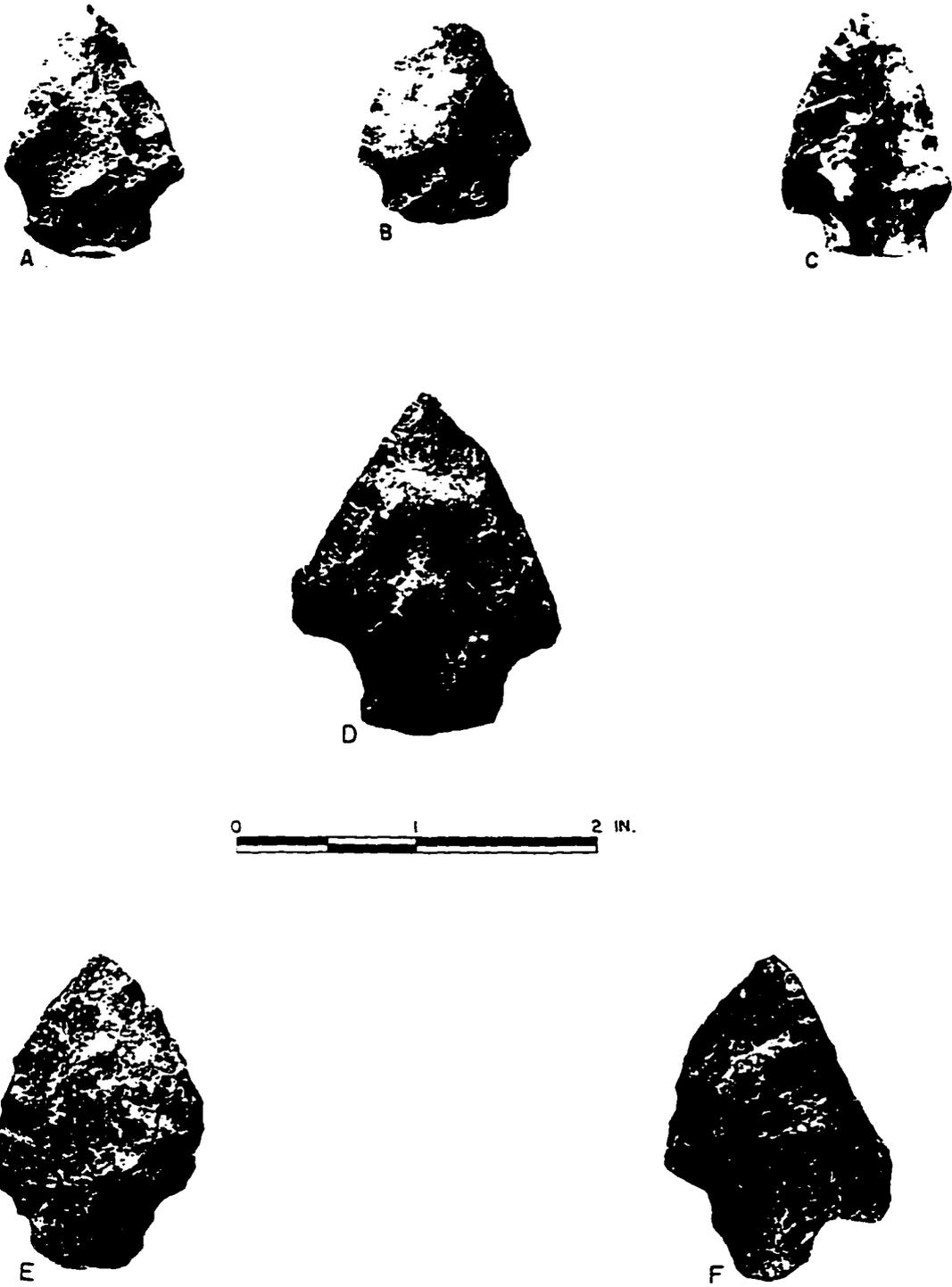


Figure 6.4 Hafted Bifaces from Zone V.

upper blade portion of another biface is missing; therefore, it is not included in the blade length or maximum length measurements (Table 6.16). Two of these bifaces (1 quartz and 1 rhyolite) have flat bases. These are the result of lateral snapping while the bifaces were hafted.

Table 6.16 Zone V, Category 2 Biface Dimensions

Biface element	Number	Range	Mean	S.D.
Stem Length	4	9.0 - 13.0	10.00	1.65
Blade Length	3	19.7 - 41.0	26.83	8.01
Maximum Length	3	28.7 - 46.1	37.10	8.72
Stem Width	4	13.4 - 17.5	15.82	1.99
Maximum Width	4	20.3 - 27.1	24.18	2.83
Maximum Thickness	4	7.9 - 10.2	9.38	1.01

Preforms: The one preform from this level is made of vein quartz and is similar to the bifaces in Category 2. The biface is crude and has deep, irregular flake scars. It is difficult to determine whether it is a preform that has not been thinned and shaped or an aborted attempt at biface manufacture.

Other bifaces: All six of these biface fragments are made of vein quartz. Three of these fragments are the tips of well-formed bifaces. Whether they were broken in manufacture or use is unknown. Two of the basal fragments appear to be sections of ovate or oblong bifaces. These are possible preform fragments. One basal fragment is from a small contracting stem biface. It is possible to join one such fragment with a

biface, but this small base does not join with any of the bifaces that are missing the base of the stem.

Hammerstones: A total of 17 hammerstones was recovered from Zone V. All of the hammerstones are medium sized quartz river cobbles.

Steatite

Levels 9 and 10 yielded 7 pieces of steatite. All of these are fragments of steatite cooking disks. The fragments exhibit either the outer edge of the disk and the edge of the perforation or just a portion of the perforation.

Features

A rock feature and two charcoal stains were mapped in level 10 within this zone. The rock feature contained 7 chunks of vein quartz (1,560g) and 2 large pieces of fire-reddened granite (1,480g). Although the quartz has reddened areas along some margins, it was not cracked and crumbling. The matrix around the rock cluster was discolored but did not contain distinct pieces of charcoal. However, there were two charcoal stains very near the rock cluster. One stain was 45-56 cm in diameter, 23 cm deep and the other was 25-30 cm in diameter, 15-20 cm deep. Five of the hafted bifaces came from the area around and between the stains and the rock features.

Zone VI

Encompassing arbitrary levels 12, 13, 14, and 15, this zone contained no features or hafted bifaces (Figure 6.1). The debitage and biface fragments are concentrated in level 14. This level also contained a large amount of firecracked rock.

Lithics

Debitage: The debitage in this zone was concentrated in the lower part of level 13 and level 14. Ninety-six per cent of the 1,583 flakes are vein quartz and the remainder are crystal quartz.

A quartz flake concentration was located in a 2.5-meter square area along the western edge of the excavation block. The contents of the concentration are listed below in Table 6.17.

Table 6.17 Zone VI, Feature 5 Debitage

Tool category	n	%
Primary flakes	118	45.0
Secondary flakes	8	3.0
Biface thinning flakes	10	3.8
Utilized flakes	2	0.8
Other flakes	118	45.0
Retouched flakes	2	0.8
Preforms	2	0.8
Cores	1	0.4
Hammerstones	1	0.4
Total	262	100%

These flakes and artifacts are all made from a very glassy, yellow quartz. Many of the flakes have a darker, dull yellow-brown cortex present on the dorsal surface, making identification of the reduction stage easier, and identifying the source of the quartz as river cobble.

Other bifaces: In addition to the preforms in the flake concentration, there are two biface tips and one biface base made from vein quartz in this zone. These biface fragments are well made and suggest final or near final stage of production. Without diagnostic artifacts it is difficult to assign a temporal association to this zone, but it may relate to the terminal position of the Middle Archaic.

Zone VII

Although the debris density was not heavy, this zone contained 4 hafted bifaces, 3 fragments, a rock feature, and a flake concentration (Figure 6.1). The zone included levels 16, 17, 18, 19, and 22.

Lithics

Ninety-eight percent of the flakes recovered (771) were classified as other flakes and 2% as biface thinning flakes. The raw material is 67% vein quartz and 33% crystal quartz.

Cores: The three random cores are vein quartz.

Other bifaces: The biface fragments from this zone represent one small vein quartz biface fragment that appears to be a lateral margin from a completed biface or preform and a tip from a complete artifact.

Morrow Mountain I

All four of the hafted bifaces from Zone VII (Figure 6.5, A-D) are similar morphologically and technologically to the Morrow Mountain I biface as described by Coe (1964:37-38) and temporally associated with the Middle Archaic. These bifaces have small triangular blades and short, tapered stems (Table 6.18). The lateral margins are straight or slightly convex. Formed on ovate preforms by percussion flaking, edge finishing and resharpening were also done by percussion of three of the four bifaces from this zone. Two of the Morrow Mountain I bifaces are made of vein quartz and two are made of rhyolite. The lateral margins of the small quartz biface (Figure) have been shaped and maintained by pressure flaking and tiny, irregular serrations are present. Resharpening has produced asymmetrical blade edges on two of the bifaces.

Table 6.18 Zone VII, Morrow Mountain I Biface Dimensions

Biface element	Range	Mean	S.D.
Blade Length	27.0 - 44.1	34.07	7.19
Stem Length	7.3 - 12.5	9.97	2.70
Maximum Length	39.5 - 51.4	44.05	5.49
Maximum Width	25.9 - 34.4	30.62	3.19
Maximum Thickness	6.3 - 9.0	7.75	1.30

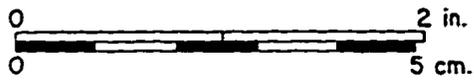
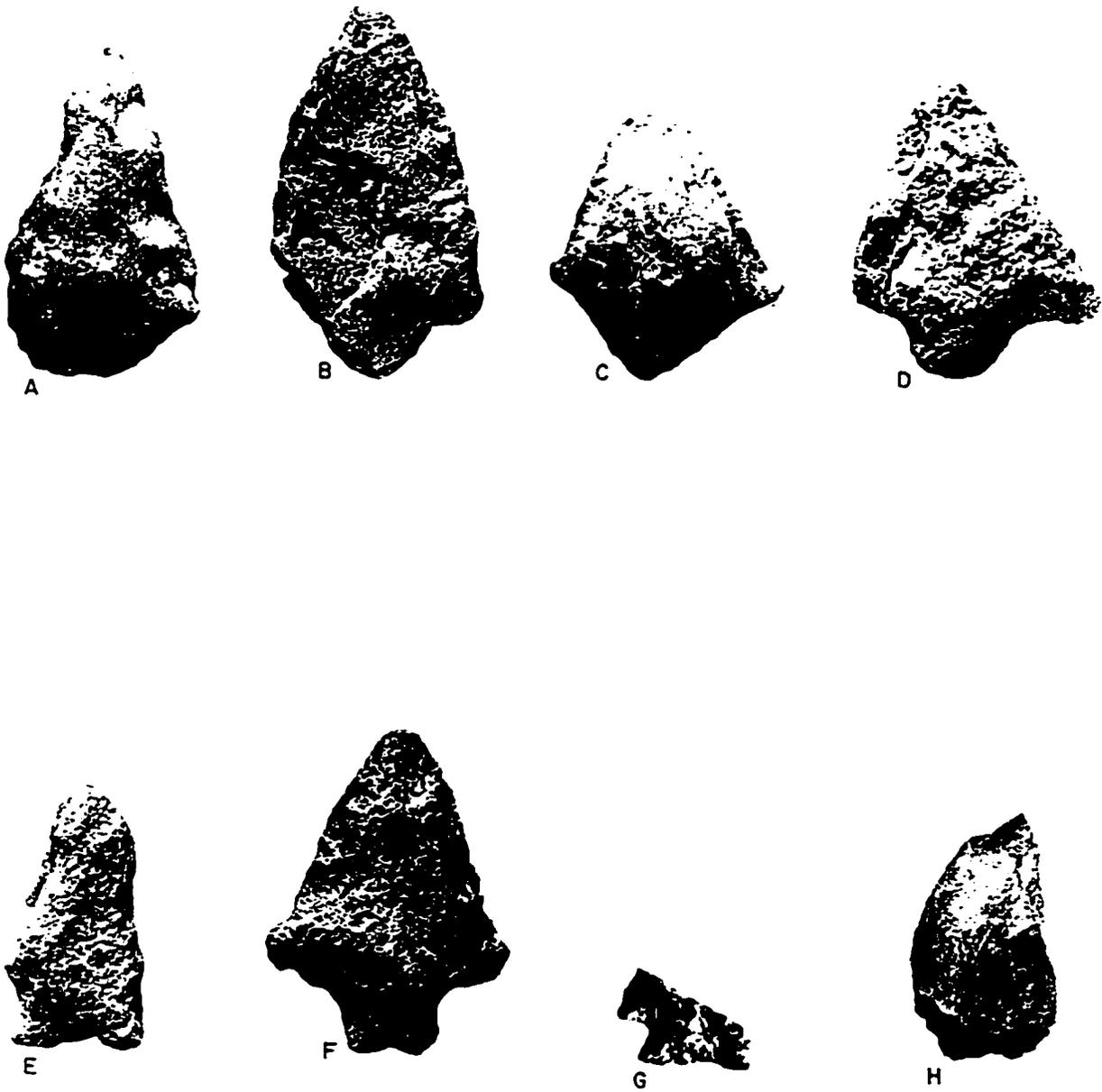


Figure 6.5 Hafted Bifaces from Zones VII and IX.

Utilized flakes: Even though identification of use wear on quartz is difficult, four quartz flakes have been identified with definite areas of use wear or edge damage.

Features

Although several features were defined in this zone, Features 5 and 6 are predominate in Zone II. Feature 6, a hearth, and Feature 5, a flake cluster with primary flaking debris and tools, provide important information on activity patterning within the Middle Archaic occupation (Figure 6.6).

Feature 6. This feature was a rock cluster or hearth (Figure 6.6) that contained 12 pieces of quartz (3,996 g) , and 2 pieces of granite (2,104 g). Although the granite and some of the quartz are fire reddened, the matrix surrounding the rock cluster was stained, but contained no distinct pieces charcoal. One of the pieces of quartz is a core with numerous flake scars. The fill surrounding the cluster contained: 1 primary flake, 2 secondary flakes, and 4 utilized quartz flakes.

Feature 5. This feature was a flake concentration which also included 2 bifaces, 2 biface fragments, 2 quartz cores, and (Figure 6.6). The flake concentration was dense and easily defined, but there was no compaction or color change in the surrounding matrix. The quartz cores were mapped near the edge of the concentration. While only 10 of the flakes were identified as biface thinning flakes, the numerous small flakes represent debitage associated with the later stages of lithic manufacture. The two Morrow Mountain hafted bifaces from this area were both made of rhyolite. The blades

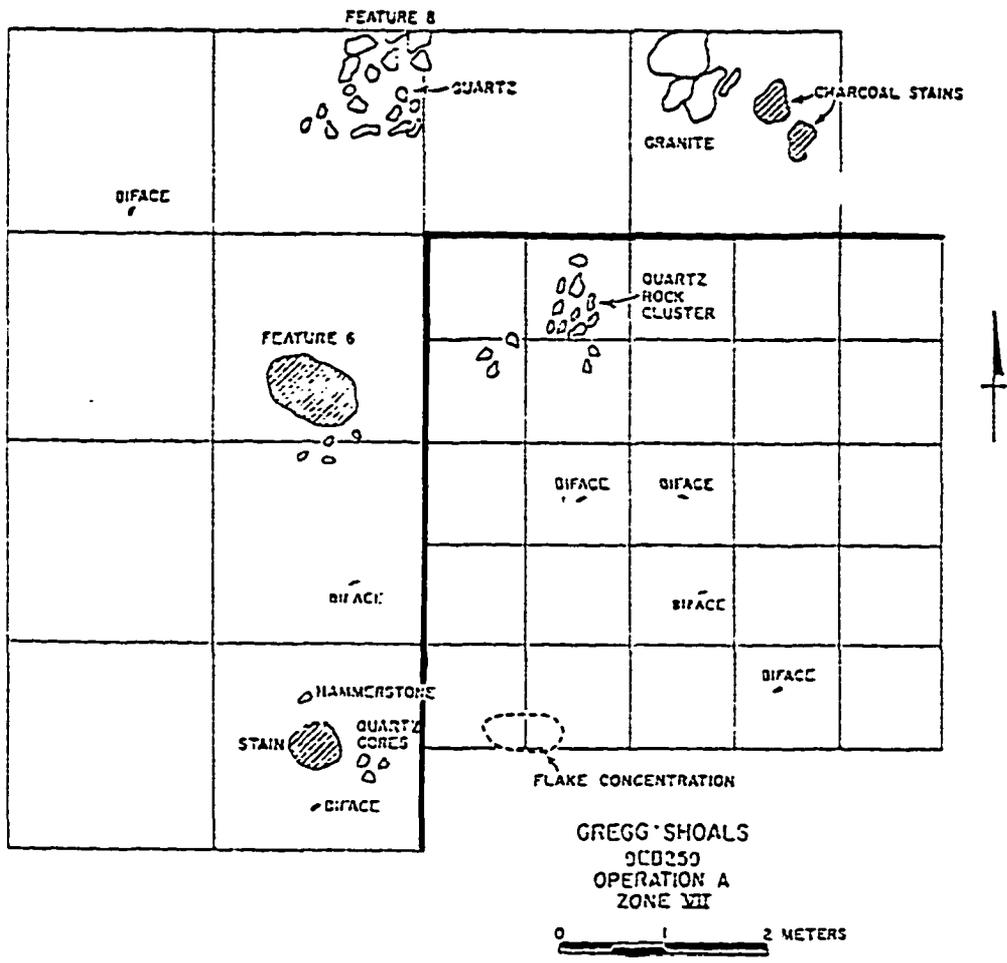


Figure 6.6 Middle Archaic Features and Artifacts from Zone VII.

of both bifaces had been resharpened, possible several times. However, no rhyolite flakes were recovered.

Taken together, Features 5 and 6, may represent a tool manufacturing area associated with several intact and scattered hearths. The low occurrence of rhyolite in Zone VII and its absence in association with this activity area appear to indicate the manufacture of tools from quartz, possible as replacements for the discarded exhausted, rhyolite bifaces.

Further excavations were undertaken in the Middle Archaic component in 1981 and 1982. From the first season, it was known that the Middle Archaic deposits were 40 cm thick and that several of the features and one artifact concentration continued into adjoining areas of this occupation zone. During the second season, the excavation was expanded into areas to the west and north.

Features 6, 8, and 9. Further excavation revealed two rock features (Features 6 and 8), and a large dark charcoal stain (Figure 6.6) associated with a quartz primary reduction activity area (Feature 9). The charcoal stain was a shallow basin-shaped pit. Around this dark stain, one Morrow Mountain hafted biface, a hammerstone, and several quartz cores were plotted in a semicircular area to the east of the shallow pit. The flake concentration and hafted bifaces (Morrow Mountain) mapped during the first season can be associated with the primary reduction concentration, cores, and debris, providing spatial information on activity area structure in the Middle Archaic occupation. The distribution of debitage over the 9m² area is shown in Figure 6.7. The contoured, density map (created using Surfer), emphasizes the almost a total absence of debitage in the area to the north around the rock features.

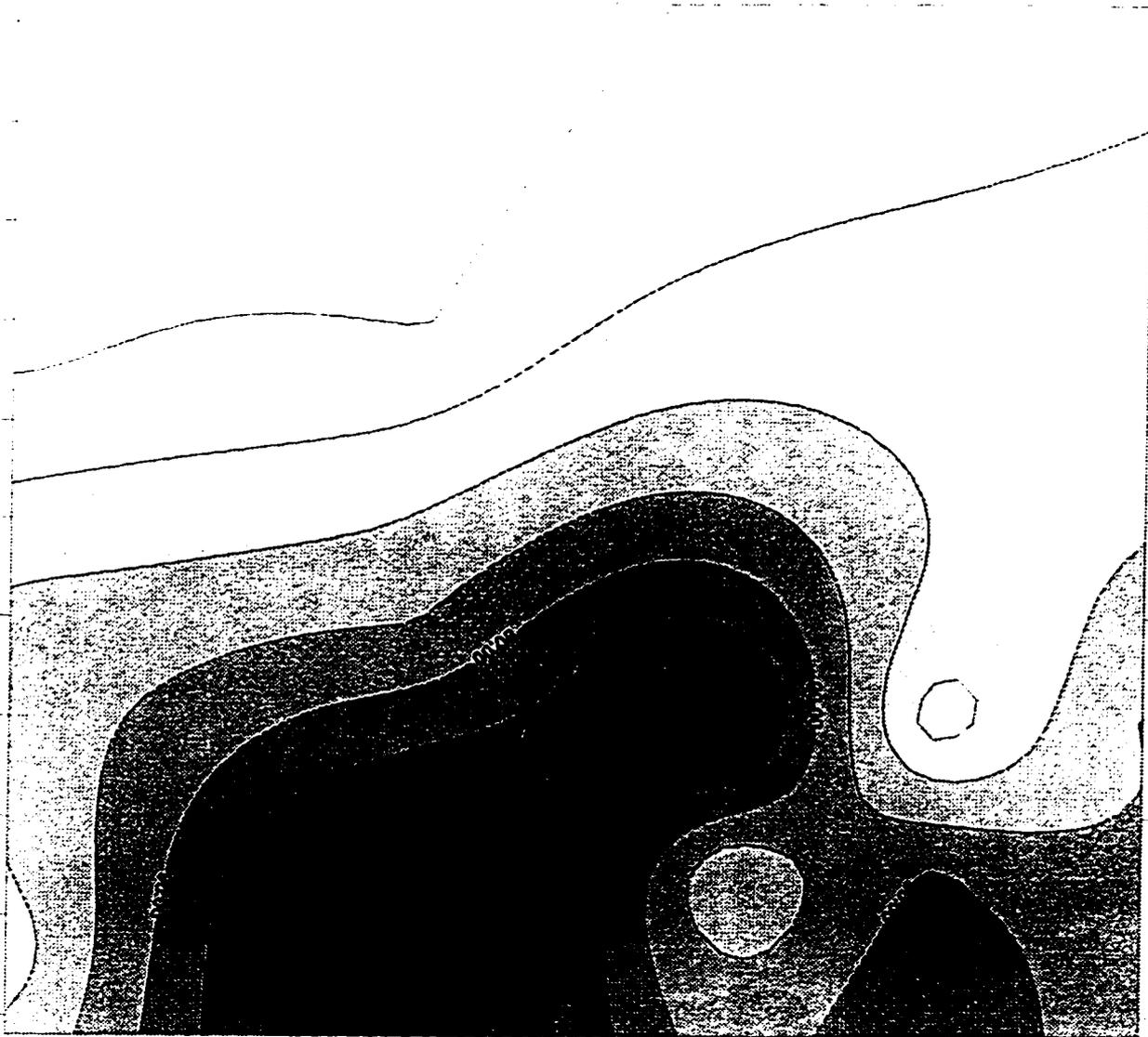


Figure 6.7 Density and Distribution of Middle Archaic Artifacts in Zone VII.

A small piece of charred hickory nut(*Carya sp.*) shell (0.024g), 3 pieces of resinous wood (possibly pine), and seven small pieces of resin were recovered from a small pit in Zone VII, unit E5, level 22. The identification of the plant remains was conducted by Dr. Gail Wagner, University of South Carolina. Only the hickory nut shell was used for dating. The sample yielded an AMS radiocarbon date of 7390±60 BP (laboratory #: Beta-98691). The Morrow Mountain biface labeled "C" in Figure 6.5 was recovered from adjoining excavation unit (E4, level 21). This radiocarbon determination provides not only an absolute date for the Middle Archaic occupation at Gregg Shoals but also it may shed light on the entire cultural sequence and stratigraphic development. It is not only the earliest radiocarbon date on archaeological material from the upper Savannah River but is also the only date on the Middle Archaic in the upper Savannah River valley.

Zone VIII

This zone consists of arbitrary levels 23,24,and 25 (Figure 6.1). The number of artifacts and debitage drops significantly in Zone VIII. The light density of artifacts and an absence of diagnostic bifaces, temporal associations are not possible. This zone appears to represent a period of very limited occupation between the Middle and Early Archaic occupations.

Lithics

Debitage: Very few flakes were recovered from this zone. Of the 213 flakes, 211 are other flakes and 2 are biface thinning flakes. The raw material is divided between vein

quartz (49%) and crystal quartz (40%). There is a small representation of chert (8%). The biface thinning flakes and the majority of the crystal quartz are found in the upper part of this zone.

Cores: Just as crystal quartz flakes are concentrated in the upper part of this zone, the one bipolar crystal quartz core also comes from this same area.

A piece of charred hickory nut shell (*Carya sp.*) was recovered from a general flotation sample from excavation unit E4, level 24. This sample was not clearly associated with a feature or an artifact. An AMS radiocarbon date on this hickory nut sample (0.168 g) yielded a date of 1630±60 BP. Several possibilities may account for this clearly aberrant date. A combination of bioturbation and prehistoric cultural activity may account for this very late (Middle Woodland) date.

Zone IX

This zone includes arbitrary levels 25 through 29 (Figure 6.1). When interpreting the artifact density, it must be remembered that due to the constraints of deep site testing the area of excavation for this zone was a 3 x 3 m area.

Lithics

Debitage: This zone reveals a debitage and raw material pattern that is very different from Zone VII and VIII (Table 6.19).

In Zone IX, chert is the predominant raw material (47%) vein quartz is second (41%), and there are smaller amounts of crystal quartz (9%), while argillite and rhyolite

form about 3% of the remaining materials. Biface thinning flakes account for 20% of the flakes from this zone.

Table 6.19 Zone IX Debitage

Tool Category	n	%
Secondary flakes	1	0.1
Bipolar flakes	4	0.5
Biface thinning flakes	155	19.8
Other flakes	625	79.6
Total	785	100.0

Cores: A large number of random cores were recovered in this zone. Several of these cores are large chunks of quartz from which only three or four flakes have been removed. The majority of these artifacts, however, are small cores with prepared platforms and numerous flake scars. The four bipolar cores are all crystal quartz.

Flake tools: There are six flake tools and one flake (Figure 6.5, H) with continuous retouch along one margin (three chert and four quartz).

Hammerstones: There are four well used quartz cobble hammerstones.

Other Bifaces: The three biface fragments from this zone are portions of complete or nearly complete artifacts (two chert and one quartz). The quartz biface fragment is one lateral margin and mid-blade section of a thick biface or preform. A fragment of Coastal Plain chert is the basal edge of a haft element, with basal grinding. The other chert biface fragment is a hafted biface that was broken during manufacture. One lateral margin is well formed and finely retouched. The hinge fracture on the proximal end and

the flake scars on the blade seem to indicate that the biface broke during thinning or final edge shaping; it is made of Ridge and Valley chert.

Preforms: There is one quartz preform from this zone. This ovate preform is thin and is made on a fine-grained vein quartz.

Stanly Stemmed

This Stanly Stemmed hafted biface (Coe 1964: 35-36), is characterized by a broad triangular blade and a short straight stem with a slight bifurcation (Figure 6.5, F) or indentation in the center of the base of the stem. The lateral margins are straight to slightly incurvate (Table 20). The blade edges have been resharpened, producing small irregular serrations. The biface is made of rhyolite and has a highly weathered exterior surface.

Table 6.20 Zone IX, Stanly Stemmed Biface Dimensions

Biface element	size in mm
Blade Length	35.5
Stem Length	9.3
Maximum Length	44.8
Stem Width	12.6
Maximum Width	32.4
Maximum Thickness	9.4

Category 5, Small, corner notched, concave base

The one biface in this category is a fragment and only the stem and lower blade section are present (Figure 6.5, G). It is possible to determine that it is the base of a

well made corner notched biface of thermally altered Coastal Plain chert. The base has been well thinned, and small, fine flake scars define the corner notch. The maximum stem width is 15.8 mm and the maximum thickness is 4.7 mm.

Although smaller than most of the Kirk Corner Notched bifaces illustrated by Coe (1964:69-71), this biface is similar morphologically and technologically. The stem width, thickness, and projected blade length are all very close to the Kirk Corner Notched cluster from the Calloway Island site (Chapman 1979:22-27).

Category 6, Small, stemmed, concave base

This biface is made of porphyritic rhyolite and all edges are worn and weathered (Figure 6.5, E). Flakes have been removed along the lower margin on one side, creating a slight stem. Due to the deteriorated condition, it is difficult to determine if a similar concavity was present on the other side and has been worn away with use or time. The base is slightly concave. The lateral margins are concave and asymmetrical, and there is evidence of resharpening and wear (Table 6.21).

Table 6.21 Zone IX, Category 6 Biface Dimensions

Biface element	size in mm
Blade Length	24.0
Stem Length	11.3
Maximum Length	36.2
Stem Width	17.8
Maximum Width	18.8
Maximum Thickness	5.3

Although the edges are worn and the flaking is not very distinct, the overall morphology and the stratigraphic position of this biface are similar to several established Early Archaic biface types, Kirk stemmed (Coe 1964:71) and St. Albans Side Notched (Broyles 1966:23).

Features

Feature 11. Feature 11 in Zone IX was a small circular charcoal stain 25 cm in diameter. While the majority of this feature was in the excavated area, it could also be clearly defined in the south profile (Figure 6.1). Feature 11 was a small, shallow pit 22 cm deep. The edges of Feature 11 were black, gray, and ashy and areas of burned earth were apparent along the edges, making feature definition even more distinct. There were no distinct pieces of charcoal into the stain. This feature most likely represents a small fire pit or hearth.

Several artifacts were mapped near the edges of Feature 11: 1 quartz uniface (scraper), a large piece of granite (possibly used as an anvil), chunks of quartz, quartz cores, and a concentration of small thinning flakes. Of the 785 flakes found around this feature, 45% were chert. Forty-four percent of the chert flakes were identified as Coastal Plain chert.

An endscraper, retouched blade, and flake (Figure 6.8) made of Coastal Plain chert were found eroding from the river edge of the site. Although these tools were not found in stratigraphic contact, the tool form and raw material suggest an Early Archaic temporal association. The well made endscraper and the retouched flake are very similar to tools from Paleo-Indian and Early Archaic contexts. In the Piedmont, this triangular type of endscraper is numerous in the Palmer and Kirk occupations (Coe 1964:76). The

PLEASE NOTE

**Page(s) not included with original material
and unavailable from author or university.
Filmed as received.**

UMI

endscraper is made from a thick flake and retains the striking platform and bulb of percussion. The lower lateral margins and the distal end are finely retouched, producing a steep angle. The distal end exhibits the small shallow flake scars of use damage and a high degree of polish on the ventral surface.

Feature 9. Feature 9 was excavated during the second season at Gregg Shoals. Based on the first season's work, contact with the top of the Early Archaic component was expected at approximately 2.50 m below ground surface. Feature 9 was uncovered at 2.55 m below the ground surface in an area adjacent to the Phase I excavation unit and a little over 2 m west of Feature 11 (Figure 6.9). Feature 9 was a cluster of firecracked vein quartz, split, firecracked river cobbles, and granite. As with the rock hearths in other zones, the combined processes of bioturbation and illuviation had removed all carbonized material and organic staining around and within the Feature 9. Several quartz bifaces and biface fragments were recovered in association with the feature (Figure 6.10, A-D). Although no hafted bifaces were recovered from excavations in the Early Archaic zone during the second season, the stone tools recovered included several finely retouched flake scrapers, cores, and utilized flakes (Figure 6.10, E-I). The density and distribution of tools and features in the Early Archaic zone is shown in Figure . The expanded excavation of the second season not only provided good spatial information but also allowed the association of the hearth (Feature 9) and tools with the Feature 11, the flake concentration, and hafted bifaces recovered in Zone IX during first season's excavation.

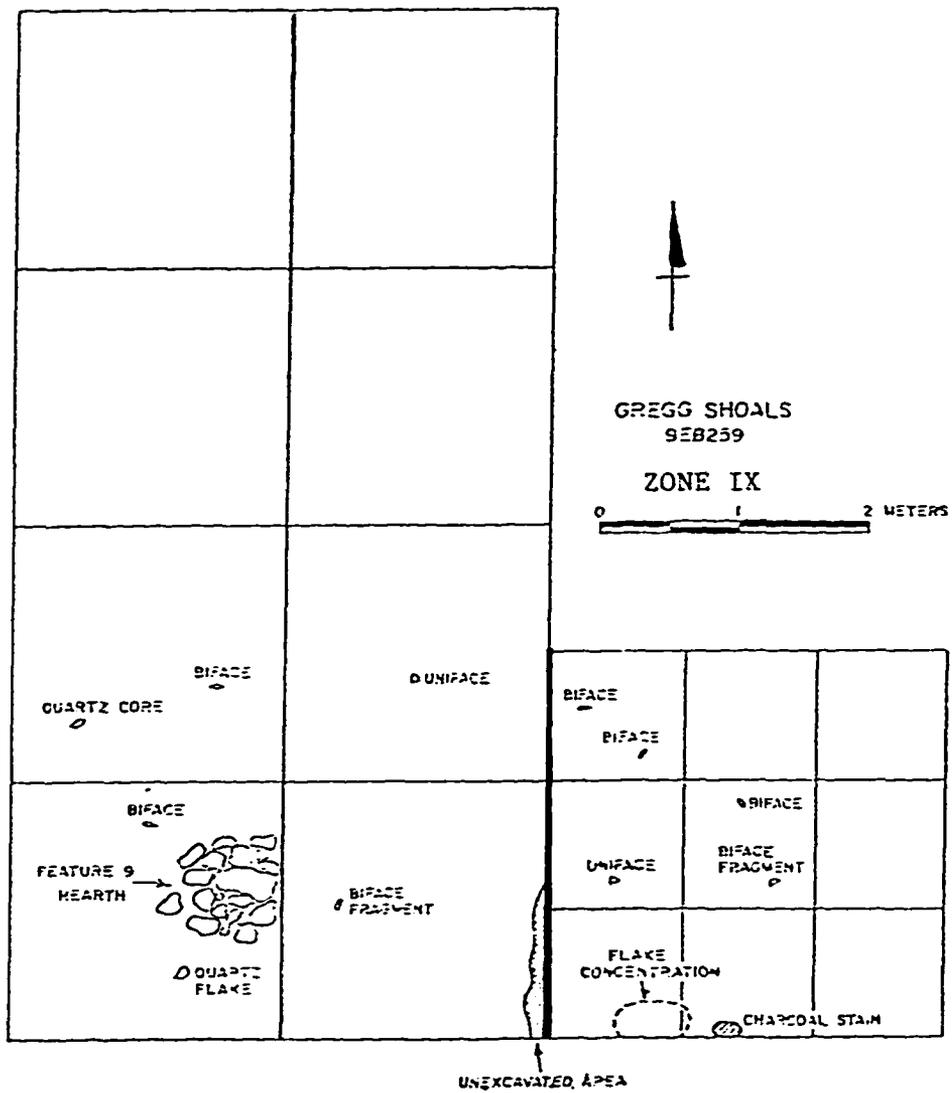


Figure 6.9 Early Archaic Features in Zone IX.

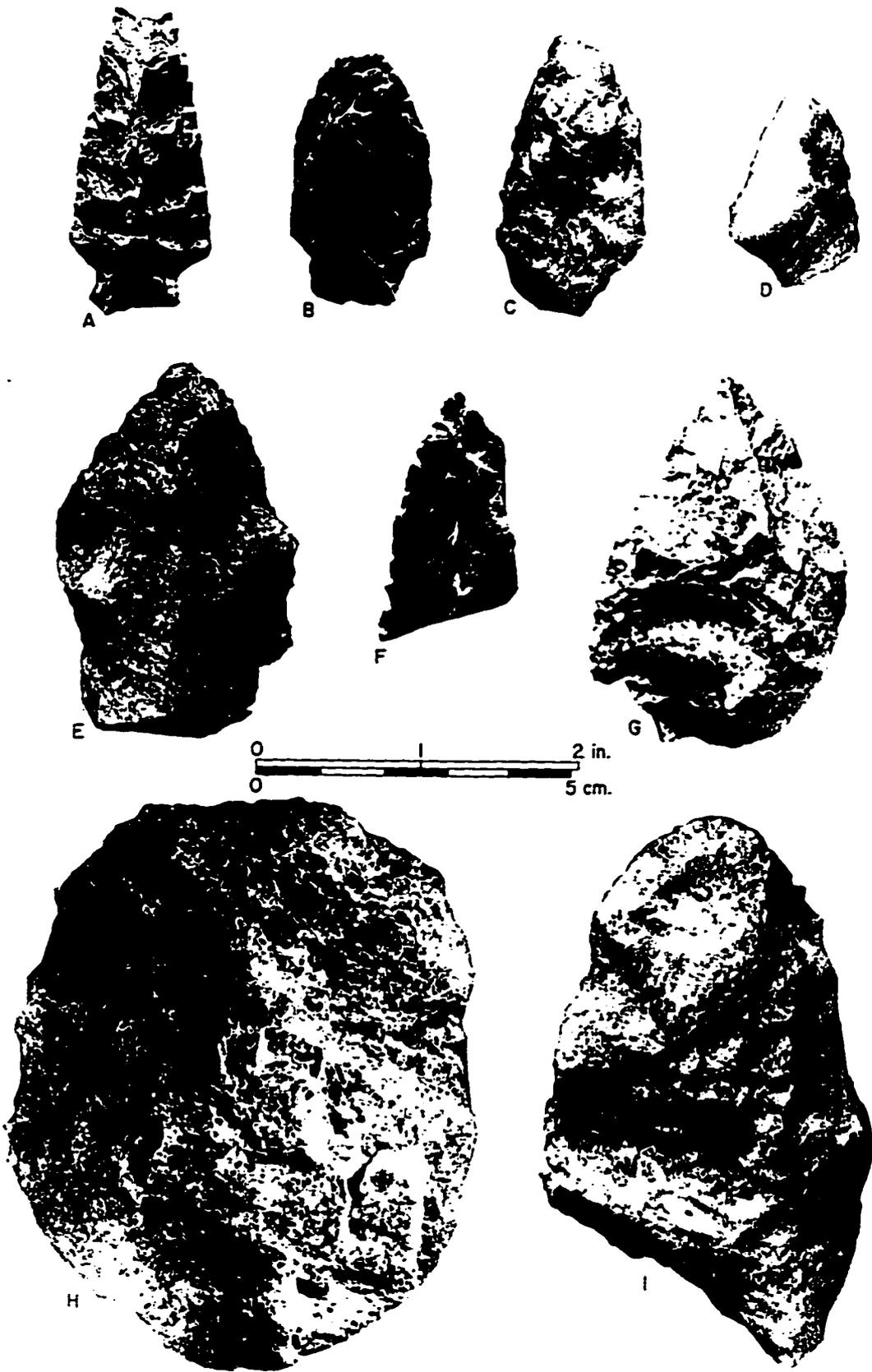


Figure 6.10 Zone IX Artifacts.

As noted above the, the majority of the chert flakes were classified as biface thinning, representing final shaping or resharpening of biface edges. The quartz debitage are mainly interior flakes related to earlier stages of manufacture.

Zone X

Very few flakes were recovered in this zone and no cultural material was recovered below this zone. This zone consisted of arbitrary levels 29, 30, and 31.

Lithics

Debitage: The only cultural material recovered from Zone X were 38 small flakes (13 chert and 25 vein quartz).

DESCRIPTION OF ARTIFACTS FROM OPERATION B

A 2 x 2 meter unit, Operation B, was opened in the western part of the site to define the interface of the alluvial levee deposits and the colluvial ridge tongue. The depth of the excavation was 1.30 m. Cultural material was confined to the upper 70 cm. At 1.15 - 1.20 m, the compact red clay of the upland was encountered. The upper 30 cm contained a few quartz flakes, several small plain pottery sherds, and a small, very roughly made stemmed biface. The vegetation in this area was heavy and root disturbances were prevalent in this upper zone.

Underlying this root-filled humus zone, a large rock feature was mapped and two hafted bifaces were recovered. The rock feature was 25 cm thick and contained 26 whole quartz cobbles, 8 split cobbles, and numerous pieces of primary reduction debitage. There was stone staining around the concentration and very small, scattered

pieces of charcoal were recovered. One biface fragment was recovered from the area near the cluster. This fragment was the base and blade portion of a large stemmed hafted biface made of quartz, possibly a Savannah River biface.

Artifact density decreased below this rock cluster. A well-made biface of vein quartz was recovered, however. The thick blade is lanceolate, contracting slightly to a concave base. This biface is similar to the Guilford Lanceolate (Coe 1964: 43). Several diorite axes similar to Guilford chipped axes have been recovered from the site cutbank erosional area at Gregg Shoals. It is not possible directly to associate this zone of artifacts with a cultural component in the main block excavation. However, with the combined use of the profiles of the backhoe trenches between Operation A and B, slope, and depth below ground surface, it is probable that these artifacts are related to Zone VI, level 14 in Operation A. This is the zone that contained a large amount of debitage and not diagnostic artifacts. The feature in Operation B and Zone VI are most likely associated with a Late Archaic occupation of the site.

SUMMARY

Zones I, II, and the upper half of Zone III are characterized by the presence of pottery, large and small triangular hafted bifaces, stemmed bifaces, a wide variety of raw material, and both random and bipolar cores. This area includes the plowzone, within which the materials representing the Early, Middle, and Late Woodland are mixed. The lower part of Zone III contains fiber tempered pottery, contracting stem bifaces, fire

cracked rock, a rock cluster, and steatite bowl fragments representing a Terminal Archaic occupation.

By contrast, the pottery collected from the beach at Gregg Shoals represents a more diverse sample than was obtained from the excavation. South Appalachian Mississippian and Savannah types recovered from the beach were not found in the excavation. Numerous good examples of the following have been found on the beach: Stalling's Island Plain, cord marked, Dunlap Fabric Impressed, Cartersville Check Stamped, Early and Late Swift Creek Complicated Stamped, Napier Complicated Stamped, Woodstock Complicated Stamped, punctated and filleted rims, and incised rims. The pottery was most abundant during the early years of erosion and it may be that the later time period occupations were on the levee front and the first to be removed by erosion.

Zone V contains an activity area characterized by an increase in firecracked rock, steatite cooking disk fragments, and small stemmed hafted bifaces. The hafted bifaces are similar to small stemmed points characteristic of the later part of the Late Archaic. This is the first intact cultural component.

Although Zone VI did not yield any temporally diagnostic artifacts, it contains a wider variety of artifacts than the preceding zones, an area of primary lithic reduction, only one type of raw material (quartz), and a relatively high incidence of firecracked rock.

Zone VII contains four diagnostic hafted bifaces (Morrow Mountain), but the density and diversity of tool and artifact categories represented is very low, especially

considering the reduction in firecracked rock. Most of the artifacts associated with the rock feature in this zone are complete or broken tools. It is interesting to note that several of the complete artifacts are made of rhyolite and have lateral margins that exhibit a high degree of edge maintenance but no rhyolite debitage was recovered. In the quartz debitage, all stages of production are represented: initial reduction, bifaces broken in manufacture, preforms, and numerous thinning flakes from final shaping and edge curation. This pattern may represent the discard of used tools and the manufacture of replacements from local material, and may be related to mobility and seasonal occupation.

Zone VIII is 40 cm thick and contains no tools, no diagnostic artifacts, and very little debitage.

In Zone IX, the artifact density and diversity increases. The predominant raw material is heat-treated Coastal Plain chert. There are no nodules or large chunks of chert and there is no evidence of primary reduction. The relatively high number of biface thinning flakes indicates resharpening and maintenance of tool edges rather than manufacture. The pattern of quartz use differs, however. The quartz cores, preforms, bifaces broken in manufacture, and flake tools indicate initial manufacture and a broader range of activities. The diagnostic hafted bifaces recovered in this zone indicate occupation during the later part of the Early Archaic.

The artifact assemblage of this zone is also characterized by the reappearance of bipolar cores and bipolar flakes. The bipolar technique provides a way to reduce raw materials that are too small to be worked by other methods (MacDonald 1968:69,

Dickson: 1977). All four of these bipolar cores are crystal quartz. The use of an anvil and hammerstone is then the appropriate technology for reducing small quartz crystals. The abundance of bipolar cores in Zone II also correlates with the increased use of crystal quartz. Questions still remain concerning whether bipolar cores are the residuals of small flake production tools formed by use as a chisel (*pièces esquilleés*), or both. Dickson (1977:98) reports using a piece of quartz as a hammer-driven chisel. A large piece of granite found near the feature in this zone may have been used as an anvil. There is a small depression in the center but the weathering of the granite has obscured any distinct pecking or battering. Several studies have characterized the wear on a bipolar anvil as a conical depression with pecking around the edges (Dickson 1977:98). In an experimental study, Spears (1975) was able to distinguish pecking that resulted from bipolar reduction and the resulting damage due to nut cracking.

In summary, the temporal placement of the intact cultural components at Gregg Shoals is as follows:

Zone II	Late to Middle Woodland
Zone III	Early Woodland to Terminal Archaic
Zone V	Late Archaic
Zone VI	Middle Archaic
Zone I	Early Archaic

Variation in the density and diversity of the artifact assemblages from these identifiable cultural components can be demonstrated in several ways. Table 6.22 provides the density of artifacts per cubic meter within Zones V, VII, and IX. While the density of artifacts may reflect intensity or duration of occupation, it must be remembered that more of the Late Archaic zone may have been lost to erosion. This

analysis demonstrates that density is greater in the Early Archaic zone with 228 flakes and 2 bifaces per cubic meter. The total volume of each zone is:

Zone V	19.2m ³
Zone VII	12.55m ³
Zone IX	.6m ³

Table 6.22 Density of Artifacts by Zone

	Zone IX Early Archaic (3 x 3)	Zone VII Middle Archaic (5 x 5)	Zone V Late Archaic (8 x 8)
Flakes	228.6/m ³	63.0/m ³	61.5/m ³
Bifaces	2.2/m ³	0.5/m ³	0.9/m ³
Other Flakes	11.7/m ³	0.5/m ³	0.4/m ³
Totals	242.5/m ³	64.0/m ³	62.9/m ³

[Note: density of artifacts calculated per cubic meter.]

Another interesting density measure is the distribution of firecracked rock. The firecracked rock from Zones I-IX are illustrated in Figure 6.11. The firecracked rock density varies relatively with the biface and debitage through the profile. Even without diagnostic material, the major occupations could be defined just by the density of firecracked rock. The distribution of the firecracked rock through the deposits can be seen in Figure 5.1.

The diversity of the assemblages can be illustrated by comparing the number of artifact classes and the number of artifacts within each class. The formula used in

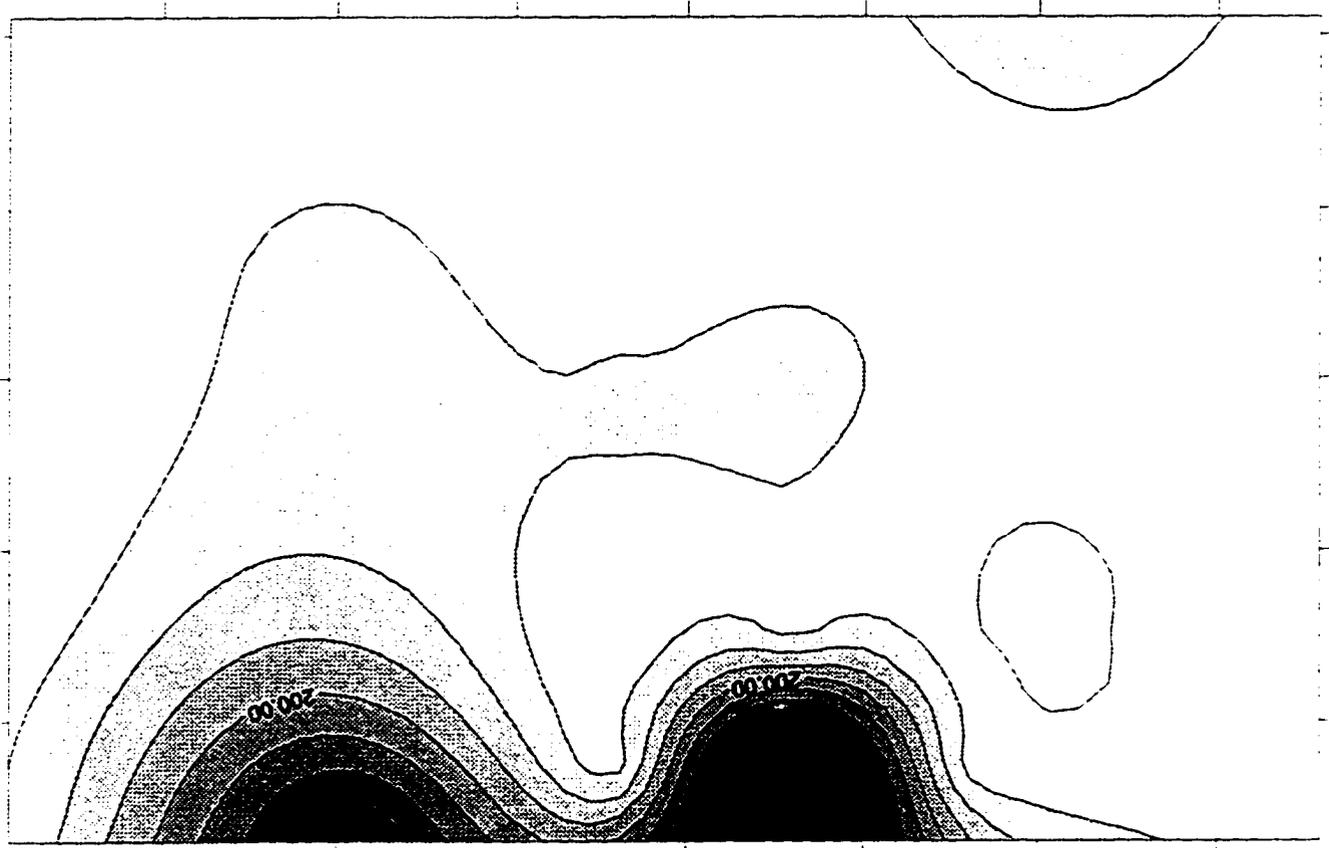


Figure 6.11 Density and Distribution of Early Archaic Artifacts.

determining diversity is the one used by Dickens (1980:41) in an analysis of several ceramic components. This method produces an index that "represents statistical probability of obtaining unlike characteristics in a population" (Dickens 1980:41).

Therefore, the larger the value of the statistic the higher the diversity. For example, a diversity index of .70 means that there are 70 chances out of 100 that any two randomly selected lithic artifacts from a zone will be different.

A diversity index was calculated for lithic artifacts in the Late, Middle, and Early Archaic zones, using the following formula:

$$D_w = 1-S = 1-(X_1)^2 + (x_2)^2 + (x_3)^2 \dots)$$

In calculating the diversity index, artifact categories comprising less than 1% of the total artifacts were deleted.

Table 6.23 Frequency of Artifacts in Zone V

	n	%
Biface thinning flakes	72	6
Other flakes	1107	92
Bifaces	13	1
Hammerstones	7	1
Totals	1199	100

$$D_w = 1-S = 1 - ((.06)^2 + (.92)^2 + (.01)^2 + (.01)^2)$$

$$1 - ((.004) + (.846) + (.0001) + (.00001))$$

$$1 - .850 = .15$$

Table 6.24 Frequency of Artifacts in Zone VII

	n	%
Biface thinning flakes	72	2
Other flakes	771	96
Bifaces	6	1
Flake tools	4	1
Totals	853	100

$$D_w = 1-S = 1 - ((.02)^2 + (.96)^2 + (.01)^2 + (.01)^2)$$

$$1 - ((.0004) + (.922) + (.0001) + (.0001))$$

$$1 - .922 = .08$$

Table 6.25 Zone IX Artifacts

	n	%
Biface thinning flakes	155	19
Other flakes	625	75
Bifaces	8	1
Cores	28	3
Flake tools	6	1
Totals	822	100

$$D_w = 1 - S = 1 - (.19)^2 + (.75)^2 + (.01)^2 + (.03)^2 + (.01)^2$$

$$1 = (.036) + (.563) + (.0001) + (.001) + (.0001)$$

$$1 - .600 = .40$$

The results are:

Cultural Period	Diversity Index
Zone V Late Archaic	0.15
Zone VII Middle Archaic	0.08
Zone IX Early Archaic	0.40

While the diversity (.40) is moderate in the Early Archaic, it is much higher than the Late or Middle Archaic lithic assemblages.

Table 6.26 Frequency of Artifacts in Zone IX by Raw Material

	Total Flakes	Biface Thinning
	%	%
Coastal Plain chert	46	70
Vein quartz	42	22
Crystal quartz	9	8
Argillite	1	0
Rhyolite	2	0
TOTAL	100	100

The major source of the higher diversity in the Early Archaic assemblage is the large proportion of biface thinning flakes produced as the result of increased edge

maintenance, differences in manufacturing techniques (percussion vs. pressure), and the characteristics of the predominant raw material (chert). In Zones I, III, and IX, crystal quartz is being worked by the bipolar technique (Figure 6.12) and there is a wider variety of non-quartz raw material being used.

Zones II and IX also have the highest number of biface thinning flakes. Some of the variation may be due to the responsiveness of the raw material and the fact that reduction stage identification is often very difficult on quartz. The variation in use and preference of raw material over the time span of occupation at Gregg Shoals is illustrated in Figure 6.13. Both the Woodland and the Early Archaic patterns reveal an increase in the use of chert and crystal quartz. There is an almost exclusive use of vein quartz in Zones VI and Zone VII, low tool diversity, and a reduced emphasis on resharpening and edge maintenance.

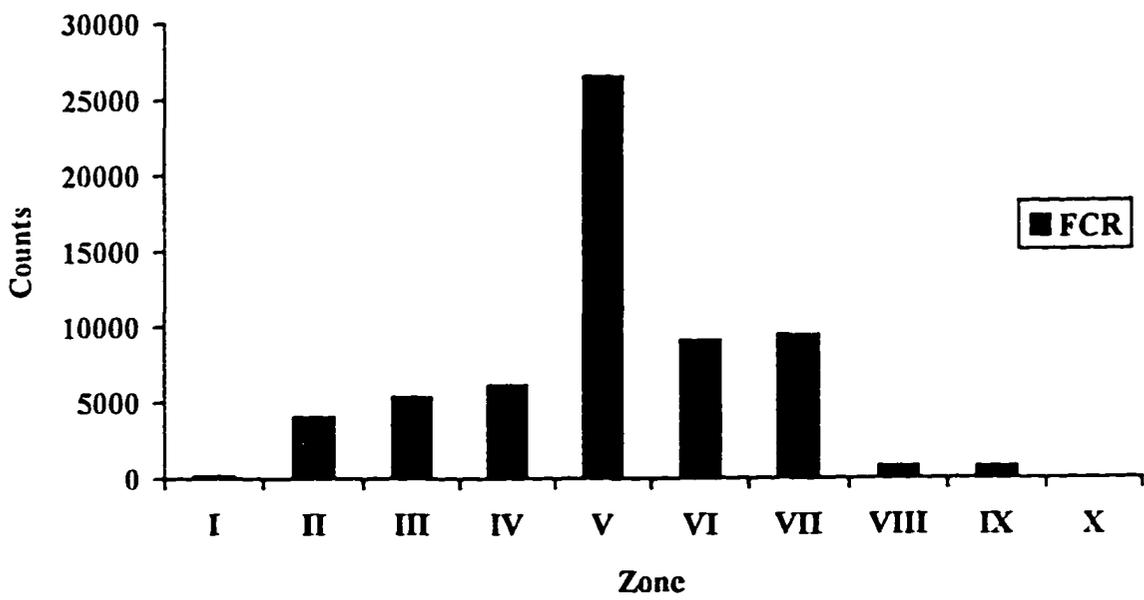


Figure 6.12 Distribution of Firecracked Rock by Zone.

Distribution of Random and Bipolar Cores

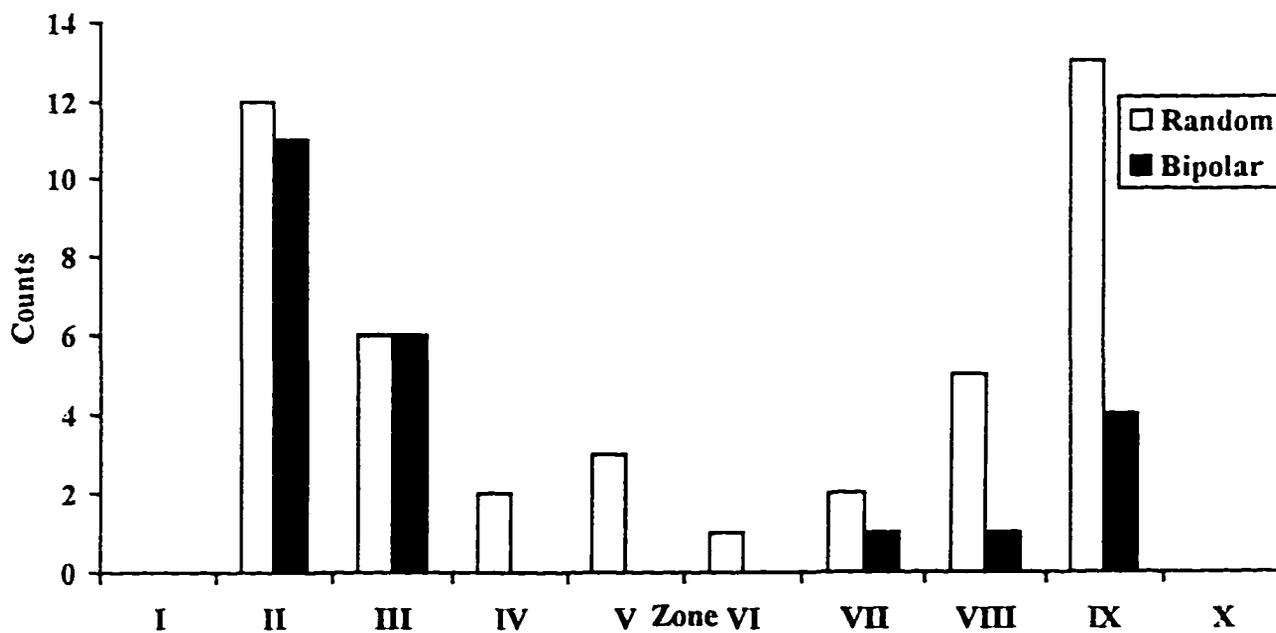


Figure 6.13 Distribution of Cores by Zone.

Chapter 7

SUMMARY AND CONCLUSIONS

This chapter presents a summary and conclusions concerning the results of the excavations in the Archaic Period levels at the Gregg Shoals site. These results are compared to other investigations in the Piedmont region of Georgia and the Carolinas, placing the Gregg Shoals site in a regional perspective. This comparative analysis will focus on stratified sites, wide area surveys, current models of paleoenvironment reconstruction, and recently proposed models of Early and Middle Archaic settlement systems. Directions for future research on the Early to Middle Archaic transition are also presented.

GREGG SHOALS

Shortly after 10,300 BP, remnants of Late Wisconsin organic sediments were deposited in pockets and low areas along the granitic gneiss that formed the bedrock under the Gregg Shoals site. A radiocarbon date of $10,300 \pm 140$ BP documents the deposit of this highly organic layer, containing large macrofossils of plant material. By this time the effects of cool and moderately dry early postglacial era were becoming pronounced. Formerly open areas in the highlands were becoming populated by oaks, pines, and chestnuts. The Savannah River meandered lazily, its banks accented by birch

and sycamore trees. Pines, oaks, and the occasional hemlock dotted the bottomlands, providing habitats and food for both small and large animals. Occasional floods deposited sand over the last remnants of the old backwater swamps. A somewhat higher floodplain began to develop, and levees expanded laterally. Groups of hunter-gatherers moved through the area, their flexible subsistence strategy taking full advantage of the patchy Piedmont habitats. By 9,000 BP, Early Archaic groups were camping along the Savannah River and nearby creeks, building fire hearths of quartz and granite cobbles and manufacturing stone tools from chert they had brought with them and from quartz they obtained nearby (Tippitt and Marquardt 1984).

On the north side of Pickens Creek, the excavation of a small camp site produced just such evidence. Three Palmer points, abundant debitage (mostly quartz), and several flake tools were recovered. Although some cores were found, the majority of the material is tertiary flakes and biface thinning flakes. Palmer and Kirk corner-notched points are well represented in artifact collections taken from the Gregg Shoals sites over the years, and they are generally made from Coastal Plain chert.

At the Gregg Shoals site, the Early Archaic zone contained a more abundant and diverse lithic assemblage, relative to later zones, including evidence of primary lithic reduction as well as biface thinning. Crystal quartz flake blades were produced by the bipolar technique. Relative to local materials, a high percentage of Coastal Plain chert was recovered.

The artifact distribution pattern in the Early Archaic level appears to have accumulated during a relatively short period of time. There is a scattering of tools

around a small hearth and a concentration of manufacturing debris in association with another small charcoal stain. A large piece of granite found in association with the flake concentration may have been used as an anvil. The abundance of Coastal Plain chert is evidence of a least periodic mobility, even as the use of quartz materials shows an adjustment to local materials.

At least one locally available material, crystal quartz, was especially favored for producing tiny flake blades. Any attribution of function to these blades is speculative, but such blade technology would have been very practical for highly mobile hunter-gatherers because of the well-known efficiency of blade production (e.g. the ratio of working edge to weight of raw material) is much higher than that for a flake tool technology.

The hafted bifaces from this zone appear to represent the last part of the Early Archaic and may well represent the Early to Middle Archaic transition period in the upper Savannah River valley. The bifaces from this zone are a highly eroded St. Albans, a Stanly, a small notched biface base, and several unifaces. It appears that the small notched base biface may be a small Kirk variant that possibly dates to the bifurcate period.

By 8,000 BP, oaks, gums, chestnuts, and beech trees were frequent in the uplands and oaks, gums, hickories, and birches were common in the lower elevations. Throughout the Piedmont, resources were ample and homogeneously distributed. By 7,000 B. P., the Hypsithermal climatic era was bringing a warm and wet regime to the

Piedmont. River terraces grew higher due to periodic flooding, and levee and backlevee soils weathered heavily under the warm, wet conditions.

During this time, evidence for human activity is ubiquitous in the Piedmont. Morrow Mountain bifaces made from quartz are the most common artifact type. Quartz, especially vein quartz, is easily procured in the Piedmont. In modeling quartz procurement, House and Ballenger (1976:128) argue that it may be treated as a “non quarried” raw material due to its ubiquity. Our modern view of quartz as being “everywhere” in the Piedmont may in fact be a result of our viewing an eroded landscape where quartz residuum is more readily visible than it was prehistorically. Certainly all quartz is not of equal value for tool manufacture and the conchoidal fracture pattern of quartz does vary greatly. Further evidence of its localized procurement is the lack of quartz debitage bearing river cortex in upland sites and the frequency with which river cobble cortex is observed on quartz artifacts as one approaches the major rivers (Goodyear et al. 1979:156).

At Gregg Shoals, cultural material is found throughout archaeological zones VI, VII, and VIII, being most frequent in Zone VII, which includes Morrow Mountain bifaces. In addition to bifaces and biface fragments, these Middle Archaic zones contain numerous dark stains, several rock hearth features, and evidence of quartz biface reduction. The quartz in Zone VI is mainly from river cobbles. Although no diagnostic artifacts were recovered, the zone can be correlated with a zone containing a Guilford biface and primary reduction area in Operation B, a unit near the interface of the alluvial deposits and the ridge toe.

Zone VII contains four Morrow Mountain hafted bifaces, but the density and diversity of tool and artifact categories represented are very low. There are chipped stone tools in association with a rock feature in this zone. It is interesting to note that several of the complete artifacts are made of rhyolite and have lateral margins that exhibit a high degree of edge maintenance, yet no rhyolite debitage was recovered. In the quartz debitage, all stages of production are represented: initial reduction, bifaces broken in manufacture, preforms, and numerous thinning flakes from final shaping and edge creation. The pattern represents the discard of used tools and the manufacture of replacements from local materials.

The spatial distribution of materials and features can be seen in. Zone VII contained a lithic manufacturing area consisting of debris representing the entire manufacturing process. The Middle Archaic component contained three rock features that are probably hearths. The matrix surrounding these features was badly leached and no charcoal or staining remained. Charred hickory nut shell fragments were recovered from the surrounding matrix, and the lithic debris is restricted mainly to an area well away from the rock features.

The radiocarbon date on charred hickory nut shell fragments from the upper part of this zone is 7390 ± 60 BP. The radiocarbon sample was taken from a circular stain that contained flakes but no diagnostic artifacts. The sample was analyzed by Dr. Gail Wagner, Department of Anthropology, University of South Carolina at Columbia. The sample contained hickory nut shell, resinous wood (possible pine) and resin. The radiocarbon date is based on the hickory nut shell only. This sample from Zone VII is

the only radiocarbon date on the Middle Archaic in the upper Savannah River and the earliest date in this area.

Zone VIII was 40 cm. thick and contains no tools, no diagnostic artifacts, and very little debitage. The only cultural material recovered from this area is a few small quartz flakes. Thus, this zone provided good separation between the Early and Middle Archaic components.

At the Gregg Shoals site, the Archaic period assemblage characteristics can be summarized as follows.

Terminal Early Archaic

- technological organization
 - wider variety of tool types
 - more diverse tool kit
 - more tool types
 - more curation and resharpening
- raw material variation
 - wider range of raw materials
 - several types of chert, metavolcanics, quartz (vein and crystal)
 - higher quality raw materials
- paleoenvironmental conditions

Middle Archaic

- technological organization
 - less diverse tool kit
 - fewer tool types
 - fewer curated or resharpened tool forms
- raw material variation
 - low diversity of raw material
 - high percent of quartz (both vein and crystal)
- paleoenvironmental conditions
 - stable river edge landscapes
 - more gentle stream flow
 - appearance of lamellae as pedogenic structures in soil profiles
 - episodes of moist climate interrupting a generally dry mid-Holocene

Regional Patterns

These Early and Middle Archaic patterns at the Gregg Shoals site can be compared to the patterns revealed by a review of the results of archaeological investigations conducted in several other major river drainages in the piedmont. The river drainages included in the comparison are the Little Tennessee, Savannah, Catawba, Yadkin, Haw, and Neuse. Data from several specific sites, Nipper Creek and Rae's Creek, are also included, as well as state wide summaries from North and South Carolina.

Little Tennessee River Valley

The results of the archaeological investigation of 34,000 acres within the Tellico Reservoir are presented by Davis (1990). This study of prehistoric settlement systems focused on regional land use patterns, spatial distribution of sites, and intrasite structure. This research revealed that the pattern of differential use of the Tellico valley and upland microenvironments is best explained in terms of spatially distinct patterns of residential site maintenance and resource extraction activities (Davis 1990). Davis identifies four major diachronic trends:

1. changes in Archaic period settlement patterns reflecting shifts in annual territories,
2. population expansion and increased site differentiation during the Late Archaic and Woodland periods,
3. population consolidation and development of settlement hierarchies during the Mississippian period, and
4. settlement dispersion and eventual abandonment during the Historic period.

The archaeological survey in the Tellico Valley recorded 930 sites. Table 7.1 illustrates the distribution of sites by time period. The largest number of sites recorded are Early Archaic with a decrease in Middle and Late Archaic sites. The settlement data suggest that following the Early Archaic period, the lower Tennessee River valley witnessed a shift in settlement, reflecting a change in regional land use and resource exploitation (Davis 1990:219).

Table 7.1 Sites by Time Period in the Little Tennessee River Valley

Time Period	n	%
Paleoindian	7	.8
Early Archaic	310	33.3
Middle Archaic	199	21.4
Late Archaic	124	13.3
Woodland	203	21.8
Mississippian	87	9.4
TOTAL	930	100

[after Davis 1990]

Richard B. Russell Reservoir

The archaeological survey conducted as part of the construction of the Richard B. Russell Dam recorded over 525 sites. Table 7.2 shows the distribution of these sites by time period. The trend revealed is an increase in the number of sites from Paleoindian through Early Archaic, with a significant increase during the Middle Archaic.

Table 7.2 Richard B. Russell Reservoir Archaeological Sites by Time Period

Time Period	n	%
Paleoindian	14	2.7
Early Archaic	74	14.1
Middle Archaic	196	37.3
Late Archaic	137	26.1
Woodland	61	11.6
Mississippian	43	8.20
Total	525	100.00

[after Anderson and Joseph 1988]

While the number of sites increases during the Middle Archaic, the number of artifacts recovered is significantly higher during the Late Archaic (Table 7.3).

Table 7.3 Richard B. Russell Reservoir Artifacts Recovered by Time Period

Time Period	n	%
Paleoindian	7	.6
Early Archaic	158	5.9
Middle Archaic	430	16.1
Late Archaic	1212	45.3
Woodland	272	10.2
Mississippian	587	21.9
TOTAL	2676	100.00

[after Anderson and Joseph 1988]

Table 7.4 illustrates the distribution of artifacts by raw material. Quartz is the predominate raw material for tools in the Middle Archaic, Woodland, and Mississippian.

Table 7-4 Richard B. Russell Reservoir Artifact Raw Material Distribution by Time Period

Time Period	Quartz		Metavolcanic		Chert		Chert		Unknown		Totals	
	n	%	n	%	n	%	n	%	n	%	n	%
	Coastal Plain/Piedmont Ridge & Valley											
Paleoindian	12	71.0	1	5.9	1	5.9	3	17.6			17	100.00
Early Archaic	102	64.6	12	8.9	33	20.9	9	5.6			158	100.00
Middle Archaic	410	95.3	17	4.0	3	.7					430	100.00
Late Archaic	388	32.0	319	26.3	41	3.4			464	38.3	1212	100.00
Woodland	233	85.7	30	11.0	8	2.9	1	.4			272	100.00
Mississippian	553	94.2	16	2.7	10	1.7	8	1.4			587	100.00
TOTAL	1698	63.5	397	14.8	96	3.6	21	.8	464	17.3	2676	100.00

[after Anderson and Joseph 1988]

The Late Archaic pattern is particularly interesting with 32% quartz, 26% metavolcanic, and 38% unknown. Whether the 38% unknown raw material reflects non-local raw materials or local material from sources that have not been recognized is unclear. When the raw material type for only bifaces is considered, Table 7.5, the predominance of quartz during Morrow Mountain and Guilford periods is clear. Quartz 41% and metavolcanic 35% are balanced in bifurcate and Stanly types.

STRATIFIED MORROW MOUNTAIN SITES

Nipper Creek

Work conducted by Ruth Wetmore and Albert Goodyear at the Nipper Creek site has also yielded the densest Morrow Mountain component known for North or South Carolina (Wetmore and Goodyear 1986). This site is located on the Fall Line near Columbia, South Carolina. There are also several Early and Middle Archaic sites in the immediate vicinity of Nipper Creek. The Middle Archaic assemblage contains Morrow Mountain bifaces, predominately of quartz, and very few formalized tools.

Rae's Creek

The Rae's Creek site (Crook 1990) near August, Georgia has produced the most complete information on Morrow Mountain chronology to date. This site is deeply stratified multicomponent site is located on a relict point bar of the Savannah River. The deposits are over four meters deep and contain several cultural middens dating from the Early Archaic. The Rae's Creek site is particularly significant because of the number of

Table 7.5 Richard B. Russell Distribution of Biface Types by Raw Material

Biface Type	Quartz		Metavolcanic		Chert		Chert		Unknown		Totals	
	n	%	n	%	n	%	n	%	n	%	n	%
Bifurcates/Stanly	7	41.2	6	35.3	3	17.6	1	5.9			17	100.00
Morrow Mountain (289)		96.0	11	3.7	1	3	9	5.6			301	100.00
Morrow Mountain (159)		98.3			1	1.7					60	100.00
Guilford	62	89.9	6	8.7							69	100.00
TOTAL	417	93.3	23	5.2	6	1.3	1	.2			447	100.00

[after Anderson and Joseph 1988]

radiocarbon dates for the intact Middle Archaic levels. The Middle Archaic dates are from the Morrow Mountain stratum and range from 7400 - 6000 BP.

Other radiocarbon dates on Morrow Mountain components are very scarce. Excavations at a site near Macon Espenshade, has produced one Morrow Mountain date of 6390 BP from a deeply buried stratum (Goodyear, personal communication).

Regional patterns

Drawing on the data from regional surveys and excavations at stratified sites in the Piedmont of North Carolina, South Carolina, and Georgia, the Early to Middle Archaic transition can be characterized by the following.

Technological Organization

- overall decrease in the number of tool types from Early to Middle Archaic
- overall decrease in the level of curation and tools constructed for a long use life
- increase in square and contracting stemmed hafted bifaces
- possible hafting shift to socketed foreshaft and the use of mastics
- greater emphasis on non-stone tools (bone, wood, shell) for scraping, cutting, perforating activities

Raw Material Variation

- overall shift from a wide variety of raw materials, including local and extralocal, to a narrow range of local raw materials
- greater emphasis on local materials in the Middle Archaic, mainly quartz

Regional Paleoenvironmental Patterns

- lower sedimentation rates
- more stable river front levees
- episodes of moist climate interrupting a generally dry mid-Holocene
- appearance of lamellae as pedogenic structures of wide areas of the Piedmont

Regional Settlement Models

- increase in the variety of environments selected for site location
- little differences in riverine- interriverine site location during Middle Archaic
- indications of increased in residential mobility combined with a reduction in the range of movements

Band/Macroband and Uwharrie-Allendale Settlement Models

The band/macroband model proposed by Anderson and Hanson (1988) emphasizes subsistence decisions based on distribution of food sources and their seasonal variations. The Uwharrie-Allendale model presented by Daniel (1994) raises the issue of the importance of chipped stone tool sources in conditioning Early Archaic settlement systems. When considering both of these models and their utility in aiding our understanding of prehistoric settlement patterns, it must be noted that these researchers have not acknowledged quartz as a significant raw material to be considered in the development of settlement models. The importance of quartz in both the Early and Middle archaic adaptation cannot be ignored if we are to understand the changes in lifeways during these times across the Piedmont and the south Atlantic slope.

Paleoindian groups moving onto the North American continent brought with them Paleolithic tools and Paleolithic knowledge of technology. They had been surviving in cold climates with well developed cold weather adapted technologies. Paleoindian social structure was clearly effective in maintaining sufficient group knowledge of stone tool manufacture, clothing fabrication, food location and preservation, and structure construction. Survival in cold climates required not only a refined tool kit of stone, bone, and shell, but also cordage, containers, and clothing. This means extensive

knowledge of plants and their properties and animals, their habits and distributions These groups were carrying with them a cumulative body of knowledge, both technological, and social.

From Early Archaic to Middle Archaic times the skill level of flintknapping does not really change. Groups do not become “better” or “worse” flintknappers. What we do see over time are changes in the production strategy or sequence, adaptations or learning a new raw material, evidence of the flow and pattern of life in hunting and gatherings groups across the Piedmont. What we “see” archaeologically are relatively minor changes in form. Corner notching, side notching, and contracting stems are all fairly subtle changes in terms of lithic technology. As archaeologists, we key on them and have elevated the changes to “saint” status because we assume or hope that these are indications of other changes (environmental, social) that we cannot see as readily. It may be that what we are seeing in these changes in lithic tool form and raw material patterns over time is being colored or directed by other factors. Some of these factors may be related to:

- 1) changes in environment conditions resulting in changes in tools or environmental changes that do not require or stimulate a response the lithic technology;
- 2) changes in population, either increase in the numbers and/or the way that groups are organized across the landscape requiring lithic tool kit responses;
- 3) the impact of group stability (size, age structure, health) and how that allows for more maintenance of learning, knowledge, and information [environmental

information] that might provide potential for group leaders to develop based on information (e.g. being to able to locate or predict location of resources); and

4) does a stable environment (natural and social) make conditions predictable or stable enough to make it unnecessary to 'over engineer' tools.

If groups are not moving long distances where raw material possibilities are unknown, then what is adaptive advantage to a highly curated and diverse tool kit? Especially, if you are confident in knowledge of home range. It may be that stability does come with the accumulation of experience. A groups experience with an environment and what it offers in terms of resources, seasonal cycles; and experience with a raw material suite: knappable stone, grinding stone, abrading stone are certainly controlling variables.

However, it may be that changes in lithic tool form are somewhat incidental to other changes. When it comes down to it is there really any difference in the effectiveness of a Clovis over a Morrow Mountain in killing a deer? It may be more important how a group gains adaptive advantage from the procurement and production process (energy required, etc.). When what is needed was something sharp that could be hurled into an animal— the question may be one of changing energy costs to produce biface and secure material. These may be more important than changes in form. Maybe we are missing the 'point'. Stone tool forms are certainly valuable as temporal indicators to tell us when something happened. However, to understand why or how requires understanding of how the tool assemblage articulates with the whole adaptive system

Sometimes, as archaeologists we need consider that a cumulative body of technological and social knowledge remains within human groups. When Mississippian societies began falling apart and large groups living close together, growing large corn crops, and maintaining large ceremonial centers was no long desirable, they fell back on the good old Woodland adaptation. We may have computers but we can still use a pencil and word process directly on paper. Piedmont farmers smoothed axe handles with large pieces of bottle glass, just as any prehistoric person would have done to smooth a arrow or spear shaft.

What we see in the Archaic lithic tool changes are organizational responses to a set of variable we are trying to identify and measure. The challenge remains in gleaning or teasing out the factors contributing to the technological patterns that we find preserved in the archaeological record. Deeply stratified sites like Gregg Shoals are critical to this endeavor especially when combined with regional distribution data. The hydrologic conditions that created the deep deposits at the Gregg Shoals site are not representative of the general development of sediments in the upper Savannah River. The special situation created by the angle at which Pickens Creek flowed into the river did allowed the build up and preservation of sediments containing valuable archaeological information and provided a geoarchaeological profile encompassing the entire Holocene.

REFERENCES CITED

- Adovasio, J. M., J. D. Gunn, J. Donahue, and R. Stuckenrath
1977 Progress report on the Meadowcroft Rockshelter--a 16,000 year chronicle. *In* Amerinds and their paleoenvironments in northeastern North America, edited by Walter S. Newman and Bert Salwen, pp. 137-159 *Annals of the New York Academy of Sciences* 288.
- American Geological Institute
1962 *Dictionary of Geological Terms*. Doubleday and Co., Garden City, New Jersey.
- Anderson, David G.
1977 Prehistoric Selection for Intentional Thermal Alteration: Tests of a Model Emphasizing Southeastern Archaeological Materials. Paper presented at the 34th Annual Meeting of the Southeastern Archaeological Conference, Lafayette, Louisiana.
- 1988 The Emergence of Sedentary Life: Middle and Late Archaic Periods. *In* Prehistory and History Along the Upper Savannah River: Technical Synthesis of Cultural Resource Investigations, Richard B. Russell Multiple Resource Area, edited by D. G. Anderson and J. W. Joseph, pp. 133-204. Russell Papers 1988. Interagency Archaeological Services Division, National Park Service, Atlanta.
- 1994 Approaches to Modeling Regional Settlement in the Archaic Period Southeast. *In* Archaeology of the Mid-Holocene Southeast, edited by K. E. Sassaman and D. G. Anderson, pp. 157-276. University Press of Florida, Gainesville.
- Anderson, David G., and J. W. Joseph
1988 *Prehistory and History along the Upper Savannah River: Technical Synthesis of Cultural Resource Investigations*. Russell Papers 1988. Interagency Archaeological Services Division, National Park Service, Atlanta.

Anderson, David G., and Glen T. Hanson

1988 Early Archaic Settlement in the Southeastern United States: A Case Study from the Savannah River Valley. *American Antiquity* 53:262-286.

Anderson, David G., and Joseph Schuldenrein

1983 Early Archaic Settlement on the Southeastern Atlantic Slope: A View from the Ruckers Bottom Site, Elbert County, Georgia. *North American Archaeologist* 4(3):177-210.

Anderson, David G., Charles E. Cantley, and A. Lee Novick

1982 *The Mattassee Lake Sites: Archaeological Investigations Along the Lower Santee River in the Coastal Plain of South Carolina*. Archaeological Services Branch, National Park Service, Special Bulletin 1.

Anderson, David G., Sammy T. Lee, and Robert Parler

1979 *Cal Smoak: Archaeological investigations Along the Edisto River in the Coastal Plain of South Carolina*. Archaeological Society of South Carolina, Occasional Papers 1.

Anderson, David G., Kenneth E. Sassaman, and Christopher Judge (editors)

1992 Paleoindian and Early Archaic Period Research in the lower Southeast: A South Carolina Perspective. Council of South Carolina Professional Archaeologists.

Antevs, Ernst

1948 The Great Basin, With Emphasis on Glacial and Post-Glacial Times; Climate Changes and Pre-White Man. *University of Utah Bulletin* 33(20):168-191.

1953 Geochronology of the Deglacial and Neothermal Ages. *Journal of Geology* 61(3):195-230.

Asch, David L. and Nancy B. Asch

1985 Prehistoric Plant Cultivation in West-Central Illinois. In *Prehistoric Food Production in North America*, edited by R. I. Ford, pp. 149-204. Anthropological Papers 75. Museum of Anthropology, University of Michigan, Ann Arbor.

Asch, Nancy B., Richard I. Ford, and David L. Asch

1972 *Paleoethnobotany of the Koster Site: The Archaic Horizons*. Report of Investigations No. 24, Illinois State Museum, Springfield.

Bartram, William

1928 *Travels of William Bartram*, edited by Mark van Doren. Dover Publications.

Binford, Lewis R.

1975 Sampling, Judgment, and the Archaeological Record. *In* Sampling in Archaeology, edited by James W. Mueller, pp. 251-257, University of Arizona Press, Tucson.

1979 Organization and Formation Processes: Looking at Curated Technologies. *Journal of Anthropological Research* 35:255-273.

1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45:4-20.

Blanton, Dennis B.

1983 *Lithic Raw Material Procurement and Use During the Morrow Mountain Phase in South Carolina*. M.A. thesis, Department of Anthropology, Brown University.

Blanton, Dennis B., and Kenneth E. Sassaman

1989 Pattern and Process in the Middle Archaic Period of South Carolina. *In* Studies in South Carolina Archaeology in Honor of Dr. Robert L. Stevenson, ed. A. C. Goodyear III and G. T. Hanson, pp. 53-72. *Anthropological Studies* 9. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Blatt, Harvey, G. Middleton, and R. Murray

1972 *Origin of Sedimentary Rock*. Prentice-Hall, Inc. Englewood Cliffs, New Jersey.

Braun, E. Lucy

1950 *Deciduous Forests of Eastern North America*. MacMillan Publishing Co. Inc., New York.

Brose, David S.

1979 A Speculative Model of the Role of Exchange in the Prehistory of the Eastern Woodlands. *In* Hopewell Archaeology: The Chillicothe Conference, David S. Brose and N'omi Greber editors, pp. 3-8. Kent State University Press, Kent, Ohio.

Brown, James A.

1984 Long-Term Trends Toward Sedentism and the Emergence of Complexity in the American Midwest. *In* Prehistoric Hunters and Gatherers: The Emergence of Social and Cultural Complexity, edited by T. D. Price and J. A. Brown. Academic Press, New York

Brown, James A., and Robert K. Vierra

1983 What Happened in the Middle Archaic? Introduction to an Ecological Approach to Koster Site Archaeology. *In Archaic Hunters and Gatherers in the American Midcontinent*, edited by J. L. Phillips and J. A. Brown, pp. 165-195. Academic Press, New York

Broyles, Bettye J.

1966 Preliminary Report: the St. Albans Site (46KA27), Kanawha County, West Virginia. *The West Virginia Archaeologist* 19:1-43.

1971 Second Preliminary Report.- the St. Albans Site, Kanawha County, West Virginia. *Report of Archaeological Investigations No. 3*, West Virginia Geological and Economic Survey, Morgantown.

Bryson, Reid A. and Wayne M. Wendlund

1967 Tentative climate patterns for some late Glacial and Post-Glacial episodes in central North America. *In Man, land, and water: proceedings of the 1966 Conference on Environmental Studies of the Glacial Lake Agassiz Region* edited by William J. Mayer-Oakes. University of Manitoba Press, Winnipeg.

Bullen, Ripley P., and H. Bruce Greene

1970 Stratigraphic Tests at Stallings Island, Georgia. *Florida Anthropologist* 23:8-23.

Butler, J. Robert and P. C. Ragland

1969 Petrology and Chemistry of Meta-Igneous Rocks in the Albermarle Area, North Carolina Slate Belt. *American Journal of Science* 267:700-726.

Butzer, Karl W.

1982 *Archaeology as Human Ecology*. Cambridge University Press, Cambridge.

Cable, John S., Charles E. Cantley, and Jim Sexton

1978 A Study of Prehistoric Utilization of the Inter-riverine Piedmont: The U.S. 176 By-pass Survey from Union to Pacolet, South Carolina. *South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Research Manuscript Series* 124.

Cain, S. A.

1944 Pollen analysis of some buried soils, Spartanburg County, South Carolina. *Torrey Botanical Club Bulletin* 71:11-22.

Caldwell, Joseph R.

- 1950 A Preliminary Report on Excavations in the Alatoona Reservoir. *Early Georgia* 1:4-21.
- 1952 The Archaeology of Eastern Georgia and South Carolina. *In Archaeology of the Eastern United States*, edited by J. B. Griffin, pp. 312-321. university of Chicago Press, Chicago.
- 1953 The Rembert Mounds, Elbert County, Georgia. *Smithsonian Institution, Bureau of American Ethnology Bulletin* 154.
- 1954 The Old Quartz Industry of Georgia and South Carolina. *Southern Indian Studies* 6:37-39.
- 1958 Trend and Tradition in the Prehistory of the Eastern United States. *American Anthropological Association Memoir No. 88*.
- 1971 Eastern North America. *In Prehistoric Agriculture*, edited by Stuart Struever, pp. 361-382. Natural History Press, Garden City, NY.
- 1974a Appraisal of the Archaeological resources of Hartwell Reservoir, South Carolina and Georgia. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* VI(2):35-44.
- 1974b Preliminary Report: Archaeological Investigation of Fort Charlotte, McCormick County, South Carolina. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* VI(2):45-56.
- Canouts, Veletta and Albert C. Goodyear
- 1985 Lithic Scatters in the South Carolina Piedmont. *In Structure and Process in Southeastern Archaeology*, edited by Roy S. Dickens Jr., and H.T. Ward, pp. 180-194. University of Alabama Press, University.
- Carbone, Victor A.
- 1983 Late Quaternary environments in Florida and the Southeast. *The Florida Anthropologist* 36(1-2):3-17.

Carbone, V. A., A. V. Segovia, J. E. Foss, M. C. Sheehan, D. R. Whitehead, and S. T. Jackson

1983 *The Changing Piedmont Landscape from late Glacial to Recent times*. Paper presented at the Annual Meeting of the Society for American Archaeology, Pittsburg, Pennsylvania, April 30, 1983.

Carlson, David L.

1979 *Hunter-Gatherer Mobility Strategies: An Example From the Koster Site in the Lower Illinois Valley*. Ph.D. dissertation, Department of Anthropology, Northwestern University. University Microfilms, Ann Arbor.

Chapman, Jefferson

1973 The Icehouse Bottom Site, 40MR23. *Report of Investigations No. 13*, Department of Anthropology, University of Tennessee, Knoxville.

1975 The Rose Island Site and the Bifurcate Tradition. *Report of Investigations No. 14*, Department of Anthropology, University of Tennessee, Knoxville.

1976 Some Thoughts on Early Archaic Settlement and Subsistence Patterns in the Lower Little Tennessee River Valley. Paper presented at the 33rd Annual Meeting of the Southeastern Archaeological Conference, Tuscaloosa.

1977 Archaic Period Research in the Lower Little Tennessee River Valley: 1975.- Icehouse Bottom, Harrison Branch, Thirty Acre Island, Calloway Island. *Report of Investigations No. 18*, Department of Anthropology, University of Tennessee, Knoxville.

1978 The Bacon Farm Site and a Buried Site Reconnaissance. *Report of Investigations No. 23*, Department of Anthropology, University of Tennessee, Knoxville.

1979 The Howard and Calloway Island Sites. *Report of Investigations No. 27*, Department of Anthropology, University of Tennessee, Knoxville.

1980a The Jones Ferry Site (40MR76). *In The 1979 Archaeological and Geological Investigations in the Tellico Reservoir*, edited by Jefferson Chapman, pp. 43-58. *Report of Investigations No. 29*, Department of Anthropology, University of Tennessee, Knoxville.

- 1980b Wear Bend Site (40LD107). *In* The 1979 Archaeological and Geological Investigations in the Tellico Reservoir, edited by Jefferson Chapman, pp. 32-42. *Report of Investigations No. 29*, Department of Anthropology, University of Tennessee, Knoxville.
- 1981 The Bacon Bend and Iddins Sites.- The Late Archaic Period in the Lower Little Tennessee River Valley. *Report of Investigations No. 31*, Department of Anthropology, University of Tennessee, Knoxville.
- 1982 A Summary and Assessment of the Archaeological Investigations at Bussell Island (40LDI 7) 1886-1978. Report prepared in partial fulfillment of Tennessee Valley Authority Contract TV48117A, Department of Anthropology, University of Tennessee, Knoxville.
- 1985a Archaeology and the Archaic Period in the Southern Ridge and Valley Province. *In* Structure and Process in Southeastern Archaeology, edited by Roy S. Dickens, Jr. and H. Trawick Ward, pp. 137-153. University of Alabama Press, Tuscaloosa.
- 1985b Tellico Archaeology. *Report of Investigations No. 43*, Department of Anthropology, University of Tennessee, Knoxville.

Chapman, Jefferson, Paul A. Delcourt, Patricia A. Cridlebaugh, Andrea B. Shea, and Hazel R. Delcourt

- 1983 Man-Land interaction: 10,00 years of American Indian impact on native ecosystems in the Lower Little Tennessee River Valley, Eastern Tennessee. *Southeastern Archaeology* 1(2):115-121.

Chapman, Jefferson and Andrea Brewer Shea

- 1981 The Archaeobotanical Record: Early Archaic Period to Contact in the Lower Little Tennessee River Valley. *Tennessee Anthropologist* 6:61-84.

Charles, Tommy

- 1981 Dwindling Resources: An Overture to the Future of South Carolina's Archaeological Resources. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* 13:1-85.
- 1983 Thoughts and Records from the Survey of Private Collections of Prehistoric Artifacts Throughout South Carolina: A Second Report. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* 15:1-37.

1986 The Fifth Phase of the Collectors Survey. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* 18:1-27.

Clafin, William H., Jr.

1931 The Stallings Island Mound, Columbia County, Georgia. *Papers of the Peabody Museum of American Archaeology and Ethnology* No. 14(1), Harvard University, Cambridge.

Claggett, Stephen R. and John S. Cable (assemblers)

1982 *The Haw River Sites: Archaeological Investigations at Two Stratified Sites in the North Carolina Piedmont*. Report 2386, Commonwealth Associates Inc., Jackson Michigan.

Cleland, Charles E.

1976 The Focal-Diffuse Model: An Evolutionary Perspective on the Prehistoric Cultural Adaptations of the Eastern United States. *Mid-Continental Journal of Archaeology* 1:59-76.

Coe, Joffre L.

1964 The Formative Cultures of the Carolina Piedmont. *Transactions of the American Philosophical Society*, n.s. 54 (5).

Cook, Thomas Genn

1976 Koster: An Artifact Analysis of Two Archaic Phases in Westcentral Illinois. *Northwestern Archaeological Program, Prehistoric Records 1, Koster Research Reports* 29.

Cowan, C. Wesley

1985 Understanding the Evolution of Plant Husbandry in Eastern North America: Lessons from Botany, Ethnography, and Archaeology. *In Prehistoric Plant Food Production in North America*, edited by Richard I. Ford, pp. 205-244. *Anthropological Papers* 75, Museum of Anthropology, University of Michigan, Ann Arbor.

Daniel, I. Randolph, Jr.

1994 *Hardaway Revisited: Early Archaic Settlement in the Southeast*. Ph.D. Dissertation, Department of Anthropology, University of North Carolina, Chapel Hill.

- Daniel, I. Randolph, Jr., and J. Robert Butler
1996 An Archaeological Survey and Petrographic Description of Rhyolite Sources in the Uwharrie Mountains, North Carolina. *Southern Indian Studies* 45:1-37.
- Davis, R.P. Stephen, Jr., and I Randolph Daniel, Jr.
1990 The Classification of Projectile Points in Existing Archaeological Collections from North Carolina. Manuscript on file, Research Laboratories of Anthropology, University of North Carolina, Chapel Hill.
- Delcourt, Paul A., and Hazel R. Delcourt
1981 Vegetation Maps for Eastern North America: 40,000 Years B.P. to Present. *In* Geobotany, R. Romans, editor, pp. 123-166. New York, Plenum Press.
- DePratter, Chester B.
1975 The Archaic in Georgia. *Early Georgia* 3(1):1-16.
- Dickens, Roy S., Jr.
1975 A Processual Approach to Mississippian Origins on the Georgia Piedmont. *Southeastern Archaeological Conference Bulletin* 18:31-42.
- 1976 *Cherokee Prehistory: the Pisgah Phase in the Appalachian Summit Region*. University of Tennessee Press, Knoxville.
- 1980 Ceramic Diversity as an Indicator of Culture Dynamics in the Woodland Period. *Tennessee Anthropologist* 5:34-36.
- Dickson, F. P.
1977 Quartz Flaking. *In* Stone Tools as Cultural Markers, Change, Evolution, and Complexity, edited by R. V. S. Wright, pp. 97-103. Australian Institute of Aboriginal Studies, Prehistory and Material Culture Series 12.
- Dragoo, Don W.
1976 Some Aspects of Eastern North American Prehistory: A Review 1975. *American Antiquity* 41:3-27.
- Elliott, Daniel T.
1994 A Savannah River History of Mid-Holocene Archaeological Research in the Southeast. *In* Archaeology of the Mid-Holocene Southeast, edited by K. E. Sassaman and D. G. Anderson. Council of South Carolina Professional Archaeologists

- Faulkner, Charles H.
 1975 The Mississippian-Woodland Transition in the Eastern Tennessee Valley. *Southeastern Archaeological Conference Bulletin* 18:19-30.
- Faulkner, Charles H. and Major C.R. McCollough
 1973 Introductory Report of the Normandy Reservoir Salvage Project: Environmental Setting, Typology and Survey. *Report of Investigations No. 11*, Department of Anthropology, University of Tennessee, Knoxville.
- Fenneman, N. M.
 1938 *Physiography of the Eastern United States*. McGraw-Hill, New York.
- Ferguson, Leland G.
 1971 *South Appalachian Mississippian*. Ph.D. dissertation, University of North Carolina, Chapel Hill. University Microfilms, Ann Arbor.
- Fish, Paul R. and David J. Hally
 1983 The Wallace Reservoir Archaeological Project: An Overview. *Early Georgia* 11:1.
- Fitting, James E., J. Devisscher, and E. J. Wahla
 1966 The Paleo-Indian occupation of the Holcomb Beach. *Anthropological Papers, Museum of Anthropology, The University of Michigan* 27. Ann Arbor.
- Ford, James A.
 1966 Early Formative Cultures in Georgia and Florida. *American Antiquity* 31:781-799.
- Ford Richard I.
 1977 Evolutionary Ecology and the Evolution of Human Ecosystems: A Case Study from the midwestern U.S.A. *In Explanation of Pre-historic Change*, edited by James N. Hill, pp. 153-184. University of New Mexico Press, Albuquerque.
- 1985 The Process of Plant Food Production in Prehistoric North America. *In Prehistoric Plant Food Production in North America*, edited by Richard I. Ford, pp. 1-18. *Anthropological Papers* 75, Museum of Anthropology, University of Michigan, Ann Arbor.
- Foss, John E.
 1981 Soils of the Savannah River Valley. Draft preliminary report to the National Park Service. Interagency Archaeological Services, Atlanta.

- Foss, John E., D. P. Wagner, and F. P. Miller
 1985 *Soils of the Savannah River Valley. Richard B. Russell Multiple Resource Area, Elbert County, Georgia.* Atlanta Interagency Archaeological Services Division, National Park Service, Russell Papers.
- Fowler, Melvin L.
 1959 Modoc Rock Shelter: an Early Archaic Site in southern Illinois. *American Antiquity* 24:257-270.
- Frost, Louis W., Jr.
 1979 *Soil Survey of Elbert, Franklin, and Madison Counties, Georgia.* U.S. Department of Agriculture, Soil Conservation Service, Washington.
- Funk, Robert E.
 1977 Early cultures in the Hudson Drainage Basin. *In Amerinds and their paleoenvironments in northeastern North America*, edited by Walter S. Newman and Bert Salwen, pp. 316-332. The New York Academy of Sciences 288.
- Gardner, William M.
 1974 *The Flint Run Paleo-Indian Complex: A Preliminary Report 1971 Through 1973 Seasons.* Occasional Paper No. 1, Archaeology Laboratory, Catholic University of America, Washington D.C.
- Gladfelter, Bruce G.
 1977 Geoarchaeology: The Geomorphologist and Archaeology. *American Antiquity* 42:519-538.
- Goodyear, Albert C.
 1979 A Hypothesis for the Use of Cryptocrystalline Raw Materials Among Paleo-Indian Groups of North America. *Research Manuscript Series No. 156, Institute of Archaeology and Anthropology, University of South Carolina.*
- 1982 The chronological position of the Dalton horizon in the Southeastern United States. *American Antiquity* 47:382-395.
- Goodyear, Albert C., and Tommy Charles
 1984 An Archaeological Survey of Chert Quarries in Western Allendale County, South Carolina. *Research Manuscript Series No. 195, Institute of Archaeology and Anthropology, University of South Carolina.*

Goodyear, Albert C., John H. House, and Neal W. Ackerly
1979 Laurens-Anderson: An Archaeological Study of the South Carolina Inter-Riverine Piedmont. *Anthropological Studies No. 4*, Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Griffin, James B.

1952 Culture Periods in Eastern United States Archaeology. *In Archaeology of Eastern United States*, edited by James B. Griffin. University of Chicago Press, Chicago.

1964 The Northeast Woodlands Area. *In Prehistoric Man in the New World*, edited by J. D. Jennings and E. Norbeck, pp. 223-258. University of Chicago Press, Chicago.

1967 Eastern North American Archaeology: A Summary. *Science* 156:175-191.

1977 A commentary on Early Man studies in the Northeast. *Annals of the New York Academy of Sciences* 288:3-15.

Griffin, V. S.

1974 Analysis of the Piedmont in Northwestern South Carolina. *Geological Society of America, Bulletin* 85:1123-1138.

Gunn, Joel D. and Kathy Wilson

1993 Archaeological Data Recovery Investigations at Sites 38CT54 and 38CT58 along the S.C. 151 Jefferson Bypass, Chesterfield County, South Carolina. Report submitted to South Carolina Department of Highways and Public Transportation by Garrow and Associates, Raleigh, North Carolina.

Hally, David J.

1975 The Mississippian Period. *Early Georgia* 3:37-52.

House, John H. and David L. Ballenger

1976 An Archaeological Survey of Interstate 77 Route in the South Carolina Piedmont. *Research Manuscript Series No. 104*, Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

House, John H. and Ron W. Wogaman

1978 Windy Ridge, A Prehistoric Site in the Inter-Riverine Piedmont in South Carolina. *University of South Carolina, Institute of Archaeology and Anthropology, Anthropological Studies* 3.

Hutto, Brooks

1970 Archaeological Survey of the Elbert County, Georgia Portion of the Proposed Trotters Shoals Reservoir, Savannah River. *Laboratory of Archaeology Series, University of Georgia Report 7.*

Keel, Bennie C.

1975 On South Appalachian Mississippian in the Appalachian Summit Region. *Southeastern Archaeological Conference Bulletin* 18:12-18.

1976 *Cherokee Archaeology: A Study of the Appalachian Summit.* University of Tennessee Press, Knoxville.

Kelly, A. R. and R. S. Neitzel

1961 *The Chauga Site in Oconee County, South Carolina.* Laboratory of Archaeology Series Report 3, University of Georgia, Athens.

Kelly, John E.

1972 *An Archaeological Survey of the Piedmont Region in North Central South Carolina.* Unpublished M. A. thesis, Department of Anthropology, University of Wisconsin, Madison.

Krieger, Alex D.

1964 Early man in the new world. *In Prehistoric man in the New World*, edited by Jesse D. Jennings and Edward Norbeck, pp. 23-84. University of Chicago Press, Chicago.

Larson, Lewis H., Jr.

1971 Archaeological implications of Social Stratification at the Etowah Site, Georgia. *Memoirs of the Society for American Archaeology* 25:58-67.

Lewis, R. Berry

1983 Archaic Adaptations to the Illinois Prairie: The Salt Creek Region. *In Archaic Hunters and Gatherers in the American Midwest*, edited by J. L. Phillips and J. A. Brown, pp. 99-116. Academic Press, New York.

Lewis, Thomas M. N. and Madeline Kneberg Lewis

1959 The Archaic Culture in the Middle South. *American Antiquity* 25:161-183.

Logan, Wilfred D.

1952 Graham Cave, an Archaic site in Montgomery County, Missouri.. *Memoir of the Missouri Archeological Society* 2. Columbia.

McMillan, R. Bruce

- 1976 The Dynamics of Cultural and Environmental Change at Rodgers Shelter, Missouri. *In Prehistoric Man and His Environments*, edited by W. R. Wood R. B. McMillan, pp. 211-232. Academic Press, New York.

McNett, Charles W., Jr., B. A. McMillan, and S. B. Marshall

- 1977 The Shawnee-Minisink site. *In Amerinds and their paleoenvironments in northeastern North America*, edited by Walter S. Newman and Bert Salwen, pp. 282-296. The New York Academy of Sciences 288.

MacDonald, George F.

- 1968 Debert: a Paleo-Indian site in central Nova Scotia. National Museum of Canada. *Anthropology Papers* 16.

- 1971 A Review of Research on Paleo-Indian in Eastern North America, 1960-1970. *Arctic Anthropology* 8(2):32-41.

Michie, James A.

- 1969 Excavations at Tom's (Thom's) Creek. *The Notebook* 1(10):2-16. South Carolina Institute of Archaeology and Anthropology, University of South Carolina.
- 1971 Excavations at the Taylor Site. *Southeastern Archaeological Conference Bulletin* 13:47-48.
- 1977 *The late Pleistocene human occupation of South Carolina*. Ms. on file, Institute of Archaeology and Anthropology, University of South Carolina.

Miller, Carl F.

- 1949 The Lake Spring Site, Columbia County, Georgia. *American Antiquity* 15:254-258.
- 1974 Appraisal of the Archaeological Resources of the Clark Hill Reservoir Area, South Carolina and Georgia (1948). South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* VI(2):27-34.

Neusius, Sarah W.

- 1981 *Post-Glacial Environmental Change and the Koster Faunal Record*. Paper presented at the Fourth Annual Ethnobotany Conference.

1982 *Early-Middle Archaic Subsistence Strategies: Changes in Faunal Exploitation at the Koster Site*. Ph.D. dissertation, Department of Anthropology, Northwestern University. University Microfilms, Ann Arbor.

Newman, Walter S. and Bert Salwen (editors)

1977 Amerinds and Their Paleoenvironments in Northeastern North America. *Annals of the New York Academy of Sciences* 288:1-545.

Novick, Andrea Lee

1978 Prehistoric Lithic Material Sources and Types in South Carolina: A Preliminary Statement. *South Carolina Antiquities, The First Ten Years* 1-10:422-437.

Oliver, Billy C.

1981 *The Piedmont Tradition Refinement of the Savannah River Stemmed Point Type*. Unpublished M.A. thesis, Department of Anthropology, University of North Carolina, Chapel Hill.

O'Steen, Lisa D.

1983 *Early Archaic Settlement Patterns in the Wallace reservoir: An Inner Piedmont Perspective*. Unpublished M.A. thesis, Department of Anthropology, University of Georgia.

Overstreet, William C. and H. Bell III

1965 The Crystalline Rocks of South Carolina. *Geological Survey Bulletin* 1183.

Parler, A. Robert, and Sammy T. Lee

1981 A Preliminary Report on the Allen Mack Site (38OR67). Paper presented at the Seventh Annual Conference on South Carolina Archaeology, Columbia, South Carolina, April 11, 1981.

Perkinson, P. H.

1973 North Carolina fluted projectile points survey report, number two. *Southern Indian Studies* 5:3-58.

Richie, W. A.

1932 The Lamoka Lake Site: the type station of the Archaic Algonkin Period in New York. *New York State Archeological Association, Researches and Transaction* 7(4).

Rudolph, James L. and D. B. Blanton

1981 A Discussion of Mississippian Settlement in the Georgia Piedmont. *Early Georgia* 8(1):14-37.

Sassaman, Kenneth E.

1983 Middle and Late Archaic Settlement in the South Carolina Piedmont. M.A. thesis, Department of Anthropology, University of South Carolina, Columbia.

1985 A Preliminary Typological Assessment of MALA Hafted Bifaces from the Pen Point Site, Barnwell County, South Carolina. *South Carolina Antiquities* 17:1-17.

1988 The Mid-Holocene Archaeological Record of the Middle Savannah River Valley. Manuscript in possession of the author.

1991 Adaptive Flexibility in the Morrow Mountain Phase of the Middle Archaic Period. *South Carolina Antiquities* 23:31-41.

Sassaman, Kenneth E., and David G. Anderson

1994 *Middle and Late Archaic Archaeological Records of South Carolina: A Synthesis for Research and Resource Management*. Council of South Carolina Professional Archaeologists.

Sassaman, Kenneth E., and David G. Anderson (editors)

1996 *Archaeology of the Mid-Holocene Southeast*. University Press of Florida, Gainesville.

Schuldenrein, Joseph

1996 Geoarchaeology and the Mid-Holocene Landscape History of the Greater Southeast. In *Archaeology of the Mid-Holocene Southeast*, edited by K. E. Sassaman and D. G. Anderson, pp. 3-27. University Press of Florida, Gainesville.

Sears, William H.

1958 The Wilbanks Site (9CK-5), Georgia. *Bureau of American Ethnology Bulletin* 169:129-194.

Segovia, Antonio V.

1981 *Archaeological Geology of the Savannah River Valley and Main Tributaries, Between Hartwell Dam and Clark Hill Reservoir, Georgia and South Carolina*. Report prepared for Thunderbird Research Corporation, Inc.

1985 *Archaeological Geology of the Savannah River Valley and Main Tributaries in the Richard B. Russell Multiple Resource Area*. Atlanta Interagency Archaeological Services Division, National Park Service, Russell Papers.

Shapiro, Gary

1983 *Site Variability in the Oconee Province: A Late Mississippian Society of the Georgia Piedmont*. Ph.D. dissertation, Department of Anthropology, Northwestern University. University Microfilms, Ann Arbor.

Sheehan, M., D. Whitehead, and S. T. Jackson

1982 *Late Quaternary environmental history of the Richard B. Russell Multiple Resource Area*. Report submitted by the Thunderbird Research Corporation under contract C-54056 with the National Park Service. Interagency Archaeological Services, Atlanta.

Smith, Bruce D.

1975 Middle Mississippian Exploitation of Animal Populations. *Anthropological Papers, Museum of Anthropology, University of Michigan* 57.

1978 Variation in Mississippian Settlement Patterns. *In Mississippian Settlement Patterns*, edited by Bruce D. Smith, pp. 479-503. Academic Press, New York.

1986 The Archaeology of the Southeastern United States: From Dalton to DeSoto, 10,500-500 B.P. *Advances in World Archaeology*, 5:1-88.

South, Stanley A.

1959 *A Study of the Prehistory of the Roanoke Basin*. Unpublished M.A. thesis, Department of Anthropology, University of North Carolina, Chapel Hill.

1973 Indian Pottery Taxonomy for the South Carolina Coast. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* V(2):54-55.

Spears, Carol S.

1975 Hammers, Nuts and Bolts, Cobbles, Cobbles, Cobbles: Experiments in Cobble Techniques in Search of Correlates. *In Arkansas Archeological Project*, edited by Charles M. Baker, pp. 83-116. Arkansas Archaeological Survey, Research Report 6.

- Stein, Julie K., K. C. Carstens, and K. W. Wesler
 1983 **Geoarchaeology and Historical Archaeology: An Example From Fort Jefferson, Kentucky.** *Southeastern Archaeology* 2(2):132-144.
- Stephenson, Robert L.
 1975 **Editor's Page.** South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* I:25-26.
- Steponaitis, Vincas P.
 1986 **Prehistoric Archaeology in the Southeastern United States.** *Annual Reviews in Anthropology* 14:363-404.
- Stoltman, James B.
 1972 **The Late Archaic in the Savannah River Region.** *Florida Anthropologist* 25(2):37-62.
- 1974 **Groton Plantation: An Archaeological Study of a South Carolina Locality.** Monograph of the Peabody Museum No. 1, Cambridge.
- Styles, Bonnie W. and Walter E. Klippel
 1996 **Mid-Holocene Faunal Exploitation in the Southeastern United States.** *In* Archaeology of the Mid-Holocene Southeast, edited by K. E. Sassaman and D. G. Anderson. The University Press of Florida, Gainesville.
- Suhm, Dee Ann, and A. Krieger
 1954 **An Introductory Handbook of Texas Archaeology.** The Texas Archaeological Society Bulletin 5.
- Taylor, Richard L. and Marion F. Smith (Assemblers)
 1978 **The Report of the Intensive Survey of the Richard B. Russell Dam and Lake, Savannah River, Georgia and South Carolina.** *Research Manuscript Series No. 142*, Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- Thomas, David H.
 1982 *Archaeology.* Holt, Rinehart, and Winston, New York.

- Thompson, Timothy A. and William M. Gardner
1983 *An Archaeological Survey of Five Islands in the Savannah River: An Impact Assessment for the Richard B. Russell Reservoir Multiple Resource Area.*
Unpublished manuscript on file at the Atlanta Interagency Archaeological Services Division, National Park Service.
- Thornbury, William D.
1965 *Regional Geomorphology of the United States.* John Wiley and Sons, Inc., New York.
- Tippitt, V. Ann, and William H. Marquardt
1982 A Preliminary Report of the First Excavation Season at the Gregg Shoals Site (9EB259), Elbert County, Georgia. *South Carolina Antiquities* 14:1-24.
- 1984 *Archaeological Investigations at Gregg Shoals, A Deeply Stratified Site on the Savannah River.* Russell Papers, Archaeological Services Branch, National Park Service, Atlanta.
- Trimble, Stanley W.
1974 Man-induced soil erosion on the Southern Piedmont. Soil Conservation Society of America, Ankeny, Iowa.
- Turnbaugh, William
1975 Toward an Explanation of the Broadpoint Dispersal in Eastern North America Prehistory. *Journal of Anthropological Research* 31(1):51-68
- Upchurch, Sam B.
1984 Geoarchaeology of the Gregg Shoals-Clyde Gulley Group. *In* Archaeological Investigations at Gregg Shoals, A Deeply Stratified Site on the Savannah River. Russell Papers, Archaeological Services Branch, National Park Service, Atlanta.
- Vitelli, Karen D.
1975 Report on the Excavation at UMBC Site 18-Ba-71. *Archaeological Society of Maryland, Miscellaneous Papers* 10.
- Voorhies, M. R.
1974 Pleistocene vertebrates with boreal affinities in the Georgia Piedmont. *Quaternary Research* 4(1):85-93.
- Wagner, Gail E.
1982 Testing Flotation Recovery Rates. *American Antiquity* 47:127-132.

Waring, Antonio J., Jr.

1968 The Bilbo Site, Chatham County Georgia (originally 1940). *In The Waring Papers: The Collected Works of Antonio J. Waring, Jr.*, edited by S. Williams, pp. 216-221. *Papers of the Peabody Museum of Archaeology and Ethnology*, Harvard University, Vol. 58.

Watson, Patty Jo

1976 In Pursuit of Prehistoric Subsistence: A Comparative Account of Some Contemporary Flotation Techniques. *Mid-Continental Journal of Archaeology* 1(1):77-100.

Watts, W. A.

1970 The full glacial vegetation of Northwestern Georgia. *Ecology* 51:17-33.

Watts, W. A.

1975 Vegetation record for the last 20,000 years from a small marsh on Lookout Mountain, northwestern Georgia. *Geological Society of America Bulletin* 86:287-291.

Watts, W. A.

1980 Late-Quaternary vegetation history at White Pond on the inner Coastal Plain of South Carolina. *Quaternary Research* 13:187-199.

Watts, W. A. and M. Stuiver

1980 Late Wisconsin climate of northern Florida and the origin of the species rich deciduous forest. *Science* 210:325-327.

Watts, W. A., E. C. Grimm, and T. C. Hussy

1996 Mid-Holocene Forest History of Florida and the Coastal Plain of Georgia and South Carolina. *In Archaeology of the Mid-Holocene Southeast*, edited by K. E. Sassaman and D. G. Anderson. University Press of Florida, Gainesville.

Wauchope, Robert

1966 Archaeological survey of northern Georgia. *Society for American Archaeology Memoirs* 21.

Wesler, Kit W.

1983 Typology and Sequence in the Maryland Archaic. *Southeastern Archaeology* 2:21-29.

- Wetmore, Ruth Y. and Albert C. Goodyear
1986 Archaeological Investigations at Nipper Creek (38RD18): An Archaic Fall Line Site. *Research Manuscript Series 201, South Carolina Institute of Archaeology and Anthropology, University of South Carolina.*
- Whitehead, Donald R.
1967 Palynology and Pleistocene phytogeography of unglaciated Eastern North America. *In The Quaternary of the United States*, edited by H. E. Wright, Jr. and David G. Frey. Princeton University Press, Princeton.
- Whitehead, D. R. and E. S. Barghoorn
1962 Pollen analytical investigation of Pleistocene deposits from western North Carolina and South Carolina. *Ecological Monographs* 32:347-369.
- Willey, Gordon R.
1966 *An Introduction to American Archaeology, Volume 1: North and Middle America*. Prentice-Hall, Englewood Cliffs, New Jersey.
- Willey, Gordon R. and Philip Phillips
1958 *Method and Theory in American Archaeology*. University of Chicago Press, Chicago.
- Williams, Stephen (editor)
1968 *The Waring Papers: The Collected Works of Antonio J. Waring, Jr.* Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University, Vol. 58, Cambridge.
- Williams, Stephen and James B. Stoltman
1965 An outline of southeastern United States prehistory with particular emphasis on the Paleo-Indian era. *In The Quaternary of the United States*, edited by H. G. Wright, Jr., and D. G. Frey. Princeton University Press, Princeton.
- Wood, W. D., Dennis Blanton, Teresa Rudolph, and Dan Elliott
1981 Archaeological Data Recovery in the Richard B. Russell Multiple Resource Area, the Anderson County Group, 38AN8, 38AN29, 38AN126: Interim Report. Southern Wildlife Sciences, Submitted to Interagency Archaeological Services, Atlanta
- Wright, H. E., Jr. (editor)
1983 *Late Quaternary Environments of the United States, pt. 2: The Holocene*. University of Minnesota Press, Minneapolis.

Yarnell, Richard A.

1982 Problems of interpretation of archaeological plant remains of the eastern woodlands. *Southeastern Archaeology* 1:1-17.