18-1 : SRS Archaeological

PROGRAMMATIC MEMORANDUM OF AGREEMENT AMONG THE SAVANNAH RIVER OPERATIONS OFFICE, UNITED STATES DEPARTMENT OF ENERGY, THE SOUTH CAROLINA STATE HISTORIC PRESERVATION OFFICER AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION CONCERNING THE MANAGEMENT OF ARCHAEOLOGICAL SITES ON THE SAVANNAH RIVER SITE, AIKEN, ALLENDALE AND BARNWELL COUNTIES, SOUTH CAROLINA

WHEREAS, the United States Department of Energy (herein referred to as DOE), Savannah River Operations Office (herein referred to as SROO) proposes to maintain and operate the Savannah River Site (herein referred to as SRS) in Aiken, Allendale and Barnwell Counties, South Carolina; and,

WHEREAS, the DOE SROO, in consultation with the South Carolina State Historic Preservation Officer (herein referred to as SHPO), has determined that some DOE activities on the SRS may adversely affect archaeological sites included in or eligible for nomination to the National Register of Historic Places (herein referred to as National Register); and,

WHEREAS, the DOE SROO has requested the comments of the Advisory Council on Historic Preservation (herein referred to as Council) pursuant to Section 106 and Section 110 of the National Historic Preservation Act (16 U.S.C. 470), as amended, and its implementing regulations, e.g., "Protection of Historic Properties" (36 CFR Part 800); and,

WHEREAS, it has been determined that appropriate measures to inventory, evaluate, protect and enhance archaeological sites on the SRS may best be accomplished by a Programmatic Memorandum of Agreement (herein referred to as PMOA) that sets forth a process by which the DOE SROO will develop and implement a comprehensive historic preservation plan that includes mechanisms for inventorying, evaluating, protecting and enhancing archaeological sites affected by activities and programs administered and carried out by the DOE SROO on the SRS;

NOW, THEREFORE, the DOE SROO, the SHPO, and the Council agree that this program shall be implemented in accordance with the following stipulations in order to take into account the effect of DOE SROO activities on archaeological sites.

STIPULATIONS

The DOE SROO will ensure that the following measures are carried out, except where another party to this Agreement is specifically named.

I. IDENTIFICATION OF ARCHAEOLOGICAL SITES:

In accordance with Executive Order 11593, the DOE SROO has completed a 40 percent sample of the SRS. An additional 20 percent of the SRS has been archaeologically surveyed in accordance with Section 106 procedures. The DOE SROO will continue to identify archaeological sites on the SRS in South Carolina in a manner consistent with Section 110 (a) (2) of the National Historic Preservation Act, the Department of the Interior's Guidelines for Federal Agency Responsibilities under Section 110 of the National Historic Preservation Act, as amended 53 FR 4727, February 17, 1988 (Section 110 Guidelines), the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation 48 FR 44716, September 29, 1983, and applicable DOE standards. The DOE SROO shall accomplish this by:

A. Maintaining a current database, including locations of archaeological sites, descriptive data, assessments of significance as necessary, sensitivity to damage, and predictions of the distributions of unrecorded archaeological sites on the Savannah River Site based on ethnographic, historical, archaeological and geoarchaeological information. Information on the extent, nature, and status of identification activities conducted or underway, as well as other relevant information, shall also be maintained in the database;

B. Establishing mechanisms for seeking information and advice from local governments, public and private organizations, and other interested persons likely to have knowledge of, or concerns with, archaeological sites on the SRS, and incorporating such information into identification and evaluation efforts (36 CFR 800.1[c]);

C. Maintaining an archaeological presence on the SRS to identify, evaluate, and manage archaeological sites on the SRS;

D. Developing and testing predictive models through the identification of: (1) areas of low archaeological site occurrence probability; and (2) areas of moderate to high archaeological site occurrence probability in which to focus future intensive archaeological surveys. These models will provide the basis for depicting zones of archaeological sensitivity on USGS quadrangles (or a computerized Geographic Information System [GIS]) for the SRS. The Archaeological Resource Management Plan that accompanies this PMOA constitutes the first comprehensive effort to identify those areas;

E. Conducting, or causing to be conducted, systematic archaeological site inventories whenever an undertaking proposed by the DOE SROO, or by another party under DOE SROO jurisdiction, may affect: (1) an area in which archaeological sites are known, or deemed likely to exist, but have not been sufficiently documented to permit Stipulation IV to be complied with; (2) an area where archaeological sites are deemed likely to exist, including but not limited to areas of predicted high and moderate archaeological sensitivity; or (3) an area where the nature and distribution of archaeological sites are poorly understood;

F. Providing archaeological reports, as outlined in Stipulation VII. A, B and C, to the SHPO for review and comment. The DOE SROO shall respond to such comments in the same manner as that outlined in Stipulation VII.C;

G. Implementing, in consultation with the SHPO, the accompanying Archaeological Resource Management Plan that includes provisions for site identification, evaluation, protection, mitigation, management, enhancement and coordination as set forth in the remainder of this Agreement. The Archaeological Resource Management Plan, which will be reviewed concurrently with the PMOA by the SHPO, is intended by DOE SROO to assist planning managers in the SRS Site Use Coordination and Approval process (Stipulation II).

II. PROJECT REVIEW:

The DOE SROO shall continue to maintain and update, as needed, the SR Site Development and Facilities Use Plan and the Site Use Coordination and Approval process (Order SR 430X.1, SR-88), administered by the Savannah River Land Use Committee. The Natural Resource Management Plan helps provide assistance to DOE SROO in determining land management policies for DOE SROO activities and for all activities of others under DOE SROO jurisdiction.

The DOE SROO shall review all terrain modifying activities to determine their potential for adversely affecting archaeological sites. The accompanying Archaeological Resource Management Plan (Chapter V) contains the process by which the DOE SROO has and shall continue to monitor daily land use activities on the SRS.

Terrain modifying activities can be divided into two SR-88 Site Use Application Review categories: (1) small-scale, routine construction activities and on-going maintenance of, but not limited to, roads, rights-of-way and forest management activities ; and (2) future large-scale construction activities. The first review category will be reported yearly by DOE SROO to the SHPO using Stipulation VII (REPORTING) A guidelines. The second review category is basically an as-needed review for project-specific activities using Stipulation VII (REPORTING) B guidelines.

These reviews will employ all appropriate archaeological site information at the SRS or on file with the South Carolina Institute of Archaeology and Anthropology and the SHPO. The review will incorporate or reference any existing predictive models and preservation plans.

III. EVALUATION OF ARCHAEOLOGICAL SITES:

The DOE SROO shall evaluate, in consultation with the SHPO, the significance of archaeological sites on the SRS on an as-needed, project-specific basis. Evaluations of significance will be in view of SRS archaeological research designs/contexts, which are derived from the SRS Historic and Prehistoric Syntheses. The evaluations shall be conducted in accordance with 36 CFR 800.4(c) and pertinent National Register guidelines. The DOE SROO shall accomplish this by:

A. Providing archaeological site evaluation reports, including opinions on eligibility with reference to the National Register criteria (36 CFR 60.4), to the SHPO for review and comment prior to taking a final action on activities involving identified sites. Within 20 working days of receipt of a completed evaluation, the SHPO shall respond that an evaluated site:

1. is not considered to be eligible for listing in the National Register; or

2. may be eligible for listing in the National Register, but requires additional evaluation to make a final determination. In this case, the site will be treated as if it is eligible until demonstrated otherwise through appropriate testing and/or other documentation; or

3. is considered eligible for inclusion in the National Register, has already been determined eligible for listing and/or is listed in the National Register.

In the event site inventory and evaluation are conducted simultaneously, a single combined report may be submitted for SHPO review and comment.

If by the end of 20 working days, the SHPO has not responded to the DOE SROO findings or requested a reasonable time extension within which to respond, the DOE SROO may assume SHPO concurrence with the DOE SROO opinion.

B. Nominating to the National Register sites evaluated as being eligible for listing in the National Register which retain that eligibility following individual project activities. By way of meeting agency responsibilities under Section 110(a)(2) of the National Historic Preservation Act, the DOE SROO shall accomplish this in accordance with the procedures contained in 36 CFR Part 60.

IV. PROTECTION AND MANAGEMENT OF ARCHAEOLOGICAL SITES:

The DOE SROO, in consultation with the SHPO, shall implement a process to assure the protection of potentially significant and significant archaeological sites on the SRS. The DOE SROO shall accomplish this by:

A. Conducting no activities that might affect archaeological sites until site inventories and evaluations have been conducted;

B. Consulting with SRS project planners, resulting in a determination that there is no feasible or prudent alternative to the proposed action; DOE SROO shall not proceed with the proposed activity until appropriate mitigative measures have been developed in consultation with the SHPO, Council and other interested persons (36 CFR 800.1(c)), and executed by DOE SROO;

C. Assuring that all research and development/technical work at archaeological sites is conducted in accordance with an acceptable research rationale;

D. Providing site monitoring and protection for identified sites in order to prevent site destruction and vandalism;

E. Providing monitoring during terrain alteration to prevent the unintentional destruction of previously unidentified sites.

V. MITIGATIVE GUIDELINES:

The DOE SROO, pursuant to 36 CFR 800.4(c) and in consultation with the SHPO, shall implement a plan for mitigating the adverse effects of activities upon significant archaeological sites on the SRS. The DOE SROO shall accomplish this by:

A. Adhering to the following guidelines:

1. wherever feasible, archaeological sites will be preserved in place, and subject to the protection and management considerations of this Agreement;

2. where not feasible to establish appropriate preservation measures, the DOE SROO shall propose mitigative measures to the SHPO. If the SHPO concurs, the DOE SROO shall proceed as planned. If the SHPO objects, the DOE SROO shall notify the Council in accordance with Stipulation VIII.D for resolution in accordance with 36 CFR 800.5(d)(1)(ii);

3. mitigation measures may include, as appropriate, data recovery, curation, and recordation and shall take into account guidelines for such measures provided by the Council, the SHPO, appropriate DOE regulations, the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation and Section 110 Guidelines of the National Historic Preservation Act;

4. where human burials are involved, appropriate DOE, state and federal laws and guidelines (e.g., ACHP Memorandum "Treatment of Human Remains and Grave Goods" and the American Indian Religious Freedom Act) will be followed. The DOE SROO stance on the treatment of human remains follows closely the Society for American Archaeology's "Statement Concerning the Treatment of Human Remains" (Bulletin of the Society for American Archaeology 1989: 7(6):1-2). In essence this statement advocates the treatment of human remains on a case by case basis. The statement also acknowledges, as does the DOE SROO, the dignity and respect due human remains. Accordingly, human remains inadvertently discovered on the SRS will be re-covered and left in situ whenever possible. However, where disturbance of burials is unavoidable, those human remains will be removed for appropriate disposition. Regarding the disposition of human remains, the DOE SROO will, in consultation with the SHPO and in compliance with applicable federal, state and local laws, regulations and guidelines, make every effort to contact an individuals' descendants. If no individual or group claims particular human remains and there exists no option for leaving the remains in

situ, the final disposition of the remains will be at a designated area on the SRS.

B. Providing the Council with copies of agreements and plans for mitigation prior to conducting the work. Should the Council not object within 10 working days after receipt of an adequately documented agreement or plan, the proposed work shall be implemented; should the Council raise a timely objection, the DOE SROO, the SHPO and the Council shall consult to resolve the objection.

VI. <u>ENHANCEMENT OF ARCHAEOLOGICAL RESOURCES</u>:

The DOE SROO, in consultation with the SHPO, shall enhance archaeological sites on the SRS. The DOE SROO shall accomplish this by:

A. Distributing educational brochures, pamphlets, monographs, and other works of a popular and technical nature. The works shall emphasize the relevance, fragility and other values of such sites to the public and appropriate DOE SROO staff in order to ensure archaeological site awareness in implementing land management plans, particularly as it relates to environment-altering management decisions;

B. Releasing information concerning the locations of archaeological sites only for research and preservation purposes to qualified experts;

C. Coordinating the accompanying <u>Archaeological Resource Management Plan</u> with other activity planning efforts through the SR Site Development and Facility Use Plan and the SR-88 Site Use Review Coordination process (Order SR 430X.1). An integral part of the activity planning effort shall be the stabilization and preservation of significant archaeological sites;

D. Continuing, within DOE SROO security regulations, the development and coordination of a public volunteer program for archaeological research and other aspects of archaeological management on the SRS. The volunteers will be supervised professionally and drawn from locally chartered South Carolina and Georgia archaeological societies;

E. Recognizing the value that research plays in evaluating archaeological sites and shall continue to support and develop archaeological research on the SRS. In attempting to comply not only with the letter but with the spirit of the laws governing cultural resources, the DOE SROO proposes to consider the SRS as a National Archaeological Research Park similar to the National Environmental Research Park already established at the SRS. The DOE SROO, at such time as is appropriate, shall form a Technical Advisory Board to help assure acceptable research rationale and to meet archaeological resource management needs;

F. Ensuring that archaeological resource materials and records receive proper conservation and curation and are preserved in accordance with 36 CFR Part 79 and state regulations.

VII. <u>REPORTING</u>:

A. Annual Review of Cultural Resource Investigations: Beginning October 1, 1991, unless a revised schedule is developed in consultation with the SHPO, the DOE SROO shall prepare and submit to the SHPO and the Council an Annual Cultural Resources Investigation Review (Annual Review) for maintenance activities, completed projects, and research abstracts. Each report shall contain in summary and tabular form: descriptions, analyses, and discussions of all archaeological investigations conducted on the SRS during the previous fiscal year. The format for the presentation of the Annual Review will be of the DOE SROO's choosing, but shall generally contain the following:

1. management summary;
2. references to appropriate documents concerning the archaeological background, environmental background and field and laboratory methods;
3. descriptions of other methods used that are not apparent in referenced documents;
4. summaries and tables of small scale SR-88 surveys conducted;
5. summaries and tables of archaeological sites and other pertinent information collected during routine SR-88 investigations;
6. summary conclusions regarding the recent investigations;
7. abstracts of other research conducted during the previous fiscal year.

B. Project Reports: Upon completion of field investigations of specific projects, the DOE SROO shall prepare and submit to the SHPO a Project Report containing, at a minimum, the following:

1. project name or other specific identifier,
2. a summary of the field methods employed during the project, including the specific locations of shovel tests and other areas of intensive investigation;
3. a listing of the archaeological sites identified and investigated (if any);
4. maps clearly locating the project area(s), area(s) investigated and resource(s) identified;
5. summary evaluations of the significance of all identified archaeological sites;

6. assessments of the probable or potential impacts to identified resources by DOE SROO actions or actions under DOE SROO jurisdiction, as applicable;

7. recommendations.

C. Report Submission and Review Schedule:

1. Project Reports: DOE SROO shall prepare and submit to the SHPO Project Reports in a timely manner following completion of project-specific archaeological fieldwork on the SRS.

   The SHPO shall have 20 working days to review the reports and return comments to the DOE SROO. The SHPO's comments will indicate whether the report is adequate or inadequate to evaluate the significance of recorded resources and, if determined inadequate, why and how the determination was reached.

   The DOE SROO shall respond within 20 working days of receipt of any comments or questions from the SHPO and, as necessary and appropriate, revise the report to incorporate additional information or correct problems.

2. Annual Reviews: DOE SROO shall prepare, and submit by 31 October to the SHPO and the Council, an Annual Review of Cultural Resource Investigations conducted during the previous fiscal year.

VIII. ADDITIONAL PROVISIONS:

A. The DOE SROO shall assure that archaeological site inventory, evaluation, and documentation activities are conducted under the professional supervision and oversight of individuals professionally trained as an archaeologist, historian, historic architect, or anthropologist and meeting the standards set forth in Archaeological and Historical Preservation: the Secretary of the Interior's Standards and Guidelines. It is understood that the described activities conducted by such professionals shall be within their areas of professional expertise;

B. The DOE SROO shall consult, as needed, with the SHPO to refine the inventory, evaluation, protection and general historic preservation planning strategies in order to assure consistency with South Carolina's Comprehensive Historic Preservation Plan and shall evaluate specific sites and/or groups of sites for potential eligibility for the National Register. The principal documentation for determinations of eligibility for nomination to the National Register shall include synthetic overviews, special studies, site records, and other materials held by the DOE SROO, and other agencies and institutions;

C. Subject to the Freedom of Information Act (5 U.S.C. 552), decisions on disclosure of information to the public regarding activities implemented under the PMOA will be made following consultation between DOE SROO, SHPO, and the Council. The DOE SROO shall give interested members of the public the opportunity to comment (36 CFR 800.1(c), 800.5(e)(3), and 800.14) on major DOE undertakings. These comments may be from any interested persons. Following 36 CFR 800.14(d), concerning the use of established agency processes for implementing public involvement, the DOE SROO will continue to employ National Environmental Protection Act (NEPA)-mandated public hearings. Public concerns may be expressed through both the NEPA-mandated Scoping Hearings and Review Hearings. On routine archaeological matters the SHPO will act on the public's behalf;

D. If, in any of the above activities and consultations, the DOE SROO, SHPO, and Council are unable to reach a mutually agreeable solution, the problem will be referred to the Council for resolution in accordance with the provisions of 36 CFR 800.5 or 800.6, as appropriate;

E. At the end of each fiscal year, the DOE SROO, the SHPO, and the Council may, if necessary, consult to determine whether modifications, alterations, additions or deletions to the terms of this Agreement are appropriate and necessary;

F. If any signatory to the Agreement determines that any of the terms of this Agreement cannot be met, or believes a change is necessary, that signatory shall request the consulting parties to consider an amendment or addendum to this Agreement. Such an amendment or addendum will be executed in the same manner as the original Agreement. This PMOA may be terminated by mutual agreement of DOE SROO, SHPO, and the Council or by any signatory upon 90 day written notice to the others.

Execution of this Programmatic Agreement by the DOE SROO and the South Carolina SHPO, its subsequent acceptance by the Council, and implementation of its terms, evidences that the DOE SROO has afforded the Council an opportunity to comment on its programs and their effects on archaeological sites on the specified DOE Savannah River Site, South Carolina, and that the DOE SROO has taken into account the effects of its activities on archaeological sites.

UNITED STATES DEPARTMENT OF ENERGY

By: Ernest [illegible] Date: 5/22/90
Assistant Manager for Administration, Savannah River Operations Office

SOUTH CAROLINA STATE HISTORIC PRESERVATION OFFICE

By: Mary W. Edmonds Date: 6/4/90
State Historic Preservation Officer

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: [illegible] Date: August 24, 1990
Chairman, ACHP

File - Licensing

Department of Energy
National Nuclear Security Administration
Office of Defense Nuclear Nonproliferation
Savannah River Site
P.O. Box A
Aiken, South Carolina 29802

May 18, 2001

Mr. Peter S. Hastings, Licensing Manager
Duke Cogema Stone and Webster
400 South Tryon Street, WC-32G
Charlotte, NC 28202

Dear Mr. Hastings:

SUBJECT: Argonne National Laboratory Request for Information

As you know, the Nuclear Regulatory Commission has retained Argonne National Laboratory (ANL) as their agent for preparation of an Environmental Impact Statement for the licensing of the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site (SRS). In this role, ANL is collecting information and data, as well as validating information presented in the Duke Cogema Stone and Webster (DCS) Environmental Report. SRS intends to be responsive and thorough to DCS, ANL and NRC as the licensing process progresses.

Please find enclosed information requested from the South Carolina Archaeological Research Program (SCARP) by ANL. As explained above, this information is being provided to DCS so that DCS may appropriately respond to ANL regarding this information request.

Mr. Bruce Verhaaren, ANL, verbally requested the information from Mr. Adam King, SCARP. The information enclosed is in response to that request and includes:

1. Programmatic Memorandum of Agreement Among the Savannah River Operations Office, United States Department of Energy, the South Carolina State Historic Preservation Officer and the Advisory Council on Historic Preservations Concerning the Management of Archaeological Sites on the Savannah River Site, Aiken, Allendale, and Barnwell Counties, South Carolina;
2. *Archaeological Survey and Testing of the Surplus Plutonium Disposition Facilities*;
3. Letter, Green to Gould, Draft Report: *Archaeological Survey and Testing of the Surplus Plutonium Disposition Facilities* (Technical Report Series Number 24) prepared by Adam King and Keith Stephenson of the Savannah River Archaeological Research Program, May 19, 2000;
4. Recommended Mitigation Plan for 38AK546; and
5. Letter, Marcil to Gould, Mitigation Plans for Sites 38AK757 and 38AK546 at the Proposed Surplus Plutonium Disposition Facility, Savannah River Site, Aiken County, South Carolina, April 11, 2001.

This has been discussed with Mary Birch. Should you have any questions concerning this subject, please contact Allison Blackmon, of my staff, at 803-725-9910.

Sincerely,

ORIGINAL SIGNED BY:
Daniel L. Bruner

Sterling Franks, Acting Manager
Office of Defense Nuclear Nonproliferation

ODNN:AAB:kas
WA-01-062

5 Enclosures:
Archeological Information

cc w/o enclosures:
D. Nulton, NN-60
D. Ryan, EQMD, DOE-SR
R. Geddes, WSRC

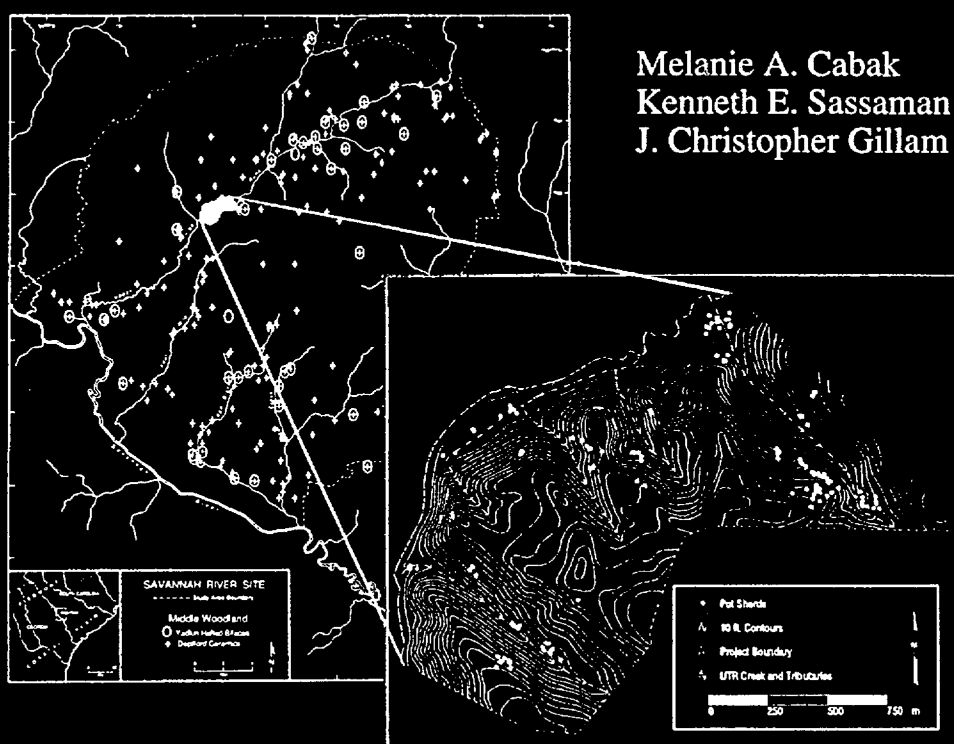
bcc ~~w/~~ w/o enclosure:
A. Blackmon, ODNN
ODNN RF
MGR RF
ECTS
File Code: 4720

18-2

1994 Archaeological
survey for lands
within or near
F-Area

Distributional Archaeology in the Aiken Plateau

Intensive Survey of E Area,
Savannah River Site, Aiken County, South Carolina



Melanie A. Cabak
Kenneth E. Sassaman
J. Christopher Gillam

Savannah River Archaeological Research Papers 8

Occasional Papers of the
Savannah River Archaeological Research Program
South Carolina Institute of Archaeology and Anthropology
University of South Carolina

DISTRIBUTIONAL ARCHAEOLOGY IN THE AIKEN PLATEAU

Intensive Survey of E Area, Savannah River Site, Aiken County, South Carolina

by:

Melanie A. Cabak
Kenneth E. Sassaman
J. Christopher Gillam

Savannah River Archaeological Research Papers 8

Occasional Papers of the
Savannah River Archaeological Research Program
South Carolina Institute of Archaeology and Anthropology
University of South Carolina

1996

This study was partly conducted through funding provided by the United States Department of Energy under contract number DE-FC09-88SR15199.

ABSTRACT

Intensive archaeological survey of the 550-acre E Area on the Savannah River Site, Aiken County, South Carolina was conducted using the methods of siteless or distributional archaeology in an effort to examine prehistoric land-use patterning in this upland portion of the Aiken Plateau. Personnel of the Savannah River Archaeological Research Program (SRARP) conducted archaeological survey of E Area between June 1993 and May 1994. Fieldwork consisted of 6.6 linear kilometers of pedestrian survey and the excavation of 1,459 shovel test pits, and 33 1 x 2-m test units. Fieldwork yielded over 28,000 artifacts, including diagnostic artifacts of occupations spanning the Early Archaic through early Mississippian periods. These materials were widely distributed at varying density across the project area. Following conventional criteria for site definition, E Area contained 32 prehistoric sites and 18 artifact occurrences.

Bordering one of the largest Coastal Plain tributaries of the Savannah River, the project area environment consists of floodplain, ridge slopes, interfluvial ridgetops, and several feeder streams. Patterning in the microenvironmental distribution of artifact classes and attributes reveals information about prehistoric land use that is usually overlooked at the site level of analysis. Specifically, the analysis provides new insight into the organization of hunting activities, seasonality of habitation, and task differentiation. Spatial data collection and management were facilitated by Global Positioning Systems (GPS) and Geographic Information Systems (GPS) resources. The methods and results of this study provide not only new insight into prehistoric land use in the Aiken Plateau, but also implications for the application of distributional archaeology elsewhere in the Eastern Woodlands.

ACKNOWLEDGMENTS

Fieldwork and data analysis for this project occurred intermittently over the course of three years. Successful completion of this project would not have been possible without the efforts of many people. The fieldwork, which consisted of pedestrian survey, shovel testing, and test unit excavation, was completed by Melanie Cabak, Christopher Gillam, George Lewis, Kristina Monaco, Kristin Wilson, and George Wingard. The artifacts were washed by Kristina Monaco, George Lewis, Kristin Wilson, and George Wingard. Most of the preliminary analysis was conducted by Tammy R. Forehand, assisted by George Wingard, Kristina Monaco, and Kristin Wilson. The secondary analysis was conducted under the guidance of Ken Sassaman by George Wingard, Kristin Wilson, and Melanie Cabak. Stephanie Brown entered all of the artifact data into the computer.

We extend a special thanks to personnel of Harry Park's GIS shop at the Savannah River Forest Station (SRFS) for access to their equipment and expertise. The GPS data were collected by Melanie Cabak, Kristin Wilson, and George Wingard with the use of SRFS equipment and under the guidance of Colin Brooks and Rick Chubb of the U.S. Forest Service (USFS). Rick Chubb directed the initial input of the survey data for the GIS database, prior to the acquisition of GIS equipment and personnel by the SRARP. SRARP GIS analysis was conducted by Christopher Gillam, who also drafted the site maps and profile drawings on the computer. Colin Brooks, Rick Chubb, and Michelle Davalos (USFS) provided valuable technical assistance during the course of this project.

Jack Mayer of Environmental Analysis and Planning (Westinghouse-Savannah River) provided us with maps and other resources at the start of this project. Health Protection personnel ensured that wetlands in the project area were free of contamination.

Lee Tippett and Niels Taylor of the South Carolina Department of Archives and History visited the SRARP early in this project to lend their expertise on matters of compliance. Keith Stephenson, Mark J. Brooks, Chester B. DePratter, Albert C. Goodyear, and David G. Anderson provided valuable assistance in our analysis of pottery and lithic artifacts. Mark D. Groover read and commented on several chapters of this report, and George Lewis provided his copy-editing expertise.

SRARP program managers Richard D. Brooks and Mark J. Brooks are acknowledged for providing administrative and technical support. We also acknowledge the institutional support of Andrew Grainger, Technical Representative to the Contracting Officer for DOE-SR, and Dr. Bruce E. Rippeteau, State Archaeologist and Director of the South Carolina Institute of Archaeology and Anthropology. This study was conducted through funding provided by the United States Department of Energy under contract number DE-FC09-88SR15199.

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CHAPTER 1

INTRODUCTION AND RESEARCH ORIENTATION

The 777-km² Savannah River Site (SRS) in Aiken and Barnwell Counties, South Carolina forms a substantial portion of the Aiken Plateau. As part of the greater Sandhills formations, the Aiken Plateau consists of fluvially dissected uplands of the Upper Coastal Plain province. Archaeological survey and excavation in recent years has shown that upland locations served different purposes for the prehistoric inhabitants of the Coastal Plain, ranging from short-term visits to sustained habitation. Such reconstructions are based as much on investigations at sites along the Savannah River as they are on upland work. The regional-scale models developed from site comparisons serve to integrate riverine and upland locations as components of particular settlement and social systems. Aiken Plateau sites are thus parts of larger entities, and are best understood in connection to the regional terrain and history.

Work in recent years has indeed brought to light a range of functions and diverse histories of Aiken Plateau occupations. However, our knowledge of this prehistory has hinged on the notion that use of the uplands was organized around particular places on the landscape, and that archaeological sites represent accurately the residues of such land use. It seems likely that land use was at times much more continuously distributed, as are the geomorphic and biotic zones comprising the upland environs. This is not to say that clusters of material do not exist, for certainly intensive and repeated activities involving material residues created clusters (i.e., sites) in the distribution of archaeological remains. But what do we know about the distribution of materials between clusters? What information about prehistoric land use is missing from the record of site clusters? Conversely, how have the analytical constraints of the site concept masked variation in the composition of clusters, as well as intervening distributions? Are there new insights to be gained from a nonsite, or distributional analysis of Aiken Plateau archaeology?

The opportunity to address these questions came in 1993 with a proposal to expand and redefine a portion of the SRS known now as E Area. The 550-acre project area (Figure 1-1) consists of a tract of upland terrain bordering an area that has witnessed considerable survey and excavation in recent years (Sassaman 1989, 1993a). The E Area tract duplicates many of the upland landform features seen in these previous studies, and was thus believed to contain very similar archaeological evidence. But because the tract also included a portion of the adjacent Upper Three Runs Creek floodplain, a greater level of landform diversity was available for study. Above all, the project offered the first good opportunity to survey a relatively large tract at sufficient intensity to locate not only the typical upland sites, but much smaller clusters as well, including ones that would not normally meet the criteria of archaeological site. Although considerable reconnaissance survey has been conducted across the uplands of the SRS, efforts to model and interpret upland land use have been built almost exclusively from the excavation of a few key sites. The E Area survey provided an opportunity to evaluate these site-level models while expanding our knowledge about the full range of activities that created the Aiken Plateau archaeological record.

Because this work was conducted in the manner deemed necessary for federal compliance, our methods were geared for site discovery and definition, and we report our findings and recommendations about sites in a traditional format in Appendix A of this volume. Eight previously recorded and 25 new sites were located and tested by the Savannah River Archaeological Research Program (SRARP) from June 24, 1993 to May 13, 1994. Methods of survey and testing are reported fully in Chapter 3. The assemblage of 23,777 prehistoric artifacts from these sites is reported in detail in Chapters 4 and 5,

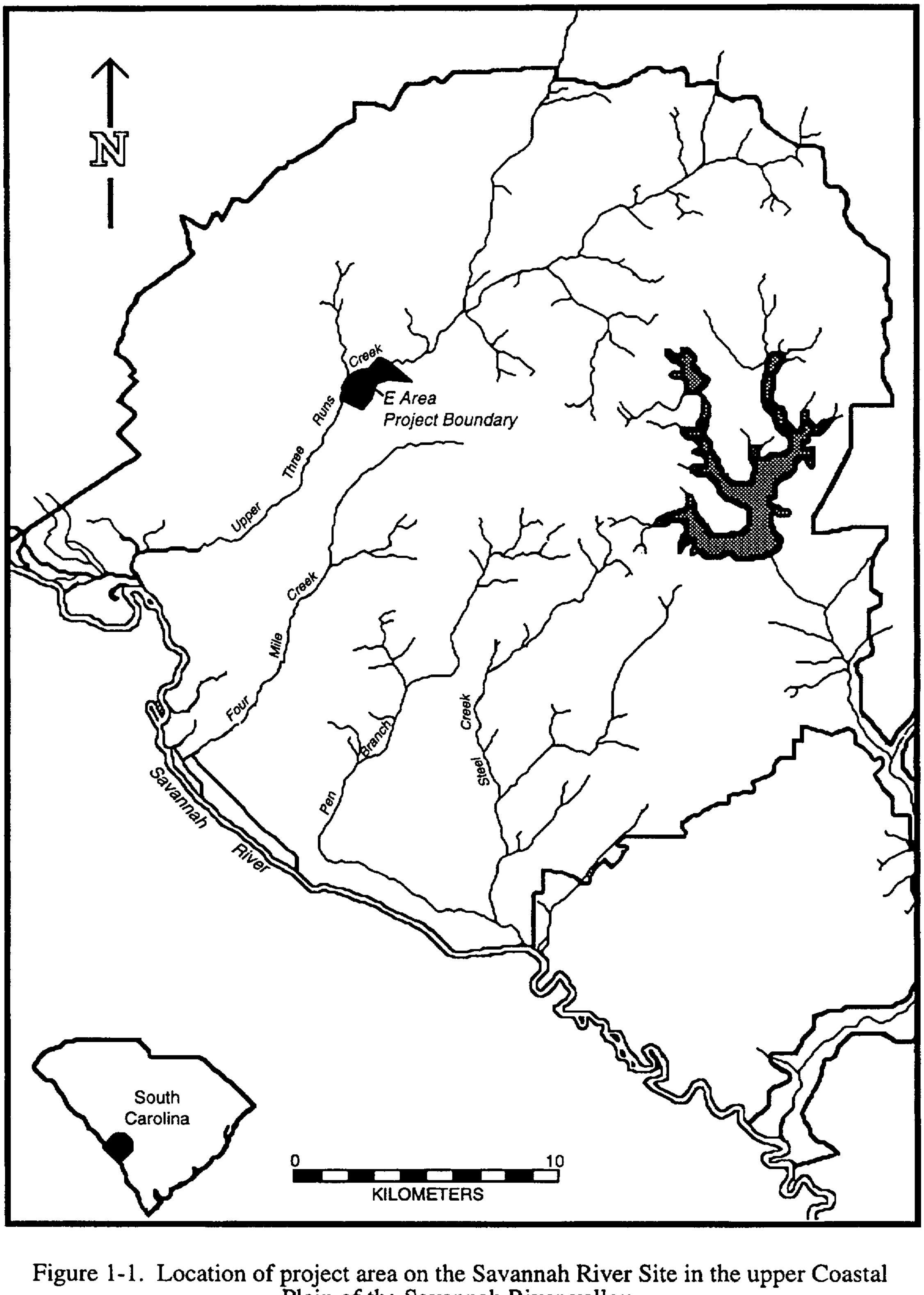

Figure 1-1. Location of project area on the Savannah River Site in the upper Coastal Plain of the Savannah River valley.

with analytical emphases on their culture-historical and technofunctional attributes. The assemblage provides evidence of prehistoric use of E Area spanning 9000 years, from Early Archaic to Mississippian times. A small assemblage (n = 45) of historic-period artifacts is enumerated in the site descriptions of Appendix A.

This report deviates from our typical survey accounts in Chapter 6, the distributional analysis. Here our scale of analysis is the artifact, or artifact class. We employ a combination of Global Positioning Systems (GPS) and Geographical Information Systems (GIS) data to analyze artifact distributions for technofunctional and cultural-historical variation relative to a series of locational variables. We designed the analysis to capture information on: (1) fine-grained differences in the distribution of technofunctional artifact classes that are otherwise masked by a site unit of analysis; (2) changes in land-use patterning within, as well as among, sites; and (3) information about activities involving artifact deposition outside of sites. Ultimately, the results of distributional analysis are used to evaluate and refine regional settlement models constructed from site-level data. Details about extant settlement models and their environmental bases are provided in Chapter 2.

What follows in this chapter is a review of the literature on distributional archaeology. We move from a brief account of overriding theoretical concerns to examples of application at the worldwide, regional, and local levels. The chapter closes with an overview of the methods and results of our own application.

DISTRIBUTIONAL ARCHAEOLOGY

In the early 1970s, some archaeologists began to express dissatisfaction with the basic unit of analysis in most archaeological surveys—the site. Since then, the discipline has witnessed the development of new methods of survey to circumvent the shortcomings of the site concept. An approach that focuses on artifacts rather than sites has enjoyed considerable success in studies spanning the globe. This alternative approach has been presented in a variety of forms and names, such as nonsite archaeology (Nance 1980; Thomas 1975), scatters and patches approach (Isaac 1981), off-site archaeology (Foley 1981), siteless survey (Dunnell and Dancey 1983), and, most recently, distributional archaeology (Ebert 1992). The impetus for these approaches was the continuous surface artifact scatters found in the semi-arid and arid lands of the western United States and East Africa, scatters that often defy efforts to draw site boundaries. While such surface distributions are clearly problematic, some have argued that all archaeological distributions are continuous, as are the human behaviors that created them (e.g., Wobst 1983). It follows that dissatisfaction with the site concept transcends the unique circumstances of arid-land archaeology.

Critics of the site concept propose that the "site" as an archaeological unit is incompatible with scientific inquiry. Archaeologists such as Dunnell (1992:36) reject the notion site because it is an "unanalyzed concept denoting spatial aggregates of archaeological significance" and "*as an archaeological concept*, has no role to play in the discipline." He argues that sites exist only in the present and are a modern, contemporary phenomenon (Dunnell 1992:26-29). The scientific objection to the site concept is that sites are portrayed as naturally occurring entities that are behaviorally meaningful but in actuality sites are artificially bounded settings resulting from archaeological decisions. The definition of a site varies from person to person, and from project to project. The concept also implies that relevant information lies exclusively within the boundaries of sites, while artifacts outside provide limited archaeological information (Dunnell 1992:26-29; Dunnell and Dancey 1983:271; Ebert 1992:47-49; Foley 1981:157; Kerber 1993:29).

The shortcomings of site-level analyses have led archaeologists to explore alternative field and analytical approaches. For example, off-site archaeology preserves the site concept but stresses regional data recovery that includes information about the artifacts between sites (Bintliff and Snodrass 1988; Foley 1981). Others advocate approaches such as nonsite or distributional archaeology in which the artifact is the primary unit of observation.

Distributional archaeology abandons survey methods that focus on sites and ignore or deemphasize low density scatters and isolated finds. The basic distributional survey technique is "the intensive discovery of individual artifacts in the field and the high-resolution recording of their locations and attributes" in a project area (Ebert 1992:246). In addition to mapping the location of the cultural finds, environmental details are recorded (i.e., topography, distance to water, slope). According to Ebert (1992:27), this method makes "no *a priori* assumptions about boundaries and the integrity of clusters, or what clusters may mean behaviorally." Another benefit, according to Ebert (1992:248), is that surveys conducted in distributional manner are more comparable because the individual artifact is the unit of analysis rather than the site. This is useful because sites are defined differently among archaeologists, a problem that renders site-level data incomparable.

The distributional approach is more than merely arguments about how to collect and analyze data; rather it underscores the importance of considering natural processes, ecology, and cultural behavior when interpreting the past by showing how natural and cultural processes are interactive (Rossignol 1992). Several studies explore the effects of postdepositional processes on the archaeological record, showing how a site rarely represents a single occupation or activity (Ebert 1992; Foley 1981; Isaac 1981). Cultural as well as natural processes are continuously adding to, removing from, and rearranging the archaeological record. For example, Dunnell (1992) shows that plowing changed the artifact distribution every year at the Cold Water Farm in Missouri. Archaeologists have demonstrated, in southwestern Wyoming and southern New Mexico, how geomorphological variables affected prehistoric land use, particularly concerning the recycling and the reuse of lithic material. It appears that differential surface visibility effected secondary use of lithic materials in the past (Camilli and Ebert 1992).

The development of distributional survey techniques in the late 1960s and 1970s also reflects a change in how the discipline began to view the past. Many archaeologists shifted from concentrating on single sites to regions (Jones and Beck 1992:167; Thomas 1975). It became increasingly apparent that settlement systems needed to be understood in relationship to regional environments. Some of the more prominent efforts include those that examined the land-use patterns of mobile hunter and gatherers (Ebert 1992; Thomas 1973, 1975). With its emphasis on environmental data, distributional archaeology appears to have been a ready-made method for hunter-gatherer archaeology because the settlement and subsistence choices of hunter-gatherers are usually considered to be strongly influenced by environmental factors In the section that follows we review some of the more notable applications of distributional archaeology to the study of hunter-gatherer land use.

Distributional Archaeology and Hunter-Gatherer Land Use

David Hurst Thomas is credited with beginning the critique of the site concept in the early 1970s (Dunnell and Dancey 1983:271). Thomas (1975) used a nonsite approach in the Great Basin for the Reese River Ecological Project. The goal of the project was to test Julian Steward's (1938) ethnographic account of the cultural ecology and settlement patterns of the Great Basin Shoshoneans. Steward's model illustrates how hunter-gatherers moved across the landscape and the specific activities conducted within different environmental zones. To test the archaeological reality of this model, Thomas formulated material correlates for Shoshonean activities and a computer simulation to predict artifact attribute frequencies in three microenvironment zones (Thomas 1973).

Thomas's field techniques included an intensive surface survey of randomly selected survey quadrants where the location and attributes of each cultural item were recorded. Analysis of the data included comparison with the predicted attribute frequencies in various microenvironments and the degree of clustering of artifacts found in the survey quadrants located in the various zones. The study demonstrated concordance between Steward's model and the archaeological record of the Reese River valley. Thomas termed his approach "nonsite" because rather than using the site as the subject of study, the locations and attributes of artifacts in the project area were the minimum analytical units (Thomas 1975:62). Prior to this study, archaeologists had focused on large artifact clusters (i.e., sites), which were merely the winter habitations of a multifaceted settlement system. Thomas concluded that the sparse scatters, typically excluded from prior surveys, were the locations of foraging and hunting activities not represented by the winter habitation sites. Importantly, it was these very data that were necessary to reconstruct the Shoshonean system with the ethnographic detail provided by Steward.

Similar approaches were employed by Bettinger (1977) and Davis (1975) in other Great Basin surveys. Bettinger used a distributional survey method to test two different models of human adaptation in Owens Valley, California. Two opposing views existed at the time. One view was that prehistoric adaptation was constant while the other view regarded human adaptation in the Great Basin as variable (Bettinger 1977:3). Like Thomas (1973), Bettinger developed material correlates for prehistoric activities in the study area from ethnographic accounts. Artifact densities were predicted and compared to actual artifact distributions in the study area. The results of the fieldwork and analysis indicated prehistoric adaptations in the project area were highly variable rather than static. Davis (1975) used distributional field methods when studying the Paleoindian occupation at China Lake, California. Neither Davis or Bettinger refer explicitly to their field techniques as nonsite, but close attention was paid to the environment and the exact locations of all artifacts, rather than just sites.

Robert Foley (1981:180) used a distributional approach to gather spatial data about prehistoric hunter-gatherers in East Africa. He argued that the site was not an appropriate unit of analysis because the archaeological record of his project area was spatially continuous. Instead, an "off-site" approach was advocated "for studies concerned with the total population of artifacts rather than just the discrete clusters within it (on-site archaeology)" (Foley 1981:166). Foley was aware that heavy concentrations of artifacts occur in settlements per se, but that these were not the only loci of artifacts. Clusters of artifacts occur away from settlements at activity stations such as hunting blinds or raw material procurement areas. This spatial patterning of artifacts is the result of human energy-extractive activities conducted within the home range of a mobile group (Foley 1981:164).

Foley tested his off-site model with surface artifact distributions in the Amboseli Basin, Kenya. His goal was to provide a basic topography of surface artifact density by randomly sampling the study area. The survey documented a diffused and scattered artifact pattern supporting Foley's idea that substantial amounts of archaeological material are preserved away from sites. Foley also explored, in great detail, the effects of taphonomic processes on the archaeological record.

East Africa also served as the setting for Glynn Isaac's (1981) study. The motivation for a distributional approach stemmed from Isaac's desire to account for the surface material between concentrated clusters of artifacts (i.e., sites) in order to better understand the early human history of the region. His approach involved studying the distribution of artifacts rather than the distribution of sites. His "scatters and patches" analysis treated sites and isolated artifacts as integrated part of a single system. Isaac's survey documented the distribution of all artifacts in randomly selected units in the Koobi Fora Research Project area. He developed three measures of artifact density to investigate the spatial patterning of artifacts. His results showed that the most typical archaeological deposits at Koobi Fora were the low-to-intermediate density deposits (2-20 artifacts per sampling unit) which were called "minisites." Minisites are the locations of single events that were integral places in hunter-gatherer land use. Given the long human occupation of the area, heavy artifact concentrations were viewed as accretional residues from smaller-scale hunter-gatherer activities.

The Skeedskadee National Wildlife Refuge on the Green River Basin in southwestern Wyoming was the setting for James Ebert's (1992) distributional study. Ebert developed models of the adaptive strategies of resident hunter-gatherers, proposing material correlates for a variety of activities and occupation types. Distributional survey techniques were used to gather the archaeological data. After artifact discovery, finds were mapped and various attributes were recorded for lithic reduction, artifact breakage, use wear, edge wear treatment, and recycling. The clustering of different artifact classes at varying spatial scales was measured in four geomorphologic zones to explore lithic manufacture, use, and discard. The patterns were then compared to the correlates of models developed by Ebert. The results suggested that the study area was occupied by groups employing four distinct adaptive strategies.

One of the more significant findings of the Skeedskadee project is that artifact clustering is dependent of the spatial scale of analysis. Cluster resolution within traditional sites is diminished in most regional-scale studies, hence variation in land-use patterning is masked. Ebert's distributional approach revealed a wider range of occupation types and much more clustering of artifacts than that provided by the site unit of analysis.

The above review illustrates some of the benefits of distributional archaeology, particularly in studies of hunter-gatherer land use. Its proponents have sought to underscore the analytical value of off-site and nonsite data, seeing these as the fundamental constituents of hunter-gatherer settlement systems, as well as the necessary source of information on subsistence activities, seasonality, lithic manufacture, and the like. Distributional archaeology today continues to be concerned with understanding the relationship between postdepostional processes, ecology, and prehistoric land use (Ebert 1992; Stafford and Hajic 1992), but has moved beyond merely demonstrating that disperse artifact scatters are important.

One limitation of distributional approaches is that studies are typically atemporal (e.g., Ebert 1992; Foley 1981). Foley noted "the enhanced attention to the spatial dimension accompanying distributional approaches has come at the expense of temporal control" (cited Jones and Beck 1992:168). Isolated artifacts or low density concentrations often lack clear temporal markers and as a result these occurrences are often "treated as a single chronologically insensitive assemblage" (Zvelebil et al. 1992:196). In the studies reviewed above the surface assemblages in question lacked a large number of temporally diagnostic artifacts, rendering diachronic analyses impossible. Archaeologists long ago lost any innocence about the contemporaneity of surface-associated artifacts, and even buried contexts are treated with similar skepticism (Ebert and Camilli 1993). In some cases, diachronic concerns are preempted by assumptions about long-term stability of hunter-gatherer land-use strategies (e.g., Ebert 1992; Thomas 1975). Other studies have considered variation in artifact patterning to reflect changing land use, but have not had the chronological control to demonstrate such. Some researchers have attempted to remedy this problem by using alternative dating methods. Jones and Beck (1992) demonstrated that obsidian hydration dating exhibits potential for dating low density and highly dispersed artifact scatters and will help evaluate association assumptions of nondiagnostic markers (e.g., debitage found near hafted bifaces).

A second shortcoming of the distributional approach is that its interpretations are often based on environmental factors alone. This results in eco-functionalist explanations for how prehistoric people used the landscape. With this type of approach the importance of individuals initiating culture change and the social, ideological, and political factors that influenced human use of the landscape are deemphasized or ignored. However, the distributional approach does not have to restrict interpretations to environmental influences. The applications to date have been guided by cultural ecological theory, but applications guided by political economy or agency theory have equal promise.

Distributional Archaeology in the Eastern Woodlands

The projects we reviewed in the previous section were conducted in areas of good surface visibility, which allowed virtually all artifacts to be detected and recorded. The E Area project area, like most undeveloped areas in the Eastern Woodlands, has low surface visibility due to dense vegetation and ground cover. Areas with surface visibility are restricted to a few roads that cut through the project area; over 90 percent of the project area is covered by a dense root mat. Therefore, surface reconnaissance—the typical method employed in distributional studies—is inadequate for discovering artifacts. Subsurface testing methods are needed to find archaeological materials in areas of poor surface visibility. The common method for this purpose is the excavation of shovel test pits.

The limitations of shovel testing has been discussed in detail and recent opinions on the efficacy of shovel testing as a site discovery technique are mixed (Krakker et al 1983; Lightfoot 1989; Nance and Ball 1986, 1989; Scheele 1990; Shott 1989). Most archaeologists advocate shovel tests for discovering archaeological resources in areas containing poor visibility or deeply buried sites until more efficient methods are developed (McManaman 1984; Lightfoot 1986, 1989; Nance and Ball 1986, 1989). Lightfoot (1989:413) considers shovel testing to be "the most efficient discovery technique now available for detecting buried cultural remains on a regional scale."

All we indicated earlier, distributional studies conducted in areas with good visibility and lacking depositional contexts have succeeded in collecting information about a full range of archaeological evidence about land use. Shovel testing, on the other hand, is biased against the discovery of low density clusters and isolated finds. Isaac (1981) demonstrated that low density artifact clusters are the most common type of archaeological deposit left by mobile hunter-gatherers. Hence, the application of shovel testing will introduce bias against the most frequently occurring spatial clusters, although it has been proven time and again to be an effective means of locating larger clusters. Perhaps due to this bias alone, distributional studies have not been attempted very often in the Eastern Woodlands.

Only two distributional studies using subsurface testing in the Eastern Woodlands have been published: Nance's (1980) archaeological survey of the Lower Cumberland

Valley, Kentucky, and Kerber's (1993) Potowomut Neck Archaeological Project in Rhode Island.

The objective of Nance's (1980) survey was to conduct a regional study of small, Late Archaic sites in western Kentucky. The project area was divided into three environmental strata, and survey quadrats within each stratum were randomly selected. Detailed information relating to the environment and survey conditions was gathered on each sampling quadrant. Survey methods in the sampling quadrants included both surface reconnaissance and excavation of 1 x 1-m test units. The analysis disregarded sites and focused instead upon comparing the distribution of artifact classes and artifact density in the different environmental zones. Results provided estimates of the density of prehistoric materials in the various strata and offered insight into the intensity of prehistoric activity in different environmental zones. Considerable amounts of prehistoric material existed in areas that had previously received minimal archaeological attention. Nance's results suggest that low probability areas do contain important information.

Kerber's (1993) research project investigated prehistoric land-use patterns in a coastal ecosystem in Rhode Island. He expected an association between cultural material and the Potowomut river estuaries, the resource base for shellfish. The location of archaeological sites was not viewed as the focus of Kerber's study. Rather he was interested in the distribution and density of cultural material in the project area. To test the study's research hypothesis he sampled the project area with a survey method called a random walk, which randomly places 50 x 50-m survey units along survey transects. Each sampling unit was tested with 16 shovel test pits that were evenly spaced. The density of stone tools and lithic debitage in each survey unit was examined. The analysis indicated that the prehistoric resources were located throughout the project area but they were not evenly distributed. In general, the closer a survey unit was to the estuary the higher the density of lithics. The density of lithics was also related to soil type. Kerber (1993:40-41) emphasizes that many of the lower density areas would have been ignored by studies that examined only high density sites.

Conducting distributional archaeological surveys in areas of heavy ground cover is difficult but a criticism of Nance's and Kerber's research is that their main point appears fairly obvious. They found that while prehistoric people more frequently utilized those areas close to desired resources (areas of high density artifact clusters or sites) they did utilize the complete environment (evidenced by low density artifact clusters or isolated finds). Are conclusions like these really optimizing distributional data and worth the effort of conducting a distributional survey? Attempts to dispense with the site concept, such as Nance's and Kerber's, have perhaps produced the same insights for a land-use study that recorded all finds, sites, and occurrences.

Distributional Archaeology in the Aiken Plateau

Our impressions of prehistoric land use in the Aiken Plateau have been shaped by compliance activities at the SRS. The goal of most archaeological surveys on the SRS has been to discover archaeological sites and evaluate their potential for nomination to the National Register of Historic Places (e.g., Cabak et al. 1996; Hanson et al. 1978; Martin et al. 1985). The present study must also abide by the dictates of federal laws protecting archaeological sites, and so our findings in Appendix A resemble prior SRS reports in its listing of sites, artifact context, integrity, and recommendations. At the same time, we are frustrated by the restrictions that site boundaries and criteria of significance have placed on interpretations of prehistoric land use. It goes without saying that prehistoric hunter-gatherers and horticulturalists of the Aiken Plateau utilized much more of the environment than the site areas we normally record and investigate. We have been able to circumvent this shortcoming, in a sense, by treating site assemblages as composites of systems-wide activities. For example, when the base of a hafted biface is found at a site and its matching tip is not recovered, we conclude that it was used and broken in another location. In a similar vein, flake size analysis has been used in ongoing SRS studies to model core reduction as tools are transported from location to location throughout a settlement system.

The point to the above examples is that one does not have to use distributional analyses to examine systems-wide land use. One only has to consider that archaeological assemblages within clusters are composites of residues of past, present, and future activities. For mobile people, this implies further that assemblages are composites of activities occurring over larger expanses of space than the site itself.

Whereas this widely accepted logic about archaeological assemblages has been liberating, there remain two problems with methods that continue to focus exclusively on archaeological clusters we refer to as sites. First, we do not routinely have the opportunity to examine the nature of assemblages and isolated finds outside of site clusters, so we do not have the opportunity to test some of the ideas about systems-wide land use based solely on the assemblages of sites. Second, in the course of making recommendations about the significance of sites, we rely on, for better or worse, the series of settlement-subsistence models that have evolved over the years to order and explain sites on the SRS. What this means is that sites, as clusters of things with certain temporal and technofunctional properties, get pigeonholed into a classification system that includes multiseasonal habitation sites, seasonal habitation sites, short-term extractive camps, hunting stations, and lithic workshops.

If we relaxed the site concept to consider the constituent elements comprising a site assemblage, we may find that they do not differ all that much from "nonsite" clusters, or so-called "occurrences." Doing so requires a distributional analysis based on artifact classes, not site types, indicative of particular activities. We assume that different activities will be conducted in different locations on the landscape, so we should be able to detect differences in locational tendencies among different activity classes. However, we must remain cognizant of the fact that locations of artifact discard are not always isomorphic with locations of use, even last use. This is especially true of artifacts with formal design properties, such as hafted bifaces, unifaces, or grooved axes, which are believed to be curated and transported over a period of time. We must therefore lend greater credence to the locational properties of so-called expedient tools, and the by-products of tool manufacture, use, and maintenance. Like nonsite data, the less formal residues of human activity are too often ignored in routine federal compliance work.

The expectations about land-use patterning we bring to this study come from a combination of regional-scale survey and a series of intensive investigations at key sites. These sources of information form the basis of a series of settlement-subsistence models for the SRS spanning the Early Archaic through Woodland periods (Sassaman et al. 1990). As we have indicated already, the models are site specific and hence do not incorporate data from nonsite sources. Still, the models are sufficiently detailed about types of activities involved at upland locations that we can offer some specific expectations about nonsite distributions. The models and expectations for activities are discussed in detail in Chapter 2.

Finally, we close this chapter with some consideration of the limitations inherent in this study. The E Area survey was not designed and implemented as a complete random sample. Because we were required to locate and evaluate *sites*, not just artifact distributions, we did what we normally do, that is, find sites. Based on the successes of previous surveys, we targeted the margins of upland landforms in the E Area survey. Interfluvial areas between the margins were not tested as intensively, although they were never completely overlooked. In the distributional analysis reported in Chapter 6, we compare our subsurface sample to a set of randomly generated points in order to identify and control our sample biases. As it turns out, our sample does not deviate markedly from randomness, at least not within the parameters of the environmental variables we consider.

Limitations with sampling notwithstanding, the E Area survey provided more than an opportunity to explore the potential for distributional survey. Included in the study area are portions of the Upper Three Runs Creek floodplain, as well as the lower slopes and bottoms of several Rank 1 streams. These are locations that are underrepresented in the work that has contributed most directly to our models of upland land use. Hence, we stand to gain new insight into variation in land use, with or without distributional archaeology. It is our aim, however, to maximize the amount of new information potential by not looking only at areas previously ignored, but by looking at familiar areas through a different lens.

CHAPTER 2

ENVIRONMENTAL AND ARCHAEOLOGICAL CONTEXTS

Provided in this chapter are details of the environment and archaeology of the Aiken Plateau relevant to a distributional survey of E Area. We focus specifically on the contexts of E Area and its immediate surroundings, but also consider the broader, region wide contexts that contribute to our current understand of prehistoric land use in the middle Savannah River valley. The chapter begins with a general overview of regional climate, physiography, geology, and biota, and then moves to a consideration of the specific conditions in an around the study area. Our consideration of archaeological context focuses on the extant models of settlement and subsistence organization that have been developed from survey and excavation in the Aiken Plateau. We derive from these models some expectations about the sorts of activities expected in the study area and their probably archaeological correlates.

Portions of this chapter are reprinted from the report of excavations of 38AK157 (Sassaman 1993a). Situated only 500 m to the east of the study area, 38AK157 offers some of the best comparative material for this project. The local environment of this site and its nearby companion, 38AK158 (Sassaman 1989), located another 300 m to the east, was the subject of detailed study in the 38AK157 report. We modify these findings to accommodate the larger and more diverse study area of the present project.

REGIONAL ENVIRONMENT

Climate

The modern climate of the South Atlantic Slope can be described as temperate with hot summers and relatively mild winters. The central Piedmont portion of the Savannah River valley has an average daily maximum temperature of 73°F and an average daily minimum temperature of 50°F (Landers 1980:66). Moving toward the coast, the figures increase: an average daily maximum of 76°F and minimum of 55°F is recorded for the Lower Coastal Plain (Janiskee 1980:104). In this area, the climate is actually classified as subtropical, being heavily affected by its maritime and southerly location (Janiskee 1980:1). Situated between the influences of continental and oceanic air masses, the Upper Coastal Plain may be thought of as a transitional climatic zone.

Precipitation is more equitable than temperatures across the region, averaging from 114 to 127 cm per year valley-wide. However, seasonal fluctuations in rainfall are more marked in the coastal area than in the Upper Coastal Plain or Piedmont. In the latter provinces, an average of eight or more centimeters of rain falls every month except in the fall when slightly lower rates are recorded (Landers 1980:66; Strommen 1977:48). Summer rains, largely in the form of thundershowers, and winter rains provide about 60 percent of the annual total. On the coast, summer rains alone account for about 40 percent of the annual precipitation (Janiskee 1980:44). The coastal tropical storm season runs from July through August, and although it rarely brings hurricanes, storms with heavy rains and winds up to 80 km per hour occur every two to three years (Janiskee 1980:2). Storms of hurricane intensity rarely occur as far inland as the lower Piedmont (Landers 1980:65), although severe tropical storms do affect the Middle and Upper Coastal Plain about once every ten years (Strommen 1977:48).

Climatic reconstructions for the prehistoric period are based primarily on the analysis of fossil pollen. Most of this research in the South Atlantic Slope has been conducted outside of South Carolina in Georgia (Bond 1971; Seielstad 1994; Watts 1971, 1975; Watts et al. 1996), Florida (Watts and Struiver 1980; Watts et al. 1996), and North Carolina (Whitehead 1965, 1973). However, one study in South Carolina was conducted by Watts (1980) at White's Pond near Columbia, and a more recent study was completed by Hussey (1993) at Clear Pond in the northeastern part of the state. In addition, late prehistoric and historic precipitation patterns are being reconstructed from tree ring data collected from Four Hole Swamp in South Carolina and elsewhere in the Southeast (Anderson et al. 1995; Stahle et al. 1988). Anderson (1994) has used these data to help interpret the patterns of political history for Mississippian chiefdoms in the Savannah River valley.

The climatic patterns of the modern era began to take shape at the end of last full glacial episode of the Pleistocene. By 12,500 B.P. in the midlatitudes, deciduous species including oak, beech, hickory, hornbeam, elm, and ash began to gain dominance over the boreal forests that characterized full glacial conditions. This change shows that the climate was becoming relatively warm and moist (Delcourt and Delcourt 1979; Watts 1980:326). Conditions were ripe for the demographic expansion of game species in the area and concomitant colonization by Paleoindian hunter-gatherers.

By 9500 B.P., broadleaf species of the "cool-temperate" early Holocene forests were replaced by oak and southern pine throughout the region (Delcourt and Delcourt 1984, 1985, 1987; Watts 1975, 1980). Oak dominated from 9500 to 7000 B.P., while pine replaced oaks as the dominant component after 7000 B.P. The earlier expansion of pine appears to have taken place in South Carolina, as early as 8000 B.P., and later to the south, not reaching full stability as a dominant in the southern Coastal Plain until about 5000 B.P. (Watts et al. 1996). This suggest a slow change in climate from north to south during the mid-Holocene.

At the provincial level, oak persisted strongly in the Piedmont, but diminished to less than 40 percent of forest composition in the Coastal Plain between 8000 and 6000 B.P. (Delcourt and Delcourt 1987:254). Elsewhere, the expansion of southern pine coincides with evidence for increased summer precipitation (Delcourt 1985:22-23; Kutzbach 1987:441). Being fire-adapted, pine was probably favored over deciduous species if summer storms were accompanied by severe lightning. In any event, an increase in pine diminished the overall mast production of the Coastal Plain, particularly in well-drained interriverine areas that were especially susceptible to lightning fires. Otherwise, increased precipitation improved the availability and productivity of surface water habitats (i.e., lakes, Carolina bays, streams, rivers and swamps), lending greater patchiness to the Coastal Plain environment. Sea level rise during this interval had a similar effect on the availability of surface water in low-lying areas.

Simulations of atmospheric circulation based on changes in the size of polar ice sheets and changes in the latitudinal and seasonal distribution of solar radiation (e.g., Kutzbach 1987) have been compared to fossil pollen records to provide inferences about past climate (e.g., Webb et al. 1987). This work shows that the mid-Holocene in the Southeast was characterized by increased temperatures (over modern values), as well as increased precipitation. Importantly, the simulations show that increased temperatures were primarily a summer phenomenon (Kutzbach 1987:444). Slightly cooler summer conditions apparently returned after 6000 B.P., although the continued expansion of southern pine after this time suggests that winter temperatures remained warm or even increased during the latter part of the Holocene (Webb et al. 1987:461).

Finally, the recent study of Mississippian chiefdoms in the Savannah River valley by David G. Anderson (1994; see also Anderson et al. 1995) provides information about late prehistoric/early historic climate derived from the analysis of bald cypress (*Taxodium distichum* L. Rich) growth rings by David Stahle, Malcolm Cleaveland and colleagues at the University of Arkansas. These data were used to calculate June Palmer Drought Severity Indices (PDSI), a climatic measure developed from monthly temperature and precipitation data. For the interval A.D. 1300 to A.D. 1600, four periods of significant drought lasting from 10 to 45 years are inferred from the tree ring data (Anderson 1994). These episodes were linked by Anderson to significant changes in the distribution and organization of Mississippian populations in the area. His analysis serves to show that climatic fluctuations too short to be of relevance to most paleoclimatic reconstructions indeed had considerable significance in the historical trajectories of particular peoples. As a further example, fluctuations in annual precipitation may have severely limited the extent to which Sandhills locations in the Upper Coastal Plain could have been inhabited prehistorically, and may help to explain patterns in the introduction and diffusion of farming innovations during the late historic period.

In sum, the climate of the study area is quite hospitable to human occupation and has been since humans arrived some 12,000 years ago. Major climatic changes include a shift from dry, cool conditions to moist, warm conditions during the early to mid-Holocene, and a return to cooler, but apparently wetter conditions later in the Holocene. Although seemingly favorable, the increase in summer precipitation during the mid-Holocene encouraged the replacement of oak by southern pine in the Coastal Plain. Riverine and lacustrine habitats simultaneously improved from wetter conditions, resulting in a patchy distribution of habitat suitable for mast species, game and humans. The persistence of wet conditions as temperatures abated in the late Holocene apparently afforded greater opportunities for productive forest to gain dominance in limited portions of the Coastal Plain. Parallel changes in the Piedmont are not readily apparent; instead, the Piedmont seems to have been buffered by major climatic changes, and was probably less susceptible to minor fluctuations in moisture and temperature. The west to east gradient in temperature that characterizes the modern climate of the Savannah River valley undoubtedly characterized prehistoric climate, and has, in fact, been cited as a critical factor in the settlement-subsistence organization of Early Archaic bands (Anderson and Hanson 1988).

Physiography and Geology

The Savannah River valley crosscuts three physiographic provinces of the South Atlantic Slope. The Blue Ridge province of the Carolinas, Tennessee and Georgia is a mountain belt consisting of well-exposed Proterozoic basement gneisses, plutons, metavolcanic and metasedimentary rift sequences, and early Paleozoic rifted continental margin (Hatcher and Goldberg 1991). The Piedmont province of the South Atlantic Slope is separated from the Blue Ridge province to the northwest by the Brevard fault, and from the third province to the southeast, the Atlantic Coastal Plain, by onlapping Cretaceous and Tertiary sediments of marine origin. Geologically, the Piedmont is subdivided into three units (western, central and eastern) that are defined by the occurrence of particular belts and blocks, and separated by shear zones. It is commonly described as a region of northeast-trending metamorphic belts. The western-most belt consists of gneisses, schists, amphibolites, and ultramafic to felsic plutons (Feiss et al. 1991:328). To the southeast are found greenschist to amphibolite facies metavolcanic and metasedimentary rocks intruded by felsic plutons and pegmatites. The Charlotte belt consisting largely of intrusive rocks, and the Carolina slate belts in the eastern Piedmont consisting of greenschist facies, include many high grade rocks of economic value to prehistoric people.

Piedmont topography is less severe than in the Blue Ridge, due mostly to its lower elevation. The recent surface is composed of a mantle of saprolite and residual soil, although much of the latter has been eroded from historic farming (Trimble 1974). Otherwise, colluvial deposits are scattered along valley flanks (Soller and Mills 1991:307). Alluvial deposits in the Piedmont are narrow and relatively thin (i.e., <10 m). Low order streams flow in saprolites within wide valleys, whereas higher order streams have cut into bedrock (Soller and Mills 1991:307). A dendritic pattern of considerable regularity characterizes the fluvial systems of the Piedmont.

The surface of the Coastal Plain in the South Carolina area consists of erosional topography near its contact with the Piedmont, and constructional topography seaward attributed to several transgressive-regressive cycles of sea level (Soller and Mills 1991:291). This surface is underlain by a veneer of Cretaceous and Cenozoic sediments that overlie pre-Mesozoic crystalline rock and tilted sedimentary formations within Triassic-Jurassic basins (Horton and Zullo 1991:6). Quaternary alluvium comprises a significant portion of the surficial geology of the Coastal Plain, particularly as regards prehistoric human occupation patterns. Piedmont-draining rivers, such as the Savannah, dominate the drainage patterns of the Coastal Plain, bringing large amounts of Piedmont sediment down river. Coastal Plain-draining rivers, such as the Salkehatchie and Ogeechee rivers that flank the Savannah, rework and displace much of the ancient marine sediment.

The Upper Coastal Plain of South Carolina is demarcated by the Fall Line to the northwest and the Orangeburg Scarp to the southeast. This portion of the province is dominated by erosional topography and includes the geographic divisions known as the Sandhills and the Aiken Plateau. Sloping gently seaward, these units are as much as 30 km wide, have elevations as great as 200 m above modern sea level, and contain fluvially dissected valleys more than 100 m deep.

The present study area lies within the Aiken Plateau geographic division of the Upper Coastal Plain. On the Savannah River Site, the Aiken Plateau consists of five successive lithological units (Novak et al. 1990; Nystrom et al. 1991): (1) the Upper Cretaceous Middendorf formation consisting of micaceous, angular, poorly sorted sands with clay beds; (2) the discontinuous Huber Formation (eastern Georgia) and SRS-equivalent Ellenton and Congaree Formations of lower Eocene age and consisting of subangular, well-sorted clayey sands; (3) the McBean Formation with a lower unit composed of beds of moderately sorted, crossbedded sand and fine gravel and laminated beds of sands and montmorillonite clays, and an upper unit with thinly laminated green clays and coarse sands; (4) formations of the Eocene Barnwell Group consisting of high angle crossbedded sands, smectitic clays, and clayey, coarse-grained red sands; and (5) the upland unit.

Within the uplands of the Aiken Plateau, the Barnwell group is covered by gravel and sand beds of Miocene age. Before being incised, this upland unit comprised a continuous land surface extending from central South Carolina to central Georgia. Rapidly deposited fluvial sediments from the Piedmont formed a broad apron of braided stream and river deposits that include distinct cobble facies at high elevations in the Aiken Plateau (Nystrom 1989, Nystrom et al. 1991:236-237). These cobbles were deposited in high-energy river channels that cut into the underlying Barnwell Group by as much as 15 meters. Thick, discontinuous beds of massive clay (including kaolin) also occur locally and represent channel-fill deposits (Nystrom et al. 1991:237-238). The prehistoric economic potential of the cobble and clay deposits of the upland unit is described in a section below.

The evolution of fluvial systems in the Coastal Plain has direct relevance to prehistoric patterns of human settlement and subsistence. The rise in sea level that resulted from the melting of Pleistocene glaciers created a trend from stream downcutting in the early Holocene to aggradation or valley infilling by the mid-Holocene (Brooks et al. 1990:23). These processes not only shaped the geomorphology of the modern surface, but they had significant impact on the availability and productivity of plant and animal resources. A thorough discussion of fluvial evolution is provided by Brooks et al. (1990); some of the specific effects on regional and local biota are discussed in the sections which follow.

Biota

Modern vegetational complexes in the Savannah River valley region are largely defined by the composition of the forest canopy. The vegetation of the Blue Ridge was historically classified as an oak-chestnut forest, but today oak and poplar compete to replace chestnut that was lost to blight (Kovacik and Winberry 1987:42). Piedmont vegetation before the nineteenth century was dominated by hardwoods and shortleaf pine (*Pinus echinata*). Farming in the province changed the vegetation pattern dramatically. After clearing over 2 million acres by 1945 (Kovacik and Winberry 1987:43), the abandonment of some 1.3 million acres has led to widespread old field succession. The result is a mosaic of plots in various stages of maturity that have little resemblance to the prehistoric or early historic past.

Pine forests today dominate much of the Coastal Plain, as they apparently have for over 7000 years. Mixed pine-hardwood communities do, however, exist on lower slopes of Coastal Plain sand ridges, while hardwood communities containing gum, oak, hickory, cypress and tupelo are found in stream bottoms and floodplains. Carolina bays throughout the interriverine portions of the Coastal Plain provide hydric and mesic microenvironments for bay, cypress, and tupelo (Kovacik and Winberry 1987:45).

To a large extent, animal species of significance to human subsistence crosscut the physiographic and vegetational zones described above. White-tailed deer (*Odocoileus virginianus*), apparently the most significant game-species throughout prehistory in the Southeast, are present throughout the region. Interprovincial variation in their size and population density is difficult to assess because of recent changes in habitat and demography. Modern coastal deer are smaller, on average, than mountain deer, reflecting perhaps a size gradient that corresponds with the latitudidal gradient known as Bergman's Rule (McNab 1971).

Other animals of economic value—turkey, bear, raccoon, opossum, squirrel, rabbit, and turtles—are also widely available throughout the region. Beaver may have been likewise widespread, but was concentrated in the upcountry at the time Bartram made his travels through Carolina (Bartram 1928). Migratory birds like the mallard duck and Canada goose provide spring and fall resources in areas of open water, while the wood duck is a permanent resource south of the fall line (Canouts 1971:109).

The greatest variation in the regional availability of animal resources is probably among aquatic species. Freshwater shellfish were abundant in the shoals of the lower Piedmont and Fall Zone, and were at times exploited from middle Coastal Plain rivers. Changes in the gradient of Coastal Plain rivers during the late mid-Holocene seem to have curtailed the productivity of shellfish beds (Brooks and Hanson 1987; Hanson 1982). Anadromous fish also provided a potentially important seasonal resource at shoals where they could be easily netted or speared. The availability of anadromous fish and shellfish in the tributaries of the Savannah River is difficult to assess, although both have been observed within the Upper Three Runs Creek portion of the Aiken Plateau and presumably were available for exploitation during the prehistoric era.

This cursory summary of the regional biota only begins to describe the vast range of plant and animal species relevant to prehistoric human populations. The purpose here is merely to review the major patterns of the region. A more detailed account of biota in the local environment of the study area is the subject of the section that follows.

LOCAL ENVIRONMENT

Biotic Resource Potential

Because the Aiken Plateau is an excessively-drained environment, the vegetation is largely xerophytic (Barry 1980). An especially critical factor in determining the composition of local communities is the availability of groundwater. In this respect it is not surprising that the Aiken Plateau, like other interriverine areas of the Upper Coastal Plain, exhibits considered variation in water table depth. The advanced degree of dissection and presence of impervious clay strata are two factors which support mesic and even hydric communities along ridge slopes and stream bottoms. The resultant topography, both surficial and subsurface, lends a certain degree of verticality to Aiken Plateau vegetation that is unparalleled along the terraces of the Savannah River.

The topographic gradient of dissected ridges within the Aiken Plateau supports a variety of vegetational communities. For instance, three distinct communities presently exist within the project area. The xeric "pine barrens" that have come to typify Sandhills vegetation extend throughout the upslope (ridge top) portions of E Area. Of course, the present composition of Loblolly (*Pinus taeda*) and Slash pine (*Pinus elliottii*) is the result of twentieth century silvicultural practice. The natural forest cover of Sandhills ridges is dominated by Longleaf pine (*Pinus palustris*), turkey oak (*Quercus laevis*) and other scrub oaks. Other natural constituents include the shrubs sparkleberry and deerberry (*Vaccimium* spp.), rosemary (*Ceratiola ericoides*), St. Andrews cross (*Hypericum hypercoides*), and sand myrtle (*Leiophyllum buxifolium*) (Barry 1980:103; Kovacik and Winberry 1987:44). A sparse herbaceous cover includes wire grasses (*Aristida* spp.) and jointweed (*Polygonella polygama*), among others, while prickly pear (*Opuntia compressa*) may be locally common.

Fire has been a determining factor in the evolution of forest communities throughout the Sandhills and Aiken Plateau. Longleaf pine has long been favored over turkey oak and other xeric hardwoods where fire has been frequent. In the absence of fire—a modern condition—hardwood species gain dominance over pines. The source of natural fire is summer lightning strikes. Fires during this season will generally be lethal to hardwood stems of less than 10 cm in diameter, while Longleaf pine not only tolerates such burns but, as a result of long-term selection, depends on fire to reduce needle blight. Winter fires kill only the tops of hardwood species, leaving the roots to sprout the following spring. Thus, controlled burning in the winter by prehistoric people had the potential to improve xeric interfluves for game browse (Hudson 1976:276-277; Swanton 1946:318). Otherwise, the natural occurrence of lightning fires precluded sustained productivity of food species, rendering most well-drained ridges relatively worthless for subsistence pursuits.

Hardwood forests within the Aiken Plateau are found on slopes of ridges, in the bottoms of major tributaries, and within Carolina bays, pocosins, and bogs. In general, a moisture gradient mirrors the topographic gradient discussed above and provides habitat for mast producers and other broadleaf species of economic value to humans. In addition to improving soil development, increased moisture decreases susceptibility to fire, thereby permitting the natural succession to hardwoods. Over the long-term, however, fuels would build-up in such areas so that intensive fires during periods of extreme drought destroyed many of the tree stems. This type of burning led to diversification of species of trees, shrubs and vines, as well as lesser herbaceous plants and graminoids, most of which were favorable to good wildlife habitat and largely useful for direct human exploitation.

A detailed study of hardwood and swamp forests on the Savannah River Site by Whipple et al. (1981) identified three communities in the Aiken Plateau, ranging from fairly dry (mockernut hickory-white oak [*Carya tomentosa-Quercus alba*]) to mesic (black gum-red bay [*Nyssa sylvatica-Persea borbonia*]) to seasonally-flooded (black gum-red maple [*Nyssa sylvatica-Acer rubrum*]). Sample sites in the vicinity of E Area included the former two communities, but not the latter. To ground truth their findings, George Lewis conducted a reconnaissance survey in 1987 of a transect emanating northward from site 38AK158 to Upper Three Runs Creek, an expanse of some 600 meters. In addition, a transect of approximately 300 meters was run on an 80° (east of north) azimuth between two ridge noses some 325 meters north of the 38AK158 excavation block to record any variation along these contours.

Lewis found that the ridges slope north of 38AK158 contained the two common hardwood communities recorded by Whipple et al. (1981): mockernut hickory-white oak and black gum-red bay. Also consistent with the findings of Whipple et al. (1981), Lewis observed indistinct boundaries between these communities, and that a few species, notably the elms (*Ulmus* spp.) and green ash (*Fraxinus pennsylvanica*) were absent.

Because Lewis's observations conform closely with the inventory made by Whipple et al. (1981), the data provided by them can be used to describe the subsistence potential of hardwood communities. Beginning with mast producers, it is evident that an abundance of oak is available at high density within the mockernut hickory-white oak community. White oak of course dominates the assemblage, but members of the red oak group, notably water oak (*Q. nigra*) and Laurel oak (*Q. laurifolia*), and another of the white oak group, post oak (*Q. stellata*) comprise appreciable fractions. Hanson et al. (1981:31-35) describe some of the differences between the red and white oak groups as regards human exploitation. Species of the red oak group are predictable acorn producers, have tough acorn shells that resist insect damage, and tolerate a wide variety of soil and moisture conditions. The white oak species are unpredictable producers with thin, insect-prone shells, and limited tolerance to extreme soil and moisture conditions. Thus, the red oak group provides an abundant and reliable resource that is available for animals and humans long into the winter. The major drawback to this resource is that it has a high tannic acid context that must be leached by water to be made palatable for humans (Hudson 1976:308). Deer are also sensitive to the bitterness of the red oak seed, and prefer the larger and sweeter acorns of the white oak group. Nonetheless, the red oak group represented an important fall and winter resource for deer and humans alike, and was undoubtedly plentiful not only in the mesic slopes of the Aiken Plateau, but also in the high interfluves where the absence of fire permitted turkey oak and scrub oaks to outcompete pine. We add that the potential for exploiting white oak mast was also very high; successful exploitation, however, required careful monitoring of seed ripening, a requirement that would be difficult to meet unless residential bases were located in proximity to stands of white oak.

The other major mast producers in the vicinity of E Area are the hickories, particularly the mockernut hickory which averages nearly 60 stems per 0.1 ha in the stands sampled by Whipple et al. (1981). Lewis's transects did not reveal such a high density, reflecting perhaps differences in aspect or age-grades between the two sample populations. The sweet nut of the mockernut hickory is produced annually, with good crops occurring every 2-3 years. Its tough shell prevents rotting and insect damage, and precludes consumption by deer, although raccoons and squirrels consider it a preferred food source. Native American consumption of hickory is of course well documented (Bartram 1928:57; Hudson 1976:286). Processing requires pounding equipment and some means of boiling crushed nuts to extract the oils. Residential proximity to hickory stands would enable a domestic approach to nut processing, but it is possible that short-term encampments were used to render nuts into a transportable and storable product (e.g., Ozker 1982).

Greenbrier/catbrier (*Smilax* spp.) was observed in abundance in both mesic communities of the Aiken Plateau. The root or tubers of this plant were a particularly important food resource to the Creek (Canouts 1971:52, 138; Hudson 1976:285). These could be collected from the fall to the spring, but were targeted for fall exploitation in early historic times (Canouts 1971:53). Other potential fall resources recorded in the study plots include muscadine, hawthorn, and especially the drupe of the black gum. Spring and summer resources observed in abundance include a variety of berries, cane, panic grass, knotweed, dayflower, and sweet gum. Lewis noted an abundance of pokeberry (*Phytolacca americana*) along his transects, although Whipple et al. (1981) fail to report any. Encouraged by disturbances to the soil, pokeberry provided spring shoots that may have been important to deer and humans alike. Finally, prickly pear, available throughout the xeric interfluves of the Aiken Plateau, was an important summer resource in parts of the aboriginal Southeast (e.g., Hudson 1976:288).

The overall abundance and productivity of plant communities in the upland Sandhills depends in large measure on the availability of water. Although many of the native species are well-adapted to relatively dry conditions, chronic shortfalls of rain, especially during the spring flowering period, can severely curtail production. Of course, rainfall distribution alone does not inform on the net productivity of plant communities. Rain that falls on the high interfluves of the Aiken Plateau tends to discharge quickly. Given favorable substrate, however, the discharge is channeled toward ridge slopes where it emanates in numerous springs. These springs and associated groundwater enable the mesic communities described above to exist. With these communities in place, the rate of summer evaporation is greatly reduced, and the resultant microenvironment forms something of an "oasis" from the dry, hot interfluves of the sandhills.

One additional microenvironment, one not reflected in previous work in the vicinity of the project area, is the floodplain of Upper Three Runs Creek. Slopes bordering the floodplain contain plant communities similar to those described above for ridge slopes, except on the steep bluffs, which are unable to support mast species. The bottoms themselves have the greatest potential to provide food for human consumption. Dense hardwood cover and thick understory provide substantial browse and cover for white-tailed deer. As it does today, this game species likely targeted the lower terraces and adjacent slopes for travel and forage, and would have depended on the creek itself for water. Tributary stems feeding into the Upper Three Runs Creek would offer extensions of these same conditions a few hundred meters into the upland unit.

Other bottomland faunal resources besides deer include resident fish populations, and possibly shellfish and anadromous fish such as shad and striped bass. Semiaquatic mammals, turtles, and avifauna provide additional animal resources. In terms of edible plants, several species of oaks and hickories adapted to mesic and hydric soils are found in the floodplain zone, as well as grasses, berries, shoots, and aquatic plants.

The drawback to exploitation of the floodplain is that so much of it is poorly drained. Late winter and early spring flooding may have been fairly routine during at least the last several millennia of prehistory, while summer thundershowers undoubtedly created occasional flashflooding. Occupation of the slightly raised terraces of the floodplain zone may have occurred during the dry season, and perhaps before modern floodplain conditions came into place after 4000 B.P. Otherwise, direct access to the this zone for resource exploitation was possible from any number of locations in the adjacent uplands.

Our consideration of the environment in the project area has, to this point, been based on modern conditions. Clearly we cannot project these conditions into the deep past, considering the data cited earlier for changes in climate, hydrology, and vegetation. At least three such changes had likely local significance. First, the early Holocene was a time of more marked seasonality than at present, as well as a period of more prevalent deciduous tree cover. Simulations of the climatic effects of orbital precession (Kutzbach and Guettner 1986) suggest that summers were hotter and winters cooler than at present. This would have encouraged greater heterogeniety in the temporal and spatial distribution of vegetation, supporting, in turn, target-specific subsistence strategies. Moreover, it would have driven winter occupants to locations with the greatest exposure to the sun (i.e., south to southwest-facing slopes) for relatively long-term uses, as long as such locations did not expose them to prevailing winds.

Second, the early and rapid expansion of southern pine forests in the area after 8000 B.P. would have diminished the resource potential of the interfluves and concentrated remaining hardwoods in mesic slope and bottoms of stream valleys. This marks the onset of changes leading to present vegetational patterns and it created the basic zonation seen today between xeric and mesic plant communities. We suspect that the overall effect was diminished carrying capacity for species dependent on mast, however, we do not expect that sustained use of the Aiken Plateau was prohibitive for either these species or members higher up the food chain. Rather, we suspect there was simply greater zonation and patchiness in the distribution of key resources, with greater concentrations in bottomland and lower slope locales. At the same time, increased temperature and moisture appears to have diminished the seasonal variation of the early Holocene, which encouraged more generalized subsistence strategies.

Third, the combination of cooler climate with increased moisture and fluvial responses to decreases in the rate of sea level rise after 6000 B.P. promoted floodplain aggradation and bottomland wetlands. The effects of sea level change were time-transgressive, in an up-river fashion, resulting in modern floodplain conditions in the Savannah River at the SRS at about 4000 B.P. (Brooks et al. 1986). Subsequent developments in Savannah River tributaries on the SRS, such as Upper Three Runs, would have transpired over the subsequent millennium (Brooks and Hanson 1987). The consequences include improved habitat for species adapted to slow-moving water and sandy channel bottoms, increased availability of surface water in floodplains (e.g., backwater sloughs), and increased flooding. After about 3000 B.P. it may not have been possible to utilize floodplain locations for extended periods of time, and certainly not for long-term habitation.

Throughout these various changes the upland wetlands referred to as Carolina bays may have been relatively stable, or at least somewhat reliable, sources of water and associated mesic and hydric resources. No such features exist within the immediate vicinity of the project area, but they are numerous in the surrounding region. Evidence is building for regular and intensive use of bays during the early Holocene (Brooks et al. n.d.; Eberhard et al. 1994). Evidence for mid-Holocene uses remains elusive, but many bays contain assemblages dating to the Woodland period. We make note of this new information not for its relevance to this study per se, but because it is changing our overall perspective on upland land use and will likely result in radical rethinking of our settlement models in years to come.

In sum, prehistoric occupations of E Area would have had available to them the several springheads and feeder streams in the upland unit of the project area. The mesic hardwood forests of slopes shaped by these streams provided abundant resources for deer, turkey, and humans alike. The fluvial dissection created by Upper Three Runs Creek and its feeder streams creates a verticality to the local forest communities that parallels, at a much smaller scale, the vegetational differences apparent in the topographic gradient of the Savannah River. The bottomland of Upper Three Runs itself would have provided additional types of resources, including appreciable varieties of fish and aquatic turtles, as well as a potential source of arable land in later prehistory. The broad-scale environmental changes we summarized would have altered the potential and limitations of bottomland resources, as well as the zonation and seasonality of hardwood stands in the upland unit.

Abiotic Resource Potential

Stone and clay were abiotic resources of extremely important value to prehistoric Native Americans. Regarding lithic raw material availability, a great deal of interprovincial variation characterizes the Savannah River valley. Quartz, quartzite, basalt and metachert are available in the Piedmont (Overstreet and Bell 1965; Ledbetter et al. 1984; Wood et al. 1986). Quartz, occurring as float in the soil, in ridgetop veins and in river cobble beds, was heavily exploited throughout prehistory for flaked stone tools and for impact/grinding tools. The other materials were drafted into similar uses but, because of their comparatively limited distribution, do not comprise a significant fraction of most Piedmont assemblages.

The metamorphic formations and intrusive volcanic dikes of the Fall Zone offered a variety of rhyolites, tuffs and argillites, rocks collectively referred to as "metavolcanic." These resources were especially important to Late Archaic occupants of the middle Savannah River valley for the manufacture of large stemmed bifaces (e.g., Ledbetter 1995).

Besides sources of flakable stone, the Piedmont and Fall Zone contain outcrops of soapstone that were exploited to manufacture cooking stones, bowls, pipes and ornaments. Within the Savannah River watershed, soapstone occurs in the Georgia counties of Stephens, Elbert, Wilkes, Lincoln and Columbia, and in the South Carolina counties of Pickens, Oconee, Abbeville and Edgefield (Wood et al. 1986:305). Elliott (1981:18; and see also Wood et al. 1986:305) has documented prehistoric quarry activity at outcrops in Oconee County, South Carolina, and Elbert and Wilkes Counties, Georgia.

Unlike the upper portion of the valley, the Coastal Plain of the Savannah River valley contains little lithic raw material. The river does, however, bisect two sedimentary formations containing marine cherts and other siliceous rock. The larger of the two is the

Flint River Formation in the middle Coastal Plain (Upchurch 1984). Prehistoric utilization of chert quarries around Allendale, South Carolina and in Burke County, Georgia is well-documented (Goad 1979; Goodyear and Charles 1984). Lower quality cherts are also available in the Barnwell formation of the Upper Coastal Plain (Upchurch 1984), although direct evidence for prehistoric quarry activity has yet to be collected.

Within the Aiken Plateau, dissection by tributaries of the Savannah River afforded ample access to mineral resources of value to prehistoric humans. Among these are low-grade, fossiliferous silicates, presumably from the Barnwell formation. Beds of these materials are currently exposed in an ancient cutbank of Upper Three Runs Creek to the immediate east of E Area. Utilization of the fossiliferous limestone and quartz arenite (orthoquartzite) sources outcropping along Upper Three Runs Creek was not evident in the assemblages from 38AK158 and 38AK159, but 38AK157 included a sizable assemblage of orthoquartzite flakes and preforms dating to the Middle Woodland.

The lithic assemblages from 38AK157, 38AK158 and 38AK159 contained numerous quartz cobbles that were extracted from the lag deposits of Miocene-aged channels that dissect the Barnwell formation (Nystrom 1989, Nystrom et al. 1991:236-237). In the vicinity of these sites, cobble beds are exposed in high roadcuts and in the bluffs overlooking Upper Three Runs Creek. We suspect that similar sources are located in slopes formed by headwater streams in the area. These cobbles apparently served a variety of functions, including cooking, heating, tool manufacture and other impact and grinding uses.

Finally, clay resources in the Aiken Plateau occur as channel fill within the incised upland unit. The suitability of these resources for pottery manufacture is unknown. Within the Coastal Plain at large, however, clay resources occur in a variety of riverine and marine contexts, many of them well suited to pottery manufacture. Residual clays from the Piedmont and Fall Zone are also present in the active fluvial regime of the Coastal Plain, although much of this material was eroded and redeposited in recent years as a result of Euro-American farming.

PREHISTORIC LAND-USE MODELS

Our attention turns now to background information on prehistoric human occupations of the middle Savannah River valley. Overviews of the culture-history and archaeological assemblages of the area's prehistory are available in a variety of widely distributed sources (e.g., Sassaman et al. 1990), and need not be repeated here in detail. Rather, we devote our review below to the key models of land-use patterning that have emerged from surveys and excavations on the SRS, and to their implications for archaeological residues in E Area. Our ultimate goal at the close of this chapter is to identify likely activity-sets and corresponding artifact patterns that derive from these models for the purpose of distributional analyses in Chapter 6 of this report.

Early Archaic Land-Use Patterns

Spanning the years 9900-8000 B.P., the Early Archaic period is typically regarded as the time of human adaptation to the warming climate of the post-glacial (Griffin 1967; Smith 1986). The period marks the first well documented use of sites on the SRS, but it is not the earliest. Across nearly all of North America, the Early Archaic period is preceded by an episode of early colonization referred to as the Paleoindian period. The fluted Clovis point technology of these early colonists stands as the primary diagnostic trait of the period. Clovis occupations in the Southeast spanned a period from 11,500 to

11,000 B.P. (Anderson et al. 1990). Over the subsequent 500 years, smaller fluted points and unfluted lanceolate points such as the Simpson and Suwannee types replaced Clovis technology in the extreme Southeast. The final phase of the Paleoindian period, the Dalton phase, dates from 10,500 to 9,900 B.P. and is signified by the emergence of the unfluted Dalton point (Goodyear 1982).

The Paleoindian archaeological record in the Savannah River region is sketchy and poorly understood. Surface finds of Clovis points and other formal lithic tools are commonplace (Anderson et al. 1990; Goodyear et al. 1990), but there remains a dearth of well-preserved, buried contexts for Paleoindian assemblages. Our knowledge of Early Archaic inhabitants in the Savannah River region is much more complete than for the Paleoindian period.

Delineated from the Paleoindian period by the emergence of notched bifaces, the Early Archaic is defined in the Savannah River region by Taylor Side-Notched points (ca. 10,000-9500 B.P.), Palmer and Kirk Corner-Notched points (ca. 9500-8300), and various bifurcate forms (ca. 8900-8000 B.P.) (Coe 1964; Chapman 1976, 1985; Michie 1966; Goodyear et al. 1979:100-101). The relative abundance of these types and related variants throughout the Southeast indicates that an extensive regional population was in place by the tenth millennium. Variation among these forms suggests further that subregional traditions began to appear among relatively stable populations.

A considerable body of survey and excavation data on the Early Archaic period accumulated in the 1980s and formed the basis for several models of settlement and subsistence. Working with assemblages from the Haw River sites in the North Carolina Piedmont, Claggett and Cable (1982) hypothesize that changes in early Holocene environments, namely a shift from a patchy to a homogeneous resource matrix, encouraged the development of residential mobility strategies (sensu Binford 1980), and thus a shift from formal to expedient lithic technology (sensu Binford 1977, 1979). The Haw River data supported this proposition, as did subsequent comparative analysis of assemblages across the region by Anderson and Schuldenrein (1983). Analyses of the distribution of raw materials by Anderson and Schuldenrein also showed that Early Archaic groups maintained extensive settlement ranges.

A more detailed exposition of Early Archaic settlement and subsistence was later developed by Anderson and Hanson (1988) for the Savannah River valley. Recognizing that Upper Coastal Plain and Fall Zone sites contained diverse assemblages of formal tools and exotic raw materials, Anderson and Hanson proposed that Early Archaic groups selected fall and winter locations for long-term, repeated use. Subsistence activities, primarily deer hunting, were launched from these camps by specialized work parties employing formalized, curated toolkits. The result was a greater degree of intersite assemblage variation than observed in the Piedmont. Anderson and Hanson also suggested that resident populations were quite small, necessitating periodic social aggregation at Fall Line sites for mating arrangements and other social transactions. Further use of the Middle and Lower Coastal Plain was predicted for the early spring, when winter camps were broken to take advantage of the earliest available plant resources. In short, the model describes a pattern of valley-wide mobility that incorporates seasonal adjustments in the availability of foods, provincial differences in the distribution and quality of lithic raw materials, and the biological need to maintain a viable breeding population.

An alternative model which characterizes Early Archaic groups as large and relatively sedentary was proposed by O'Steen (1983) in her analysis of assemblages from the Wallace Reservoir area of Piedmont Georgia. She predicts that the local population was comprised of several hundred people who maintained territorial boundaries and exchanged lithic raw materials with similarly organized groups across the region. The favorable, productive microenvironments of the early Holocene Piedmont enabled groups to position relatively permanent base camps in locations of greatest resource diversity and density.

Continuing research on the Early Archaic in the Piedmont is bringing to light other evidence that forces a reevaluation or refinement of the Anderson and Hanson model. For instance, Randy Daniel of the University of North Carolina reanalyzed the Hardaway site collection to document the manufacture and use of technology indicative of logistic-based settlement organization (Daniel 1994). Located in close proximity to outcrops of flow-banded rhyolite, the Hardaway site indeed contains all the indications of a long-term, or reoccupied base camp. Interestingly, its proximity to sources of high quality raw material may account for long-term use in the same sense that Paleoindians may have been tethered to outcrops of cryptocrystalline rock. Daniel has also conducted detailed petrographic analyses of flow-banded rhyolite and has applied these results to the regional distribution of Early Archaic artifacts. He argues that much of the rhyolite from the Uwharrie area (at Hardaway) was moving <u>between</u> river drainages in the Piedmont. This brings to question the patterns of mobility Anderson and Hanson propose on the basis of raw material flow. I hasten to add, however, that although data from the South Carolina Coastal Plain likewise evince some movement of raw material between drainages (Sassaman 1996), more material was transported <u>along</u> drainages, as Anderson and Hanson anticipate. Rather than undermine the basic framework of the Anderson-Hanson model, I believe these new data are bringing to our attention the need to include other factors besides settlement mobility to explain the regional patterns of raw material use. O'Steen's (1983) proposal for intergroup exchange should be more thoroughly explored.

Detailed expectations for Upper Coastal Plain settlement in the Savannah River valley have been developed by Hanson (1988). In his formulation, winter residential bases were situated along the first terrace of the Savannah River, primarily at or near the mouths of major tributaries (Figure 2-1). Occupied sequentially by a single band, terrace base camps were the centers of domestic activity, including food preparation, hide processing, and tool manufacture and maintenance. Dense and diverse tool assemblages, habitation structures and other facilities are expected at these sites. A foraging zone of roughly ten kilometers around each base provided daily sources of plant and small animal foods, firewood and other raw materials. The brief and dispersed nature of foraging activities within the zone are not expected to have left much of an archaeological record. Beyond the foraging zone, food and material procurement, primarily deer hunting, required logistical forays by specialized work parties. Field stations from which procurement activities were launched were positioned throughout the logistical zone, and repeated use of such locations involved tool and material caching, as well as the discard of broken and exhausted specialized tools.

The G.S. Lewis-East (38AK228-East) and Pen Point (38BR383) sites are cited by Hanson (1988) as examples of residential base camps. Tool assemblages at each of these sites are diverse and dense, and there is some indirect evidence for a habitation structure at Lewis-East. These manifestations are markedly different from the more typical small, low-diversity assemblages that are scattered throughout the upland zone, exemplifying the sorts of short-term hunting stations postulated in Hanson's model.

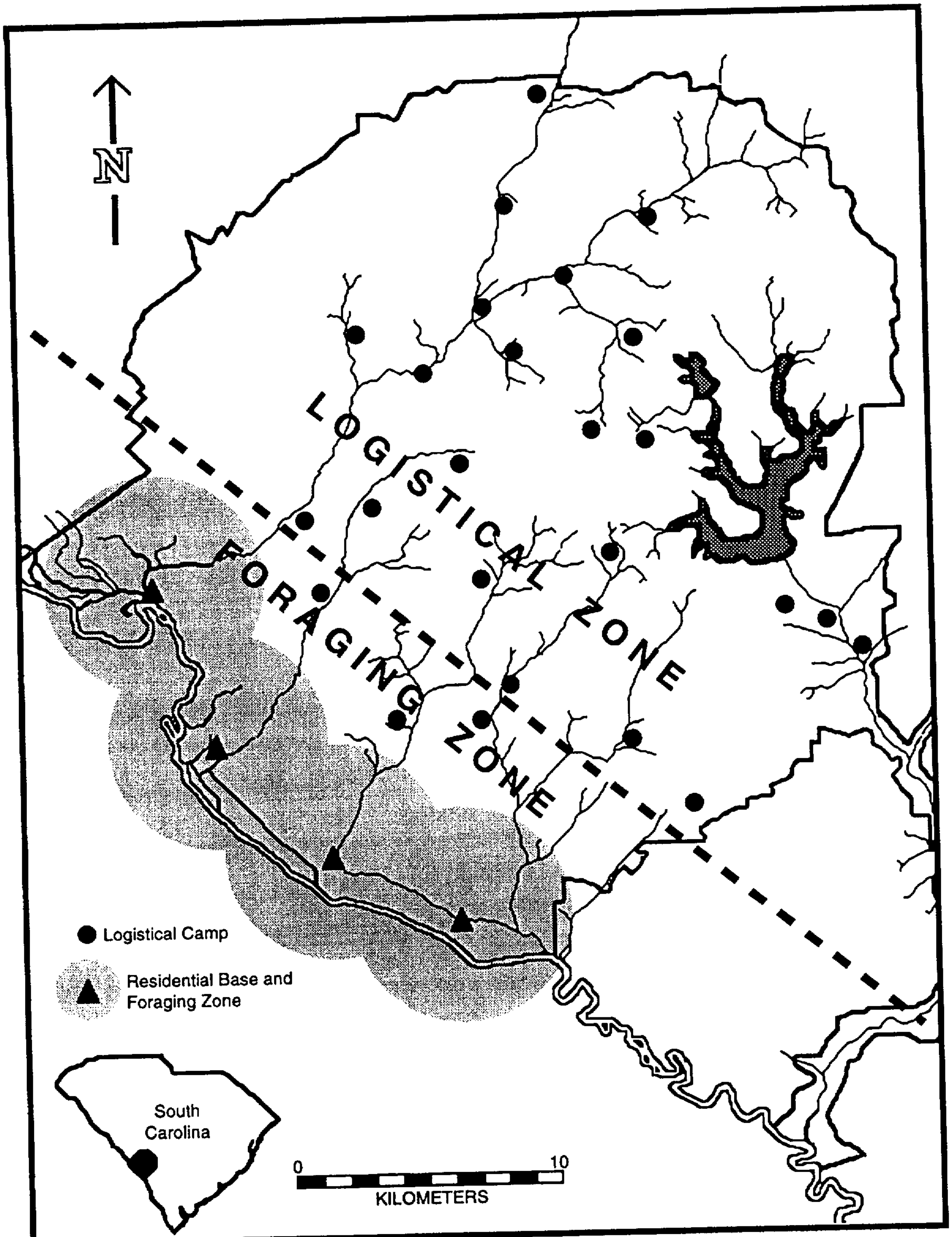

Figure 2-1. Model of early Holocene settlement in the Savannah River Site area of the Upper Coastal Plain.

In contrast to the Lewis-East and Pen Point assemblages, upland assemblages on the Savannah River Site are generally small and exhibit little diversity. Consisting primarily of exhausted hafted bifaces and small debitage, these assemblages fit the expectations for short-term, limited function sites. Also common at many of these sites are exhausted formal unifaces, including Edgefield scrapers. These specialized items have been interpreted as hide- or wood-working tools associated with hunting forays (Hanson 1988), although their exact function remains unknown.

Late Archaic Land-Use Patterns

The course of prehistory from 8000-5000 B.P., the Middle Archaic period, in the Georgia-Carolina Coastal Plain remains poorly understood (Elliott and Sassaman 1995; Sassaman and Anderson 1995). Early eighth millennium phases of the Early Archaic Period, notably the bifurcate point phases, are poorly represented in the region (Anderson 1991; Sassaman 1996). Evidence for the subsequent Kirk Stemmed (8000-7800 B.P.) and Stanly phases (7800-7500 B.P.) is likewise sparse. Not until the Morrow Mountain phase (7500-6000 B.P.) is there solid evidence for sustained occupation, but even then it pales in comparison to evidence from the Piedmont and Mountain provinces of the Southeast. The Guilford phase (6000-5000 B.P.) evinces a similar upcountry bias, although equivalent diagnostic forms are found in the MALA and Brier Creek types of the Coastal Plain. These latter forms apparently mark the beginnings of a trend for increased occupation in the Coastal Plain after 6000 B.P. By 5000 B.P., the start of the Late Archaic Period, full-scale occupation of local sites was underway.

Because of the dearth of Middle Archaic finds in the SRS in general and E Area in particular, we select to by-pass further discussion of this period and move to a directed consideration of the more conspicuous Late Archaic record. Readers interested in the discussions of the seeming lack of full-blown Middle Archaic manifestations in the Coastal Plain province may wish to consult one of the regional syntheses that have been issued recently (Elliott and Sassaman 1995; Sassaman and Anderson 1995).

Irrespective of the causes for limited occupation of the Coastal Plain during the Middle Archaic, by about 6000 B.P. occupation of riverine sites in the province was on the rise. The local Coastal Plain phases (MALA and Brier Creek) reflect the emergence of groups that apparently occupied river terrace sites for lengthy periods, employing a technology that involved elaborate lanceolate bifacial tool forms, thermal alteration of Coastal Plain chert, and intensified tool production. Little is actually known about the settlement-subsistence organization of these people. The use of quartz and chert at Fall Line sites (Braley and Price 1991:56-58; Ledbetter 1991:58-59) and Upper Coastal Plain sites (Sassaman 1985) reflects a greater degree of geographical displacement for raw materials than in the Morrow Mountain phase. From this we might infer a higher degree of residential mobility for the period, although it is possible that intergroup exchange was on the rise. Supporting evidence for intergroup exchange is found in the large scale of biface manufacture in the Coastal Plain, a pattern that may reflect production for exchange (Sassaman 1988, 1994).

The MALA/Brier Creek complex represents in the middle Savannah River valley a turning point in local prehistory. Settlement in the valley from the Fall Line to the coast burgeoned after 5000 B.P. The first serious exploitation of shellfish in the area is documented at about 4500 B.P. A variety of technological innovations appeared, including the first use of ceramic vessels. Unequivocal evidence for habitation structures, pit features, and human burials reflect an unprecedented level of site permanence. For a period of at least 1500 years, the middle Savannah River valley witnessed relatively continuous and intensive occupation by a large resident population.

The onset of the Late Archaic period (5000-3000 B.P.) is marked by the appearance of large stemmed hafted biface forms typically attributed to the Savannah River Stemmed type defined by Coe (1964:44-45). Researchers in the area have devoted much attention to the typological significance of the Savannah River Stemmed and its Late Archaic variants (e.g., Alterman 1987; Anderson and Joseph 1988:195-199; Anderson and Schuldenrein 1985; Oliver 1981, 1985; White 1982). Based on observations made by Bullen and Greene (1970) from excavations at the Stallings Island site, large stemmed bifaces were replaced by smaller stemmed varieties over the course of occupation. This observation has been widely embraced as the overall trend for biface technology in the region: that is, that Late Archaic bifaces became progressively smaller through time, leading eventually to the diminutive forms of stemmed bifaces referred to as Small Savannah River Stemmed and Otarre (Oliver 1981, 1985).

Fiber-tempered pottery referred to as Stallings and St. Simons was added to the Late Archaic technological inventory after 4500 B.P. Based on the occurrence of pottery, Stoltman (1974; see also Smith 1974) defined three phases of the so-called "Stallings Culture" in the Savannah River valley: Stallings I, a preceramic phase; Stallings II, a ceramic phase dominated by plain fiber-tempered pottery; and Stallings III, a ceramic phase dominated by decorated fiber-tempered pottery. Although the coastal records of South Carolina and Georgia lack preceramic Late Archaic components, the Stallings II and III phases coincide well with the St. Simons I and II phases as defined by DePratter (1979). The St. Simons I phase is dated from 4200-3700 B.P. by DePratter (1979:114), while the St. Simons II phase lasts from 3700-3100 B.P. In addition to fiber-tempered pottery, sand-tempered wares of the Thom's Creek series coincide with the use of Stallings pottery after 4000 B.P. (Trinkley 1980a). Thom's Creek pottery is not found in St. Simons assemblages from the Georgia Coast, and is generally absent from the Coastal Plain of Georgia west of the Brier Creek drainage (a tributary of the Savannah River).

Recent and on-going work by Jerald Ledbetter and Dan Elliott at sites in the middle Savannah River valley has greatly refined Late Archaic chronology and typology. Based in part on assemblages and radiocarbon dates from the Paris Island site (Wood et al. 1986), Elliott proposes that a Late Archaic phase marked by the use of medium-sized stemmed points predated the classic Savannah River Stemmed phase (Elliott, personal communication 1992). The diagnostic Paris Island Stemmed is found at other sites throughout the Piedmont, including especially Sara's Ridge (Wood et al. 1986) and Moody (Moody et al. 1985). Elliott proposes a 4450-4150 B.P. interval for the Paris Island Phase (Elliott et al. 1994:370-371).

The local manifestation of the Savannah River Stemmed phase is designated the Mill Branch phase by Elliott. Based primarily on the work of Ledbetter (1991, 1995) at the Mill Branch sites, this phase marks the use of classic Savannah River Stemmed bifaces and the incipient use of Stallings fiber-tempered pottery. Elliott assigns an interval of 4150-3800 B.P. to the phase (Elliott et al. 1994:371-372).

A third Late Archaic phase in the middle Savannah River valley has been designated the Lover's Lane phase by Elliott from his recent work at the Lover's Lane site. This phase coincides with the onset of intensive pottery utilization at Stallings Island, circa 3800 B.P., and ends at about 3300 B.P. A final phase marking the terminal aspect of the Late Archaic period has not yet been defined, although Elliott proposes that the local use of soapstone vessels at about 3300 B.P. is part of a cultural manifestation he tentatively calls the Dickens "Complex" (Elliott et al. 1994:372-373).

These recent refinements in Late Archaic chronology lend a great deal of temporal control to research within the middle Savannah River valley. Unfortunately, comparable control has not been achieved in other parts of the valley, particularly within the middle to lower Coastal Plain. Thus, detailed interprovincial comparisons remain tenuous. Nonetheless, the extant chronology for Late Archaic occupations in the Coastal Plain is sufficiently detailed to permit some broad generalizations. For instance, it is apparent that the Coastal Plain contains Late Archaic manifestations that differ markedly from the Piedmont. Differential access to raw materials explains some of the differences with respect to lithic typology, but beyond that are other technological differences. The most important among them perhaps is the use of fiber-tempered pottery. Pottery was being made and used on the coast and in the middle Coastal Plain long before it was made and used in the Piedmont. This contrast, coupled with differences in lithic raw material selection (e.g., Sassaman et al. 1988), serves as evidence that distinct sociopolitical entities occupied the Piedmont and Coastal Plain during the Late Archaic period. As we have seen above, this division was perhaps foreshadowed in the Middle Archaic period with the MALA/Brier Creek complex.

Although we are certain that distinct sociopolitical entities were present in the Savannah River valley during the Late Archaic period, we have little empirical data about the extent of these groups, their interactions, and their ultimate demise. One model was recently developed to account for the rise and fall of distinct Late Archaic groups with respect to the origins and spread of fiber-tempered pottery (Sassaman 1991a, 1993b). Proposed in the model are three phases of Late Archaic development. Phase I is characterized as a period of dispersed settlement throughout the region, but with distinct sociopolitical entities (macrobands?) occupying the Piedmont and Coastal Plain. By 4500 B.P. plain, basin-shaped fiber-tempered vessels were made and used throughout the Coastal Plain, and in limited portions of the Fall Zone or lower Piedmont. In contrast, occupants of the Piedmont made and used perforated soapstone slabs for indirect-heat cooking in pits or other sorts of non-ceramic containers. They apparently traded soapstone slabs with Coastal Plain occupants who used them in ceramic vessels for similar indirect-heat cooking functions. Over the ensuing centuries, coastal occupations became increasingly permanent and we find evidence for innovations to improve the thermal efficiency of pots for direct-heat cooking. By 3700 B.P. (Phase II), groups occupying the interior Coastal Plain and the Fall Zone consolidated into a central sociopolitical entity ("classic" Stallings Culture). They adopted pottery for use but continued to make and use soapstone slabs. At the same time, interprovincial trade in soapstone diminished. By Phase III, sociopolitical entities on the coast and in the interior dissolved. Settlement patterns became increasingly dispersed over the next few centuries, leading eventually to increased, perhaps perennial utilization of remote upland sites by small residential groups. Pottery was widely adopted for use in direct-heat cooking during Phase III.

The Late Archaic period was a very dynamic time, and we need to keep in mind that patterns in settlement, subsistence, and sociopolitical organization cannot be reduced to simple, straightforward phase descriptions. This is obviously true of the technological attributes used to signify cultural-historical phases or periods. Patterns to the adoption of fiber-tempered pottery in the Savannah River valley are variegated and manifold. The presence or absence of fiber-tempered pottery alone is insufficient to reconstruct the geographical, temporal, and sociopolitical distributions of Late Archaic inhabitants. Moveover, evidence is accumulating to support the notion that groups indigenous to the middle Savannah before the appearance of pottery (i.e., Mill Branch phase residents) persisted in relatively traditional ways (i.e., aceramic) throughout the time when Stallings Culture formed, flourished, and collapsed. They almost certainly interacted with Stallings people but appear to have remained ethnically distinct, and, perhaps, economically and politically autonomous.

Having pointed out some of the sociocultural complexity of the Late Archaic period, it now remains for this section to highlight some of the broad patterns of Late Archaic land use in the region. The Late Archaic record in the Savannah River valley region includes sites that range from small to large, from simple to complex, and from riverine to upland. Some of this variation can be attributed to changes in organization through time, as outlined above. Otherwise, a generalized, seasonal pattern of settlement aggregation and dispersal has long been applied to the Late Archaic record in the region (e.g., White 1982), and its applicability remains viable today.

Sites such as Stallings Island (Claflin 1931) and Lake Spring (Elliott 1995; Miller 1949) in the middle Savannah River valley are large shell middens with evidence for permanent architecture, intensive but diversified resource exploitation, tool and craft manufacture, and human interments. These sites probably were home to large groups over long periods of time, although the actual size of groups and periodicity of use is unknown. They contain multiple components, but the time during which most of the shellfish accumulated appears to coincide with the "peak" of Stallings Culture in the middle Savannah, that is, roughly 3700-3500 B.P.

Smaller shell-midden sites are located throughout the Coastal Plain and the Fall Zone, and they appear to span much of the Late Archaic period.. Some from the Coastal Plain, such as Rabbit Mount (Stoltman 1974) and Cox/Fennel Hill (Trinkley 1975) are quite early (ca. 4500 B.P.) and presumably represent the first exploitation of freshwater shellfish in the area. Coastal shell middens and shell rings all postdate 4200 B.P. Interior sites containing shellfish remains include those dating to the earliest uses of middle Savannah River shell by groups who spent much of their time in the Coastal Plain, and later sites that are coeval with shellfish accumulation at Stallings Island. The former includes Victor Mills (9CB138), Ed Marshall (38ED5), and Uchee Creek (9CB15); the latter is exemplified by Mims Point (38ED9) (Sassaman and Anderson 1995:70-72).

Nonshell riverine sites in the middle Savannah River valley include examples that predate shell-midden accumulation at Stallings Island, such as Lewis-East (Hanson and Sassaman 1984) and Rae's Creek (Crook 1990); as well as those that are coeval with shell-midden formation, such as Lover's Lane (Elliott and Doyon 1981; Elliott et al. 1994) and perhaps Pig Pen (Ledbetter 1988). Similarly, upland sites lacking shellfish remains include small sites occupied at various times throughout the period. Examples include Moody (Moody et al. 1985) and Mill Branch (Ledbetter 1991) in the Fall Zone, and Tinker Creek (Hanson 1980), the L-Lake sites (Brooks and Hanson 1987), Hitchcock Woods sites, and numerous others on the Savannah River Site of the upper Coastal Plain (Sassaman et al. 1990).

Subsistence remains at shell-midden sites are abundant, but poorly documented. However, recent and ongoing analyses of fauna from Stallings Island, Mims Point, Ed Marshall, Victor Mills, and a site on Brier Creek (Midden Point-9BK113; Sassaman 1991b) are showing that the Late Archaic diet was highly diverse and included a large fraction of aquatic species, as well as the usual abundance of deer (Sassaman and Walker 1995). Unfortunately, seasonality from these data is not easy to infer. Claflin (1931:12) noted a large quantity of sturgeon in the Stallings Island midden, an anadromous species that would have been available only in the spring. However, no sturgeon remains were detected in the samples collected in the early 1970s by Crusoe and DePratter (1976) (Weinand and Reitz 1992), nor has any species of anadromous fish been detected in appreciable frequency from other Stallings contexts (Sassaman and Walker 1995). Claassen's (1986) study of shellfish seasonality in the Southeast suggests that freshwater species were collected from spring to fall, but not in the winter. The abundance of turtle remains at Stallings Island and other shell middens is indirect evidence for seasons of warmth, when turtles are most active (Weinand and Reitz 1992). Juvenile deer mandibles from Stallings Island lend further support to spring occupations, but the occurrence of unshed antlers on three individuals may reflect fall or early winter occupations as well. Thus, the combined lines of evidence support a warm-weather period of occupation for riverine sites, but they do not preclude cold weather seasons.

Recent evidence for Late Archaic architecture lends further insight into patterns of settlement and seasonality. A semi-subterranean structure was uncovered at site 9WR4 (South Block) at the headwaters of Brier Creek in the Fall Zone (Ledbetter 1991, 1995). Dated to about 3900-3850 B.P., the pit house contained an internal hearth with a large zone of charcoal and ash. Because of this substantial feature, Ledbetter interprets the pit house as a cold weather habitation structure (R. Jerald Ledbetter, personal communication 1992). He also provides evidence to show that the structure was relatively isolated, or that at least no other comparable structures were present in the immediate site area. This evidence supports a model for Late Archaic settlement which includes group dispersal during cold weather seasons (e.g., Sassaman et al. 1990:313-315).

Other structures in the middle Savannah River valley have been recently uncovered at the Lover's Lane (Elliott et al. 1994) and Mims Point (Sassaman n.d.). Five surface structures and a possible pit house were identified by Elliott at Lover's Lane. Elliott provides estimates of the occupation times of each structure based on absolute dates and artifact content. A time span of about 300 years is represented (ca. 3850-3550 B.P.), with each of the structures potentially marking discrete, noncontemporaneous occupations. However, Elliott extrapolates the findings from the excavation blocks at Lover's Lane to speculate on the pattern of community structure. Isolated structures are expected for the earliest period of occupation (ca. 3900 B.P.), but after 3750 B.P., as many as seven structures (households?) may have occupied the site simultaneously. A more limited pattern of site use is projected for the period postdating 3550 B.P. (Elliott et al. 1994:364-367).

Evidence for structures at Mims Point continues to accumulate. At least three Late Archaic structures has been identified in the three seasons of excavation completed to date. Based on the areal extent of midden deposits in the block area (roughly 2000 m^2), the traces of several other houses are undoubtedly located in the immediate area, but until further excavation is conducted, their temporal and spatial relationships remain unknown. Radiocarbon dates for the Mims Point site place Stallings occupations at ca. 3650-3600 B.P.

Finally, the remains of a clay platform was recently uncovered at the Ed Marshall site. Located within a shell midden dating to ca. 3850-3750 B.P., the subrectangular to circular floor measures about 4 m in diameter. A few suspected postholes were observed and several areas in the clay were exposed to excessive heat. Because the site lies low within the Savannah River floodplain, we suspect the use of this platform took place during the dry, warm season. In contrast, the high ridgetop site of Mims Point, overlooking the Savannah River floodplain, could have very well taken place during the cool, wet season. Differences in the architecture at these different, albeit nearby, locations bears out the inference of seasonally distinct occupations.

In sum, evidence for Late Archaic structures in the area has grown tremendously in the last few years. The pit house from Mill Branch lends credibility to an argument for cold weather dispersal into upland sites by small co-resident groups of this phase, including apparently individual households. Structural evidence from other sites is ambiguous with regard to the contemporaneity of structures (where several are found) and to seasonality. However, the contrast of floodplain and adjacent ridgetop sites for occupations affiliated with classic Stallings Culture points to a more circumscribed pattern of seasonal movement. Use of upland locations by these people may not have included much sustained habitation until riverine occupations were altogether abandoned after ca. 3500 B.P.

Given the complex culture-history and seeming ethnic diversity of the Late Archaic period, a variety of expectations can be put forth about Aiken Plateau land use. In general, a pattern of fall-winter seasonal dispersal appears to have characterized the period until about 3700 B.P. (Figure 2-2). Use of uplands by both the indigenous Mill Branch people and their Coastal Plain counterparts seems likely, although evidence of the former is relatively scarce of the SRS. Also rare at SRS upland sites are sherds of the earliest pottery of Coastal Plain groups—the plain fiber-tempered wares with thickened/flanged lips. Still, several sites excavated in the SRS uplands contain assemblages of stemmed points made from chert, soapstone cooking stones, and occasionally fiber-tempered and sand-tempered pottery of Late Archaic age. These include sites adjacent to E Area (38AK157, 38AK158, 38AK159), and the Tinker Creek site (38AK224) upstream from E Area. This latter site has produced decorated fiber-tempered pottery of classic Stallings design, but we have no independent evidence that this material dates to the 200-year or so interval when large riverine shell middens sites formed in the middle Savannah.

Some of the most secure information about Late Archaic upland land use comes from the organization of flaked stone technology. Throughout the period, sites in the Aiken Plateau were provisioned with bifaces made from chert obtained from quarries along the river (Sassaman 1992a). This strategy characterized upland site use for many millennia, but not until the Late Archaic period is the magnitude of provisioning great enough to indicate anything more than short-term visits. At this time, tool makers were preparing large bifacial cores for transport into the uplands. As these cores were reduced they provided not only core tools such as stemmed hafted bifaces, but also sources of large flakes. Stemmed bifaces themselves were undergoing intensive maintenance and recycling. At the same time, local, upland sources of low-grade chert and orthoquartzite were all but ignored. This indicates that the duration of upland site use was long enough to warrant lithic provisioning, but short enough to rely solely on transported sources. That Late Archaic occupants of the Aiken Plateau apparently returned to riverine sites on a regular basis, and thus had good access to high quality material, explains why so much of the transported tools kits were abandoned at upland sites.

Over the course of the Late Archaic period, upland site use in the Aiken Plateau became increasingly permanent (Brooks and Hanson 1987; Sassaman 1991c; Sassaman et al. 1990:315-317). Some of this change appears to be directly related to the demise of riverine occupations after about 3500 B.P. Stallings occupations along the middle Savannah cease altogether as the number and density of upland sites increases. We have long speculated that many, if not most of the Late Archaic assemblages from upland locations on the SRS date to the last few centuries of the period, that is, 3500-3100 B.P.

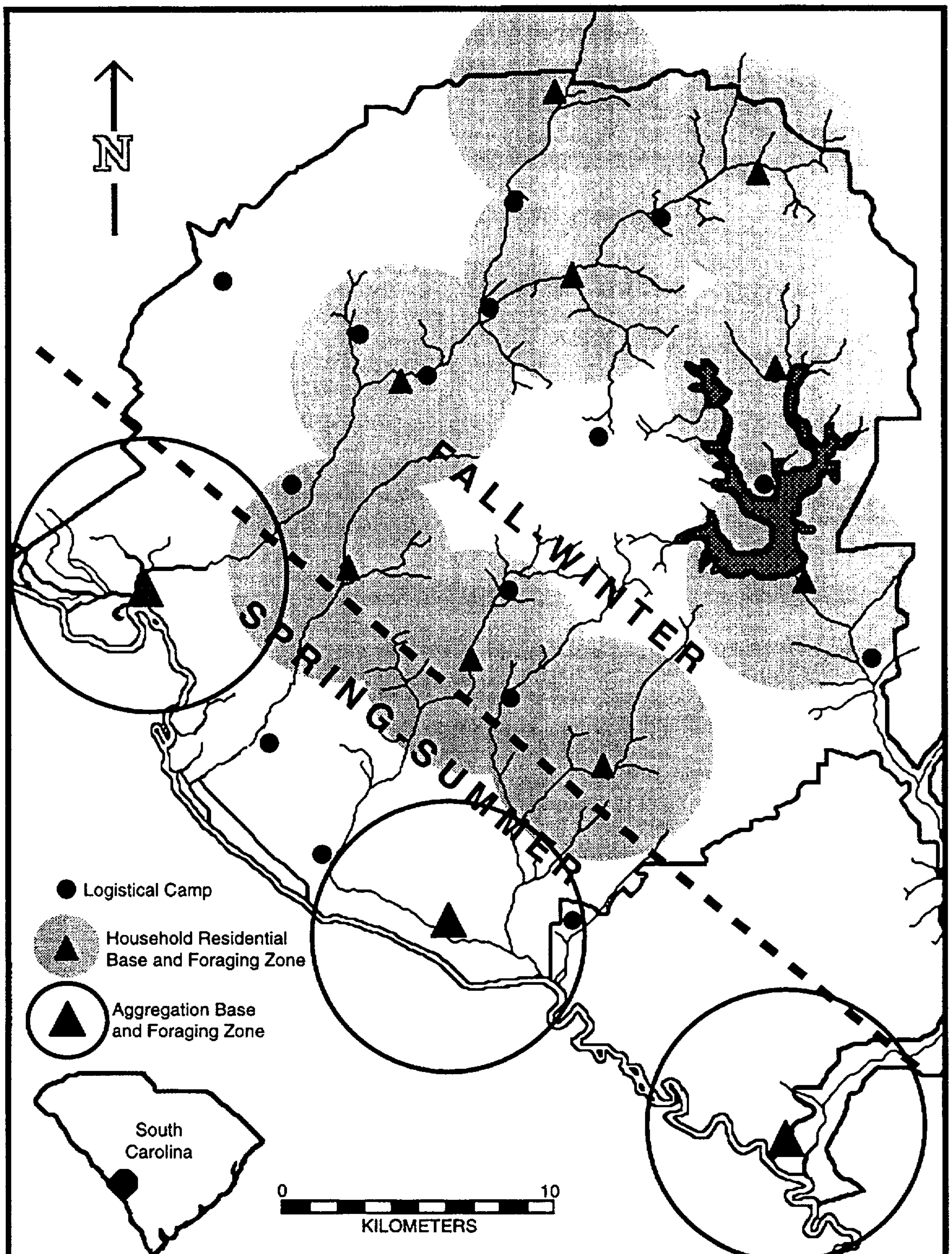

Figure 2-2. Model of Late Archaic settlement in the Savannah River Site area of the Upper Coastal Plain.

Sand-tempered Thom's Creek pottery, soapstone vessel sherds, and small stemmed points dominate these assemblages. The evidence marks the onset of a strategy of dispersed upland land use that characterizes much of the ensuing Woodland period.

Woodland Land-Use Patterns

Although sites of the Woodland period (ca. 3000-1000 B.P.) comprise the vast majority of prehistoric archaeological resources on the SRS, knowledge about the land-use patterns during this interval are sketchy at best. Investigations of Woodland period sites in the area has led to a general appreciation for the increased use of upland sites for seasonal and even perennial habitation. However, over this 2000-year period there were clearly some fundamental changes in settlement organization, including a temporary return to the intensive use of riverine sites that was abandoned after 3500 B.P. Also, the introduction of corn-based horticulture in the area at about A.D. 1000 and the Mississippian period lifeways it supported established entirely new parameters of land use.

In this section we outline the generalized Woodland settlement model that has been developed for the SRS and point out some of the expected deviations from this model given changes in the use of riverine sites and subsequent economic changes. We provide here very few details about the culture-history and diagnostic traits of the local Woodland record, but refer the reader to the SRS synthesis (Sassaman et al. 1990) and the section of the 38AK157 report where such details can be found (Sassaman 1993a:55-67).

Early Woodland settlement in the middle Savannah area, denoted by the local Refuge phase (ca. 3100-2500 B.P.) was decidedly upland in orientation. No shell middens or other intensively occupied riverine sites dating to the Refuge phase have been found in the middle or upper Coastal Plain portions of the Savannah River valley (Peterson 1971; Stoltman 1974). On the SRS, nearly 10 percent more Early Woodland sites are located in upland settings compared to those of the Late Archaic period (Sassaman et al. 1990:297). Some of these sites have yielded indirect evidence for structures and other indications of relatively permanent habitation (Brooks and Hanson 1987; Sassaman 1989, 1993a). Based on these data, and the notable lack of riverine assemblages of comparable density and diversity, a model of perennial use of upland sites had been posited for the Early Woodland period (Figure 2-3).

Explanations for intensified upland site use remain a subject of considerable discussion. From his investigations of four sites on T_2 along Steel Creek, Brooks views fluvial responses to mid-Holocene sea level rise as a stimulus to increased upland resource potential (Brooks and Hanson 1987). He indicates that the onset of modern floodplain development in the Upper Coastal Plain of the Savannah River valley at ca. 4000 B.P. (Stevenson 1982) established the local fluvial base level that led to subsequent hydrologic changes in upland tributaries. This resulted in increased biomass of aquatic plant and animal resources as tributaries adjusted to a low-energy flow and mature floodplain regime. Importantly, these newly productive resources constituted spring and summer foods that were heretofore limited to mesic terrace zones below the Aiken Plateau. Given this new potential, along with attendant improvement in deer habitat, Brooks posits that upland utilization changed from fall resource procurement (i.e., deer and nuts) prior to ca. 4000 B.P., to seasonal habitation along upland tributaries during the Late Archaic period, leading eventually to multiseasonal habitation within upland zones by the Early Woodland period. Tests of these postulates with excavation data from four sites in the Steel Creek watershed were generally supportive (Brooks and Hanson 1987).

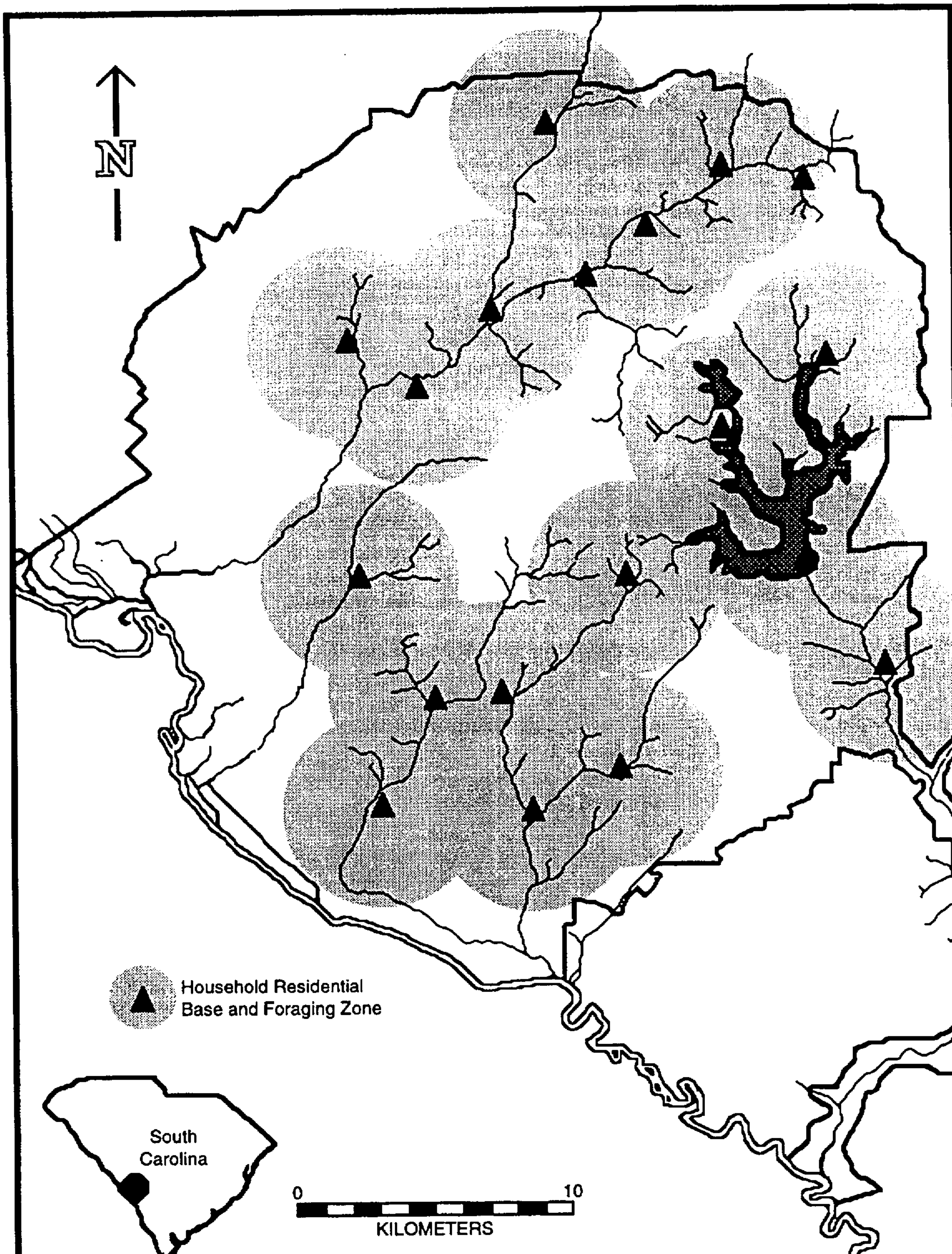

Figure 2-3. Model of Early Woodland settlement in the Savannah River Site area of the Upper Coastal Plain.

As a complement to and expansion of Brooks' model, intensified upland site use can be explained as a result of the sociopolitical processes alluded to in our discussion of the Late Archaic period above. The regional picture at ca. 4000 B.P. reflects dramatic changes in the organization of populations that obviously had some bearing on the scale and duration of upland occupations. In short, upland dispersal that is predicted for the Late Archaic period provided not only economic options for the fall and winter, but also refuge from periods of intensive social interaction at riverine sites. No doubt for some, perhaps those falling at the lower end of any spectrum of socioeconomic variation, upland settlement was not only desirable as a seasonal strategy, but perhaps also a permanent way to disengage from undue constraints on personal autonomy. Once some exercised this option, others could more readily follow.

The deviation from an established fall-winter land-use pattern in the uplands may have begun with extensions of summer occupation at upland floodplain sites—a pattern not far removed from tradition, but at a much smaller scale. With expansion to include an increasingly larger number of dispersed groups, occupations of greater duration (i.e., at least multiseasonal) would have to located out of the floodplain.

How such loosely-integrated Early Woodland groups interacted with other regional populations is unknown. Little evidence was observed for intensive site-use in the Richard B. Russell area of the upper Savannah River valley (Anderson and Joseph 1988:217). Simultaneous with the "apparent depopulation" of the Russell area (Anderson and Joseph 1988:218), there appears to have been widespread use of interriverine zones across the adjacent Piedmont uplands, including evidence for small-scale habitation sites near springheads (Goodyear et al. 1979:229). In contrast, the subsequent Middle Woodland period witnessed relatively limited use of interriverine sites combined with a return to riverine-oriented settlement (Anderson and Joseph 1988:230-231; Goodyear et al. 1979:230). These patterns parallel the Aiken Plateau data and suggest that Early Woodland populations throughout the interior of the Savannah River valley remained loosely integrated through a system of small-scale upland habitation and household autonomy. This level of organization does not preclude group interaction, though it is unlikely that interpersonal contacts or communal activities were organized above the level of local communities, perhaps local lineages.

Middle Woodland settlement organization, as identified locally by assemblages of the Deptford check stamped pottery, reflects renewed incidences of large-scale coresidency at riverine sites. Some researchers have argued that the increased settlement permanence of Middle Woodland sites and their (largely) riverine orientation may reflect increased dependence on food production (e.g., Goodyear et al. 1979; Phelps 1983:35; Purrington 1983:136). Evidence for food production remains sketchy, however (Garrow 1975:22). There is clearly insufficient evidence to suggest that Middle Woodland populations engaged in maize agriculture. On the other hand, a variety of native cultigens may have formed a sufficient economic base to support relatively sedentary groups in bottomland zones.

Alternatively, one has to consider the role that regional integration had on constraining the settlement choices of Middle Woodland groups. Far-flung exchange and mortuary ceremonialism have been documented at several sites in Georgia. These sorts of nonsubsistence activities undoubtedly influenced settlement decisions. For example, mortuary sites became permanent places to which people returned on a regular basis to conduct communal feasts and related ceremonies (Snow and Stephenson 1990). The subsistence base to support such activity apparently did not include a significant amount of food production. Rather, a great diversity of natural resources were intensively exploited from the surrounding environment. It goes without saying that bottomland habitats offered the greatest diversity and density of edible resources in the area, but one must also consider that the selection of sites for ceremonial purposes has much to do with the need to regulate the flow of information about the scheduling of ceremonies, the mobilization of people and resources, and control over site access. Riverine locations would have served these needs much better than would upland tributary sites.

The sociopolitical complexity of certain Middle Woodland populations in Georgia and South Carolina seems to have waned after A.D. 500 as cultural elements that signify the Late Woodland period entered the area. However, there remains a great deal of confusion surrounding the recognition of Late Woodland cultures in the region. Locally, in the SRS area, the Late Woodland period is marked by the increased use of cordmarked pottery and the demise of check stamping. Recently we have been made aware of the use of fine simple stamping and some complicated stamping during the later years of the period, but they have not yet been defined for the local sequence.

Late Woodland settlements in northeast and central Georgia are focused on the floodplains of major streams (Rudolph 1991). In contrast, site distributions on the SRS, and interior Coastal Plain in general, assume a pattern of widespread, small-scale settlement (Brooks and Canouts 1984; Sassaman et al. 1990; Stoltman 1974). In the Fall Zone, a dramatic contrast between the South Carolina and Georgia sides of the Savannah River is apparent in the distribution of cordmarked pottery. Sites with cordmarked pottery are legion on the SRS, but are virtually absent from Fort Gordon in Georgia (Braley and Price 1991; Campbell et al. 1980). It appears that the Late Woodland histories of present-day South Carolina and Georgia diverged not only in material ways, but in an organizational sense as well.

Details about the organization of Late Woodland communities are essential to an understanding of the emergence of Mississippian polities. The apparent continuity among late Swift Creek, Napier, Woodstock and early Mississippian complicated stamped designs suggests that Mississippianization was an indigenous development. However, changes in settlement organization and subsistence in the Savannah River valley raise the possibility that chiefly authority was imposed from outside the immediate area, perhaps from the Etowah or Oconee valleys (Anderson et al. 1986). Corn agriculture apparently accompanied this imposition. It appears that Late Woodland communities in the Piedmont were more predisposed to such economic and political change than their loosely integrated counterparts in the Coastal Plain (e.g., Stephenson and King 1992). By the time Mississippianization engulfed the entire Savannah River valley (i.e., after A.D. 1150), large villages and mound centers along the river became the focus of settlement and agricultural production.

Major mound centers in the Savannah River valley included Irene near the coast; Lawton, Silver Bluff and Hollywood in the interior Coastal Plain; Rembert and Beaverdam in the central Piedmont; and Chauga, Tugalo and Estatoe in the upper Piedmont. Shifting power and political alliances among leaders of mound centers is evident in the occupational histories and records of mound construction at particular sites. Anderson (1990, 1994) attributes these changes to cycles in the distribution of power and resources among chiefs that are partly related to fluctuations in agricultural production. Indeed, by A.D. 1450 the chiefdoms of the Savannah River valley disintegrated as larger, more powerful polities gained prominence elsewhere in the region.

We are only now beginning to piece together Mississippian land-use patterns for the SRS area. No mound centers existed on the SRS-proper, and we have no sound knowledge of large villages either. Instead, the relatively small SRS inventory of sites consists of small sites scattered across the uplands, with no apparent regularity in location or orientation. It would seem reasonable to suggest that the location of sites would be tied directly to patches of arable land, if, indeed, corn production was a central economic pursuit. We have enough cob-impressed pottery to know that corn played some role in local economies, but no information of the scale and organization of such activities. For now all we can add is that the land-use pattern appears dispersed, small-scaled, and disintegrated. The number of sites pale in comparison to Late Woodland sites, so we assume that the collective Mississippian population was but a small fraction of its predecessor. The area was allegedly abandoned at about A.D. 1450 (Anderson 1994). If some people persisted in the area after this time, their archaeological traces have remained undetected.

SURVEY AND EXCAVATION RESULTS IN THE AIKEN PLATEAU

The archaeological context provided in the foregoing sections was constructed from a combination of intensive study within the SRS area and comparative studies involving data from across the greater middle Savannah region. We now turn to a brief review of the results of intensive survey and excavation in the immediate vicinity of the project area. In addition to providing the most relevant comparative data for this project, this review helps to establish some expectations about land-use patterning for our distributional analysis in Chapter 6.

SRS-wide survey took place over many years and included upland tracts in the vicinity of E Area. However, these survey efforts were inconsistent and rarely intensive enough to locate small, buried deposits (Sassaman et al. 1990:82-88). Subsequent survey for small-scale projects were generally adequate as they included systematic subsurface testing and, in some cases, secondary testing. We review each of these survey projects below. Large-scale excavations at two sites in the immediate vicinity of the project area, 38AK157 and 38AK158, provide some of our best data on Aiken Plateau land use. These projects and several others are also reviewed below. The locations of each of the projects is provided in Figure 2-4. Table 2-1 provides some data on the extent and results of these investigations.

NPR Survey

The 520-acre NPR survey tract is located approximately 6 km southeast of E Area (Figure 2-3). In 1989 the SRARP conducted intensive survey of the tract involving excavation of 881 shovel tests and 11 secondary test units (Brooks et al. 1989). Being among the most interfluvial of all land tracts on the SRS, the NPR tract included only minor water sources in the form of springheads and the western margin of an upland wetland. Subsurface testing was concentrated in relatively flat, well-drained areas adjacent to water sources, but a series of transects was also examined in the intervening portions of the project area.

Investigations into prehistoric land use in the NPR study were designed to test a settlement-subsistence model developed by Hanson from his survey of the Steel Creek watershed on the SRS (Hanson et al. 1981). The model predicts for upland locales like NPR only limited use, which resulted in small lithic scatters and other evidence of short-term, nonhabitation functions. NPR survey results were generally supportive of this model. Eleven prehistoric sites were located, only one of which, 38BR258, produced more than scattered debitage. Ceramic sherds were especially infrequent. Irrespective of the low density of material, some nonrandom patterning in site location was observed.

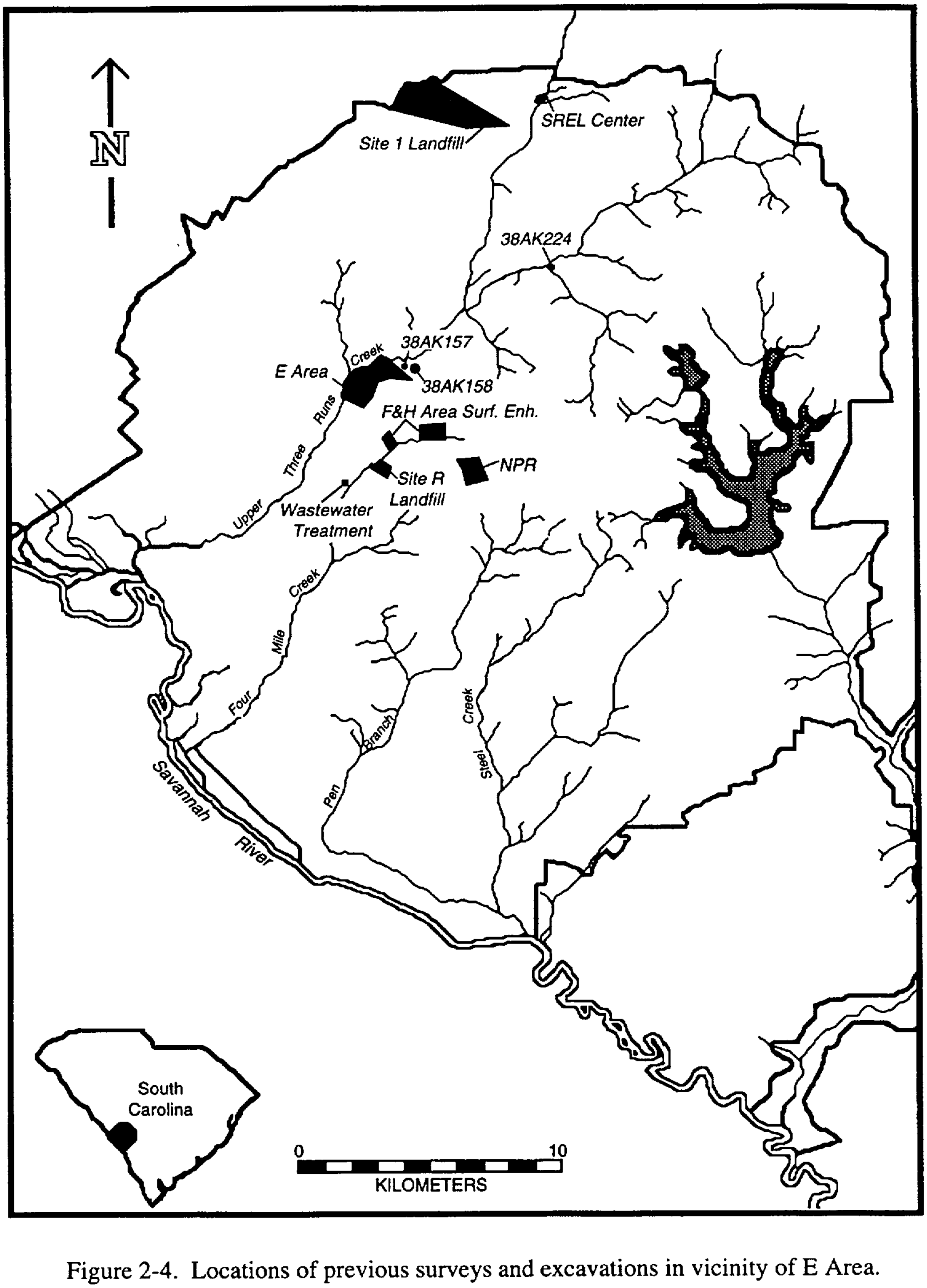

Figure 2-4. Locations of previous surveys and excavations in vicinity of E Area.

Table 2-1. Summary Data on the Extent and Results of Survey and Testing for Aiken Plateau Projects in the Vicinity of E Area.

Project	Acres	STPs	Test Units	Preh. Sites	Preh. Occ.	Major Comp.	Minor Comp.
NPR	520	881	11	11	0		MA, LA, Wdld
Site R Landfill	140	65	1	1	1		EA
F/H Area	480	302	6	11	4	MW, LW	LA, EW, Miss
CSWTF	6	57	0	1	0		Ind. lithic
SREL	70	395	14	3	0		EA, MA, LA, EW, MW, LW, Miss
Site 1 Landfill	1,158	577	0	1	1		Wdld
38AK158	45	61	13	1	0	LA, EW, MW	MA, LW
MW-HW Disposal	60	50	3	1	0	EW, LW	EA, MA, LA, MW Miss

Abbreviations: EA = Early Archaic; MA = Middle Archaic; LA = Late Archaic; EW = Early Woodland; MW = Middle Woodland; LW = Late Woodland; Miss = Mississippian; Wdld = Woodland; Ind. = indeterminate; STP = shovel test pit; Preh = prehistoric; Occ. = occurrence; Comp. = component

The area of highest, driest land was practically devoid of prehistoric remains, while locations closer to water yielded at least small scatters of flakes. This pattern suggested that edge locations were selected for utilization regardless of site function or duration of use.

Site R Sanitary Landfill Survey

A 140-acre tract of land 4 km south of E Area was surveyed in 1991-92 by SRARP for the development of a sanitary landfill (Sassaman et al. 1992). Occupying an upland ridge near the headwaters of Fourmile Branch, the Site R project area completely lacked sources of running water or other wetlands. As expected, only very limited evidence of prehistoric use was detected in the 65 shovel tests excavated along four transects. The only site located (38AK463) consisted of only several patinated chert flakes from a single, blocky core, presumably Early Archaic in age.

In addition to the meager results from survey of the project area proper, some additional survey was conducted in a tract of mild ridgeslope bordering Fourmile Branch. In this area, outside, but adjacent to the project area, six additional sites were recorded, at least four of which contained the level of artifact density and diversity expected of habitation functions. Nearly all of the diagnostic artifacts from these sites dated to the Middle and Late Woodland periods; only a single example of Early Woodland material was located. The limited Early Woodland evidence runs counter to data from upland sites in the adjacent Upper Three Runs Creek drainage (Sassaman et al. 1990; see also the sections below on 38AK157 and 38AK158). These sorts of contrasts in site occurrences signify drainage-scale land-use patterning that cannot be predicted from local environmental properties, but instead point to historical factors at a much greater scale.

F/H Area Surface Enhancement Survey

Another project at the headwaters of Fourmile Creek involved limited survey of 480 acres for the surface enhancement of land tracts containing seepage basins (Sassaman and Gillam 1993). The project area was divided into two tracts, both of which crosscut topography to include both upland ridge and stream terrace land. Previous land alteration in portions of the upland ridges prevented thorough survey of the entire project area. However, the lower slopes of ridges and terrace portions were examined with numerous shovel test transects.

Eleven prehistoric sites were located along the terrace margins, including at least five with assemblage density and diversity indicative of small-scale habitation. Four occurrences of lithic debitage were uncovered in locations generally upslope from the sites. As in the Site R landfill project, the F/H area sites consisted almost exclusively of Middle and Late Woodland components. One notable exception was the presence of small ceramic Late Archaic and Mississippian components on the eastern margin of a small wetland. The other four potential habitation sites were located at the floodplain margin of Fourmile Branch. The lesser sites, consisting generally of a few Middle and/or Late Woodland sherds and some flakes, tended to be located in upslope positions, but still within 150 m of the Fourmile Branch floodplain.

Central Sanitary Wastewater Treatment Facility Survey

Twenty-nine kilometers of trunkline and a 6-acre tract of upland ridge were surveyed by the SRARP in 1992-93 for construction of the Central Sanitary Wastewater Treatment Facility (CSWTF) (Stephenson and Sassaman 1993). Most of the trunkline received only cursory examination because of prior land alteration. The 6-acre tract, located 4.5 km southwest of E Area along Fourmile Branch, was examined with 50 shovel tests, all negative. A firebreak along the eastern margin of the footprint, just upslope from the Fourmile Branch floodplain, yielded three chert flakes. Seven shovel tests in a cruciform pattern around this find produced only one additional flake. No other prehistoric use of the tract was detected in this intensive survey.

SREL Conference Center Survey

A 70-acre tract of land bordering Upper Three Run Creek some 12 km upstream from E Area was surveyed in 1992-93 for the Savannah River Ecological Lab's (SREL) Conference Center (Stephenson et al. 1993). This effort involved more shovel testing than usual, as well as the excavation of 14 test units. Three sites were involved, two of which contained diagnostic artifacts from virtually every time period of prehistory but none in great numbers. One of the more significant finds was a small but diverse Early Archaic component at 38AK289. This site and its neighbor, 38AK287, occupied terrace edge positions overlooking the Upper Three Runs Creek floodplain. The third site, 38AK466, which produced only a handful of flakes, was located further upslope.

Three Rivers Landfill Site 1 Survey

A 1,158-acre tract of interfluvial land was surveyed by SRARP in 1993 in response to a proposal for landfill construction that never came to pass (Cabak 1994). Located about 12 km north of E Area, the landfill tract was removed from Upper Three Runs Creek by a few kilometers and contained only a minor headwater source of an intermittent stream. Survey focused on the landform margins of these water sources, but absolutely no prehistoric material was located. The only "site" of prehistoric age was a small surface scatter of flakes at the upslope end of the project area. (This site was recorded in 1983; by current standards it would have been classified as an occurrence) Also recorded was a surface occurrence of four plain sand-tempered sherds on the north slope of the intermittent stream. All told, this project verified the general lack of prehistoric materials at locations far removed from significant sources of water.

38AK158 Survey and Data Recovery

Site 38AK158 is defined as a 45-acre ridge to the immediate east of the present project area. Investigations over the years served to expand what once was a much smaller site boundary to include the entire landform (Sassaman 1987, 1989). Subsurface testing across the entire ridge in 1987 showed that prehistoric material was concentrated along the ridge margins bordering the two Rank 1 streams that formed the ridge, especially above the springhead location of one of the streams. The spine of the ridge and much of its upslope area was practically devoid of cultural material. Major components represented in the testing of 38AK158 included ones dating to the Late Archaic, Early Woodland and Middle Woodland periods.

Data recovery at 38AK158 was targeted for the area immediately above the west springhead, where testing confirmed the presence of relatively dense deposits (Sassaman 1989). A 142 m^2 block was excavated to reveal substantial components dating to the Late Archaic and Early Woodland periods. Evidence for minor Middle Archaic and Middle Woodland components was also uncovered.

Late Archaic use of the 38AK158 block resulted in the discard or abandonment of a flaked stone assemblage of 77 retouched tools and tool fragments, 95 utilized flakes, and 3,383 pieces of debitage. High-quality Coastal Plain chert dominated the assemblage; almost 40 percent of the chert was thermally altered. The stemmed hafted bifaces of the assemblage exhibited a high level of resharpening and recycling. Among the polished and ground stone items were three perforated soapstone slabs, a grooved axe fragment, a gorget fragment, and a pitted stone. The raw materials of these items are all nonlocal. Over 200 cobbles and cobble fragments from the block are believed to date to the Late Archaic period based on both vertical and horizontal position. Some of the cobbles occurred in clusters believed to reflect heating and cooking activities (i.e., hearths, earth ovens, "stone boiling").

Given the presence of nonlocal materials in the Late Archaic assemblage, the high-level of attrition of the hafted bifaces, and the apparent lack of local (Barnwell) cherts in the flaked stone inventory, it seems reasonable to conclude that 38AK158 was a seasonal camp for people who maintained a relatively vast annual range, at least one encompassing both the uplands and riverine zones of the middle Savannah River valley. This conforms to our current model of Late Archaic seasonal settlement, which would predict a fall-winter occupation for this upland locale. If indeed heat-related, the abundance of cobbles supports an inference for cold-weather dwelling. However, the northwest-facing aspect of this location would have been less than ideal from the standpoints of solar aspect and prevailing wind, especially during the winter. We therefore must reserve judgment about seasonality and simply reiterate that the stone tool assemblage supports the inference for some sort of regular movement outside the Aiken Plateau.

The Refuge phase Early Woodland component of the 38AK158 block was represented by a denser assemblage than that of its predecessor. The flaked stone assemblage consisted of 162 retouched flaked stone tools and tool fragments, 337 utilized flakes, and 8,400 pieces of debitage. Much of the assemblage was contained within Feature 6, a cluster of tools, cores, and debitage of locally available (Barnwell formation) chert. Twenty-two of the 24 sherds in and around this feature were Refuge Simple-Stamped. Aside from the predominance of local chert core reduction, the lithic cluster also showed evidence for the recycling of higher-grade cherts of probable Late Archaic origin. This constituted sôme of the first hints of what has proved to be a substantial body of evidence for systematic scavenging and recycling of Late Archaic lithic debris by Early Woodland inhabitants of the Aiken Plateau (Sassaman 1993a:214-224; Sassaman and Brooks 1990). Combined with evidence for the seemingly exclusive use of locally available cherts, the scavenging evidence points to a technology geared toward limited mobility outside the Aiken Plateau or at least limited direct access to nonlocal sources of chert. A second insight is that we must be suspicious about the disposition of Late Archaic materials in association with Early Woodland activities such as those reflected at 38AK158—they may very well have been collected and transported to 38AK158 by Early Woodland tool makers.

The nonflaked stone Early Woodland assemblage from 38AK158 was limited to cobbles and cobble fragments, a few of which showed traces of wear. Cobble clusters of definite Early Woodland age were not identified. Ceramic sherds with simple stamped and linear punctate (Thom's Creek) surface treatments were relatively abundant and widespread in the block. Sherds from a minimum of 23 vessels are represented, but few were reconstructed beyond a small portion. No "pot busts" were observed.

The minor Deptford Middle Woodland and Late Woodland assemblages from block excavation were restricted to pot sherds and small triangular points. A minimum of 18 Deptford vessels was identified. These differed from the Refuge sherd assemblage in being more complete and spatially concentrated. Their disposition resembles "pot busts" more than secondary deposition, although none were fully reconstructible. The nearby site of 38AK159 included a "pot bust" of a cordmarked vessel (Feature 1) adjacent to a second concentration of cordmarked sherds from four vessels, fire-cracked rock, and charcoal dating to 1590 ± 90 B.P. (Beta-23669) (Sassaman 1989:40). These examples show what sort of disposition the 38AK158 block assemblage may have had before being plowed.

HW-MW Disposal Facility Survey and 38AK157 Data Recovery

A survey and testing project situated between the area occupied by 38AK158 and the present project area was conducted in 1989 for the Hazardous Waste-Mixed Waste (HW-MW) Disposal facility (Sassaman 1990). The 60-acre footprint for this project consisted largely of an upland ridge landform, but it extended into locations near the heads of Rank 1 streams in topographic situations similar to 38AK158. Subsurface testing was concentrated at the location of an existing site, 38AK157, which occupied a small (<3 acre) ridge nose between two springheads. Artifacts were recovered from tests across the entire landform, but never at great density. Major components dated to the Early Woodland and Late Woodland periods, with virtually every other period represented by a few diagnostic artifacts.

Data recovery at 38AK157 in 1990 entailed excavation of 418 m^2 in two large blocks and two small blocks (Sassaman 1993a). Centered on the main portion of the site's small ridgenose, the largest (216 m^2), south block produced a low density assemblage with small assemblages dating to the Thom's Creek Late Archaic, Refuge Early Woodland, Deptford Middle Woodland, and Late Woodland periods. Habitation structures were inferred from indirect evidence for the Thom's Creek and Deptford occupations. A lesser Mississippian component was present also. Better representation of this late component was found in the small block some 30 m to the southwest of the large block.

A second large (144 m^2) block was excavated some 60 m beyond the original northwestern limits of 38AK157 (Sassaman 1990:6), where additional shovel testing reveled relatively dense and rich Woodland deposits. These results forced a redefinition of site boundaries to include this small, secondary ridgenose.

Uncovered in the north block was an especially dense assemblage of Early Woodland material including a sizable assemblage of Refuge Simple-Stamped pottery, dozens of small stemmed points and other flaked stone tools, two dense clusters of chert debitage, several gorget fragments, and five cobble clusters. Two Refuge phase structures were inferred from the distribution of materials in the block. Deptford Middle Woodland and Late Woodland assemblages were likewise documented in the North Block, albeit at lower density and diversity than the Early Woodland assemblage. A minor Late Archaic component and isolated Early and Middle Archaic artifacts round out the North Block assemblage.

Tinker Creek (38AK224) Excavations

Excavations of nearly 400 m^2 have taken place at the Tinker Creek site (38AK224) over several years beginning in 1978 (Sassaman et al. 1990:124-127). Field work at the site was completed recently and analysis is underway. What we know about the site to date is that it contains substantial components of Late Archaic and Early Woodland age, as well as moderate components dating to the Early Archaic, Middle Archaic, Middle Woodland, and Late Woodland periods. Of all the SRS sites excavated to date in the Aiken Plateau, Tinker Creek has produced the largest Late Archaic assemblages, both preceramic and ceramic. Its Early and Middle Archaic assemblages are also comparatively sizable although we note that excavations at the other Aiken Plateau sites has not been consistently deep enough to capture such early materials. No apparent structures or hearth-like features have been identified at Tinker Creek.

Hitchcock Woods Sites

A series of sites located in Hitchcock Woods in Aiken, South Carolina have yielded enormous assemblages of Archaic and Woodland period age from illicit digging in the early 1980s. The collections have been loaned to the SRS for analysis and a report is pending. We provide here information about these sites because they include several located along the low-lying terraces of a Rank 3 stream, Sand River, which is a tributary of Horse Creek, the nearest upriver equivalent of Upper Three Runs Creek. Four sites along Sand River include large assemblages of Late Archaic and Woodland materials. We make reference to these sites in our discussion of locational tendencies below.

Carolina Bay Sites

As we noted earlier, directed research has been initiated to locate sites adjacent to Carolina bays on the SRS (Brooks and Taylor 1992; Brooks et al. 1993; Brooks et al. 1996.). Other Aiken Plateau work outside the SRS continues, with surface collections at one site south of Aiken recently reported (Eberhard et al. 1994). We have few conclusions to offer at this time about the regional significance of bays except to note that they more often than not contain some evidence of use and sometimes evidence for intensive occupation (e.g., Trinkley 1974), and that the southeast rims of bays are usual locations of occupational evidence. We add this short note about bays to remind the reader of these unique features in the upland landscape and to underscore the need to incorporate more data from bay sites in models of regional land use.

LOCATIONAL TENDENCIES OF AIKEN PLATEAU SITES

Long-term survey and testing of the SRS has afforded opportunities for the analysis of locational patterning among Aiken Plateau sites (e.g., Sassaman et al. 1990). However, analyses to date have been coarse-grained due to limited knowledge about the content of sites and the functional inferences such contents allow. We have attempted in the past to control for site functional variation by considering assemblage density and diversity, but not specific classes of artifact. Our examination of diachronic patterning was afforded by the use of diagnostic artifacts, but again, functional variation within any given time period was hampered by lack of better data.

Now, after having excavated at several sites in the Aiken Plateau, we are in a much better position to discuss functional variation among sites, albeit with relatively small samples. In the paragraphs that follow we summarize some of the more obvious locational tendencies among our sample of excavated sites, moving from the earliest to the latest components. We refer repeatedly in the paragraphs below to the extant settlement models reviewed in earlier portions of this chapter.

Early Archaic

Evidence for Early Archaic land use in the Aiken Plateau is generally limited to small assemblages, presumably the remains of limited functions, as the extant model predicts. Not all sites have produced evidence for Early Archaic use, however. The sites with the largest and most diverse assemblages span upland and bottomland locations alike, but generally have south to west aspects. These aspects would be most beneficial from the standpoint of solar exposure, hence we suspect that these are preferred cold-season locations, as the extant model predicts. Early Archaic materials do occur on landforms with northwest to northeast exposures, but at seemingly lower density and diversity. Northwest exposures may have been especially advantageous for game surveillance due to their position downwind from prevailing winds. Sizable assemblages at sites with northeast aspects may signify warm-weather occupation of the Aiken Plateau, something not predicted by the extant model. Examples from Hitchcock Woods lie on the low terrace margins of Sand River, locations that may have been uninhabitable during the cold, wet season. If warm-weather occupations did occur in the Aiken Plateau, the large and diverse assemblages at Crosby Bay (Eberhard et al. 1994) and another wetland-adjacent site near Jackson, South Carolina (DeBiase and Sassaman n.d.) are good candidates for base camps. Solar aspect at these sites is west to south, but neither has much topographic relief, hence aspect may not have been as critical as prevailing wind and access to flat, well-drained soil. All of the sites considered here are within 120 m of running water; most are much closer.

Middle Archaic

Our knowledge of Middle Archaic land-use patterning in the Aiken Plateau has not been improved much by recent excavations, unless one considers the value of negative evidence. Assemblages of Middle Archaic age continue to be small and of limited diversity. Hitchcock Woods sites have produced the greatest density of Morrow Mountain points, and Tinker Creek has yielded several MALA, as well as Morrow Mountain points. Still, there are no clear candidates for sustained site use during this period and no obvious locational patterning to the limited evidence available. Given the occurrence of comparatively many Middle Archaic points at floodplain-adjacent sites in Hitchcock Woods, there may be a tendency for sites of this age to be located in tributary bottomland settings, locations heretofore underrepresented in SRS studies.

Late Archaic

Our discussion of Late Archaic land use has to be divided into two subsections, for we have already noted a major change in settlement organization documented from regional studies. The earliest portion of this period, the preceramic era, (ca. 5000-4200 B.P. locally) is believed to be a time when groups in the middle Savannah River valley spent the warm season at sites along the Savannah River and the cold season dispersed in the uplands, including the Aiken Plateau. Aside from the tenuous reliance on a lack of pottery, the period can be recognized by a variety of large stemmed bifaces. Included are the classic Savannah River Stemmed points made from metavolcanic material, belonging locally to the Mill Branch phase, and their Coastal Plain counterparts.

The change we refer to is a seeming gradual shift to more permanent, year-round use of Aiken Plateau sites. The shift occurred on at least two fronts. First, Mill Branch phase occupations along the middle Savannah, which date to as much as 4400 B.P., are suspended after about 4000 B.P. Upland utilization continues, however, for at least the next two centuries as Coastal Plain groups utilizing plain fiber-tempered pottery make increasing use of Savannah River sites for shellfishing and other river-based pursuits. Growing out of these circumstances was the expression of classic Stallings Culture, with its large shell middens, decorated fiber-tempered pottery, and seemingly exclusive use of riverine sites in the middle Savannah, and along Brier Creek and the Ogeechee River in Georgia. There is virtually no evidence for the routine use of Aiken Plateau sites by Late Archaic people during the "heyday" of Stallings Culture, that is, from about 3700 to 3500 B.P. But, when Stallings riverine sites are abandoned after 3500 B.P., the constituent population appears to have dispersed into upland settings for year-round habitation. This is the second front of expanded upland habitation to which we refer and one that persisted during the ensuing Early Woodland period.

Having noted the complexities of the Late Archaic situation, we should expect of the Aiken Plateau record three things: preceramic cold-season habitation (Mill Branch and others), late preceramic year-round, albeit mobile habitation (Mill Branch), and dispersed year-round, but mobile habitation by "postclassic" Stallings. Lack of chronological control prevents the recognition of early vs. late Mill Branch or other preceramic components at Aiken Plateau sites. However, the major Mill Branch component at Hitchcock Woods has one radiocarbon date (3800 ± 90 B.P.) that places it at the end of the known range of dates. It is located on a low-lying terrace of Sand River, with a northeastern aspect. A warm-weather occupation is suggested by this position. Another preceramic component with Coastal Plain affiliation is at Tinker Creek, a high ridge nose with west to southwest aspect. A cold-weather occupation is suggested here.

Among the likely candidates for "postclassic" Stallings are the assemblages at Tinker Creek, two Hitchcock Woods sites, and 38AK157-South Block. These four sites run the gamut from high ridgenoses to low-lying terraces, and with aspects ranging from northeast to southwest. This wide range of site settings is clearly suggestive of multiseasonal use of Aiken Plateau sites, with seasonal movements taking place within relatively small ranges. If so, we ought to be able to find independent evidence for seasonality in functional aspects of the assemblages. No such analysis has been attempted, however.

Early Woodland

As most of our compliance-driven excavations in the Aiken Plateau have centered on sites with Early Woodland (Refuge phase) components, we have some very detailed information on this period. However, our three major excavations on the SRS (Tinker Creek, 38AK157, 38AK158) occurred on high ridgenose sites; tributary floodplain sites have not been investigated. Even so, it does not appear that Refuge phase residents made routine use of sites on the larger tributaries of the Savannah River and certainly not the Savannah itself. Rather, settlement appears to have focused on upland ridgenoses, springheads, and perhaps Carolina bays, all seemingly small scale and perennial, though still seasonally mobile. It follows that a range of aspects would be reflected in the sample of upland locations investigated to date. This is clearly the case as west, southwest, northeast and southeast aspects are represented. Again, seasonal variation ought to be seen in the content and structure of constituent assemblages. Habitation structures inferred from indirect evidence at 38AK157 (North Block) lack internal hearths and lie on a northeast-facing slope, both signs of warm-season habitation. Variation in the volume of fire-cracked rock appears to exist, with northeast-facing slope sites containing a much greater volume (associated with mast processing?). Also, the only sites with appreciable numbers of soapstone vessel sherds lie on west-facing slopes (winter?).

At a larger scale of observation, it is noteworthy that Refuge phase sites are concentrated along the ridges of Upper Three Runs Creek. Very few such sites have been documented along the adjacent ridge margin of Fourmile Branch, just 2.5 km to the south of E Area. The patchy nature of this wider distribution suggest relatively self-contained upland ranges, or, alternatively, a pattern of range relocation that systematically avoided certain portions of the uplands. If the strategy was to target the upland margins bordering the largest tributaries of the Savannah River, then Upper Three Runs Creek was an ideal choice. The high ridgenoses overlooking Upper Three Runs Creek afforded plenty of well-drained land as well as access to the bottoms. Seasonal repositioning of habitations to improve solar aspect or access to seasonal resources was possible even along only one of the creek's upland margins because of large numbers of feeder streams and associated side slopes. The distinctive feature of this settlement strategy is its scale: it appears that only small habitation sites could be sustained in much of the upland margins of Upper Three Runs. This follows from the preceding Late Archaic pattern of group dispersal following a period of large-scale, river-based settlement.

Middle Woodland

Beginning with the Middle Woodland Deptford phase at about 2500 B.P. settlement is again widespread and seemingly functionally differentiated. Large riverine sites are established at the mouths of large tributaries such as Upper and Lower Three Runs, while upland land use continues to increase. The riverine camps are definitely habitations for they contain substantial architecture, thick middens, storage pits, and a wide variety of other features. The seasonality of these sites is not known. Year-round settlement at some sites is not out of the question, but we yet have an enormous number of small, widely dispersed sites across the uplands. And unlike the preceding Refuge phase, the upland Deptford sites occupy a full range of landforms, from bottoms to ridgenoses and bays, and with a full range of aspects. For the first time too we see extensive use of the smaller tributaries, including Fourmile Creek. Seasonal movement between these various tributaries is one possible settlement strategy.

Little more can be added about Middle Woodland settlement. There have been no concerted efforts to document functional variation among upland sites. There appears to be a good bit of variation in the association between Deptford pottery and the Middle Woodland lithic assemblage, particularly Yadkin points. As we noted earlier, there is a tendency for Deptford pottery to be isolated in contexts referred to as "pot busts." Suggested here is an activity involving either the transport of pots, perhaps from habitations to processing stations (hickory/acorn processing?), or their role as storage containers.

Late Woodland

Late Woodland land-use patterns are poorly understood although it is widely known that sites of this period are ubiquitous, usually small, and distributed across a wide variety of landforms. Functional variation among Late Woodland sites has never been explored for the SRS. Part of the difficulty with this prospect is that Late Woodland material culture is not very diverse, or if it is, it is poorly documented. Aside from cordmarked pottery and small triangular points we have few definitive traits with which to work. In recent years some other varieties of Late Woodland pottery (complicated stamped, simple stamped) have come to our attention but these remain to be documented in culture-historic and technofunctional terms. Chapter 5 includes discussion of some examples of these wares from E Area.

Mississippian

Finally, the Mississippian period embodies the most complex array of land-use patterns in the region for it includes primary mound centers, secondary centers, villages, hamlets, isolated farmsteads, and a full array of special purpose sites. Unfortunately, on the SRS, the patterns of Mississippian land use are virtually unknown. Some recent work has documented a few possible farmsteads. Otherwise the period is thus far represented by only scattered, typically isolated complicated stamped sherds and small triangular points. We suspect that continuing survey will eventually show evidence for increased use of tributary floodplain sites, a presumed manifestation of growing use of tropical cultigens. However, we must remain cautious of this assumption for much of the Mississippian period activity in the uplands may be little removed from traditional Woodland patterns. Needless to say, it will take a great deal more data than is currently available to begin to address such issues.

CONCLUSION

In this chapter we have reviewed in some detail the environmental and archaeological contexts for Aiken Plateau prehistory. The settlement models described here and the subsequent review of survey and excavation in the Aiken Plateau embody considerable variation in the scale, duration, and functional orientation of upland site use. The analyses to date have been dependent on the site unit of observation. As is evident in this chapter, work has embraced the concept of functional site types, types which include habitation camps, lithic workshops, food processing stations, and hunting stands, among others. It goes without saying that these ideal types are not "real" in the sense that they are not self-contained, mutually exclusive categories, without overlap or ambiguity. To advance beyond these constraints we aim in the remainder of this study to relax the site concept a bit to consider the constituent activities that resulted in archaeological traces of Aiken Plateau land use. The categories we use to analyze these activities are, of course, the artifacts themselves. Associations between particular classes of artifacts and particular features of the environment may reveal patterning that transcends the site unit of observations. We revisit this issue in Chapter 6 after providing the requisite information on survey methods and assemblage content in the following three chapters.

CHAPTER 3

METHODS AND RESULTS OF SURVEY AND TESTING

In this chapter we describe the methods used in the survey and testing of archaeological resources in E Area along with the specialized techniques employed to capture and organize spatial data about these resources. We begin with a review of prior archaeological work conducted in and near the project area. This information is combined with archaeological sensitivity data for the SRS to develop a survey design (SRARP 1989:39-53). The specific field methods used in the E area survey are then detailed. This is followed by a discussion of the methods of the Global Positioning System and Geographic Information Systems. In the final section of this chapter we provide an overview of the results of survey and testing.

PREVIOUS INVESTIGATIONS

Three archaeological surveys were conducted in the project area prior to the 1993-94 E Area survey: a transect reconnaissance survey, part of the SRS-wide inventory, and a special project survey. These efforts resulted in the discovery of eight sites. Two data recovery projects were also conducted near the E Area.

Most of the previously recorded sites in the E Area tract were first located during a transect reconnaissance of the entire SRS. This survey was conducted by the staff of the South Carolina Institute of Archaeology and Anthropology between 1973 and 1977 (Hanson et al. 1978). This preliminary archaeological reconnaissance entailed pedestrian survey of rights-of-way including roads, railroad beds, powerlines, and firebreaks; subsurface testing was not undertaken. At this time, the dirt roads in the E Area were first surveyed (Figure 3-1). This effort resulted in the discovery of six prehistoric sites: 38AK106, 38AK151, 38AK152, 38AK153, 38AK154, and 38AK155 (Hanson et al. 1978:46-47, 55-56). The prehistoric artifacts from these sites reflected occupations dating from the Early Archaic, Early Woodland, and Middle/Late Woodland periods. Site 38AK106 also contained a small scatter of historic artifacts.

Further reconnaissance survey in and around the E Area tract was undertaken as part of the SRS-wide inventory (Sassaman et al. 1990:69-76). Designed as a stratified, random sample, the survey entailed 40-percent coverage of the SRS for the purpose of developing a long-term management plan. To facilitate representative coverage in all microenvironments, the SRS was stratified by watershed and Patrol Index Units (PIUs). Each 4000 x 4000-ft. PIU was coded for landform and stream rank to derive sampling strata, and from these a 40-percent sample was selected for survey. Fourmile Branch was the first watershed completed in the SRS-wide survey. The results of this pilot project led to refinements in survey design (Sassaman et al. 1990:73). Among the refinements was a reduction in the size of strata by subdividing PIUs into 2000 x 2000-ft. quadrants.

The PIU quadrants in and around the project area are depicted in Figure 3-2. Six PIUs quadrants (H-12 NE, H-12 SE, H-13 NE, H-13 SE, H-13 NW, and H-14 SW) in the project area were randomly selected as part of the SRS-wide survey (Sassaman et al. 1990:84). Field methods consisted of pedestrian survey in high visibility areas, with rake and shovel tests supplementing surface inspection in some areas. The results of subsequent surveys (i.e., Cabak et al. 1996; Martin et al. 1985; Sassaman et al. 1992) demonstrate the SRS-wide survey methods were often inadequate to locate buried prehistoric deposits. Nevertheless, two new sites were discovered in the project area, 38AK330 and 38AK373. At these sites, only small, low-density scatters of prehistoric artifacts from the Early Archaic and Middle/Late Woodland periods were detected. The

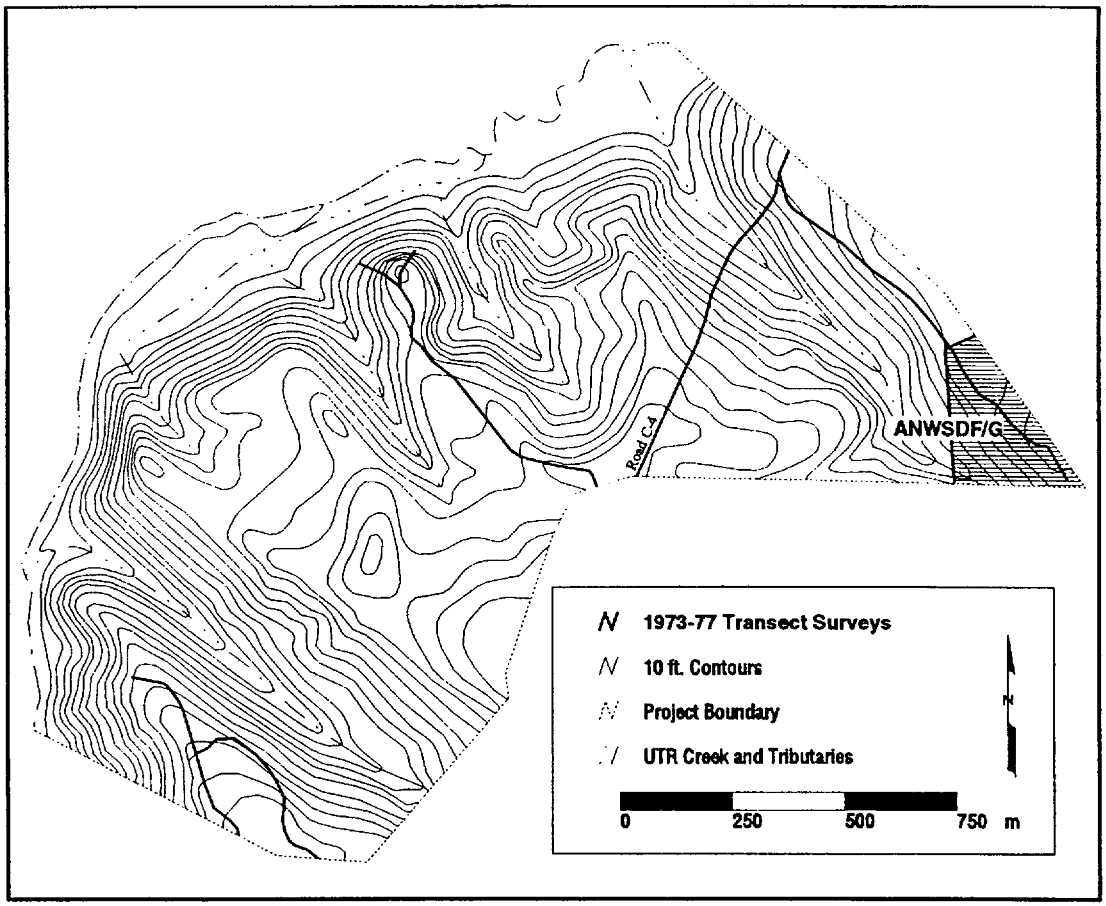

Figure 3-1. Locations of previous archaeological survey in E Area.

previously recorded sites in the E area were also revisited at this time (38AK106, 38AK151, 38AK153, 38AK154, and 38AK155).

Fourteen special projects were conducted on the SRS between 1977 and 1987 (Sassaman et al. 1990:76). Between November 1985 and February 1986 six locations for the storage of mixed waste in the upland sandhills of the SRS were surveyed for archaeological resources. This project was called the Alternative New Waste Storage/Disposal Facilities (ANWSDF) survey (Brooks et al. 1986). The ANWSDF survey was the first time shovel testing was systematically used as a site discovery technique in the upland sandhills of the SRS (Sassaman et al. 1990:81). A portion of one of the proposed locations, Area G, was located in the southeastern corner of the E Area (Figure 3-1). The ANWSDF survey discovered no new sites in the E Area. However, one of the E Area sites, 38AK155, was located within the footprint for Area G of the ANWSDF project. Pedestrian survey and subsurface testing were conducted at 38AK155 during this survey. Three additional E Area sites, 38AK106, 38AK153, and 38AK154, were also visited and tested at this time, but they were not officially assessed for NRHP eligibility because they were outside the proposed area of impact (Brooks et al. 1986).

Two data recovery projects were conducted in the vicinity of E Area at sites 38AK157 and 38AK158 (Sassaman 1989, 1993a). A summary of these efforts is provided in Chapter 2 of this report.

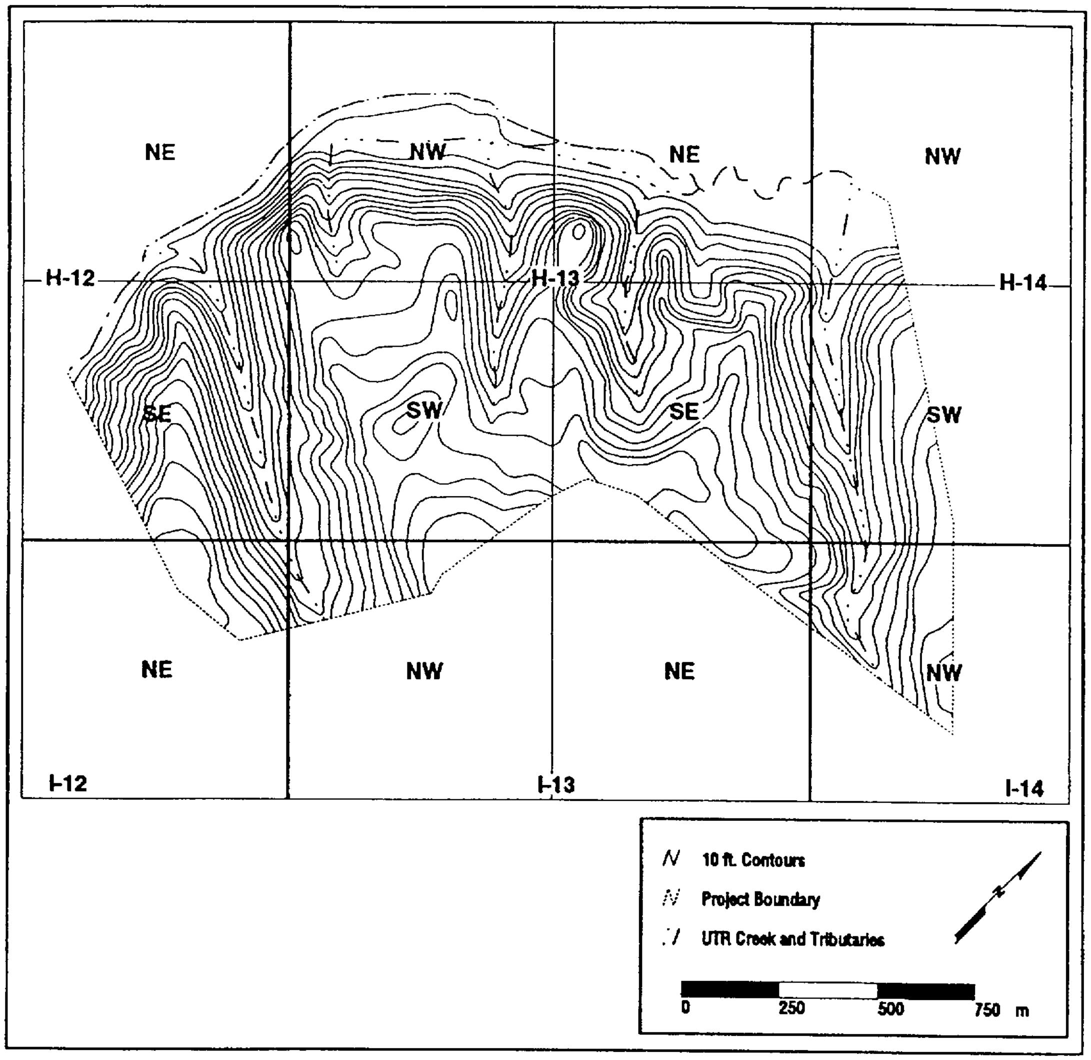

Figure 3-2. Patrol Index Unit (PIU) quadrants in E Area.

An inventory of the survey units, survey status, and recorded sites within the vicinity of the E Area tract is provided in Table 3-1. Figure 3-3 provides the locations of existing sites. It appears from this information that the project area has been surveyed extensively. However, all the previously recorded sites were discovered by surface reconnaissance. As previously stated, the transect reconnaissance survey, which located six sites, consisted solely of pedestrian reconnaissance. Any deeply buried deposits were missed. The survey methods of the SRS-wide survey were also inadequate (i.e., surface reconnaissance and rake tests) and more intensive subsurface testing was needed to discover deeply buried sites. The ANWSDF project, which intersected only a small portion of E Area, failed to discovery any new sites, despite the use of subsurface testing. Subsequent work elsewhere has demonstrated that even the ANWSDF project was ineffective at locating sites (Cabak et al. 1996:38).

Because of the lack of adequate subsurface testing, previous survey in the project area systematically missed buried sites and sites that were not located in proximity to rights-of-way with good surface visibility. In the project area there are no roads along the

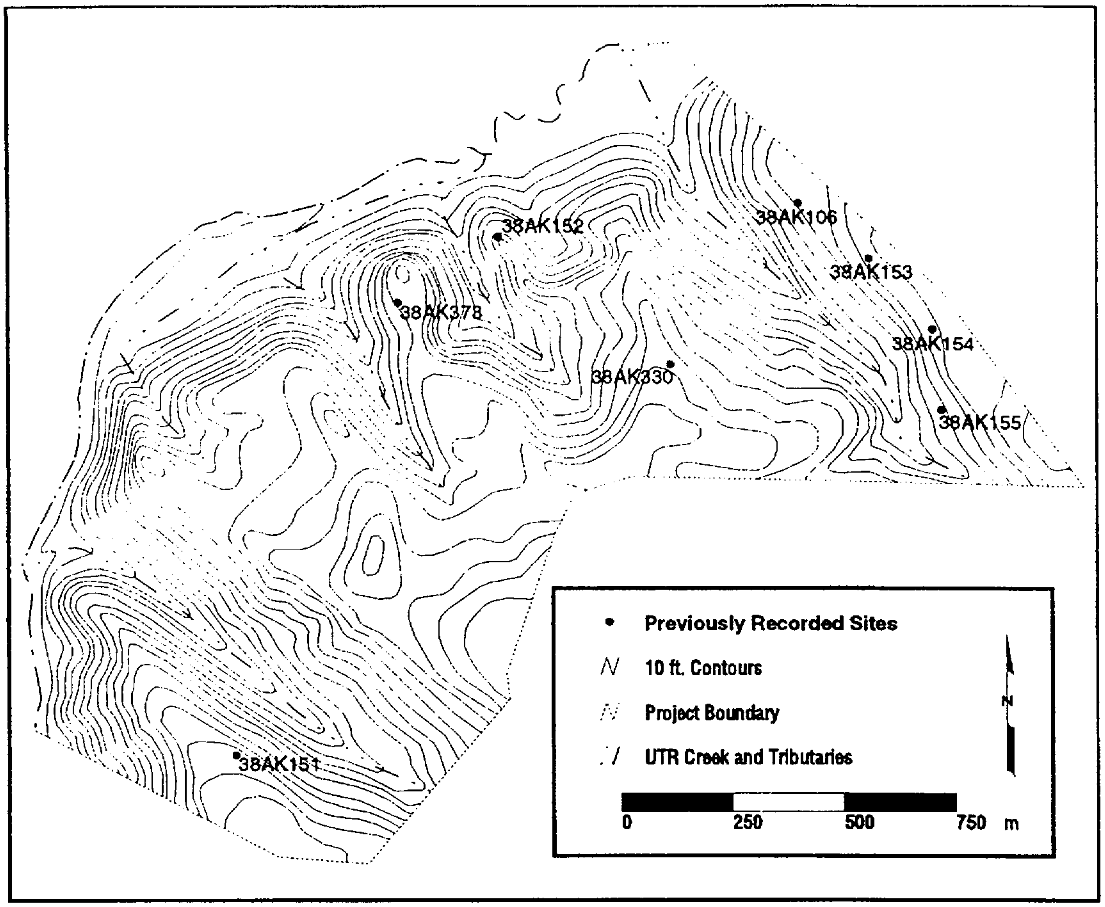

Figure 3-3. Locations of previously recorded archaeological sites in E Area.

Table 3-1. Survey and Site Information for Patrol Index Unit Quadrants (PIU Quads) in and around the E Area Tract.

PIU Quad	Survey Status	Projects	Sites Recorded
H-12 NE	Random	SRS-Wide	
H-12 SE	Transect; Random	SRS Recon., SRS-Wide	38AK151
H-13 NE	Transect; Random	SRS Recon., SRS-Wide	38AK152
H-13 SE	Random	SRS-Wide	38AK330
H-13 SW	No Survey		
H-13 NW	Random	SRS Recon., SRS-Wide	38AK373
H-14 NE	No Survey		
H-14 SE	Random	SRS-Wide	38AK334
H-14 SW	Transect, Random	SRS Recon., SRS-Wide	38AK106, 38AK153, 38AK154, 38AK156
H-14 NW	No Survey		
I-12 NE	No Survey		
I-13 NE	Excluded		
I-13 NW	Excluded		
I-14 NE	Transect, Special	SRS Recon, ANWSDF.	38AK157, 38AK158, 38AK159, 38AK338
I-14 NW	Transect, Special	SRS Recon, ANWSDF.	38AK155, 38AK420

Table 3-2. Diagnostic Artifacts Collected during Previous Surveys of E Area by Site and Culture-Historical Period.

Site	EA	EW	MW	MW-LW	LW-MI	HS
38AK106	2	25	1	11	5	3
38AK151		1		7		3
38AK152						
38AK153	2	3	1	5		
38AK154		2				
38AK155				3	3	
38AK330	1					
38AK373				1		
TOTAL	5	31	2	27	8	6

EA = Early Archaic; EW = Early Woodland; MW = Middle Woodland; MW-LW = Middle Woodland-Late Woodland (cordmarked pottery); LW-MI = Late Woodland/Mississippian; HS = Historic period

lower portions of the ridge slopes and floodplain. These areas also have the greatest potential for appreciable deposition.

Table 3-2 lists the number of diagnostic artifacts collected in prior surveys (hafted bifaces, formal unifaces, decorated prehistoric pottery, and historic artifacts) by site and cultural-historical period. These data show that the project area was utilized heavily by prehistoric Native Americans and only lightly by historic period settlers. The E Area prehistoric assemblage is dominated by small stemmed/notched bifaces, small triangular projectile points, Refuge Simple-Stamped pottery, and cordmarked pottery. These artifact types represent the Early Woodland and Late Woodland periods. A few Early Archaic hafted bifaces and formal unifaces were also collected during previous survey. The prehistoric artifacts were distributed along the upper portions of ridge slopes. A dirt road running parallel to the Rank 2 stream, on the northeastern slope, exposed a continuous scatter of prehistoric artifacts of varying density and composition. Good surface visibility demonstrated that this area contained long and overlapping prehistoric occupations. Previous surveys identified this continuous scatter of artifacts as four archaeological sites (38AK106, 38AK153, 38AK154, and 38AK155). Relatively few Middle Woodland artifacts were present in the assemblage (i.e., checked stamped pottery and Yadkin bifaces), and no Middle Archaic or Late Archaic artifacts were recovered.

Only six artifacts provided evidence for historic period land use in the E Area. The lack of substantial historic period resources is probably due to two factors. First, until recently, historic sites were not routinely recorded during archaeological survey. Second, the landforms in the project area may not have been used intensively by nineteenth- and twentieth-century farm families because they are highly dissected by streams. A steep ridge slope fronts the floodplain of Upper Three Runs Creek and five tributaries cut through the 550-acre project area, which results in very few locations suitable for large-scale farm operations.

SURVEY DESIGN

The small inventory of previously recorded sites in the E Area tract offers little insight into prehistoric land-use patterns in the Aiken plateau. However, as part of the larger SRS inventory of sites, the small site sample reflects the tendency for habitation sites to be situated near appreciable sources of running water. Most of the previously recorded sites in the E Area were along the Rank 2 stream.

Data on site distribution and assemblage content were used to quantify this relationship between running water and cultural resources in a model of archaeological sensitivity (SRARP 1989:39-53). Archaeological sensitivity refers to the potential a given area has to contain sites with multiple components and dense and diverse assemblages. The data indicate that sites indicative of long-term and/or repeated occupation are located within 400 m of streams Rank 3 or greater. Smaller sites are also located in this zone, but extend much farther away from major streams into upland areas along small tributaries and at springheads. Sites generally referred to as "lithic scatters" (i.e., assemblages consisting of a few nondiagnostic lithic artifacts, usually flakes) assume a seemingly random distribution across the landscape and are found as much as 1,700 m from a source of running water. Interfluvial land use therefore appears to have been transient or specialized.

SRS Archaeological Sensitivity Zones were calculated from a locational analysis of over 450 prehistoric sites for which adequate documentation about content was available. Sensitivity Zones range in value from 1 to 3. Zone 1 consists of all lands within 400 m of streams Rank 3 or greater, Zone 2 is all land 401-800 m from streams Rank 3 or greater and all land within 400 m of streams less than Rank 3. Zone 3 is all other lands with the exception of modern swamps and floodplains.

Archaeological data on site distribution on the SRS indicate intensive habitation areas are situated close to appreciable sources of running water. Upper Three Runs Creek is located along the northwestern boundary of the tract, so the project area is predicted to contain substantial prehistoric sites. The project area also includes four Rank 1 streams and one Rank 2 stream. Archaeological Sensitivity Zones 1 and 2 comprise the majority of the project area but there is also a small portion of floodplain represented (Figure 3-4). None of the project area lies within Zone 3, the least productive zone. Virtually none of the Zone 1 area has been previously surveyed and only small portions of Zone 2 areas have been surveyed. Hence, the areas targeted for survey were along the ridge margins that parallel the small streams and those that overlook Upper Three Runs Creek. In addition to these upland areas, portions of low-lying terraces along the tributaries and the floodplain of Upper Three Runs Creek were targeted for survey.

The discovery of historic period sites requires an adjustment to survey design because of changing settlement patterns. Historic sites predating the twentieth century generally conform to prehistoric site distribution as regards proximity to streams, and hence are usually located in Zone 1 (Brooks and Crass 1991; SRARP 1989). However, in contrast to prehistoric and early historic sites, the interfluvial areas of the SRS became important venues for late historic settlement in the Aiken Plateau (Brooks and Crass 1991). Thousands of farmsteads were established under the land-tenure system after the Civil War, many in the 1930s and 1940s. These residences were either relocated or razed when the Atomic Energy Commission initiated construction of the SRS in 1951. Traces of these sites are found across the SRS, though they are not always conspicuous. Fortunately, the locations of former farmsteads are visible in the 1951 aerial photographs. Thus, survey efforts in uplands do not always necessitate transect sampling to discover late historic period resources. The routine procedure for surveying late historic period sites on the SRS is to review 1951 aerial photographs for visible evidence for sites, then to locate these sites in the field.

To summarize, the survey of the E Area was designed to target the areas of greatest archaeological sensitivity by focusing survey along ridge and terrace margins. Although late historic farmsteads do not conform to prehistoric site distributions, the review of 1951 aerial photographs provides a good, if not comprehensive means of locating such sites. In addition, transects along ridge tops and upper slopes were initiated

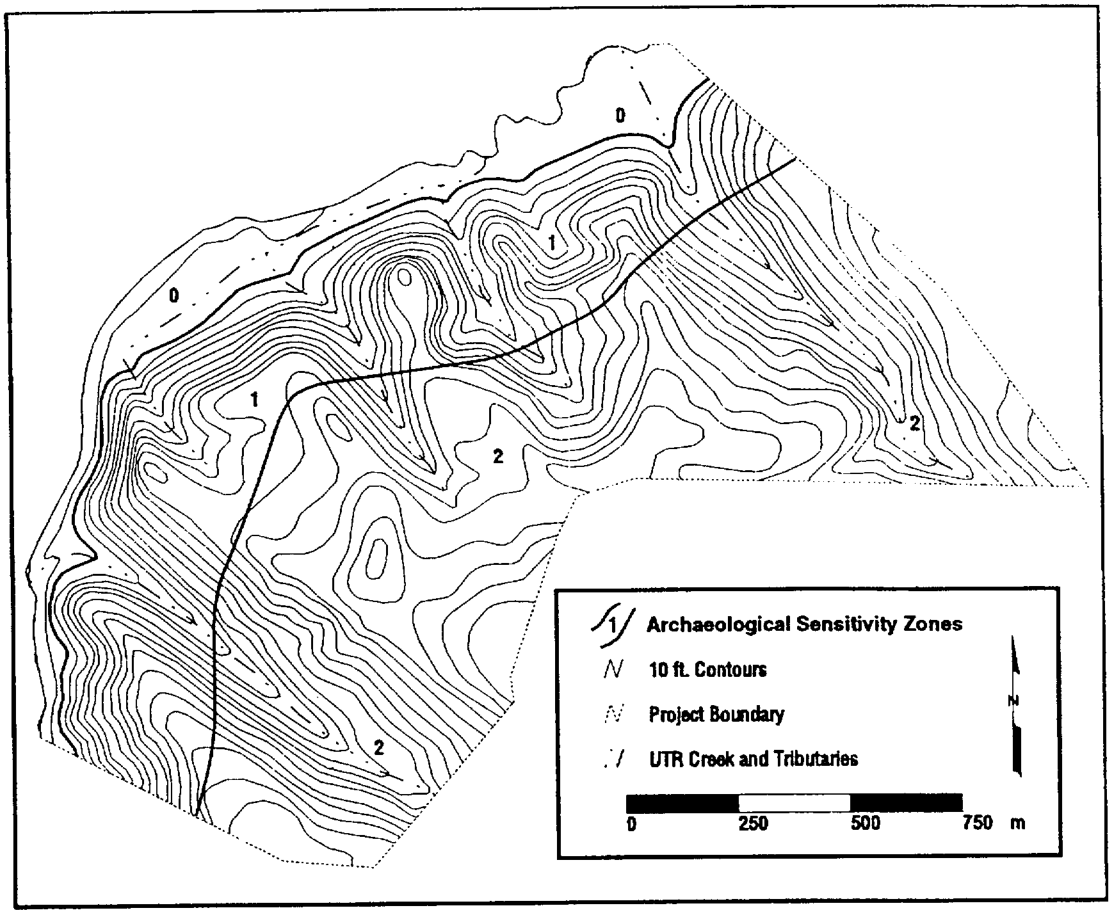

Figure 3-4. Archaeological Sensitivity Zones in E Area.

to examine potential late historic areas and to provide some coverage in locations with limited potential for prehistoric sites. These efforts were, of course, deemed necessary to capture data not normally sought in routine site-oriented surveys.

FIELD METHODS

Standard SRARP survey procedures established in January 1990 (SRARP 1990:15-16) were followed during fieldwork. Investigations were conducted in four phases: (1) site revisits, (2) pedestrian survey in areas with greater than 25 percent visibility; (3) transect survey along the ridge and terrace margins and the floodplain of Upper Three Runs Creek; and (4) test unit excavation. A survey team composed of two to four archaeologists conducted all the fieldwork between June 24, 1993 and May 13, 1994.

Even though this study is guided by the concepts and analytical techniques of "nonsite" archaeology, "sites" were recorded for federal compliance purposes. Following SRARP standards, archaeological sites are locations that contain artifactual evidence for two or more activities. For example, a find consisting of a chert flake and pottery sherd would be considered a site while two chert flakes, from the same core, would not be defined as a site, but merely an "occurrence." Sites consisting of exclusively prehistoric lithic and ceramic remains are referred to as "lithic and ceramic scatters." Lacking direct traces of habitation (i.e., features, structural remains), prehistoric sites cannot be more precisely classified without detailed and comparative analyses of assemblage composition and spatial structure (Sassaman 1993a). We accept, however, that some sites classified as "scatters" are locations of prehistoric habitation. Historic sites with evidence, artifactual or documentary, for a structure are considered "house sites" and those with no evidence for buildings are classified as "historic artifact scatters."

Postbellum Sites

The 1951 aerial photographs of the project area were examined for evidence of twentieth-century occupations of the E Area. Although some cultivated and idle fields are visible in the project area boundaries, no historic structures were evident on the aerial photographs (USAECAP 1951:63 and 89). It was therefore unnecessary to initiate target-specific survey for twentieth-century house sites.

Site Revisits

Eight previously recorded sites (38AK106, 38AK151, 38AK152, 38AK153, 38AK154, 38AK155, 38AK330, and 38AK373) were located in the project area. All but one of these sites was relocated during the E Area survey. The seven previously recorded sites were located by surface indications in exposed ground surfaces and by subsurface testing. They were also examined with shovel tests and excavation units for information on subsurface extent, integrity, and content. Extensive shovel testing efforts in the vicinity of 38AK152 failed to located cultural material.

Surface Reconnaissance

Pedestrian survey was conducted all roads and firebreaks in the project area with good surface visibility. A total of 6.6 linear kilometers of roads and firebreaks was visually inspected for surface indications of cultural material (Figure 3-5). Besides the seven previously recorded sites discussed above, this effort resulted in the discovery of two new sites (38AK548, 38AK586). In areas of high surface artifact density, surface artifacts were collected in 30 m sections along the roads and plotted on site maps.

Shovel Test Transects

Because the areas with the most potential for prehistoric artifacts were wooded, shovel test pits (STPs) excavated along transects were used to discover cultural material. Shovel test pits, measuring 0.35 x 0.35 m were excavated to a depth of at least 80 cm below surface (BS) or until sterile, sandy-clay substrate was encountered. All soil was passed through 0.25 in (0.64 cm) wire mesh, and artifacts were collected and bagged according to STP number and provenience. The location, content, and depth of each STP were recorded on SRARP forms. Shovel test pits were excavated at 30-m intervals along each transect. Where artifacts were found, a close interval cruciform pattern of STPs was excavated to determine the extent of subsurface material. Shovel tests were placed 10-20 m apart along four transects radiating from the initial positive STP. Each of these four test lines was terminated when two consecutive negative STPs were found or at the natural boundary of a landform. If several positive STPs were encountered in a row on the initial transect, not all positive STP were cruciformed.

Thirty-nine site discovery transects were excavated along ridge and terrace margins and in the floodplain of the project area. This effort resulted in the excavation of 537 STPs along 14.9 linear kilometers of transect (Table 3-3, Figure 3-6). Judgmental testing was conducted in 21 areas with 93 STPs (Figure 3-7). These judgmental locations

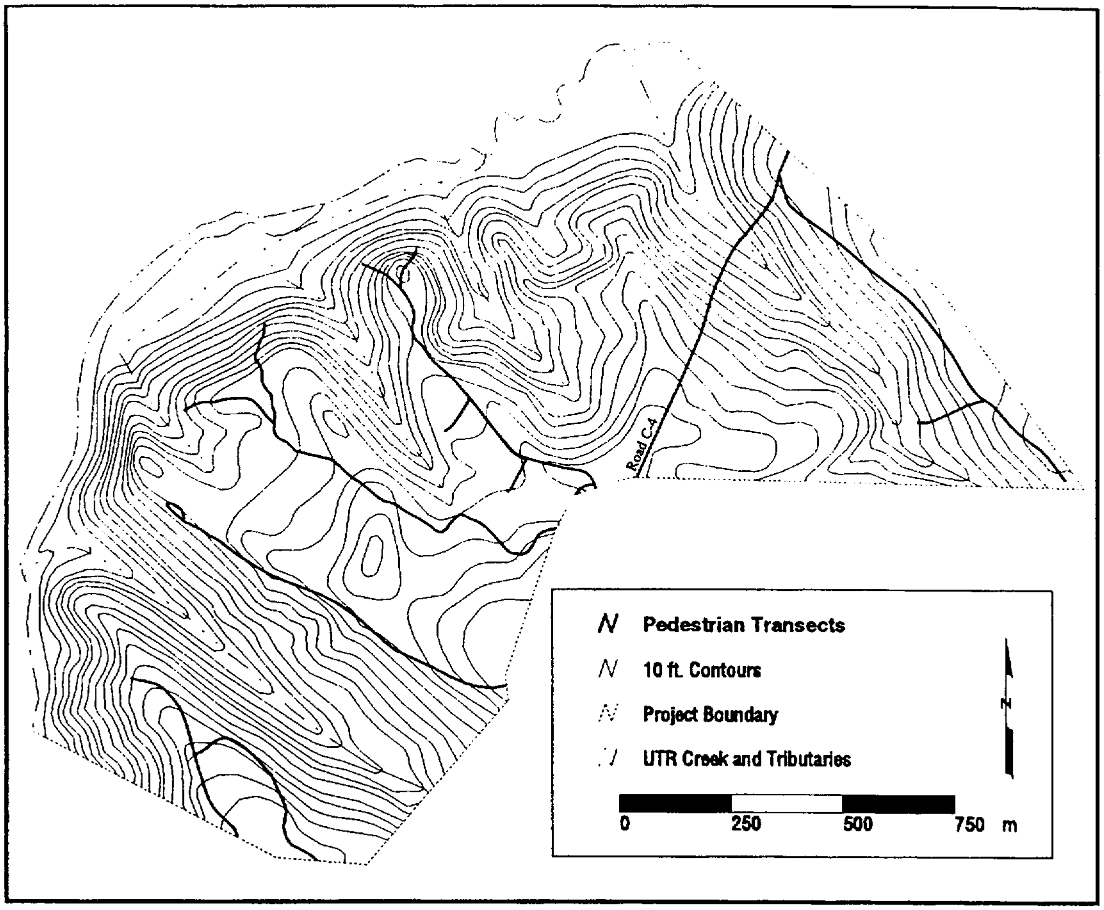

Figure 3-5. Locations of surface survey transects in E Area.

Table 3-3. Absolute Frequency and Average Depth (cm) of Shovel Tests by Transect.

Transect #[a]	Freq. of STPs	Average Depth (cm)	Transect #[a]	Freq. of STPs	Average Depth (cm)
1	6	68	24	19	86
2	23	75	25	52	82
3	3	82	26	76	81
5	16	73	27	25	76
8	4	74	28	11	90
9	14	85	29	7	81
10	4	87	30	8	85
11	6	86	31	14	71
12	6	82	32	9	74
13	6	80	33	13	80
14	3	87	34	5	64
15	6	83	35	5	74
16	7	85	36	4	81
17	11	64	37	4	73
18	11	56	38	7	52
19	31	72	39	7	73
20	11	60	40	6	83
21	13	63	41	6	66
22	43	83	42	12	73
23	23	84			

[a]Transects 4, 6, and 7 were surface reconnaissance transects.

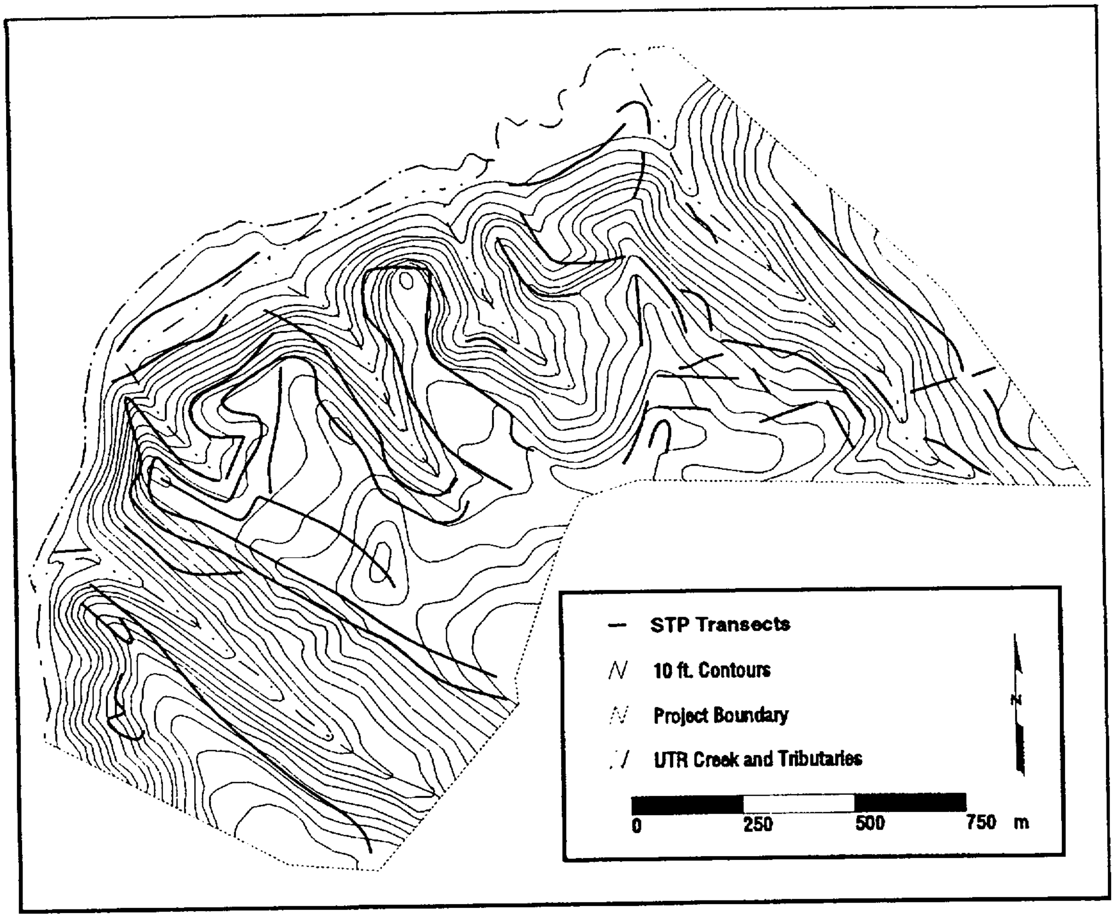

Figure 3-6. Locations of site discovery shovel test transects in E Area.

were often small areas on shelves of ridge slopes that seemed highly likely to contain prehistoric artifacts. Shovel test pits in these locations were not necessarily spaced at 30-m intervals.

Cultural material was found in 19 percent (120 of 630 STPs) of the transect and judgmental STPs. An additional 829 STPs were excavated when cruciforming these positive STPs. Subsurface testing resulted in the discovery of 25 sites and 13 occurrences. During the 1993-94 field work in the E Area, a total of 1,459 STPs was excavated. An additional 76 0.25 x 0.25 m STPs were excavated in the E Area tract prior to the 1993-94 survey: 25 STPs in 1983 and 51 STPs in 1985. In all, a total of 1,535 STPs have been excavated in the E Area by SRARP personnel.

Test Unit Excavations

Additional site testing involved the excavation 1 x 2-m test units in areas believed to contain good subsurface integrity, and high artifact density and/or diversity (Figure 3-8). One test unit was also excavated in a historic site that was believed to contain a domestic occupation. A total of 33 test units was excavated (Figure 3-9). Units were oriented with the cardinal directions and excavated in arbitrary 10-cm levels until two culturally sterile levels were encountered. All soil was screened through 0.25 in (0.64 cm) wire mesh, and artifacts were collected and bagged by test unit level. The content,

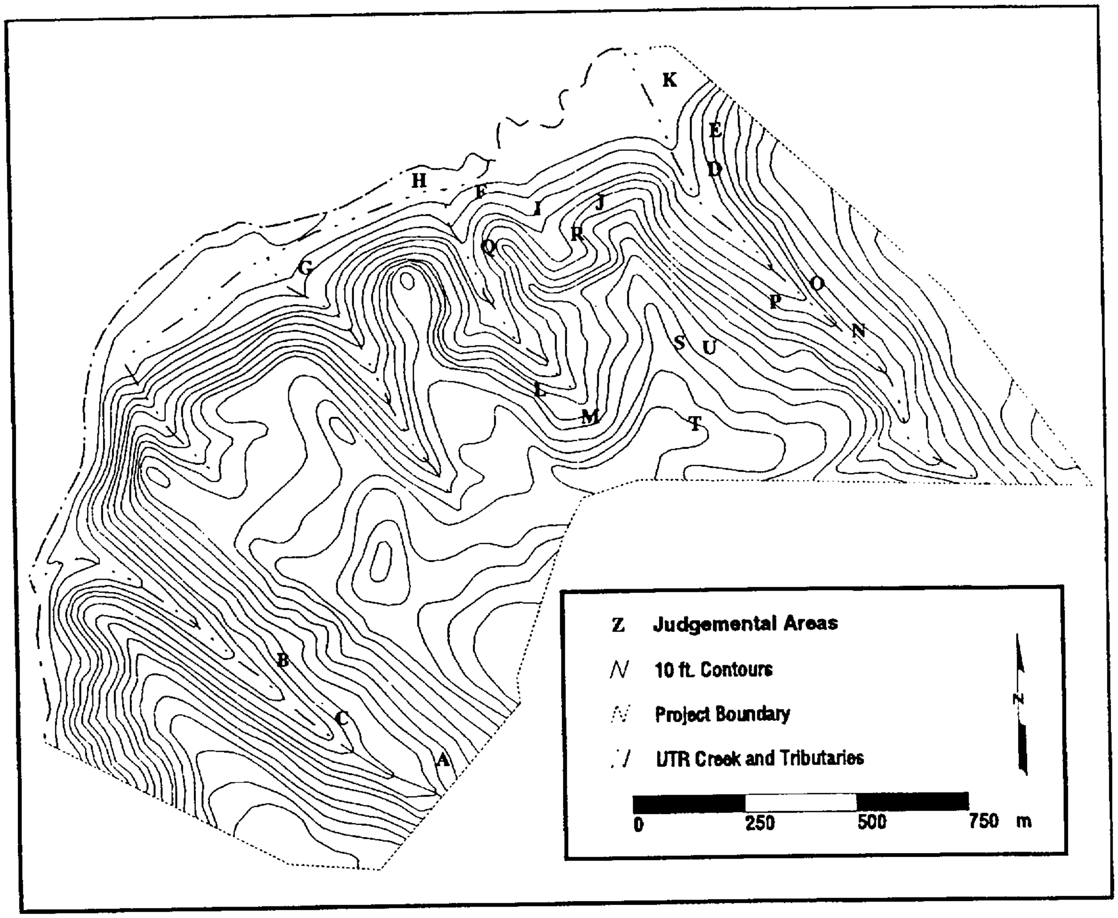

Figure 3-7. Locations of judgmental testing in E Area.

depth, and other relevant information concerning each level were recorded on SRARP forms. Any features encountered were excavated separately, mapped, and photographed. The fill from features was floated using a modified SMAP apparatus (Watson 1976). Upon completion of each test unit, scaled drawing and photographs were made of one profile. Finally, black and white photographs were taken and field maps were drawn of each area that contained an artifact concentration. Two 2 x 2-m units were also excavated in the E Area tract in 1985. The results from these test excavations were incorporated into this study.

GLOBAL POSITIONING SYSTEM

In order to identify the exact position of cultural material in the project area, the locations of STPs were recorded with Global Positioning System (GPS) technology. Developed by the Department of Defense, GPS technology uses satellites and computers to calculate exact positions on earth. The system is "based on the constellation of 24 satellites orbiting the earth at a very high altitude" (Hurn 1989:7). The satellites are used as reference points for triangulating exact locations on earth (Hurn 1989:17). Distance is calculated by timing how long it takes radio signals to travel between a satellite and receiver. Trigonometry dictates that readings from four satellites are necessary for accurate locations. This GPS system is accurate enough, with differential positioning, to locate a stationary point to within one meter of the actual location (Hurn 1989:58). A

Figure 3-8. Photograph of test unit excavation at 38AK546.

base station (a second receiver at a known location) is used to identify and correct errors in the data collected by the mobile unit (this process is called differential correction).

A *Trimble Navigation* data logger and receiver (GPS unit) were used to collect the GPS information in the E Area. The data collected from the GPS unit, when differentially corrected, can accurately determine locations between three and five meters of the actual location. The GPS data were collected from STPs, test units, roads, and other landmarks in the project area. At least 200 "triangulation fixes" were collected from each data collection point (STPs or test units). The data were then down-loaded into a computer for differential correction. Test unit and STP locations were determined from the average position of the 200 "triangulation fixes." The range of variation in the collected data was examined, and if the standard deviation was greater than five meters, the field crew returned to the location to recollect the data. The standard deviation of all points used in this study is less than five meters. The corrected locations of STPs, test units, roads, and other landmarks were then loaded into an Arc/Info® GIS program.

The GPS data were gathered between August 3, 1994 and August 30, 1994, by a field crew of two people. Due to time constraints, the position of all the STPs excavated in 1993-94 could not be recorded with GPS technology. The position of at least one STP in every location cultural material was concentrated (i.e., sites) was recorded. The GPS locations of all 1 x 2-m test units were also recorded. Azimuth and distance readings from the GPS shovel tests were used to determine the locations of the remaining STPs. Figure 3-10 shows the all STPs and test units where GPS data were gathered to determine their locations.

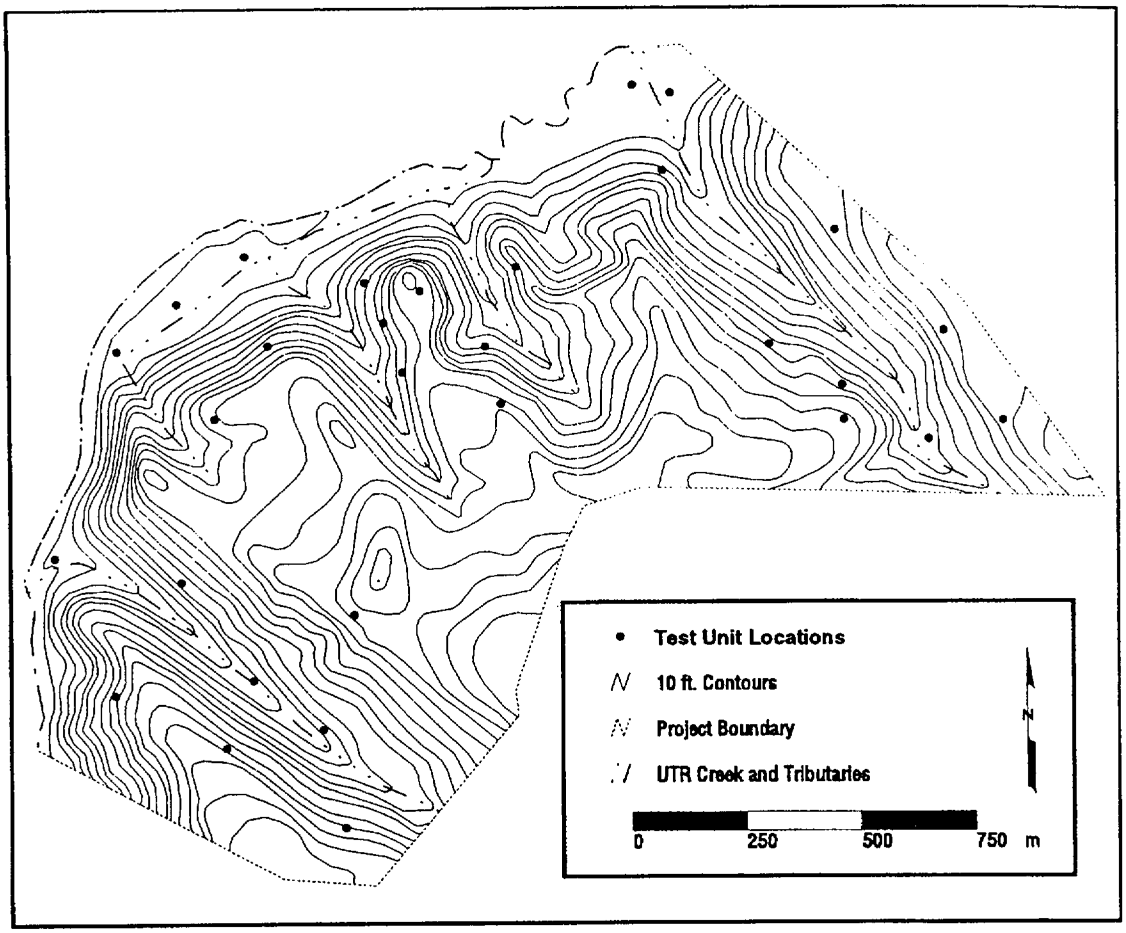

Figure 3-9. Locations of test units excavated in E Area.

GIS ENVIRONMENTAL AND ARCHAEOLOGICAL DATASETS

The spatio-temporal analyses reported in Chapter 6 were conducted using Arc/Info® 7.0.3 geographic information system (GIS) software. This GIS package is particularly useful because it incorporates both raster and vector processing modules within a single system. The majority of the environmental data were derived by raster processing, although distance measures were derived through vector calculation techniques.

The environmental datasets consist of a digital elevation model (DEM), slope, aspect, hydrography, and soils coverages. All of the environmental data have a scale of 1:24,000 with grid resolutions of 30 meters. The DEM is derived from USGS digital line graph (DLG) data. The slope and aspect data are derived from the DEM using smoothing operations which will be detailed below. The hydrography coverage also represents USGS DLG data. The soils coverage represents the 1990 Soil Conservation Service (SCS) survey data for the Savannah River Site (Rogers 1990).

Digital elevation models (DEM) are the numerical equivalents of USGS 7.5' quadrangle topographic maps. Although cartographically unattractive and less informative than your average topographic map, DEMs are inherently powerful analytical

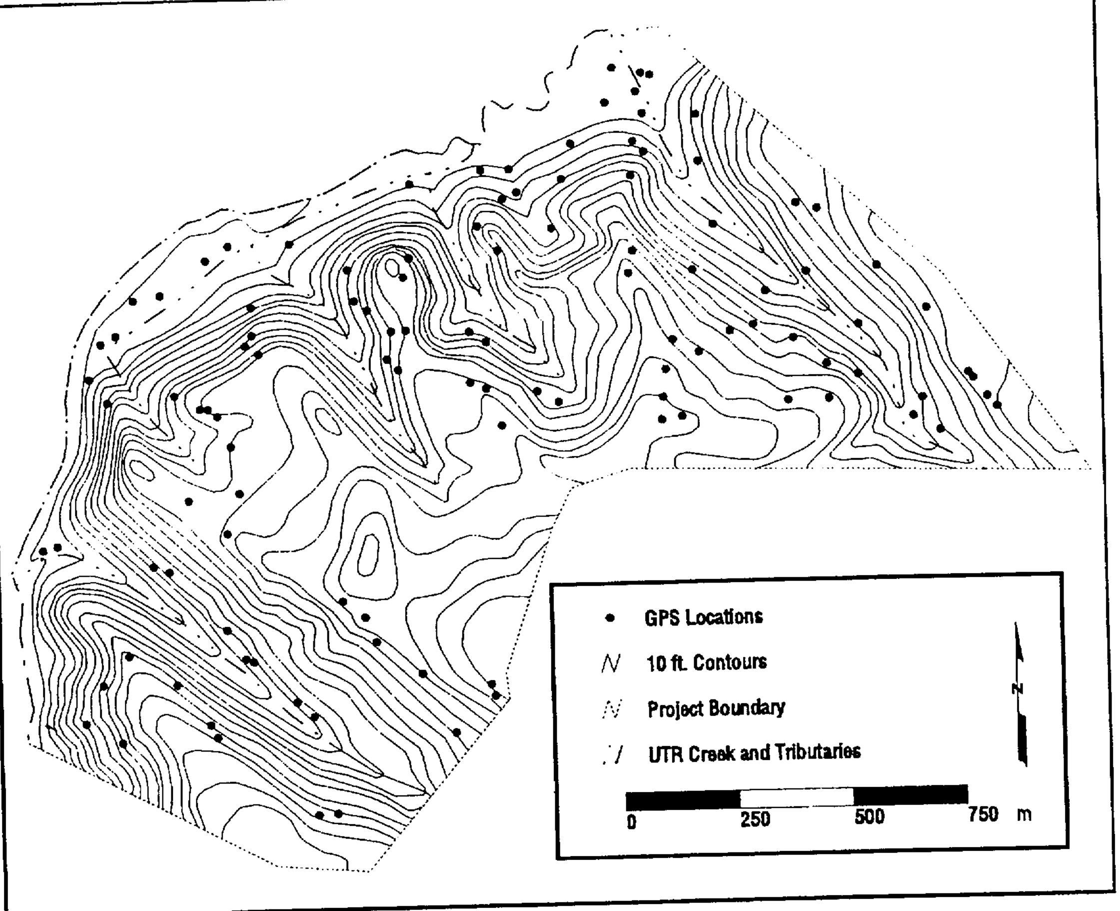

Figure 3-10. Locations where GPS data were gathered in E Area.

representations of the earth's surface. In a DEM, each cell within the coverage has a value corresponding to the elevation of that location. A DEM may therefore be mathematically manipulated to simulate landform processes and derive other valuable datasets such as slope and aspect coverages (Burrough 1994:39-56; McMaster and Shea 1992:99-112).

The slope coverage is derived from the DEM using a smoothing operation known as the average maximum technique. Slope is commonly expressed in either degrees or percentage of slope; here percent slope is used. A moving 3 x 3 neighborhood of cells determines the value of each center cell in turn. The following is a brief description of the derivation process (modified after ArcDoc 1995). Using this simplified grid:

a	b	c
d	e	f
g	h	i

The algorithm for percent slope is:

rise_run = SQRT((dz/dx)^2 + (dz/dy)^2)

percent_slope = rise_run * 100

where:

dz/dx = ((a + 2 d + g) - (c = 2f + i)) / 8 * x_width

dz/dy = ((a + 2b + c) - (g + 2h + i)) / 8 * y_width

Aspect is also derived from the DEM using a smoothing operation. Again, a moving 3 x 3 neighborhood of cells determines the value of each center cell in turn. The assigned value indicates slope direction in positive degrees from 0 to 360, measured clockwise from north. Flat areas with no slope are assigned a value of -1 and cells from the DEM containing no data are not assigned a value in the new coverage (ArcDoc 1995). The aspect data were reclassified for statistical manipulation into the following categories:

Aspect Category	Abbreviation	Degrees
North-Northeast	NNE	1- 45
East-Northeast	ENE	46- 90
East-Southeast	ESE	91- 135
South-Southeast	SSE	136- 180
South-Southwest	SSW	181- 225
West-Southwest	WSW	226- 270
West-Northwest	WNW	271- 315
North-Northwest	NNW	316- 360 (0)
None	NO	-1 (no aspect)

The archaeological database consists of positive shovel test, negative shovel test, combined shovel test, test unit, site centroid, and site boundary coverages linked to artifact data tables. The archaeological datasets were created by digitizing a base map with key locations verified by GPS. A random distribution coverage containing 500 point locations was also generated for comparison to the shovel test data. The artifact data tables represent presence/absence of artifact type or class and were used to query the spatial data for user-specified artifact attributes.

GIS Analysis

The GIS analysis generated environmental data for each archaeological dataset. The desired environmental data included elevation, slope, aspect, linear distance to running water, and linear distance to the Upper Three Runs floodplain. The elevation, slope, and aspect data were obtained by raster processing techniques, whereas the distance measures were obtained through vector processing. Summary statistics for examining variability in the acquired data include the sum, mean, minimum, maximum, and standard deviation.

The archaeological data were converted from vector (point) to raster (1 meter) format for the derivation of elevation, slope, and aspect. Once converted to raster format, grids of the archeological locations were simply added to the elevation, slope, and aspect maps to derive these data for each location. The new grids were then linked to tables containing provenience and artifact data for further analysis.

The vector point datasets were used for the derivation of distance to water and distance to Upper Three Runs floodplain. In the case of distance to water, the point data were simply processed with the stream line coverage to determine the nearest distance for each point to the stream network.

The distance to Upper Three Runs floodplain demanded further processing. Each point coverage had to be "clipped" to remove locations within the active floodplain. This required the creation of a polygon coverage representing the non-floodplain areas used to clip the corresponding archaeology point coverages. Distance was then calculated for all upland archaeological points to the boundary of the Upper Three Runs floodplain. Point locations within the floodplain were assigned a value of zero and combined with the upland distance data for statistical manipulation.

SUMMARY OF RESULTS OF E AREA SURVEY AND TESTING

Archaeological survey in the E Area was conducted intermittently between June 1993 and May 1994. A field crew ranging from two to four people excavated a total of 1,459 STPs and 33 1 x 2-m test units. This translates into a total excavated area of 245 m^2. In conventional terms, 32 archaeological sites and 18 artifact occurrences were located, tested, and evaluated for this project. The appropriate documentation of these resources for compliance purposes is provided in Appendix A, and the location of sites is given in Figure 3-11. The locations of occurrences can be found in Figure A-67 in Appendix A. Appendix B provides locational data for each of the STPs and test units excavated. Appendix C contains the metric data for hafted bifaces and Appendix D provides data on ceramic vessels.

A summary of the artifacts from the E Area is provided in Table 3-4. Most of the 28,279 artifacts were recovered during the E Area survey, however 6 percent (n = 1,543) of the artifacts were collected prior to the present survey. In addition to the artifacts listed in the Table 3-4, 16.4 g of burnt tar, 369.6 g of wood charcoal, and 0.6 g of seeds were recovered during test unit excavation at 38AK155. Each positive STP contains an average of 8 artifacts (2,895 artifacts/362 positive STPs). A cursory glance shows that

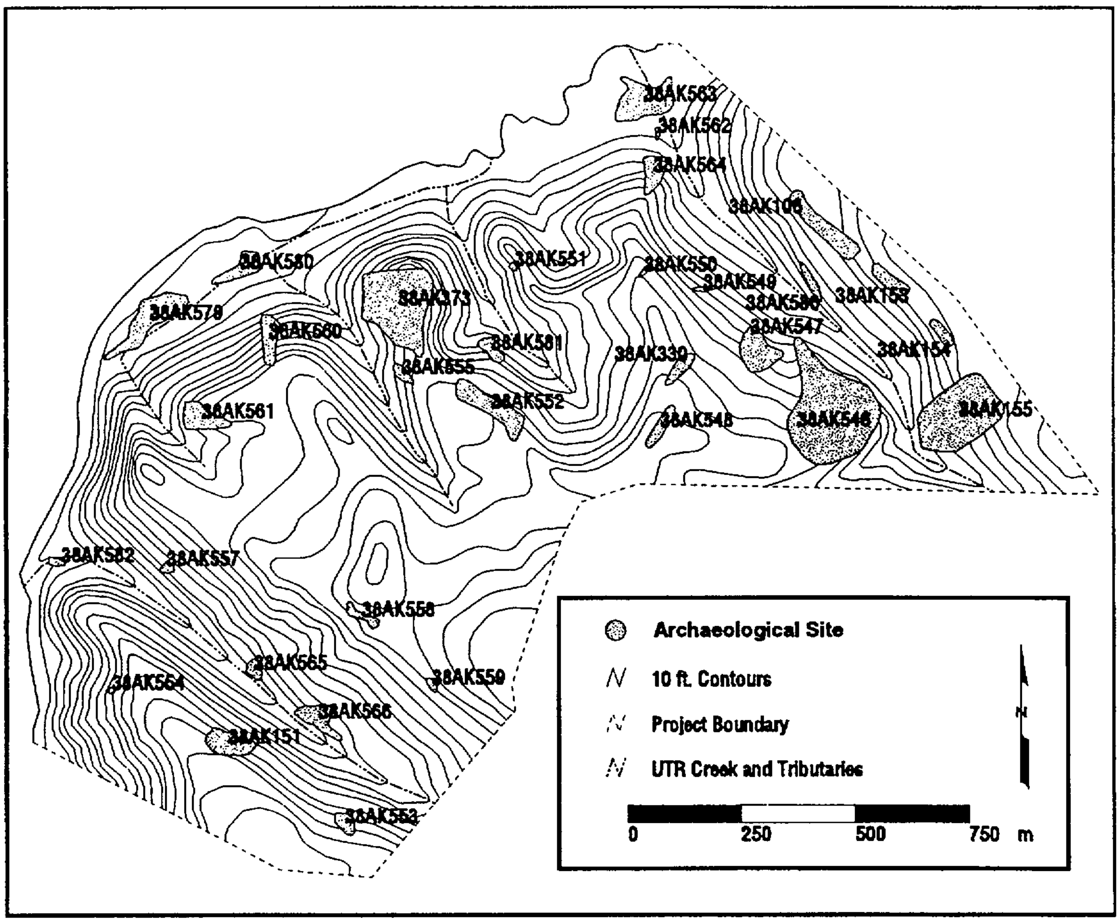

Figure 3-11. Locations of all archaeological sites in E Area.

Table 3-4. Artifact Inventory of Recovered Materials for the E Area by Material Type and Provenience Type.

Artifact Class	Surface	STP	Test Unit	Total
Hafted Bifaces	20	9	44	73
Other Bifaces	32	27	108	167
Cores	9		3	12
Unifaces	2	3	8	13
Unifacially Modified Flakes	1		11	12
Utilized Flakes	30	51	178	259
Polished Stones	2		10	12
Cobble Tools	1	6		7
Bead			1	1
Sherds ≥1/2"	208	184	900	1,292
Sherds <1/2"	19	45	456	520
Debitage	1,834	2,392	16,248	20,474
Unmodified Cobbles	10	46	868	924
Hematite	1	4	7	12
Cracked Rock <3 cm	23	83	2,907	3,013
Pebbles	1	14	219	234
Small Soapstone			5	5
Fired Clay		1	689	690
Nutshell			234	234
Bone	4	16	260	280
Historic Artifacts	14	14	17	45
TOTAL	2,211	2,895	23,173	28,279

lithic debitage is the most numerous artifact type in the assemblage. Unfortunately, except when the debitage is heavily patinated, this artifact type rarely provides cultural-historical information. The most common diagnostic artifacts in the assemblage are pottery sherds. Of the 1,812 prehistoric sherds collected, 708 are temporally sensitive.

Table 3-5 is a tally of the diagnostic artifacts collected at E Area sites before and after the present survey. The earlier archaeological investigations showed heavy use of the project area during the Early Woodland and Middle/Late Woodland. The 1993-94 investigations increased the proportion of Middle/Late Woodland artifacts significantly, while diminishing the presence of Early Woodland finds. Also, prior to the 1993-1994 survey, no Middle and Late Archaic artifacts were identified. Artifacts from these periods were found subsequently in areas with poor surface visibility and appreciable deposition (i.e., floodplain and lower ridge slopes). As previous surveys indicated, the 1993-1994 investigations confirmed that the project area contains on a light scatter of historic artifacts. No evidence for structures is seen in the 1951 aerial photographs we consulted, although they indicate that a small portion of the project area was used for agricultural purposes in the twentieth century.

Despite extensive testing, cultural features were identified at only one site. Site 38AK155 contained three features that related to the prehistoric occupation of the E Area. These features are concentrations of locally available quartz cobbles and cobble fragments. None of the cobbles contained evidence for use alteration other than heat damage, so it is presumed these features functioned as cooking or heating locations. These features are described briefly below. Appendix A provides a more detailed description and photographs of the features (see site 38AK155).

Feature 1 consists of a circular shaped rock cluster located in Provenience 16 and 17 at 38AK155. The feature was 75 x 80 cm in size and extended from 48 to 65 cm below datum (BD; datum was located at the surface in the northeast corner of Prov. 16). Table A-23 in Appendix A provides the inventory of the material recovered from Feature 1 and Figure A-13 illustrates the feature. As the inventory shows, the material recovered consists primarily of rocks, botanical specimens, and lithic debitage. The botanical specimens include wood charcoal, seeds, nutshell, and tar. Five sand-tempered crumb sherds similar to Refuge pottery were found in Feature 1. The feature was located just below the level where a majority of the Early Woodland artifacts was found. The presence of these sherds in Feature 1 may have been the result of vertical displacement. The uncalibrated radiocarbon age of Feature 1 is 3540 ± 60 B.P. (Beta-78830; wood charcoal; $\partial^{13}C$ = -27.4 0/00). For this date the 2-sigma calibrated result is 2015 to 1705 cal B.C. (p = 0.95). This assay places Feature 1 firmly in the Late Archaic period.

Provenience 18 at 38AK155 contained a small cluster of rocks identified as Feature 2. This feature was 35 x 40 cm in size and extended between 37 and 49 cm BD. The feature may have been a pit but staining was not visible. As the artifact inventory shows (Table A-23), Feature 2 consisted primarily of rocks, botanical specimens, and lithic debitage (Figure A-12). As the figure and table illustrate, the rocks in this feature were not nearly as concentrated as the rocks in Feature 1 and 3. Because the feature was poorly defined, the charred botanical material was not used for a radiocarbon date.

Feature 3 is a rock cluster that measures 58 x 73 cm in size (Figure A-11). The feature extended from 18 to 31 cm BD and contained 707 artifacts and 24.6 g of charred botanical specimens (Table A-23). The botanical specimens include wood charcoal, nutshell, tar, and seeds. The assemblage from this feature included 15 cordmarked sherds

Table 3-5. Tabulation of Diagnostic Artifacts Recovered from E Area Sites before and after the Present Survey Effort.

	1973-1992		1993-1994	
Cultural-Historical Group	#	%	#	%
Early Archaic	5	6.3	15	2.0
Middle Archaic	0		11	1.4
Late Archaic	0		31	4.1
Early Woodland	31	39.2	64	8.4
Middle Woodland	2	2.5	66	8.6
Late Middle-Late Woodland	27	34.2	323	42.3
Late Woodland-Mississippian	8	10.1	215	28.1
Historic	6	7.6	39	5.1
TOTAL	79	100.0	764	100.0

and a Late Woodland simple stamped sherd. In the matrix surrounding this feature several folded rim sherds were found. These artifacts indicate a Late Woodland/Early Mississippian origin for Feature 3. A radiocarbon date confirms this conclusion. The uncalibrated radiocarbon age of Feature 3 is 870 ± 60 B.P. (Beta-78829; wood charcoal; $\partial^{13}C = -25.6$ 0/00). For this date the 2-sigma calibrated result is 1025 to 1275 cal A.D. ($p = 0.95$). This assay corroborates the Late Woodland to Early Mississippian age inferred from the sherds.

E Area Stratigraphy and Depositional Context

The discovery of three buried rock clusters at 38AK155 confirmed the existence of colluvial depositional contexts at sites in the Aiken Plateau. Previous work at sites 38AK157 and 38AK158 has shown that the depth and extent of colluvial deposits can be predicted from surface topography. More specifically, in locations with upslope sources of unconsolidated sand, grades as gentle as 5 to 10 percent are sufficient for the transport of sediments. Deposition appears to occur regularly in downslope locations at the margins of ridge features, where slopes are reduced a few percentage points before dropping sharply into stream valleys. We suspect that the process was more or less random, being triggered, no doubt, by a combination of climatic factors and incidental lightning fires. The deposits have splay characteristics, and, as such, have parabolic transverse cross sections and wedge-shaped longitudinal cross sections.

At the level of secondary testing, data are insufficient to draw definitive conclusions about colluvial contexts in the E Area. The 38AK155 features is proof enough that such contexts exist in the study area, and we are certain that variation among the various buried contexts can be predicted from larger-scale topographic variables, such as slope. For instance, the range of depth of diagnostic artifacts of Early Archaic age is from 50 to 110 cm BS. The upslope terrain of these locations ranges from mild to moderately steep, and distances to topographic highs range from nearby to distant. It is probable that the variation in terrain coincides with variation in artifact depth. This is at least an avenue worth pursuing, but one that requires large samples of artifacts from relatively large, contiguous areas of excavation, such as those from 38AK157 and 38AK158.

Floodplain locations of alluvial deposition comprise a different type of depositional environment in the study area. Floodplain profiles generally extended to a meter or more in depth, where small, usually patinated flakes continued to appear. Groundwater at this depth prevented deeper excavation in some cases. Stratigraphic unconformities were observed in some profiles, suggesting the possibility of scoured surfaces, in addition to alluvial deposition. Overall, however, artifact distributions in profiles do not deviate markedly from those in the upland unit. That is, both are stratified contexts approximately one meter in depth, with little to no visible horizonization or bedding. Under these circumstances, arbitrary level excavation and artifact point-plotting remain our best strategy of excavation.

CONCLUSIONS

Survey and testing of E Area was undertaken using standard procedures for the identification and evaluation of archaeological sites per federal law. Thirty-two archaeological sites and 18 artifact occurrences were located, tested, and evaluated for this project. The over 28,000 artifacts recovered reflect prehistoric land use spanning the Early Archaic through Mississippian periods. Use of E Area resulting in the greatest number and density of diagnostic artifacts occurred during the Late Woodland period.

Sites were distributed widely across the study area, in upland and bottomland locations alike. In general, artifacts were recovered in buried, stratified contexts. Site size, artifact density and diversity, and the range of components present all vary widely. Rock clusters at one site constitute the only features located in this survey.

To some extent the site-oriented nature of our survey and testing compromises efforts to analyze land-use patterning using the methods of nonsite or distributional archaeology. However, from this point forward we begin to relax the constraints of a site-oriented archaeology to begin treating the E Area assemblage as a whole, and to investigate the distributional properties of this entire assemblage in a manner not unlike intrasite spatial analysis. The assemblage descriptions that follow in Chapter 4 and 5 make occasional reference to site provenience to avoid ambiguity and confusion. By and large the descriptions ignore provenience. When we revisit provenience in Chapter 6 it is at the level of STPs and test units, not sites.

CHAPTER 4

LITHIC ARTIFACT ANALYSIS

The description and analyses of lithic materials reported in this chapter are divided between cultural-historical and technofunctional aspects of the assemblage. A total of 21,965 lithic artifacts were recovered from archaeological investigations in the E Area (Table 4-1). Flaked stone tools consist of 73 hafted bifaces, 167 other bifaces, 12 cores, 13 formal unifaces, 12 unifacially modified flakes, and 259 utilized flakes. Flaked stone debitage amounts to 20,474 pieces weighing 13,534.7 g. Other modified stone artifacts include 7 cobble tools and 12 ground/polished stone artifacts. Finally, the assemblage contains 936 unmodified cobble and cobble fragments weighing 56,136 g. The lithic artifacts were collected from exposed ground surface (*n* = 1,942), STPs (*n* = 2,538), and test units (*n* = 21,965).

METHODS OF ANALYSIS

Lithic analysis began by sorting material into six categories: flaked stone, polished/ground stone, cobbles, unmodified soapstone, hematite, and pebbles. Waterworn pebbles, unmodified cobbles, and soapstone and hematite fragments smaller than 3 cm in size were counted, weighed, and bagged; no further analysis was conducted on these artifacts.

Raw material type was recorded for all lithic artifacts. Coastal Plain chert consisted of any white to tan-colored chert and its thermally altered counterparts. Other raw materials include slate, orthoquartzite, quartz, metavolcanic, and ferruginous

Table 4-1. Lithic Artifact Inventory for the E Area by Technofunctional Type and Provenience Type.

Type	Surface	STP	Test Unit	TOTAL
Hafted Bifaces	20	9	44	73
Other Bifaces				
Preforms	15	15	45	75
Biface Fragments	11	3	39	53
Indeterminate Bifaces	6	9	24	39
Cores	9		3	12
Unifaces				
Formal Unifaces	2	3	8	13
Unifacially Modified Flakes	1		11	12
Utilized Flakes	30	51	178	259
Debitage	1,834	2,392	16,248	20,474
Ground/Polished Stone	2		10	12
Cobble Tools	1	6		7
Unmodified Cobbles	11	50	875	936
TOTAL	1,942	2,538	17,485	21,965

sandstone. Thermally altered chert was not routinely distinguished as a separate category of raw material, although it was used to derive cultural-historical information for certain biface types (e.g., Middle Archaic biface preforms). An effort was made to isolate and record separately all Coastal Plain chert artifacts exhibiting an advanced degree of patination. From repeated observations of assemblages in the area, we are confident that advanced patination appears routinely on only Paleoindian and Early Archaic chert artifacts. We do not imply that all chert artifacts of these periods are heavily patinated, for there exists a good deal of variation in this condition. However, patination is only moderately or weakly developed on artifacts postdating 6000 B.P., with the exception of older items scavenged and recycled by late prehistoric inhabitants (Sassaman 1993a:214-224), in which case "double patination" or "repatination" is often observed. Despite an apparent regularity to the rate of patination, there exist no straightforward criteria for classifying degree of patination. Thus, a certain of amount of interanalyst bias plagues the classification, and we exercise caution in inferring chronological patterning to patination data in lieu of other cultural-historical information.

Flaked stone artifacts were further divided into five groups consisting of hafted bifaces, other bifaces, unifaces/unifacially modified flakes, utilized flakes, and debitage. Hafted bifaces are defined as any bifacially modified flaked stone tool with basal modification to facilitate the mounting in a haft or on a projectile shaft. The major exception to this rule is small triangular points, which are assumed to be hafted bifaces despite the lack of a morphologically distinct haft element.

The following attributes were recorded for hafted bifaces: cultural-historical type as defined for SRS collections (Sassaman et al. 1990), biface condition (whole, tip, midsection, base, edge fragment, other, and indeterminate); fracture type (lateral snap, perverse, radial, crenated, potlid, incipient fracture plane, impact, and haft snap) following criteria established by Purdy (1975), Johnson (1981), and Frison and Bradley (1980); haft element morphology (stemmed, side-notched, corner-notched, basal-notched, triangular, other, and indeterminate); and basal morphology (flat, convex, concave, indented, notched, other, and indeterminate). Metric attributes recorded for each hafted biface include maximum length, blade length, maximum width, shoulder width, basal width, maximum thickness, and weight. Linear measurements were recorded to the nearest tenth of a millimeter and weights were recorded to the nearest tenth of a gram.

The "other" biface category consists of all bifacially worked lithics that lack evidence for a hafting element. This category includes hafted biface preforms, hand-held bifacial tools, bifacial blanks, and small fragments exhibiting bifacial flaking. Condition and fracture types, as specific above, were recorded for all other bifaces. Also recorded was the percentage of cortical material on all surface area to the nearest five percent. The only metric attributes recorded for other bifaces were maximum length, maximum width, and maximum thickness, as well as weight.

Unifaces are defined as any flake containing technological modification on only one face. Uniface types recognized in the E Area assemblage include Edgefield scrapers, teardrop (hafted) end scrapers, other end scrapers, side scrapers, gravers, Waller knifes, and unifacially retouched flakes. Recorded for each uniface were the attributes percent cortex, maximum length, maximum width, maximum thickness, and weight.

Utilized flakes are defined as unretouched flakes exhibiting macroscopic evidence of edge attrition associated with utilization. To distinguish utilized flakes from unifaces objectively, tools with edge-originating flake scars greater than 2 mm are considered to have technological modification while those with scars 2 mm or less are considered to be flaked from use. The following attributes were recorded for each utilized flake: flake type (flake of bifacial retouch, blade, bipolar, chunk, and other), condition (whole, distal, medial, proximal, edge fragment, and indeterminant fragment), raw material, percentage of cortex, number of edges with use-wear, edge wear shape (straight, concave, convex, irregular, and indeterminant), and flake size (see discussion of debitage analysis below). The weight and maximum thickness of each flake were also recorded.

Lithic debitage was sorted into three groups based on flake type (flake of bifacial reduction/retouch, blades, and other). Flakes were then divided into subgroups based by condition (whole or broken), and presence/absence of cortex. The size of each whole flake was measured using a series of nested squares divided at 5-mm intervals. The squares range in area from 1-1000 mm^2 to >2026 mm^2. The total weight of all flakes from a provenience was recorded.

Artifacts classified as polished/ground stone consist of only worked soapstone (perforated slabs) and unidentified polished/ground stone. Recorded for each specimen were condition (whole, nearly whole [greater than 70 %], or fragment), maximum length, maximum width, maximum thickness, and weight.

Cobble and cobble fragments greater than 3 cm in any dimension were subjected to detailed analysis of condition (whole, nearly whole, fragment, and indeterminant), and shape (ovoid, spheroid, elliptical, rectangular, irregular, other, and indeterminant). The maximum length, maximum width, maximum thickness, and weight were recorded for each specimen. Each specimen was also examined for pecking, battering, and abrasion. All specimens with evidence of use were coded for number of wear facets, type of wear, and location of wear. These observations were used to classify tools by functional types (e.g., hammerstone, anvil, and metate) using criteria established by Ballo (1987) in his analysis of the L Lake assemblages (Brooks and Hanson 1987).

RESULTS OF LITHIC ANALYSIS

The presentation of results of lithic analysis is organized by artifact classes listed in Table 4-1. For each section, discussion begins with cultural-historical information, followed by inferences about the technofunctional attributes of each class.

Hafted Bifaces

Seventy-three hafted bifaces were recovered in the survey and testing of E Area. Table 4-2 provides a distribution of these bifaces by cultural-historical type and provenience type. Raw material data on hafted bifaces are provided in Table 4-3, and metric data in Table 4-4.

Early Archaic. Pronounced notching in hafted bifaces marks the beginning of the Early Archaic period in the Eastern United States at circa 10,000 B.P. Early Archaic diagnostic bifaces in the region include the side-notched Taylor type (Michie 1966) and the corner-notched Palmer and Kirk types (Coe 1964). Detailed discussions of these types, including chronology, technology, and regional distributions, are found in Sassaman and Anderson (1990:147-150).

Evidence for Early Archaic uses of the E Area is provided by five hafted bifaces: a single Taylor Side-Notched point, and four examples of Kirk Corner-Notched (two of which are shown in Figure 4-1*a, b*). These specimens were found during subsurface testing in three locations; no Early Archaic hafted bifaces were found in surface contexts (Table 4-2). The Taylor and one of the Kirk points were recovered from 38AK153, in a

STP and 2 x 2-m test unit, respectively, some 4 m apart. Another site, 38AK373, yielded two Kirks, one in a test unit 100-110 cm BS, the other in a nearby STP. The fourth and final Kirk specimen was retrieved from a test unit at 38AK564, 60-70 cm BS.

Coastal Plain chert was the only raw material used in the manufacture of Early Archaic hafted bifaces from the E Area (Table 4-3). The lack of other materials is not altogether surprising given the dominance of Coastal Plain chert in local assemblages of all ages. However, upland sites on the SRS and immediate vicinity often contain examples of quartz, orthoquartzite, metavolcanic, and occasionally Ridge and Valley chert bifaces (e.g., Eberhard et al. 1994; Sassaman 1996; Stephenson et al. 1993). In contrast, larger, riverine sites such as Lewis-East (Sassaman et al. 1990:91-96) and those associated with the Allendale chert quarries (Goodyear and Charles 1984) include very limited nonlocal materials. The greater diversity of raw materials at upland assemblages has been attributed to the use of interriverine areas by groups moving into the upper Coastal from a number of directions, not simply from nearby sites along the Savannah River (Sassaman 1992b, 1996). Such movement may be expected of territorial ranges encompassing multiple drainages of the South Atlantic Slope (e.g., Daniel 1994), or by

Table 4-2. Absolute and Relative Frequencies of Diagnostic Hafted Bifaces by Cultural-Historical Type and Provenience Type.

	Surface		STP		Test Unit		TOTAL	
Type	n	%	n	%	n	%	n	%
Taylor			1	11.1			1	1.4
Kirk			1	11.1	3	6.6	4	5.5
Morrow Mountain			1	11.1			1	1.4
Guilford			1	11.1			1	1.4
Late Archaic Stemmed	1	5.0	1	11.1			2	2.7
LA/EW Stemmed					4	8.9	4	5.5
Woodland Stemmed/Notched	5	25.0	1	11.1	3	11.1	9	12.3
Yadkin	1	5.0			4	11.1	5	6.8
Small Triangular	11	55.0	3	33.3	25	55.6	39	53.4
Small Triangular, Stemmed					1	2.2	1	1.4
Indeterminant	2	10.0			4	2.2	6	8.2
TOTAL	20	100.0	9	100.0	44	100.0	73	100.0

Table 4-3. Absolute Frequencies of Diagnostic Hafted Bifaces by Raw Material.

Type	Coastal Plain Chert	Patinated CPC	Meta-volcanic	Quartz	TOTAL
Taylor		1			1
Kirk		4			4
Morrow Mountain	1				1
Guilford			1		1
Late Archaic Stemmed	2				2
LA/EW Stemmed	4				4
Woodland Stemmed	9				9
Yadkin	5				5
Small Triangular	38	1			39
Small Triangular, Stemmed	1				1
Indeterminant	5			1	6
TOTAL	65	6	1	1	73

Table 4-4. Summary Statistics on Metric Attributes for Diagnostic Hafted Bifaces from the E Area.

Maximum Length (mm)					
Type	n	mean	s.d	min.	max.
Taylor	1			40.1	40.1
Kirk	2	35.1	7.6	30.1	40.9
Late Archaic Stemmed	1			60.1	60.1
Woodland Stemmed/Notched	4	32.4	4.0	28.6	37.2
Yadkin	1			35.7	35.7
Small Triangular	9	25.7	3.1	20.9	29.7
Shoulder Width (mm)					
Type	n	mean	s.d	min.	max.
Taylor	1			17.4	17.4
Kirk	3	25.0	8.1	17.4	33.5
Morrow Mountain	1			26.9	26.9
Late Archaic Stemmed	2	45.6	2.7	43.7	47.5
Woodland Stemmed/Notched	7	26.3	8.6	18.3	44.8
Basal Width (mm)					
Type	n	mean	s.d	min.	max.
Taylor	1			17.5	17.5
Kirk	3	23.8	2.4	21.4	26.2
Guilford	1			9.3	9.3
Late Archaic Stemmed	1			19.5	19.5
LA/EW Stemmed	3	20.3	2.2	18.2	22.5
Woodland Stemmed/Notched	5	16.9	2.2	15.0	20.4
Yadkin	2	22.2	2.3	20.5	23.8
Small Triangular	35	19.7	3.3	11.1	26.1
Small Triangular, Stemmed	1			10.2	10.2
Maximum Thickness (mm)					
Type	n	mean	s.d	min.	max.
Taylor	1			7.7	7.7
Kirk	4	6.7	1.4	5.0	8.3
Morrow Mountain	1			7.2	7.2
Guilford	1			9.7	9.7
Late Archaic Stemmed	2	10.2	1.6	9.0	11.3
Woodland Stemmed/Notched	9	7.6	1.5	5.7	10.2
Yadkin	5	5.2	0.8	4.1	6.3
Small Triangular	39	4.5	0.8	3.0	7.2
Small Triangular, Stemmed	1			4.2	4.2

habitual use of interriverine divides for drainage-oriented movement (e.g., Eberhard et al. 1994).

Small sample size notwithstanding, the lack of raw material diversity within the E Area tends to support the model developed by Anderson and Hanson (1988), which views Early Archaic settlement in the Upper Coastal Plain as the winter component of a drainage-wide system of mobility. In the model, sites located on terraces of the Savannah River (e.g., Lewis-East) were the relatively stable winter residences from which specialized work parties were deployed into the uplands with toolkits comprised

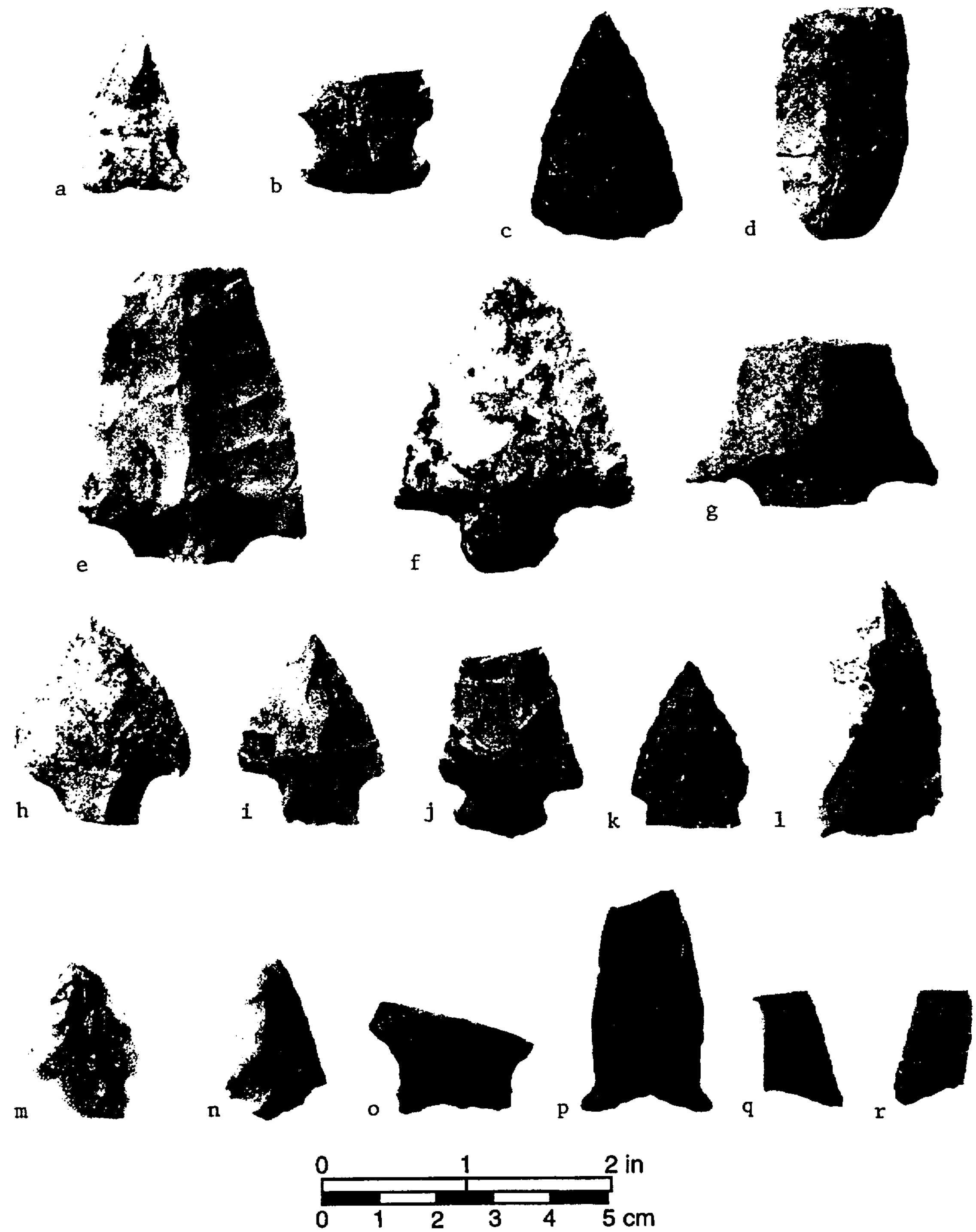

Figure 4-1. Archaic and Woodland period hafted bifaces from E Area. Kirk Corner-Notched (a, b); Morrow Mountain (c); Guilford (d), Late Archaic stemmed (e, f); Early Woodland stemmed/notched (g-o); Eared Yadkin (p); Yadkin (q-r). Provenience: (a) 38AK373-2K; (b) 38AK373-18X-3; (c) 38AK579-1X-11; (d) 38AK546-6X-1; (e) 38AK548-1Ø; (f) 38AK563-9X-1; (g) 38AK155-17D; (h) 38AK564-5E; (i) 38AK106-13C; (j) 38AK106-1Ø; (k) 38AK106-3Ø; (l) 38AK106-6Ø; (m) 38AK153-9Ø; (n) 38AK153-9Ø; (o) 38AK564-2X-1; (p) 38AK155-17D; (q) 38AK155-19C; (r) 38AK155-18D.

predominantly, if not exclusively, of Coastal Plain chert. We return to the implications of this model repeatedly in this report to see how well the E Area assemblage fits.

An advanced degree of patination is evident on each of the Coastal Plain chert specimens. Fracture planes on the fragmented examples are as patinated as other surfaces, indicating that none were broken or modified by later occupants of the sites.

Little can be said about the metric attributes of the Early Archaic bifaces because only two whole examples are present. The whole Taylor point is a more-or-less typical specimen with an elongated blade, well-defined side notches and basal ears, and a slightly concave basal margin. There are very few assemblages of Taylor points with published metric attributes, and none with sufficiently large samples to adequately characterize metric variation within the type. Even the type site, Taylor (38LX1), has but two specimens with published metric attributes (Michie 1992:228). Hence, we cannot comment on the conformity of the E Area specimen to assemblages elsewhere. We nevertheless take note that the E Area specimen lacks the blade beveling common to Taylors with advanced resharpening.

We are in a much better position to evaluate the metric conformity of E Area Kirk points to other assemblages in the area. Similar to area assemblages, the E Area Kirks range from small to large, with differences in basal and notch morphology, as well as blade morphology. Much of the interassemblage variation in length and shoulder width can be attributed to varying levels of blade attrition and maintenance. Overall, the E Area examples are well-worn or broken, so they are relatively short and narrow. Less interassemblage variation is seen in the haft elements of Kirks. The average basal width on three Kirks from E Area is 23.8 mm; the average width between notches is 16.5 mm. Nine specimens from the Crosby Bay site have a mean basal width of 21.4 mm, and mean width between notches of 16.4 mm. Twenty-seven Kirks from Lewis-East have a mean basal width of 23.8 mm, and a mean width at notches of 18.0 mm. These numbers suggest that the haft element of Kirks vary around a consistent norm, independent of the level of blade attrition. This helps to secure the conclusion that Kirk points from the area are the products of a single cultural tradition.

Metric data on Kirks also have the potential to inform on regional settlement organization. Inasmuch as blade length and width are sensitive to use-life stages, interassemblage differences among tools can be used to infer the use-time elapsing since tools in the assemblage were manufactured. Moreover, if this time-dependent process occurred over space (i.e., tool users dispersed from locations of manufacture, using and discarding bifaces at points distant from tool sources), then we ought to be able to make inferences about mobility patterns. The occurrence of Coastal Plain chert Paleoindian and Early Archaic bifaces at great distances from Allendale sources is among the best evidence used to argue for vast mobility ranges during early prehistory (e.g., Anderson and Schuldenrein 1983; Goodyear et al. 1979; Sassaman et al. 1988).

All else being equal, mean blade length and width would be greatest at quarry locations and decrease in regular fashion with distance from quarry. At 38 linear kilometers from the major Allendale chert sources, the Lewis-East site provides the assemblage of measured Kirks closest to a quarry. The two other sites with published metric data on Kirks are roughly 56 (Crosby Bay) and 116 (Taylor) linear kilometers from the Allendale chert quarries.

Mean metric values for maximum length, shoulder width, between-notch width (i.e., haft width), and basal width are tabulated by site in Table 4-5. Because the E Area assemblage is so small, we include data on an assemblage of seven Kirks from the Tinker

Creek site, eight kilometers up the creek from E Area. As shown in Table 4-5, these assemblages are very similar, except in mean basal width. Other similarities between the Tinker Creek and E Area Early Archaic assemblages help to support the notion that these Aiken Plateau locations were limited function sites, which we discuss further below.

The data in Table 4-5 show an overall trend of decreasing length and width with distance from quarry, especially among the Lewis-East, Crosby Bay, and Taylor site samples. However, E Area and Tinker Creek are but only one or two kilometers more distant than Lewis-East, yet they contain considerably shorter and narrower Kirks. Aside from these measures of blade attrition, variation among assemblages is seen in mean haft width and mean basal width, both of which seem to decrease with distance from quarry. To standardize for these possible functional differences, we calculated length-to-haft-width ratios. Three distinct subsets emerge from the comparisons of this variable. Lewis-East is alone in its high ratio, Crosby Bay and Taylor have similar moderate values, and E Area and Tinker Creek share the lowest values. Obviously, these values do not covary with distance from quarries.

In considering the possible causes for deviation from a linear relationship between distance and biface attrition, functional differences among the sites come to mind immediately. Two conditions must be true for a linear relationship to exist: the sites included must be functional equivalents (e.g., base camps), and, they must all be part of a single settlement system. On the first count, we have little basis for suggesting that E Area and Tinker Creek are the functional equivalents of Lewis-East, Crosby Bay, and Taylor. These latter sites have each produced not only sizable assemblages of corner-notched bifaces, but also numerous and diverse unifacial tools, debitage, and cobble tools. In contrast, E Area and Tinker Creek have produced scattered distributions of a few bifaces and unifacial tools. Granted, E Area sites have not been excavated enough to dismiss the possibility of dense accumulations of diverse Kirk-aged toolkits, although this seems highly unlikely given the extent of testing to date. Tinker Creek, on the other hand, has seen over 350 m^2 of excavation, enough of which has been sufficiently deep to substantiate the scattered, low-density nature of Early Archaic deposits.

Like so many other small "scatters" of Early Archaic material at upland sites on the SRS, the E Area and Tinker Creek appear to represent limited function, nonhabitation sites. Launched from sites such the Lewis-East, the small parties that visited these upland

Table 4-5. Summary Statistics of Coastal Plain Chert Kirk Corner-Notch Attrition at Selected South Carolina Sites.

Site	Distance to quarry (km)	Mean Maximum length (mm)	Mean Shoulder width (mm)	Mean Haft width (mm)	Mean Basal width (mm)	Length to haft width ratio
Lewis-East	38	46.6	29.3	18.0	23.8	2.59
E Area	*39 (50)	35.5	25.1	16.5	23.8	2.15
Tinker Creek	*40 (58)	33.9	23.3	16.1	20.6	2.11
Crosby Bay	56	37.9	24.4	16.4	21.4	2.32
Taylor	116	35.5	20.6	15.4	20.5	2.31

*distance in parentheses is combined distance from quarry to Lewis-East and from Lewis-East to respective sites on Upper Three Runs Creek.

sites left behind broken bifaces, occasional unifaces, and the by-products of tool maintenance and use. Thus, the level of attrition seen in tools from such sites is a function of not simply distance of the base camp(s) from quarries, but also distance of special function site from base camp(s). Using Lewis-East as an example, the total distance from quarry to base camp (i.e., Lewis-East) to special function site (i.e., E Area and Tinker Creek) is a much better predictor of the attrition of Coastal Plain chert bifaces than is distance to quarries alone (Table 4-5).

This sort of refinement in our modeling of tool attrition is possible because we are able to draw some conclusions about the functional relationships among sites in an early Archaic settlement systems, such as those we reviewed in great detail in Chapter 2. Obviously, we cannot jump to further conclusions about the functional relationships between the SRS sites and Crosby Bay or Taylor. At some level we can argue they are all part of an integrated, large-scale system, such as that proposed by Anderson and Hanson (1988). But this is not to say that the patterns of tool attrition will be reduced to a simple reconstruction of the functional integration of site types and their respective distances from one another. However, we are optimistic that continued efforts to record and analyze metric data on Coastal Plain chert Kirks (as well as other tool types) will form some of the best data we can muster for reconstructing Early Archaic settlement organization, including aspects of mobility range, range repositioning, procurement patterns, and possibly exchange.

Finally, the condition and breakage patterns of Early Archaic hafted bifaces lend additional insights into technofunctional properties and land-use patterns. The Taylor point and one of the Kirk specimens are whole (Table 4-6), although, as noted above, they exhibit advanced levels of resharpening. The three fragmented Kirks include two basal fragments with lateral snaps to the blade, and a small basal "ear" fragment that was likely produced by a radial fracture (Table 4-7). All of these fractures are use breaks; none can be attributed to manufacturing errors. Hence, the condition and breakage patterns on Early Archaic hafted bifaces points to use damage and intentional discard or, in the possible case of the radial fracture, recycling. This supports an inference for limited functions at E Area locations.

Table 4-6. Absolute Frequencies of Diagnostic Hafted Bifaces by Condition.

Type	WH	TR	BS	TR/BR	BR	OT	TOTAL
Taylor	1						1
Kirk	1		2			1[a]	4
Morrow Mountain					1		1
Guilford			1				1
Late Archaic Stemmed	1			1			2
LA/EW Stemmed			4				4
Woodland Stemmed	4	1	1	1	2[b]		9
Yadkin	1	1	3				5
Small Triangular	7	20	10			2	39
Small Triangular, Stemmed			1				1
Indeterminant		2	2		2		6
TOTAL	15	24	24	2	5	3	73

WH = Whole; TR = Tip Removed; BS = Base; TR/BR = Tip Removed and Portion of Base Removed; BR = Base Removed; OT = Other

[a]Only a very small portion of biface missing.

[b]Only a very small portion of one biface missing.

Table 4-7. Absolute Frequencies of Fragmented Diagnostic Hafted Bifaces by Fracture Type.

Type	Reduction Error[1]	Incipient Fracture Plane	Heat Fracture[2]	Impact	Other Use Fracture[3]	Other[4]	TOTAL
Kirk					2	1	3
Morrow Mountain					1		1
Guilford					1		1
Late Archaic Stemmed						1	1
LA/EW Stemmed					4		4
Woodland Stemmed				1	3	1	5
Yadkin					2	2	4
Small Triangular	2	4	1	3	16	6	32
Small Triangular, Stemmed					1		1
Indeterminant	1			1	3	1	6
TOTAL	3	4	1	5	33	12	58

[1]perverse fractures, [2]crenated fracture, [3]includes lateral blade and haft snaps, [4]includes multiple fractures and radial fractures.

Middle Archaic. The Middle Archaic period in the South Atlantic Slope is marked by the appearance of stemmed hafted biface technology (Sassaman et al. 1990:150). This change is believed to be an outgrowth of the indigenous traditions of notching in bifaces (Coe 1964; Oliver 1985), although some local phases of the Middle Archaic period are of seemingly nonlocal origin. Borrowing from the Carolina Piedmont sequence established by Coe (1964), the Middle Archaic biface sequence in the middle Savannah River valley includes, in order from oldest to latest, the Kirk Stemmed (ca. 8000-7800 B.P.), Stanly (7800-7500 B.P.), Morrow Mountain (7500-6000 B.P.), and Guilford types (6000-5000 B.P.) (Sassaman and Anderson 1990:144). Examples of each type have been recovered from SRS sites, but none appear in large numbers. In fact, of the four, only the Morrow Mountain type has appreciable occurrence on the SRS, and even then the numbers pale in comparison with frequencies from upcountry sites (Blanton and Sassaman 1989). In short, the Middle Archaic period, as defined on the basis of the Coe point types, is very poorly represented on the SRS.

In addition to the Coe types, the SRS area contains sites with lanceolate stemmed points referred to as Brier Creek (Michie 1968a) and MALA (Sassaman 1985). These types share a number of features that parallel Guilford technology of the Piedmont province. They are all lanceolate in form, with relatively thick, lenticular cross sections. The Brier Creek and MALA types differ from the Guilford type in terms of raw material. While Guilfords are usually made form Piedmont sources of quartz and metavolcanic rock, the MALA and Brier Creek types in the SRS area are made from Coastal Plain chert, nearly all of which is thermally altered. Localized raw material procurement is implied by these differences, suggesting that the two distinct groups are subregional variations on the same tradition. If fact, Brier Creeks are sometimes referred to as "Coastal Plain Guilfords" (e.g., Novick 1982). The types indeed are likely coeval, but we have no sound knowledge about the actual cultural-historical relationships among them. Sassaman (1985; Sassaman and Anderson 1990:153-157) has maintained that the local MALA tradition has historical roots in the Benton phase of the Midsouth. As such, it represents the first substantial use of Coastal Plain sites in the Savannah River valley since the Early Archaic period. MALA points are relatively numerous in the Allendale area, and throughout the Coastal Plain portion of the Savannah River valley, including the SRS. Despite their conspicuousness, MALA points have yet to be adequately dated.

Based on limited stratigraphic context (Elliott et al. 1994; Albert C. Goodyear, personal communication, 1995; Sassaman 1985) and crossdating with Guilford and Benton points, we assume that MALA points date to the late Middle Archaic, roughly 6000-5000 B.P. Knowledge about the settlement-subsistence systems of MALA-using people is virtually nonexistent.

Consistent with prior work at upland locales on the SRS, the E Area survey produced only minor evidence for Middle Archaic activities. Hafted biface remains are limited to two fragmented specimens: a Morrow Mountain and a Guilford, both coming from shovel tests (Table 4-2; Figure 4-1*c*, *d*). The Morrow Mountain point was made from thermally-altered Coastal Plain chert. It appears to have been broken in use by a haft snap. The Guilford is made from metavolcanic material indicative of a Piedmont origin. It was broken by a lateral snap of the blade. Both specimens appear to have been damaged from use, instead of manufacture or maintenance, although the Guilford may have been discarded in the context of retooling. In any event, the limited occurrence of these types and supporting technofunctional data indicate only limited, transient use of the E Area during the Middle Archaic period.

The lack of MALA points in the E Area survey is a bit surprising. We note, however, that several fragments of bifacial preforms (described in the "Other Biface" section below) have the distinctive attributes of MALA technology. A more intensive use of E Area during the late Middle Archaic period may be argued from these additional occurrences.

Late Archaic. Large, square-stemmed bifaces are the hallmark of Late Archaic flaked stone technology in the middle Savannah region, as elsewhere in eastern North America. The classic Savannah River Stemmed type, as defined by Coe (1964), has long-been considered the typical Late Archaic biface, and its use as a diagnostic form has been generalized to include many of the local Late Archaic cultures of the South Atlantic Slope. The Carolina Piedmont sequence features a continuation of stemmed bifaces throughout the Late Archaic and into the Early Woodland periods, but with a gradual reduction in size. Small Savannah River Stemmed and Otarre Stemmed are two of the later types in the sequence (Oliver 1985).

As one might expect, the Carolina Piedmont sequence does not apply wholesale to the Savannah River valley. One deviation is that smaller stemmed points such as the Paris Island Stemmed (Wood et al. 1986) predate the Savannah River Stemmed form by several centuries. We have come to appreciate recently, based largely on the work of Jerald Ledbetter and Dan Elliott (Elliott et al. 1994; Ledbetter 1995), that the classic Savannah River Stemmed type has very limited cultural and historical application. By "classic" we mean the large, square-stemmed and broad-bladed forms made almost exclusively from metavolcanic materials. These forms are restricted virtually to the Fall Zone and Piedmont areas of the South Atlantic Slope, indicating localized procurement patterns, and, more importantly, geographical circumscription of local populations. In the middle Savannah region the type is dated securely to the interval 4150 to 3800 B.P. and is referred to by Elliott (et al. 1994) as the Mill Branch phase, based largely on the work of Jerald Ledbetter (1995) at the Mill Branch sites in Warren County, Georgia. We are also secure in the knowledge that during this same interval of time there were groups occupying Coastal Plain riverine sites who made plain, fiber-tempered pottery with thickened and flanged lips, as well as large stemmed points made from Coastal Plain chert. Perhaps due to size restrictions on nodules of chert, the Coastal Plain forms average about two-thirds the maximum length (ca. 66 mm) of their metavolcanic counterparts (ca. 92 mm), and with proportionately smaller haft elements (Ledbetter 1995:65). Because of the differential use of pottery, however, we would not argue that the Piedmont and Coastal Plain groups are one and the same, biface similarities notwithstanding. Rather, there is little doubt that the Mill Branch phase represents a distinctive cultural expression of local Late Archaic populations and that it had a Coastal Plain counterpart with which it was fully contemporaneous.

After about 3800 B.P. the situation becomes even more complex. Full-blown Stallings Culture, with its large accumulations of freshwater shell and use of elaborately decorated fiber-tempered pottery, comes to dominate the middle Savannah region as the Mill Branch phase and its distinctive Savannah River Stemmed technology disappear. Biface technology diversifies at this point to include a wider range of raw material types and stemmed biface forms. Smaller stemmed points described as Otarre, Small Savannah River Stemmed, and Kiokee Creek Stemmed (Elliott et al. 1994) predominate. The use of thermal alteration on cherts and the high level of flaking quality both disappear from the record. The diversity of stemmed forms may have chronological and ethnic significance, but none that has yet been identified. This trend of increasing diversity in stemmed biface form continues for several centuries after the demise of concentrated Stallings settlement in the middle Savannah region, that is, after ca. 3500 B.P.

The E Area survey yielded only two examples of large stemmed points attributable to the Late Archaic period (Figure 4-1*e, f*). Although both specimens are large, neither is similar in form to the classic Savannah River Stemmed type as defined by Coe (1964). The complete specimen has a short and narrow stem on a broad, but short blade. The fragmented example is especially well-made, with an elongated, thin blade. A haft snap precludes any comment of stem form, although we note that the remnant left by this fracture is relatively broad. Both E Area examples are made from thermally-altered Coastal Plain chert.

Possibly four additional examples of Late Archaic stemmed bifaces from the E Area are represented by small stem fragments produced by haft snaps. All four consist of Coastal Plain chert, two of which were thermally altered. Because these are generally small forms (i.e., <23 mm basal width), none can be attributed to the Savannah River Stemmed type. Their small form also makes it difficult to assign them with confidence to the Late Archaic period, for they could easily fit into any number of Early Woodland Refuge assemblages from the Aiken Plateau (e.g., Sassaman 1993a).

Little can be concluded about the E Area stemmed biface assemblage aside from the fact that examples of early stemmed points and classic Savannah River Stemmed forms are absent. This finding is consistent with the lack of MALA points, and the very limited occurrence of fiber-tempered pottery. We can suggest reasonably that the stemmed bifaces were being used by the inhabitants who made, used, and discarded Thom's Creek pottery at E Area sites, although we note again the possibility of at least some of the fragmented examples dating to the Refuge phase. The whole stemmed biface noted above was associated with Thom's Creek pottery at 38AK563. Otherwise, the low incidence of stemmed points accords well with the relatively low frequency of Late Archaic pottery in the E Area (see Chapter 6). Both sets of data point to limited habitation use of E Area sites.

Early Woodland. As we noted above, during the Early Woodland period (ca. 3000-2500 B.P.), there was a persistence of stemmed biface forms from the Late Archaic period. However, the bifaces from the Early Woodland period are generally smaller and exhibit a wider range of hafting morphology than Late Archaic bifaces. Most forms in area sites have stemmed morphology, although corner notching and side notching are not uncommon (Sassaman 1993a). No single trait distinguishes Early Woodland points from their Late Archaic antecedents. Instead, a suite of attributes must be considered.

Characteristics of Early Woodland hafted biface technology include: (1) expedient tool manufacture; (2) situational tool design; (3) use of thick, irregular flake blanks; (4) expedient tool manufacture; (5) deep, irregular flaking; (6) flaking occasionally limited to dorsal surface of flake blank; (7) limited controlled thermal alteration of chert; and (8) occasional scavenging of raw material and flaked stone debris from older sites (Sassaman 1993a:167; Sassaman and Anderson 1990:162). The seeming irregularity and situational nature of this biface technology has been attributed to limited access to raw materials, diminished need for formal bifaces in the context of reduced settlement mobility, and the greater visibility of biface technology in domestic contexts, including that used by women (Sassaman 1992c, 1993a:166-167).

Because of the formal diversity observed among Early Woodland bifaces from SRS sites, we have been reluctant to classify specimens into established types, or to create new types to accommodate local variation. We choose instead to employ the catch-all category "Woodland Stemmed/Notched," which is consistent with our treatment of Early Woodland technology in the SRS synthesis report (Sassaman and Anderson 1990:161-163) and in the report on 38AK157 (Sassaman 1993a).

Nine hafted biface specimens from the E Area survey are classified herein as Woodland Stemmed/Notched (Figure 4-1*g-o*). This group includes an appreciable range of forms and sizes. All are made from Coastal Plain chert, only one of which is definitely thermally altered. This latter example and one, possibly two of the others show traces of double patination. Two other examples were made from the snapped blades of larger, presumably older bifaces. This pattern of scavenging and recycling follows from that documented at 38AK157, and appears to be a widespread aspect of Refuge-phase biface technology in the Upper Coastal Plain (Sassaman 1993a:214-224).

Fractures among the Woodland Stemmed/Notched bifaces include several use breaks, including impact (n = 1), haft snap (n = 3), and lateral snap (n = 1). Three of the four whole specimens have advanced levels of resharpening, and likely were discarded because of exhaustion. Both tool use and tool replacement are indicated by this small assemblage. Spatially, the bifaces are found exclusively along the easternmost stream stem, the area that likewise produced the greatest concentration of Refuge Simple-Stamped pottery.

Middle Woodland. In the vicinity of the SRS the Middle Woodland period is heralded by the introduction of check-stamped pottery and triangular hafted bifaces. Three forms appear about 2500 B.P. in Deptford Middle Woodland contexts: the Large Yadkin, Eared Yadkin, and Badin Crude Triangular (Coe 1964). The Badin is either the earliest triangular form in the area, or, more likely, an early-stage preform of the Large Yadkin (Sassaman and Anderson 1990:164). Either way, Badins are not very common to the SRS. Eared Yadkins and the more numerous Large Yadkin are probably contemporaneous. All of these types were supplanted by small triangular arrowpoint technology at about A.D. 500. The various Yadkins types may yet prove to be an early form of arrowpoint technology, although it seems more likely that they served as dart points in the continuing tradition of Archaic and Early Woodland points.

Five examples of Yadkin points were found in the E Area, one of which is an Eared Yadkin (Figure 4-1*p*). Four of the specimens, including the eared variety, were found in adjacent test units and associated with Deptford pottery at 38AK155. The nearby site of 38AK157 is the location of one of the largest Yadkin assemblages (n = 16) ever recovered on the SRS (Sassaman 1993a:174).

All of the Yadkin specimens were made from Coastal Plain chert. One example with potlid and crenated fractures was thermally-altered, but we cannot tell if this was intentional or postdepositional. The three other fractured examples have combinations of lateral snaps to the blade and longitudinal fractures through the base (Figure 4-1*q, r*). Impact may have caused these breaks, although intentional radial breaks or other sources cannot be ruled out. Similar breakage patterns are seen in the 38AK157 assemblage in the context of tool replacement. Given the concentrated nature of basal portions at 38AK155, retooling appears to have been the major activity involving Yadkins. The only other occurrence of a Yadkin point in the E Area is the whole specimen from 38AK153. The limited biface evidence for Middle Woodland use of E Area is duplicated by the relatively small assemblage of Deptford pottery (see Chapter 5).

Late Woodland and Mississippian. Small triangular arrowpoints are the lithic hallmark of the Late Woodland and Mississippian periods in the region (ca. A.D. 500-1450). They are believed to reflect the introduction of bow and arrow technology in the region at circa A.D. 500, although, as we noted above, the Yadkin types may represent a local antecedent. The typology of small triangular points remains ambiguous for the SRS, although a variety of types such as Caraway and Madison are applied by researchers in the region.

Despite the ambiguity of type names and their application, some variation in the metric attributes of small triangulars appears to have chronological significance. Small triangular points from SRS sites range in basal width from 9 to 30 mm, although the vast majority fall in the range of 15 to 24 mm (Sassaman and Anderson 1990:167). Based on SRS samples and assemblages from other regional sites (e.g., Anderson et al. 1982:151-155; Blanton et al. 1986; Rudolph and Hally 1985), a trend of decreasing size has been proposed for small triangular points. The SRS distribution for basal width for 91 points shows a slight bimodality; points 18 mm or less in basal width constitute a small-size mode, while those greater than 18 mm form a large-size mode. Supporting evidence from other sites has been used to infer that the larger points are Late Woodland in age and the smaller points Mississippian (Sassaman et al. 1990:167-168).

A total of 40 small triangular points was recovered from the E Area survey (Figure 4-2). Basal widths measured on 35 of these specimens have a range of 11.1 to 26.1 mm, with an average of 19.7 mm (Table 4-4). When rounded to the nearest whole millimeter, basal widths show a mode at 18 mm. However, the distribution is skewed decidedly toward the upper end of the range, suggesting that most of the points date to the early centuries of bow and arrow technology. Only six specimens are smaller than 18 mm in width and all but one of these came from Level C (20-30 cm BS) of Prov. 16 at 38AK155. At the same depth in this and contiguous test units were found cordmarked sherds from a vessel with a folded rim, some cob-impressed rim sherds, and a rock cluster with charcoal that yielded a calibrated radiocarbon age of A.D. 1195. This early Mississippian material and corroborating C-14 date help to substantiate the inference that the smallest triangular points are indeed late in the sequence. The other 12 small triangular points from contiguous test units of 38AK155 were spread over levels B-F (10-60 cm BS), with eight of them divided between C and D levels (20-40 cm BS).

Small triangular points with minute stems are represented by an isolated haft element fragment at 38AK563. This type was uncovered in excavations of 38BR495, although its diffuse stratigraphic distribution precluded a definitive estimate of chronology and association (Brooks and Hanson 1987; Sassaman and Anderson 1990:175).

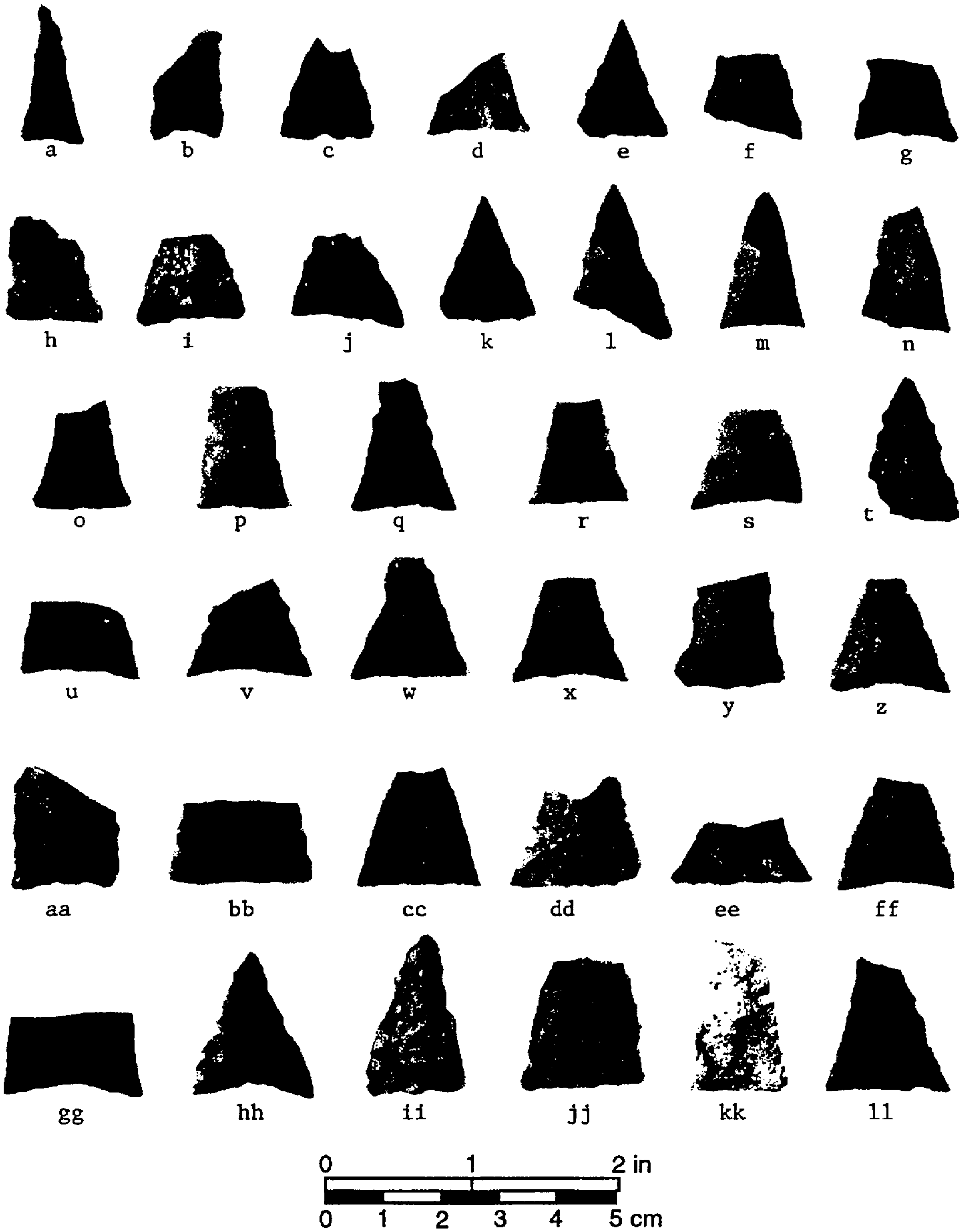

Figure 4-2. Small triangular arrowpoints from E Area. Provenience: (a) 38AK155-16C; (b) 38AK155-16C; (c) 38AKAK546-22B; (d) 38AK580-7A; (e) 38AK546-18X-1; (f) 38AK373-5Ø; (g) 38AK563-13B; (h) 38AK155-16C; (i) 38AK106-13A; (j) 38AK106-1; (k) 38AK566-7B; (l) 38AK155-16B; (m) 38AK155-16C; (n) 38AK155-16C; (o) 38AK106-12Ø; (p) 38AK106-1Ø; (q) 38AK565-5B; (r) 38AK153-10X-1; (s) 38AK546-22B; (t) 38AK155-16F; (u) 38AK546-22B; (v) 38AK155-17D; (w) 38AK563-13B; (x) 38AK155-19C; (y) 38AK155-17D; (z) 38AK155-2Ø; (aa) 38AK155-17B; (bb) 38AK155-25Ø; (cc) 38AK155-17C; (dd) 38AK155-5Ø; (ee) 38AK155-17C; (ff) 38AK155-16D; (gg) 38AK155-19D; (hh) 38AK155-16C; (ii) 38AK155-2Ø; (jj) 38AK106-26Ø; (kk) 38AK106-28Ø; (ll) 38AK106-1.

All 40 small triangular points from E Area were made from Coastal Plain chert. One of the specimens is heavily patinated, although this undoubtedly reflects the use of scavenged material. Ten examples show evidence of excessive thermal alteration (e.g., potlidding, crazing), a condition not uncommon to small triangulars at SRS sites. Analysis of the 38AK157 assemblage of small triangulars concluded that excessive heat was applied to finished points only, indicating either an intentional treatment or post-depositional process that differentially affected a select part of the late prehistoric tool kits (Sassaman 1993a:175).

Besides thermal damage, small triangulars from E Area suffered other types of use damage. Tips were removed by lateral snaps in 16 cases, while another three show definitive traces of impact damage. Incipient fracture planes and reduction errors account for only a few of the fracture types. All in all, the small triangular assemblage reflects projectile use damage and tool replacement.

Other Hafted Bifaces. Six fragmented hafted bifaces from the E Area survey cannot be readily identified to a particular time period or cultural group. Generally, these are small fragments with portions of haft elements, all but one of which are made from Coastal Plain chert. The exception is the basal fragment of a quartz point. These specimens are scattered widely across the study area, and thus our inability to classify these forms does not likely represent a consistent bias in either cultural-historical or technofunctional terms.

Other Bifaces

"Other biface" is a catch-all category for bifacially flaked tools that lack evidence for a haft element. Basically, this category consists of two distinct classes: (1) fragments of bifaces presumed to be hafted bifaces, but lacking definite traces of haft elements; and (2) bifacial preforms and preform fragments. The latter class is defined by bifacial flake scar patterning indicative of early-stage thinning and shaping (i.e., deep, broad flake scars; irregular edge morphology; generally thick, irregular cross sections). A third subset of other bifaces consists of finished bifaces lacking haft element morphology and presumed to be hand held. No such examples are present in the E Area assemblage. Finally, a large portion of the other biface assemblage consists of fragments of bifacially worked stone lacking sufficient morphological properties to be assigned to any of the above classes (listed herein as "Indeterminant Biface").

The E Area flaked stone assemblage includes 167 artifacts classified as other bifaces. Table 4-8 provides a distribution of these bifaces by cultural-historical type and provenience type. Raw material data are provided in Table 4-9. Tables 4-10 and 4-11 provide information of biface condition and fracture type respectively.

In presenting the data on other bifaces, we follow the same format used in the hafted biface section above; that is, the presentation is organized chronologically, from oldest to youngest, and within each time period we present first information on culture-history, followed by inferences about the technofunctional properties of the assemblage.

Early Archaic. Because of the advanced degree of weathering on flaked Coastal Plain chert dating to the early Holocene, it is possible to identify Early Archaic tools from fragmentary and otherwise nondiagnostic artifacts. In addition, some of the distinctive properties of Early Archaic hafted bifaces, such as edge serrations and blade beveling, make it possible to classify even small edge fragments to this early period. Of course, neither patination nor minute morphological properties is adequate to make definite classification at the level of Early Archaic phase, for many of these same properties apply

Table 4-8. Absolute and Relative Frequencies of Other Bifaces by Cultural-Historical Type and Provenience Type.

	Surface		STP		Test Unit		TOTAL	
Type	n	%	n	%	n	%	n	%
Preforms								
Early Archaic	3	9.4	1	3.7	3	2.8	7	4.2
Middle Archaic					2	1.9	2	1.2
Yadkin	1	3.1	1	3.7	4	3.7	6	3.6
Small Triangular					5	4.6	5	3.0
Unidentified	11	34.4	13	48.1	31	28.7	55	32.9
Biface Fragments								
Middle Archaic	1	3.1	2	7.4	4	3.7	7	4.2
Small Triangular Tips	4	12.5			14	13.0	18	10.8
Unidentified	6	18.8	1	3.7	21	19.4	28	16.8
Indeterminate Bifaces	6	18.8	9	33.3	24	22.2	39	23.4
TOTAL	32	100.0	27	100.0	108	100.0	167	100.0

Table 4-9. Absolute Frequencies of Other Bifaces by Raw Material.

Type	Coastal Plain Chert	Patinated CPC	Ortho-quartzite	Quartz	Meta-volcanic	TOTAL
Preforms						
Early Archaic		7				7
Middle Archaic	2					2
Yadkin	6					6
Small Triangular	5					5
Unidentified	48	2	4	1		55
Biface Fragments						
Middle Archaic	7					7
Small Triangular Tips	18					18
Unidentified	26			1	1	28
Indeterminate	32		6	1		39
TOTAL	142	9	10	3	2	167

Table 4-10. Absolute Frequencies of Other Bifaces by Condition.

Type	WH	TP	BS	MS	ED	UN	TOTAL
Preforms							
Early Archaic		4	2			1	7
Middle Archaic		1		1			2
Yadkin	3		3				6
Small Triangular	1		3			1	5
Unidentified	6	17	4	2	5	21	55
Biface Fragments							
Middle Archaic		1		5		1	7
Small Triangular Tips		18					18
Unidentified		12	1	7	3	5	28
Indeterminate	1	6	6	2	5	19	39
TOTAL	11	59	19	17	13	48	167

WH = Whole; TP = Tip; BS = Base; MS = Midsection; ED = Edge fragment; UN = Unidentifiable

Table 4-11. Absolute Frequencies of Fragmented Other Bifaces by Fracture Type.

Type	Reduction Error[1]	Incipient Fracture Plane	Heat Fracture[2]	Radial	Impact	Other Use Fracture[3]	Other[4]	TOTAL
Preforms								
Early Archaic	1	3				2	1	7
Middle Archaic		1					1	2
Yadkin	1	1				1		3
Small Triangular	1	1				1	1	4
Unidentified	13	3	1	4		17	12	50
Biface Fragments								
Middle Archaic		1		1		4	1	7
Small Triangular Tips	1	4	1			12		18
Unidentified	2	2	1	6		11	6	28
Indeterminate	3	4	6	3	1	8	13	38
TOTAL	23	17	9	18	1	50	39	157

[1] consists of perverse and stacked hinge fractures, [2] consists of a crenated and potlid fractures, [3] consists of lateral blade snap fractures, [4] includes multiple fractures and unidentified fractures.

to late Paleoindian tools, and the scavenging and recycling of Early Archaic materials extends these properties into later prehistory. Nevertheless, we feel it is yet worthwhile to isolate heavily patinated and morphological distinct other biface fragments from the rest of the assemblage as possible, if not highly probable, evidence of Early Archaic land-use patterning the E Area.

Seven other biface fragments in the E Area assemblage display an advanced level of patination (Table 4-8; Figure 4-3*a-e*). All but one of these items has irregular flaking and edge properties indicative of middle-stage preforms, whereas one is a well-thinned and shaped preform base that shows minor modification or use-wear on its fracture planes (Figure 4-3*a*). Unequivocal examples of blade fragments from finished Early Archaic hafted bifaces are not observed.

We conclude that all seven pieces are fragments of Early Archaic hafted biface preforms. As such they reflect a relatively narrow range of reduction; there are no examples of biface blanks or early-stage preforms (i.e., none with cortex and/or unmodified surfaces). Suggested here is a pattern of relatively late-stage reduction in the context of tool replacement. The four tip, two basal, and one unidentified fragments that constitute this assemblage were broken variously by raw material flaws (i.e., incipient fracture planes), perverse fractures, and lateral snaps, all of which can occur in the late stages of biface reduction.

Given the evidence from hafted bifaces for limited, transient use of E Area during Early Archaic times, the small preform assemblage shows that relatively late-stage preforms were transported into the E Area for further reduction and on-site tool replacement. Most of this activity appears to have taken place along the southwest-facing slopes of the largest tributary in the study area, an area that also yielded two of the five Early Archaic hafted bifaces in our sample.

Middle Archaic. Like the Early Archaic, Middle Archaic flaked stone technology in the SRS area exhibits raw material and morphological properties sufficiently distinct to enable reasonably secure temporal classification of other biface fragments. In this case,

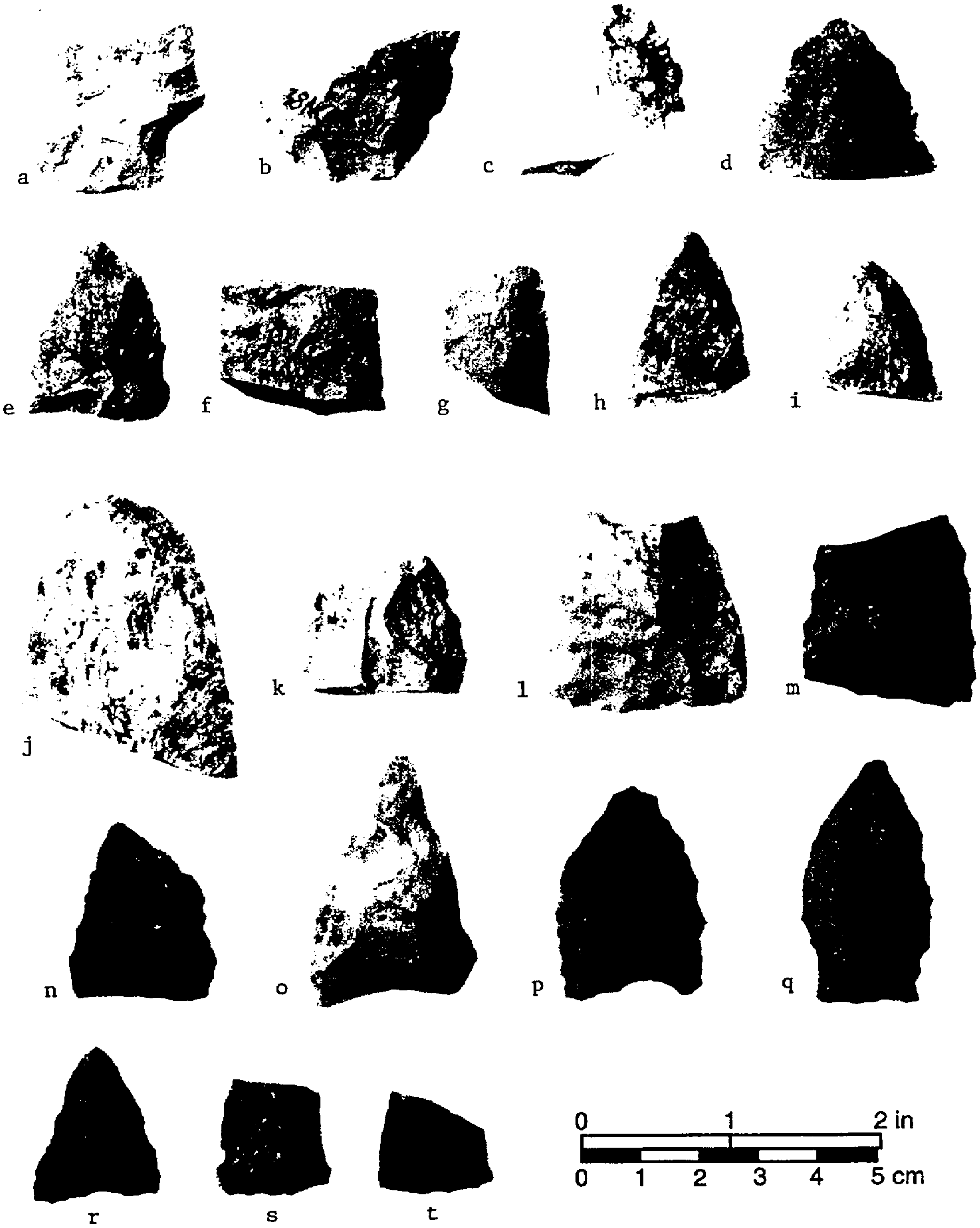

Figure 4-3. Other biface fragments with diagnostic traits from E Area. Provenience: (a) 38AK106-6Ø; (b) 38AK106-9F; (c) 38AK151-14G; (d) 38AK153-14Ø; (e) 38AK552-7X-4; (f) 38AK563-12D; (g) 38AK580-7D; (h) 38AK154-11B; (i) 38AK561-2X-1; (j) 38AK561-6F; (k) 38AK561-6F; (l) 38AK155-19D; (m) 38AK155-15Ø; (n) 38AK155-17C; (o) 38AK580-7C; (p) 38AK565-5F; (q) 38AK546-11X-1; (r) 38AK563-13C; (s) 38AK155-17C; (t) 38AK155-18D.

however, the distinctive features are limited to only the latest portion of the period, roughly 6000-5000 B.P., when thermal alteration and lanceolate projectile technology were in vogue. Specifically, the heat treated chert and well-made lanceolate forms of Brier Creek and MALA bifaces can be recognized in lieu of finished tools. This is significant for we have absolutely no evidence for late Middle Archaic use of E Area in the hafted biface assemblage.

Seven Coastal Plain biface blade fragments from E Area exhibit the well-controlled use of thermal alteration, high-quality flaking, and lanceolate morphology of MALA/Brier Creek technology (Figure 4-3*f-k*). Five of the fragments are midsections, one is a tip, and another an unidentifiable edge fragment. No basal fragments are present, suggesting that broken tools were not routinely removed from hafts and discarded in the study area. Lateral snaps are the most common fracture type in the sample, while at least one, possibly two specimens appear to have been intentionally shattered by a radial fracture.

Consistent with the lack of evidence for retooling is the limited number of preform fragments attributed to the late Middle Archaic period. The biface production sequence of MALA points has been observed in several contexts on the SRS, particularly at 38BR383 and 38BR34 (Sassaman et al. 1990:100-104, 109, 11), so we have a sound basis for recognizing MALA preforms within the E Area assemblage. Examples of such are limited to a preform tip and midsection from one location in E Area (38AK561; Figure 4-3*j, k*). The tip broke at a large vug in the preform and presumably was abandoned because most of this imperfection remained with the tip fragment. The midsection has been reworked and/or utilized following two lateral snaps. It may actually have come from a finished tool; if so, evidence of its finished edges have been obliterated.

Taken together, the late Middle Archaic biface assemblage points to limited, transient use of E Area. Locationally, the assemblage has a peculiar distribution, much of it coming from two Upper Three Runs floodplain sites and the preforms from a single location overlooking this floodplain. We shall return to this peculiar pattern in our spatial analysis of the E Area data, but note for now that it is one that deviates from the patterns of all other time periods.

Late Archaic/Early Woodland. As we discussed in the section of hafted bifaces above, Late Archaic and Early Woodland hafted biface technology encompasses a great deal of variation within the longstanding tradition of stemmed biface form. Aside from the distinctive raw material and morphological properties of classic Savannah River Stemmed bifaces, none of the Late Archaic and Early Woodland material is unique enough to enable sound classification of biface blade fragments and preforms. This holds true for the E Area assemblage. We cannot identify confidently subsets of the other biface assemblage that definitely dates to either time period, although we are certain that much of the "indeterminant" material in this catch-all category indeed dates to these periods.

One additional point is worthy of mention. Because of the frequent scavenging of Late Archaic lithic refuse by Woodland-period tool makers in the Aiken Plateau (Sassaman 1993a:214-224), it is possible that much more Late Archaic tool manufacture and discard took place in E Area than our survey data allow. This bias must be borne in mind in the spatial analyses we present later.

Middle Woodland. The ambiguity of stemmed biface technology ends with the introduction of triangular biface technology during the Middle Woodland period.

Excavations at SRS sites have provided good opportunities to document Large Yadkin preforms in association with finished points (e.g., Brooks and Hanson 1987; Sassaman 1993a). In many respects, Yadkin preforms fit the criteria for "Badin Crude Triangular" type, as provided by Coe (1964:45): " a large, crudely made triangular point," with large, broad flake scars and lacking final edge retouch. A comparison of Coe's plates of Badins and Yadkins is evidence enough that the former are preforms of the latter (Coe 1964:46-47).

Six large triangular (Yadkin) preforms were recovered from E Area (Figure 4-3*l-q*). All are made from Coastal Plain chert, one of which appears to have been altered by heat. Three are whole, the others are basal fragments missing relatively minor portions of the tip. Stacked hinge fractures appear to have the reason why two of the whole examples were abandoned without further reduction. One of the whole specimens may have been intended for reduction into the eared variety of Yadkin.

Yadkin preforms from E Area are widespread: four different locations are involved, with only one (38AK155) producing more than one example. This is the same location that produced the only subsurface examples of finished Yadkins in the study area. A strategy of focused tool manufacture and replacement was documented at the nearby site of 38AK157 (Sassaman 1993a). The 38AK155 assemblage appears to duplicate this evidence, but with chert as the raw material instead of the orthoquartzite used at 38AK157.

Late Woodland and Mississippian. Small triangular points of the Late Woodland and Mississippian periods are recognized in preform and fragmentary states by their consistently small size, triangular shape, and the use of thin flake blanks (three examples of small triangular preforms are depcited in Figure 4-3*r-t)*. The tips of broken triangular points, for instance, are easily discriminated from their counterparts in Archaic and Woodland technologies.

Eighteen tips of small triangular points were recovered from E Area. All came from points made from Coastal Plain chert flakes. The majority (67%) have been broken by lateral snaps of the blade. Impact damage is not obvious on any of the specimens, although because they are so thin, the blades may suffer lateral snaps instead of fluting upon impact. On the other hand, all but two of the tips occurred in only three locations (38AK106, 38AK155, 38AK563), not the sort of dispersed pattern one might expect from de facto impact damage. Rather, much of the fragmentary assemblage may have been generated during retooling. Indeed four of the five small triangular preforms, and 30 of the 36 small triangulars with basal elements came from these same three locations. It is unlikely, then, that the E Area tip assemblage is revealing a functionally distinct aspect of small triangular use and discard. Completely isolated tips are the functionally distinct signature of projectile use. The chances of locating such finds with shovel testing are exceedingly remote.

Unidentifiable Preforms and Biface Fragments. The E Area biface assemblage includes 6 whole preforms and 49 fragments with preform characteristics that lack temporally meaningful traits. Examples of these nondiagnostic specimens are depicted in Figure 4-4. Coastal Plain chert was used for 48 of the specimens. There is little that can be added about these nondescript chert specimens except to point out the wide range of fracture types represented (Table 4-11; Figure 4-4). As we noted earlier, a good deal of this material undoubtedly derives from Late Archaic and especially Early Woodland tool production.

Examples of quartz and orthoquartzite are notable because they are missing from all other preform classes. The quartz example has a distinctive triangular outline with a

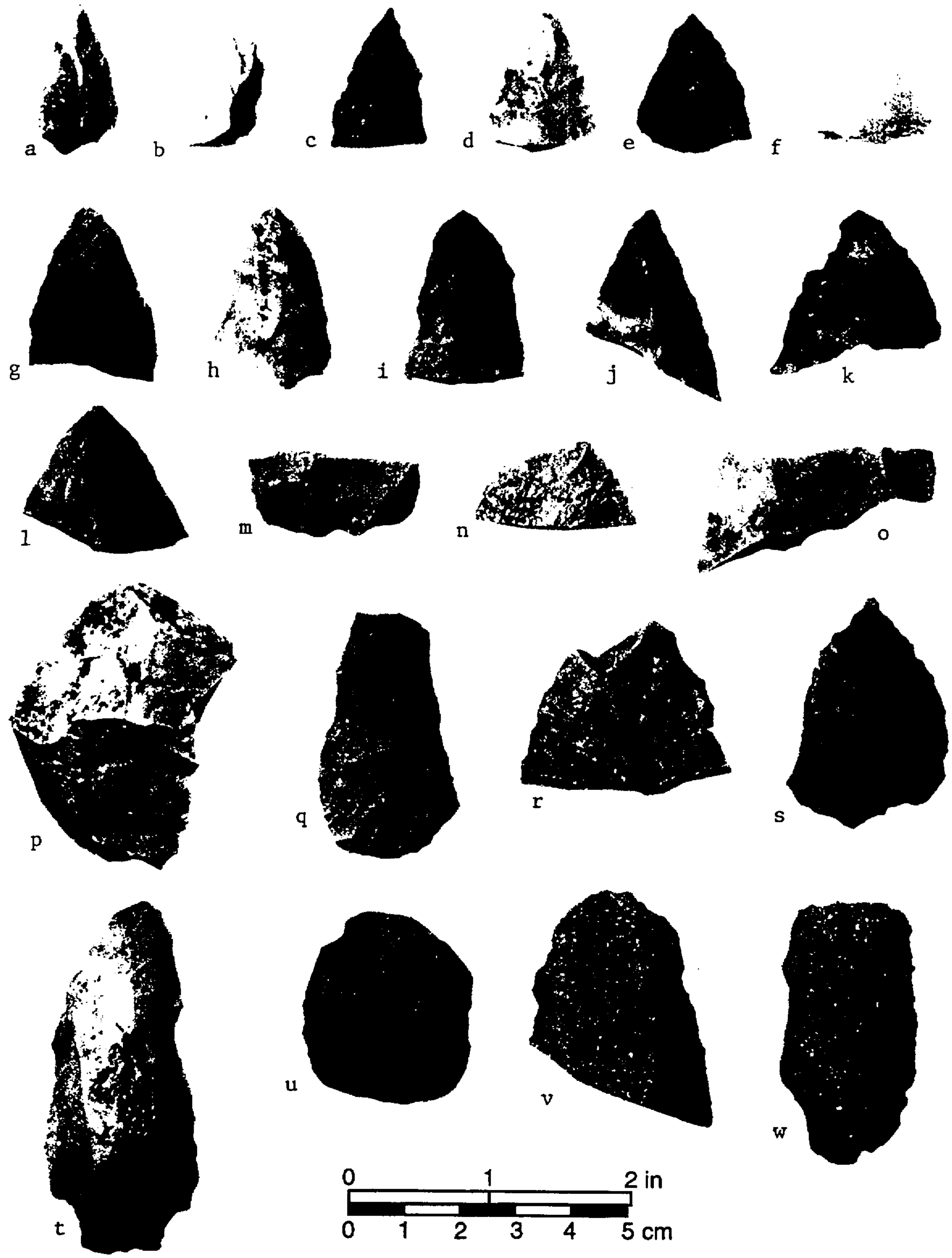

Figure 4-4. Nondiagnostic other biface fragments from E Area. Provenience: (a) 38AK151-13Ø; (b) 38AK553-5F; (c) 38AK106-1Ø; (d) 38AK564-5A; (e) 38AK566-1X-1; (f) 38AK155-17C; (g) 38AK564-5B; (h) 38AK106-6Ø; (i) 38AK579-14B; (j) 38AK155-18E; (k) 38AK106-1Ø; (l) 38AK155-F. 3; (m) 38AK106-13C; (n) 38AK561-6G; (o) 38AK580-7D; (p) 38AK561-6F; (q) 38AK106-2Ø; (r) 38AK154-4Ø; (s) 38AK563-9X-3; (t) 38AK546-23C; (u) 38AK153-3Ø; (v) 38AK106-6Ø; (w) 38AK579-13F.

"rocker" base. It may represent a variant of Yadkin technology but it does not coincide with the other Yadkin examples, nor is there a local precedence for the local use of quartz in this Middle Woodland tradition. The four orthoquartzite preform fragments (three shown in Figure 4-4*u-w*) may likewise derive from Yadkin manufacture as this material was drafted into such use at 38AK157. We hesitate to give this inference much weight, however, because the morphology of the E Area examples does not match the 38AK157 ones, nor do the E Area finds coincide with other Middle Woodland evidence.

Another 28 biface fragments from E Area have traces of finely-retouched and utilized edges indicative of finished tools. Aside from single examples of metavolcanic and quartz, the fragments consist of Coastal Plain chert. Most of the fragments are too small to project anything about the size and shape of tools from which they come. A couple of the larger tips represented may derive from Late Archaic stemmed bifaces, while many others could have fit comfortably on the smaller stemmed and notched points of the Early Woodland period. As none of the fragments include haft elements or other obvious basal features, we do not expect any to reflect retooling activities. Instead, the number of use breaks, including intentional radial fractures, point to contexts of tool use and recycling.

Indeterminant Biface Fragments. The E Area biface assemblage is rounded out by 39 fragments that cannot be classified as to cultural-historical or technofunctional type. Again Coastal Plain chert dominates the assemblage, with six examples of orthoquartzite and a single quartz specimen. Fracture patterns include a large number of production-related breaks, so we suspect that the majority of these amorphous artifacts were generated in the context of biface production.

Cores

The E Area survey produced a small but diverse and interesting set of cores. Represented among the 12 specimens in the assemblage are at least three distinct technologies. A patinated chert flake core from 38AK106 (Figure 4-5*a*) matches the flake core technology observed in the Early Archaic Kirk assemblage from 38AK228E (Sassaman et al. 1990:91-96). It is an exhausted bidirectional core used to produce flakes for purposes other than biface manufacture (perhaps unifacially-retouched flake tools). This item was found in association with Early Archaic biface preforms, and thus helps to bolster the inference that 38AK106 was more than a casual stopover in transient use of the E Area.

A second type of core technology is seen in a set of three bifacial cores from 38AK563 (two shown in Figure 4-5*b, c*) One is an especially large, thick core; the others are fragments from what appear to have been equally large bifacial cores. Cores of this form and size have been found repeatedly in Late Archaic assemblages on the SRS. They are believed to have served a dual purpose: (1) serving as a source of large, usable flakes, and (2) ultimately being drafted into use as a functional biface in various stages of reduction. In this latter sense we would be justified in classifying these sorts of cores as "bifaces," although we hesitate to do so because we do not wish to equate these with the finished products we normally associate with Late Archaic stemmed biface technology. The significance of this sort of core design is that it is a portable source of high-quality and predictably reducible raw material for use in areas away from naturally-occurring or culturally-stockpiled sources of stone. The adaptive significance of bifacial cores among mobile hunter-gatherers has been the subject of much research across North America (e.g., Kelly 1988; Nelson 1987), and it has formed the basis for settlement subsistence models for the Late Archaic in the middle Savannah area (e.g., Sassaman 1989:59-61; 1993:268-269; Sassaman et al. 1990:319-321). These E Area examples add to the body

Figure 4-5. Cores from E Area. Provenience: (a) 38AK106-9F; (b) 38AK563-12E; (c) 38AK563-13E; (d) 38AK106-1Ø.

of evidence for this portable technology, and, for the purposes of this study, form some of the best evidence we have for land-use patterning during the Late Archaic.

A third type of core technology is exemplified by two cortical flake blanks from the surface of 38AK106 (one shown in Figure 4-5*d*). This is the cortical nodule pattern documented in the Early Woodland Refuge component of 38AK158 (Sassaman 1989:54-57). The technique involves splitting relatively small, cortical chert nodules and then subjecting them to what appears to have been poorly controlled heat. A great number of thermal shock fractures were observed in the 38AK158 assemblage. The application of excessive heat may have been a means of culling out nodule blanks with hydration planes and other incipient fracture planes. In any event, the split and heat-treated cores were then flaked on the dorsal surface to remove cortex. Bifacial reduction ensued, with the alternative goals of producing large flake blanks in the case of larger nodules, or a bifacial tool from the original split nodule in the case of smaller cores. The technology has been interpreted as the response to both the diminished need for large portable biface cores, as well as more localized raw material procurement in the Aiken Plateau (i.e., use of the Barnwell formation cherts, instead of more far afield, but better quality Flint River formation cherts).

The remaining six fragments in the E Area assemblage are amorphous, multidirectional core fragments lacking diagnostic features. Two orthoquartzite examples were recovered from the surface of the same site with orthoquartzite preform fragments (38AK106). The four Coastal Plain chert specimens are small fragments of varying raw material quality.

Unifaces and Unifacially Modified Flakes

Twenty-five flaked stone tools in the E Area assemblage exhibit unifacial technological modification (Table 4-12). Each is made from Coastal Plain chert; 12 heavily patinated examples are considered Early Archaic or older. Among them are a number of the formal uniface types documented for Paleoindian and Early Archaic assemblages in the region.

Table 4-12. Absolute and Relative Frequencies of Unifaces by Technofunctional Type and Provenience Type.

	Surface	STP	Test Unit	Total
Early Archaic				
Formal Unifaces				
Edgefield Scraper			1	1
Hafted Endscraper (Type I)	1			1
Other Endscraper	1			1
Side Scraper (Type I)		1		1
Side Scraper (Type III)			1	1
Pointed Scraper		1	1	2
Waller Knife			1	1
Unifacially Modified Flake		1	3	4
Graver			1	1
Unifacially Modified Flake	1		11	12
TOTAL	3	3	19	25

Early Archaic Unifaces. The diverse assemblage of 12 unifaces includes both formal and informal specimens. The formal tools are more-or-less recurring types that are found in early prehistoric assemblages across eastern North America. One regionally-specific form, however, is the Edgefield scraper (Michie 1968b), an example of which was recovered from the 40-50 cm BS level of a test unit at 38AK557 (Figure 4-6*f*). Technically, the Edgefield scraper is a biface because it typically has a large, well-shaped, bifacial haft element with large side notches, as well as one bifacial edge on its blade. However, the most distinctive aspect of this form is its steep, canted, unifacial working edge which gives it the appearance of a heavy-duty scraping tool.

The chronology of Edgefield scrapers remains somewhat ambiguous. In its side-notched morphology, the tool form resembles bifaces of the Early Archaic side-notched tradition, the local expression of which is the Taylor Side-Notched. However, work in and around the SRS shows that Edgefield scrapers are almost always associated with Kirk Corner-Notched points. Either way, the tool form is restricted to the southern Coastal Plain, from southeast South Carolina through northern Florida. In their consideration of Edgefield scraper distributions, Goodyear and colleagues (1980) suggest the tool was seasonal technology used by groups whose settlement ranges encompassed both Coastal Plain and Piedmont provinces. The relatively frequent occurrence of Edgefield scrapers and other unifacial tools at sites in the Aiken Plateau (Sassaman 1996), including E Area, suggest not only seasonal specificity for the tools, but also that they were transported, used, and discarded frequently at short-term encampments. Like so many of the upland finds in the SRS area, the E Area Edgefield scraper was resharpened to near exhaustion.

Another formal uniface from E Area that is found frequently at SRS area sites is the "teardrop" hafted endscraper, or what Coe (1964:76; see also Daniel 1986:11-15) called Type I endscrapers. A single, fragmented example from E area was recovered in surface collections of 38AK106 (Figure 4-6*a*). This form has a much longer history of use and wider geographical distribution than the Edgefield scraper. Because of its long period of use—from Paleoindian times through at least the Kirk Corner-Notched phase—it cannot be dated specifically. The E Area example is thin (4.5 mm) compared to others from SRS sites, and certainly thinner than those from the type assemblage at the Hardaway site (mean = 7.9 mm; Daniel 1986:14). The flake from which it was made was thin to begin with, so its final form appears to be by design.

A much thicker and larger endscraper was recovered from the surface of 38AK330 (Figure 4-6*g*). It resembles the Type III endscrapers of Coe (1964:76-77) although is not clear if the tool once had a tapered haft element like Type I endscrapers. This item may have instead been unhafted. Its 15.8 mm thick edge was formed by steep unifacial retouch to the dorsal surface.

Side scrapers in the E Area assemblage are represented by two specimens: single examples each of Coe's Type I (Figure 4-6*h*) and Type III (Figure 4-6*d*) (Coe 1964:77-79; see also Daniel 1986:20-31). The greatest difference between these two forms is thickness: the Type I example is made from a thick (15.7 mm), cortical flake, while the Type III form is from a thinner (9.1 mm), decorticated flake. Also, the Type II example has, in addition to its unifacially retouched edge, an opposite edge with "nibbling" from use. These specimens came from two different locations along the Rank 2 stream in E Area.

Two examples of pointed scrapers were recovered from 38AK106 (Figure 4-6*c*, *i*). Like the pair of side scrapers, these unifaces are represented by both thick (15.9 mm) and thin (5.9 mm) examples. Both are distal portions broken by transverse fractures, presumably from use. Their proximal end counterparts were not recovered.

Figure 4-6. Early Archaic unifaces from E Area. Provenience: (a) 38AK106-6Ø; (b) 38AK373-2I; (c) 38AK106-13F; (d) 38AK547-7E; (e) 38AK557-3F; (f) 38AK557-3E; (g) 38AK330-1Ø; (h) 38AK562-1X-3; (i) 38AK106-8X.

The final formal unifaces attributable to the Early Archaic period is a single Waller Knife from 38AK557 (Figure 4-6*e*). This is a tool form defined by Ben Waller (1969) from work in Florida. It is simply a thin blade with unifacial retouch along at least a portion of one of its lateral edges, and a pair of small notches at the proximal end to facilitate hafting. The E Area example retains its striking platform at the proximal end. Knowledge about the geographical and temporal distribution of this tool type is limited. Only a few such tools have been recovered from SRS sites.

Unifaces made from patinated chert and thus presumed to be Early Archaic in age include four specimens lacking formal design properties. Two are complete tools with multiple unifacial edges, including narrow concavities ("spokeshaves") (an example shown in Figure 4-6*b*). The other two are edge fragments with irregular unifacial retouch. These specimens are divided evenly between 38AK106 and 38AK373.

Other Unifaces. Thirteen unifaces from E Area lack attributes of a temporally diagnostic nature. These are largely fragments of unifacially modified flakes with irregular retouch. Some are likely the failed results of attempts for shape flakes for hafted bifaces. Two appear to have been recycled from the refuse of earlier periods. One specimen, found among Middle-Late Woodland artifacts, shows traces of double patination in its edge modification. A second example appears to have been recycled as a spokeshaving tool. The remaining unifacially modified flakes vary in size and thickness and contain no unusual or diagnostic attributes. However, one small flake was modified to produce a graver spur.

Utilized Flakes

Utilized flakes are not formal tools but simple, expedient tools. These artifacts were not purposefully modified with retouch but rather contain edge wear from use. Such tools are the most abundant type of lithic tool artifact identified in the E Area assemblage. A total of 259 utilized flakes was recovered, 30 from exposed surfaces, 51 from STPs, and 178 from test units. The raw material of all of these artifacts is Coastal Plain chert, 12 of which are heavily patinated. Use-wear on orthoquartzite and metavolcanic lithic debitage is difficult to observe because of edge erosion, thus utilized flakes made from these materials may have gone undetected.

The majority of the utilized flakes are whole (n = 190), while the remaining flakes contain a few examples of distal, medial, proximal, and edge fragments (Table 4-13). The fact that most of the utilized flakes are whole illustrates how they were expedient tools, it is believed that utilized flakes were used for a specific purpose and then discarded rather than curated until they were broken. The size of most of the whole utilized flakes ranges between 200 and 600 mm^2 (Table 4-14). This range of size is arguably the minimum necessary to be held effectively between the thumb and finger, but below the size threshold of flakes sufficiently large to use as small biface blanks, including small triangular points.

Table 4-13. Absolute and Relative Frequencies of the Condition of Utilized Flakes from E Area.

	Frequency	Percent
Whole	190	73.4
Distal Fragment	29	11.2
Medial Fragment	10	3.9
Proximal Fragment	13	5.0
Edge Fragment	9	3.5
Other	5	3.1
TOTAL	259	100.0

Table 4-14. Size Distribution of Whole Utilized Flakes.

Size (mm^2)	Frequency	Percent
I (1-100)	1	0.5
II (101-225)	17	9.0
III (226-400)	66	34.7
IV (401-625)	53	27.9
V (626-900)	32	16.8
VI (901-1225)	13	6.8
VII (1226-1600)	5	2.6
VIII (1601-2025)	2	1.1
IX (>2025)	1	0.5
TOTAL	190	100.0

Analysis of utilized flakes from 38AK158 showed that the number of utilized edges per flake correlated inversely with the immediate abundance of usable flakes (Sassaman, unpublished data). That is, when the source of flakes available at the location of an activity requiring flake tools was abundant, flakes were cycled in and out of use rapidly, resulting in few use-wear edges per tool. Conversely, when local sources of replacement flakes are scarce, flakes were drafting into longer-term use and hence show a greater number of use edges per tool. Subsequent analysis of the 38AK157 assemblage failed to duplicate this pattern, showing instead that variation in the average number of use edges among assemblages was due to flake size, not abundance (Sassaman 1993a:189). In one sense these results are showing the same thing: expedient use of flakes is dependent on the availability of usable edges. Shaping and thinning of a flake to produce edges that can be maintained is partly what bifacial and unifacial modification are all about. We would not expect expedient flakes to exist at all in a stone-poor environment, and we would undoubtedly see fewer formalized flakes stone tools in an environment loaded with good quality stone.

With this relationship between flake tool design and raw material availability in perspective, it is interesting to note that the average number of edges per flake in the E Area assemblage is the lowest ever recorded for an Aiken Plateau assemblage. Three-hundred edges were observed on the 259 E Area flake tools, which gives us an average of only 1.16 edges per tool. The nearby block excavations of 38AK157 yielded edge:flake ratios of 1.25 and 1.57. Interestingly, the stratigraphic contexts of 38AK157 enabled us to document an increase in the number of use edges per flake with depth/time. The low frequency of edges per flake in the E Area suggest than that the majority of the flake stone assemblage is late in the sequence, have formed during the time when local groups not only drafted local, low-grade sources of chert into use but also had the accumulated lithic refuse of all their predecessors to scavenge.

Examining edge morphology of the flakes also provides insight into the flake-using activities in the project area. Differences in edge wear morphology presumably reflects different functions of the utilized flakes. Concave edge wear probably resulted from spokeshaving activity. Convex edges may have functioned as endscrapers (Sassaman 1993a:190). Straight and irregular edges probably served a wide variety of functions including cutting and sawing.

Figure 4-7 shows the frequency distribution of E Area utilized flakes. Straight edges dominate the assemblage, followed, in order of decreasing frequency, by convex, irregular, and concave edges. This distribution matches closely those observed at 38AK157 and 38AK158 (Sassaman 1993a:192). All three of these Aiken Plateau sites

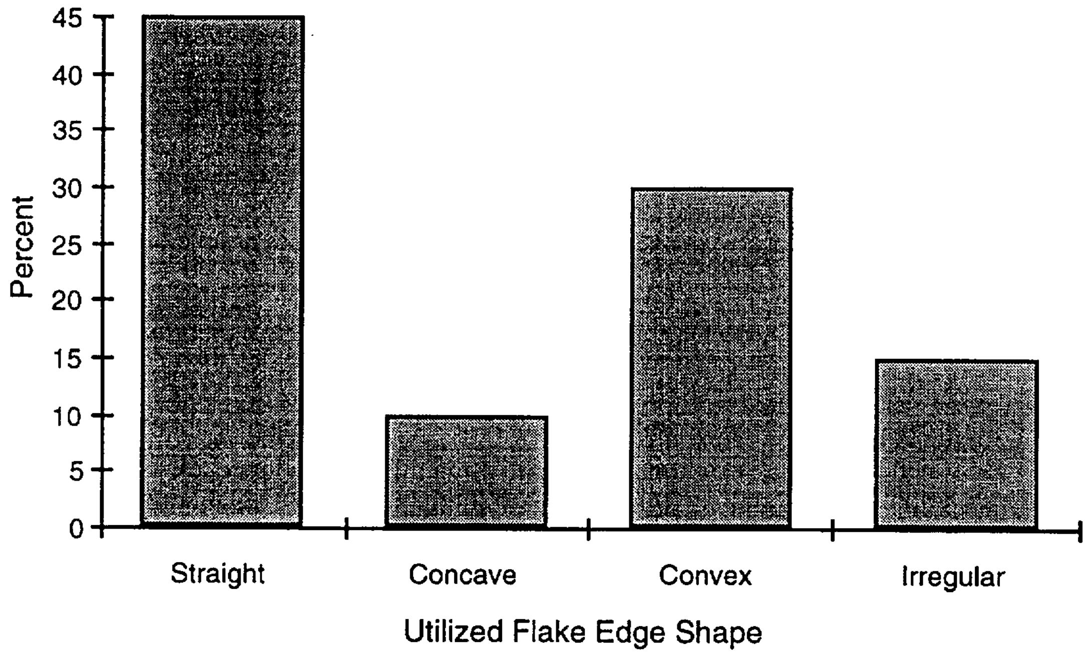

Figure 4-7. Relative frequency distribution of utilized flakes from E Area by edge type.

deviate from the flake tool assemblage at Pen Point on the Savannah River (Sassaman, unpublished data), where convex edges dominate in a context of biface production and retooling.

Debitage

As is the case in virtually all projects in the Aiken Plateau, debitage comprises the most numerous artifact class of the recovered assemblage. A total of 20,474 flakes was recovered from surface, STP, and test unit contexts. Nearly 80 percent (n = 16,248) of the flakes came from test units, and of this a full 45 percent (n = 7,399) came from test units at 38AK155.

Despite its numerical dominance in most archaeological assemblages, debitage does not often receive more than passing attention in reports of investigations. It is sometimes even ignored altogether when an assemblage contains other, more attention-getting artifact classes. However, debitage has the potential to inform on a variety of technological and land-use patterns, including, but not limited to, raw material selection, core design, reduction strategies, mobility patterns, and on-site activities. In fact, debitage is one of but a few classes of artifact that can inform directly about the activities that took place at a site because it is generally discarded in the context of tool manufacture and maintenance. The formalized core tools from which debitage is derived are often transported from location to location before being lost or discarded. It follows that debitage is a more literal source of data on regional land-use patterning.

Years of debitage analysis on assemblages from SRS sites has led to the development of models of tool reduction based on flake size. Generally, these models track a process of bifacial core reduction that yields increasingly smaller flakes through time. All else being equal, debitage assemblages produced from initial-stage core reduction are dominated by large flakes, while those from late stages of reduction are dominated by small flakes. Ongoing research has been able to document some of the factors that cause this general expectation to vary. For instance, the size of bifacial cores or flake blanks will vary with the size of intended end products, and this, of course, affects the actual size range of detached flakes. The larger bifacial cores of the Paleoindian and Archaic periods stand in sharp contrast to the small flake blanks required for small triangular point manufacture. Obviously, flake sizes of these difference processes cannot be compared without adjustment.

We have also learned over the years that core type, as well as core size, must be considered. While bifacial core technologies dominate local assemblages throughout prehistory, amorphous cores and blade cores were also produced. The size of by-products of these various core types cannot be compared blindly, especially if they served different organizational roles in the various tool industries. For instance, hafted bifaces were often portable tools, whereas amorphous cores may have usually served the purpose of on-site flake production. If debitage from these different processes can be distinguished, there is some potential for isolating different parts of an integrated technological system and how it was deployed for particular purposes.

Each of the points we raise above has consequences for how the debitage assemblage from E Area is sorted and analyzed. Throughout the initial sorting process an effort was made to group flakes into one of three technological classes. Bifacial flakes or "flakes of bifacial reduction" (FBRs) have a number of distinguishing features: well-defined, multifaceted platforms with acute angles, sometimes ground, and sometimes lipped; dorsal surfaces bearing the flake scars of previous flake removals; and longitudinal curvature. Flakes from amorphous cores (classified here as "Other Flakes") have single-faceted platforms with obtuse to right-angle configuration, irregular flake scarring on dorsal surfaces; and flat longitudinal cross sections. We also isolated blades as a distinct type of flake. These are flakes that are twice as long as they are wide, with flake scars on dorsal surfaces running parallel to length. Blade cores do not figure prominently in the flaked stone technology of the study area, although ongoing work in the Allendale quarry area by Albert Goodyear (personnel communication) is documenting the use of microblade cores in Paleoindian context.

Temporal control of the debitage assemblage is much more difficult. Short of locating definitive metric and/or morphological traits that are time sensitive, the only means of dividing the assemblage into temporal units is raw material. Again, the criterion of heavy patination is used to isolate the earliest materials. Thermal alteration of chert is a potential means of discriminating mid-Holocene debitage from later materials, but, unfortunately, this feature is not easy to recognize on flakes alone, and is therefore not attempted in this study. Aside from the possibility that orthoquartzite reflects predominately Middle Woodland flaked stone use, as documented at 38AK157 (Sassaman 1993a), no other criteria for temporal control is possible. As such, the analysis of debitage cannot be as sensitive to changes in core design through time as is necessary to examine fine-grained land-use patterning.

Having sufficiently qualified our analysis of E Area debitage, we turn now to the data at hand. Table 4-15 displays a breakdown of E Area debitage by form, size class, and raw material. Blades are not included in this table. Only 17 such examples were located in the analysis. Sixteen of the blades were made of Coastal Plain chert, and one from quartz. No further discussion of these items is warranted at this time.

Table 4-15. Absolute Frequencies of E Area Flakes by Form, Size Class, and Raw Material.

	Coastal Plain Chert	Patinated CPC	Ortho-quartzite	Quartz	Meta-volcanic	Other	TOTAL
Whole Cortical FBR							
Size Class I	157			1			158
Size Class II	373		1				373
Size Class III	184	1	1	1			187
Size Class IV	72						72
Size Class V	24		1				25
Size Class VI	6						6
Size Class VII	3						3
Size Class VIII		1					1
Broken Cortical FBR	123			1			124
Total Cortical FBR	942	2	3	3			950
Whole Noncortical FBR							
Size Class I	2,611	68	147	19	1		2,846
Size Class II	3,312	31	134	19			3,496
Size Class III	1,430	14	56	3		2	1,505
Size Class IV	329	6	40		1	1	377
Size Class V	85	3	13	1			102
Size Class VI	14	1	3				18
Size Class VII	2		1				3
Size Class VIII			1				1
Size Class IX	1	1	1				3
Broken Noncortical FBR	4,847	132	299	32	1		5,311
Total Noncortical FBR	12,631	265	695	74	3	3	13,662
Whole Cortical Other Flake							
Size Class I	137	1		1			139
Size Class II	258						258
Size Class III	197						197
Size Class IV	77	1		1			79
Size Class V	32	1					33
Size Class VI	8	1					9
Size Class VII	2						2
Size Class VIII	1						1
Size Class IX	2						2
Broken Cortical Other Flake	164	2					166
Chunk, Cortical	23	1					24
Total Cortical Other Flake	901	7		2			910
Whole Noncortical Other Flake							
Size Class I	407	11	85	6	2	2	513
Size Class II	744	4	165	8		4	925
Size Class III	476	5	98	6	2		587
Size Class IV	156	6	49	2		3	216
Size Class V	49		26			1	76
Size Class VI	7		11				18
Size Class VII	8		4	1	1		14
Size Class VIII	5	1	4			1	11
Size Class IX	2					1	3
Broken Noncort. Other Flake	1,803	50	278	51	16	24	2,222
Chuck, Noncortical	310	10	19	4	6	1	350
Total Noncortical Other Flake	3,967	87	739	78	27	37	4,935
Mean Cortical FBR	2.34		3.33	2.00			2.35
Mean Noncortical FBR	1.97	1.82	2.15	1.69	2.50	3.33	1.98
Mean Cortical Other Flake	2.52	4.00					2.53
Mean Noncortical Other Flake	2.34	2.44	2.63	2.39	3.00	3.67	2.41
Percent FBR	73.7	74.4	48.7	49.0	10.0	7.5	71.4
Percent Cortical	10.0	2.6	0.2	3.2	0.0	0.0	9.1

The E Area debitage assemblage of FBRs and "Other Flakes" totals 20,457. Seventy-one percent (n = 14,612) of the assemblage consists of biface thinning flakes. This proportion holds for both patinated and nonpatinated Coastal Plain chert, but for orthoquartzite and quartz it drops to less than 50 percent, and for metavolcanic and "other" raw materials is 10 percent or less. These lower values for FBRs in the minority raw materials should not be taken literally for it is much more difficult to sort these by core type due to a combination of excessive weathering and their highly fragmented nature.

Considering for the moment only the dominant raw material class, (nonpatinated) Coastal Plain chert, the FBRs include 942 cortical flakes (6.9% of FBRs). The fraction of cortical flakes is over twice as large among the other flakes (18.5%). This is what we would expect if bifacial cores were more often decorticated at locations outside the E Area than were amorphous cores. Size data support this notion although we again note that flake size will depend on initial core size, as well as stage of reduction, and we have no independent data on variation in core sizes across classes. Nevertheless, as a measure of the overall size ranges represented, the size data show that flakes of Coastal Plain chert struck from bifaces are smaller on average (mean = 2.01) than those struck from amorphous cores (mean = 2.39).

A comparison of the E Area Coastal Plain chert debitage with debitage from other SRS sites provides some basis for inferring site function and settlement organization. In recent years the flake size distributions of assemblages from a variety of SRS sites has been used to model flake assemblage "types" (Sassaman 1993a:193-198). Figure 4-8 provides graphic display of the flake size distributions from six assemblage types. To quickly summarize these models, the "Quarry-based Procurement" graph represents the flake assemblage from Pen Point (38BR383), where mid-Holocene biface production but no habitation function was inferred from a cluster of over 25,000 flakes. The Lewis-East (38AK228E) assemblage of Late Archaic debitage was used to construct the "Quarry-based Procurement and Habitation" model. Documented here was evidence for both biface production and long-term habitation. The higher proportion of small flakes (size class 1) compared to Pen Point, attests to relatively frequent late-stage reduction, much undoubtedly associated with tool maintenance.

"Nonquarried Procurement (sensu Gould 1977) and Habitation" is exemplified by the Early Woodland flake assemblage at 38AK158 (Sassaman 1989). Here the size of early-stage debitage (size classes 4 and larger) is limited by the small size of cores introduced to the site for bifacial reduction. The "Limited Function" assemblage from NPR sites (Brooks et al. 1989) attests to biface maintenance exclusive of production. Transient use of the NPR area was inferred from an assemblage dominated by small, late-stage debitage.

From the flake assemblage of 38AK157 came two flake-size models pertaining to tool production in late prehistory. "Small Triangular Production" was shown to produce an assemblage of flakes nearly equally divided between size classes 1 and 2. "Yadkin Large Triangular Production" is distinct in the predominance of size class 2 flakes. Neither of these models necessarily involve bifacial cores, and hence, they cannot be compared to the other models, based on Archaic period or Early Woodland technology, without qualification. In addition, the Yadkin model was based on an assemblage of orthoquartzite flakes, so its comparability to chert flake distributions may be questionable.

Size distribution graphs for E Area assemblages are depicted in Figure 4-9. Starting with all Coastal Plain chert flakes, the E Area assemblage has strong similarity to

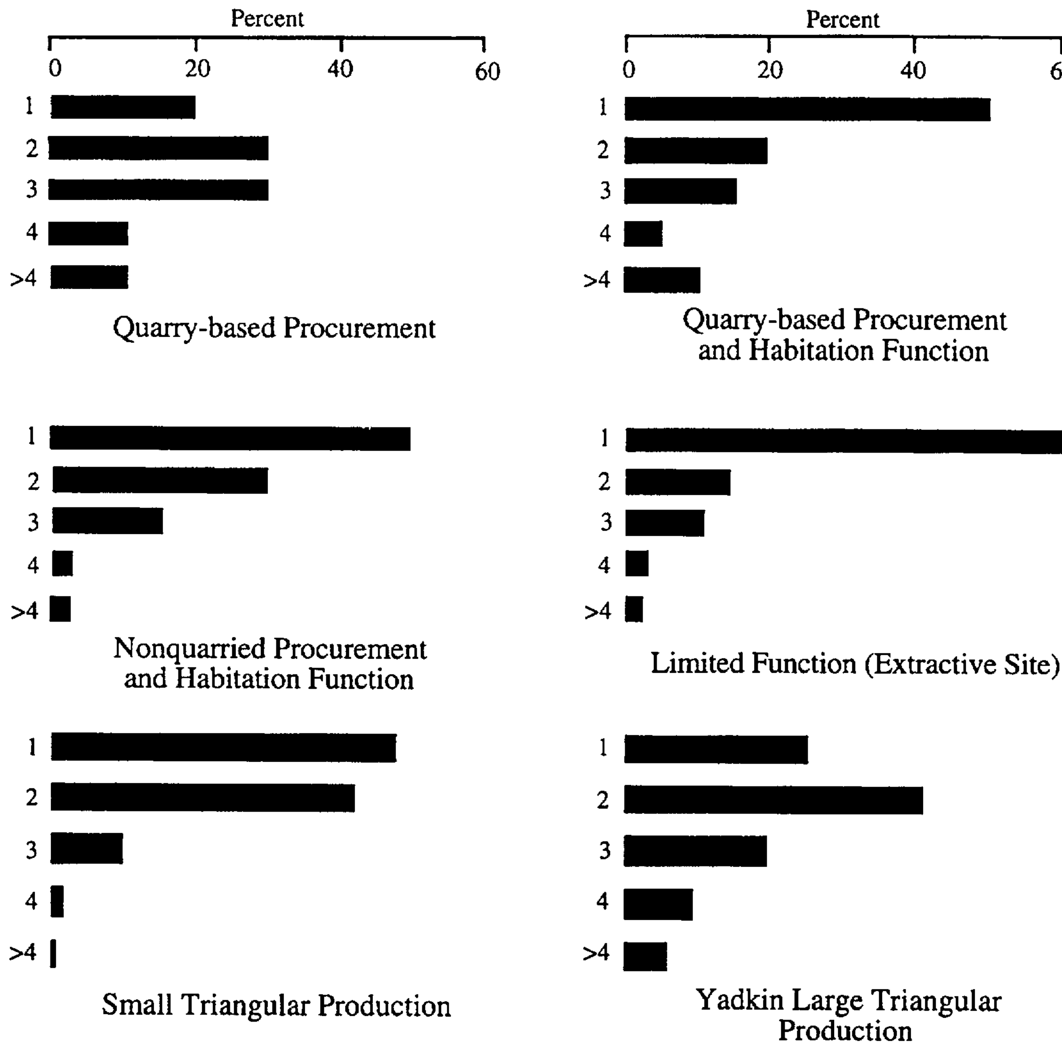

Figure 4-8. Models of the relative frequencies of whole flakes by size for six distinct contexts of flaked stone manufacture, use, and maintenance.

Yadkin Large Triangular production assemblage from 38AK157. The only E Area location with abundant evidence of Yadkin production is the test unit cluster at 38AK155. Debitage from this location alone duplicates the area-wide pattern, and its associated assemblage of chert preform fragments and finished Yadkin points supports the inferences from flake size data. It is noteworthy that the 38AK155 assemblage of Coastal Plain chert flakes compares so favorably to the 38AK157 assemblage of orthoquartzite flakes. Local sources of low-grade chert are available from nearby outcrops, where orthoquartzite likewise occurs. It appears that these materials were treated similarly by Middle Woodland tool users.

Removing the 38AK155 sample from the remaining assemblage of chert flakes does little to alter the distribution shown in Figure 4-9. Similarly, when other flakes are removed from the equation, the size distribution does not change appreciably. We conclude from this that the area-wide assemblage of (nonpatinated) chert flakes, as a collective, exemplifies the reduction of locally-procured cores, both amorphous and

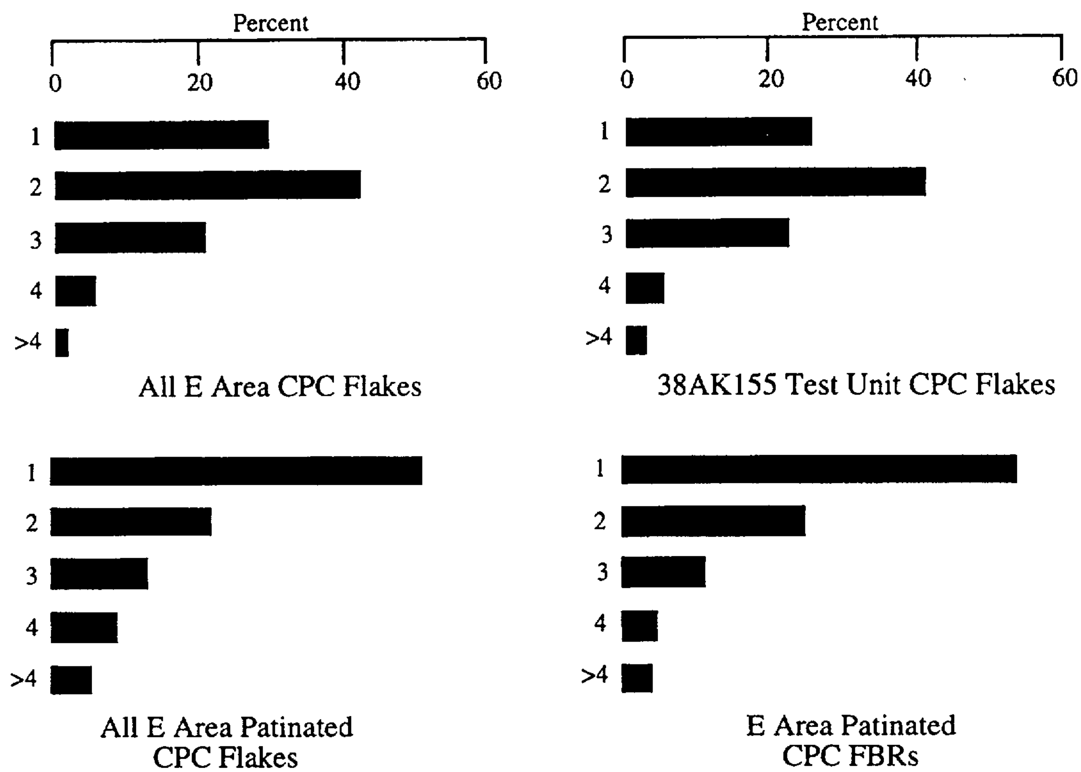

Figure 4-9. Relative frequencies of whole flakes by size for four subsamples of E Area debitage.

bifacial, with a dominance of Yadkin-like tool production. There is a notable lack of evidence for the reduction of nonlocal bifacial cores introduced to the study area as late-stage tools. Because the E Area assemblage seems to match the Yadkin production assemblage from 38AK157, which arguably represents "gearing-up" or retooling for site abandonment, much of the flake reduction activity in the study area took place on bifaces that were removed from the study area early in their use-life. Finer temporal resolution of the assemblage may expose other patterning, but this is not easily accomplished with the nonpatinated flakes.

Turning now to the patinated chert flakes, we note a much different pattern to the size class distributions. The small assemblage of whole flakes (n = 361) is dominated by flakes of size class 1 (Figure 4-9). The distribution bears similarities to two of the models depicted in Figure 4-8, "Nonquarried Procurement and Habitation" and "Limited Function." Considering only patinated chert FBRs, the distribution is skewed even more to the low end (Figure 4-9), increasing its concordance with the "Limited Function" model. What these data suggest is that early Holocene tool users introduced into E Area biface cores in late-stages of reduction. This includes both finished tools that were used, maintained, and discarded in E Area, as well as late-stage preforms for tool replacement. In addition, the E Area flake assemblage shows a sufficiently large fraction of flakes greater than size class 2 to indicate some core reduction in early stages. Implicated by this are nonbifacial cores, such as the flake core found at 38AK106. Supporting data for this inference comes from the incidence of cortex on flakes. Cortex is observed on only 0.7 percent of the patinated FBRs, compared to 7.4 percent of other flakes. Two distinct flaked stone technologies are evident: bifaces introduced as late-stage preforms and finished tools, and larger flake cores for on-site flake production. How unifacial tool production and maintenance figure in all of this remains unknown.

In sum, two distinct technologies and corresponding land-use patterns can be inferred from flake size data. The patinated chert assemblage supports an inference for limited use of E Area by early Holocene groups. The technology brought to bear on E Area land use included both late-stage bifaces and larger flake cores. Later technology was based on more localized procurement of chert and orthoquartzite. Bifacial core reduction and the use of amorphous cores cannot be discriminated by the flake size data, although the former involved less decortication than the latter. The Yadkin pattern of tool production documented at 38AK157 fits the assemblage from both 38AK155, where independent data for such occurs, and the area-wide assemblage of chert flakes.

Ground and Polished Stone

Twelve items in the E Area assemblage have morphology and/or facets of modification that can be classified as ground and polished artifacts. These artifacts are listed by form and material type in Table 4-16. Two of these artifacts were found during surface reconnaissance of exposed surfaces, the remaining 10 were found during excavation of test units.

Perforated soapstone slabs dominate the sample and represent the only artifacts of this class with definitive formal morphology. These warrant some detailed discussion below. The remaining three items include a metavolcanic fragment with grinding/polish facets indicative of either axe or bannerstone technology (Figure 4-10*g*). It came from a level 40-50 cm BS in a test unit with Thom's Creek pottery. A small metavolcanic fragment exhibiting polished facets was found in a STP at 38AK546. This artifact was used as a beaver tooth hone and may have also been part of a gorget. Two small fragments of polished slate, weighing 1.6 g, were found on exposed ground surface. One of these slate fragments contains a ground edge. Finally, one unidentified polished metavolcanic fragment (1.4 g) was found in a test unit.

Other artifacts exhibiting wear from grinding are included in the cobble tool category described below.

Perforated Soapstone Slabs. A total of seven fragments of worked soapstone, weighing 151.7 g, was recovered during the E Area survey. Each of these items is a fragment of perforated slabs; five showed evidence for the perforation and two are edge fragments (Figure 4-10). Traditionally referred to as "netsinkers" (Clafin 1931:32), perforated slabs are now considered to be part of the indirect-heat stone-boiling technology used during the Late Archaic period (Sassaman 1993a:198). Five of the

Table 4-16. Ground and Polished Stone Artifacts by Form and Raw Material.

	Perforated Slab		Unidentified Ground Stone		Unidentified Polished Stone	
Raw Material	Freq.	Wt. (g)	Freq.	Wt. (g)	Freq.	Wt. (g)
Soapstone	7	151.7				
Metavolcanic			1	24.4	2	2.0
Slate					2	1.6
TOTAL	7	151.7	1	24.1	4	3.6

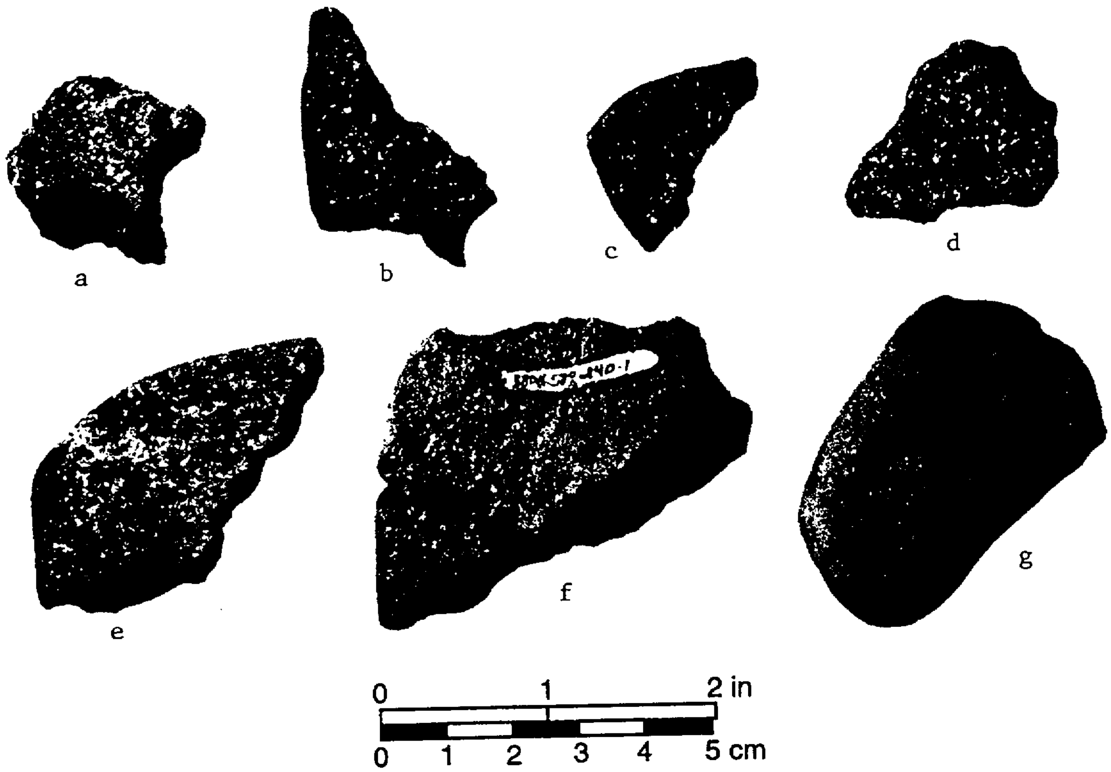

Figure 4-10. Fragments of perforated soapstone slabs (a-f) and a polished stone tool fragment (g) from E Area. Provenience: (a) 38AK563-12C; (b) 38AK579-14D; (c) 38AK579-14D; (d) 38AK579-14C; (e) 38AK563-12C; (f) 38AK579-14D; (g) 38AK564-5E.

fragments were recovered in a test unit between 20-50 cm BS, which also contained two fragments of Stallings pottery that are believed to date from 3500 to 3000 B. P. The other two fragments were recovered 20-30 cm BS at 38AK563. This test unit also contained a bifacial core that with attributes similar to Late Archaic lithic technology.

A minimum of four slabs are represented by the seven fragments, none of which are large enough to be serviceable as cooking stones. In addition to these fragments, five small, unworked soapstone pieces, weighing 15.0 g, were also collected in the E Area. Four of these small fragments were located in excavations levels with the perforated slab fragments. The other unmodified fragment was found in excavation levels that contained only lithic debitage.

Cobbles

Cobble Tools. Of the 943 cobbles recovered during the E Area Survey, less than one percent (n = 7) contained evidence for use-wear. One cobble tool was collected from the surface and the remaining six were recovered during shovel testing. No cobble tools were identified in the artifacts recovered during 1 x 2-m test unit excavation. A breakdown of cobble tool types by raw material is presented in Table 4-17. Hammerstones are the most common type recovered. Three of the hammerstones are whole and one is a fragment (three of which are shown in Figure 4-11*b-d*). These four artifacts contain evidence for battering in 10 locations; one of these artifacts also

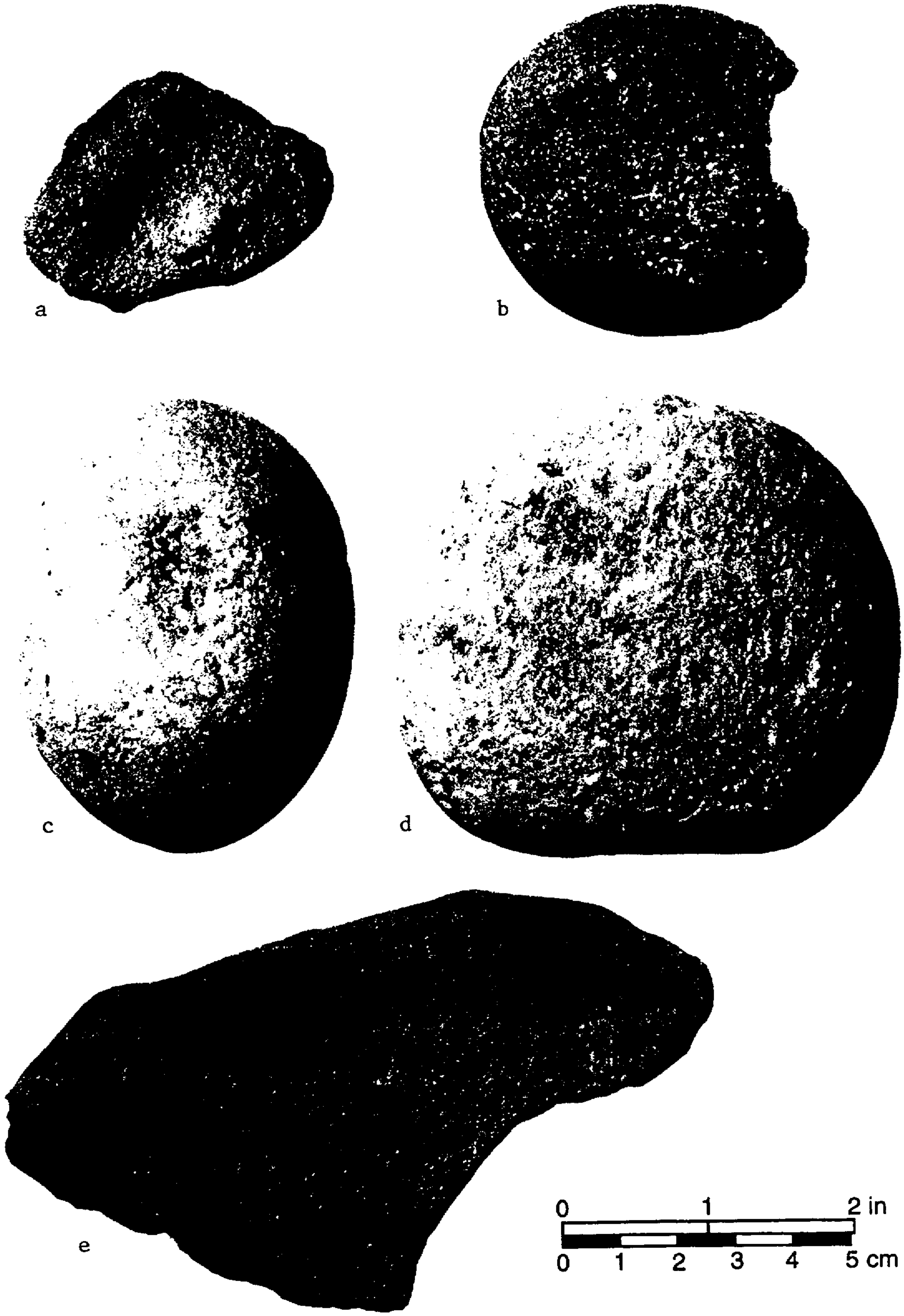

Figure 4-11. Cobble tools from E Area. Provenience: (a) 38AK546-25Ø; (b) 38AK151-14E; (c) 38AK552-3X-2; (d) 38AK552-12X-1; (e) 38AK581-1X-1.

contains evidence for pecking. Two of these hammerstones appear to have been used as an anvil. One orthoquartzite abrader was found in an exposed surface in a firebreak (Figure 4-11*a*). This whole example contains a U-shaped groove. A metavolcanic metate fragment was found in a STP (Figure 4-11*e*). This relatively small fragment exhibits an advanced degree of wear from grinding. Finally, one unidentifiable orthoquartzite cobble tool was recovered in a STP.

Unmodified Cobbles A total of 936 unmodified cobbles and large cobble fragments (3 cm or larger), weighing 56,135.6 g, were recovered during the E Area survey. Shovel testing recovered 50 of these unmodified cobble artifacts. Unmodified cobbles were not routinely collected during surface reconnaissance, only 11 were collected from exposed ground surfaces. The remaining 875 artifacts were all located in test units. Three hundred and fifty-nine of these cobbles and cobble fragments were part of Features 1, 2, 3, and 4 at 38AK155. The cobble and cobble fragments from these features weigh 21,897.0 g. The unmodified cobble artifacts are listed by material type in Table 4-18. The E Area assemblage consists of 207 whole cobbles, 207 nearly whole cobbles, and 490 cobble fragments. The condition of 32 cobbles was indeterminate.

Table 4-17. Cobble Tools by Raw Material Type.

	Hammerstone		Metate		Abrader		Unidentified	
Raw Material	Freq.	Wt. (g)	Freq.	Wt. (g)	Freq.	Wt. (g)	Freq.	Wt. (g)
Quartz	4	1,140.0						
Orthoquartzite					1	27.3	1	225.4
Metavolcanic			1	255.1				
TOTAL	4	1,140.0	1	255.1	1	27.3	1	225.4

Table 4-18. Unmodified Cobbles and Cobble Fragments by Raw Material Type.

Raw Material	Freq.	Weight (g)
Coastal Plain Chert	2	111.4
Ferruginous Sandstone	10	363.7
Hematite	12	508.7
Metavolcanic	1	11.3
Marine Hash	3	47.4
Orthoquartzite	5	634.9
Quartz	893	54,193.2
Unidentifiable	10	265.0
TOTAL	936	56,135.6

CHAPTER 5

CERAMIC ARTIFACT ANALYSIS

Recovered in archaeological investigations of the E Area were 1,813 prehistoric ceramic artifacts. These items were retrieved from 26 sites and two occurrences. Six of the sites in the project area did not contain ceramics. An overall majority, 75 percent (n = 1,357), of the total ceramic sherd assemblage was recovered during 1 x 2-m test unit excavation. The remaining sherds were recovered during pedestrian survey (n = 227) and shovel testing (n = 229).

This chapter provides the results of the ceramic analysis. The first portion of this chapter describes surface treatment and other diagnostic attributes of the ceramic artifacts. The goal of this analysis is to gain a better understanding of the culture history of the project area. This information is placed in a regional context with a discussion of other sites in the middle Savannah River valley. The remainder of this chapter discusses the results from vessel analysis which provide technological and functional information about the pottery assemblage.

METHODS OF ANALYSIS

During preliminary analysis, conducted by SRARP curation staff, basic data were collected on the types and frequencies of the ceramic artifacts. Sherds were cataloged into broad categories based primarily on surface treatment (e.g., simple stamped, check stamped, plain, etc.) and temper (fiber vs. sand temper). This information was recorded on SRARP Artifact Summary forms and incorporated into the site-wide inventory.

More in-depth analysis for the purposes of this study began with an examination of surface treatment. Sherds were first sorted by size, using an 1/2-inch geological sieve, to isolate "crumb" sherds (i.e., sherds less than 1/2-inch in maximum dimension). Crumb sherds were sorted into three broad categories: plain, decorated, and eroded/unidentified. These sherds were counted and weighed and not subjected to further analysis.

The remaining sherds were sorted by surface treatment and paste (Table 5-1), using ceramic sorting criteria developed by David G. Anderson (1987). The criteria include not only general paste and surface treatment categories, but also metric attributes (e.g., the width of checks on checks-stamped sherds) and nominal traits (e.g., cross-sectional shape or orientation of simple stamping) believed to have some potential for refining cultural-historical types (e.g., the width of the stamp impressions on simple-stamped sherds). Analyses in the past several years on large sherd assemblages from SRS sites have not identified definitive patterning in attributes of simple-stamped and check-stamped types (e.g., Sassaman 1993a 1993:118-125; Keith Stephenson, unpublished data on 38AK228W). Although such efforts have not been fruitful, SRS analyses have continued to employ most of Anderson's criteria in the hopes of locating meaningful cultural-historical variation with better contexts.

After the analysis of surface treatment was completed, provenience and catalog numbers were labeled on the sherds with India ink. All the sherds were then laid out on a large table in an effort to crossmend sherds for purposes of a vessel unit of analysis. Unfortunately, relatively few crossmends were found, undoubtedly due to the fact that most ceramic artifacts were recovered from widely scattered shovel test pits and test units rather than contiguous excavation units.

Table 5-1. Paste and Surface Treatment Categories of Anderson's (1987) Ceramic Sherd Sorting Criteria.

(I) Paste Categories
- (1) Fiber-temper
- (2) Fine sand/grit
- (3) Clay/grog

II. Surface Treatment Categories
- (1) Plain
  - (a) Plain
  - (b) Burnished plain
- (2) Punctated and Incised
  - (a) Linear separate punctations
  - (b) Drag and jab punctations
  - (c) Incised
- (3) Dentate, Irregular Dentate/Other Stamped
  - (a) Linear dentate stamped
  - (b) Random dentate stamped
  - (c) Random "Bunched Twig" punctations
- (4) Linear Check Stamped
  - (a) Lin. check stamped, checks ≤3.0mm
  - (b) Lin. check stamped, checks >3.0 mm
  - (c) Lin. check stamped/simple stamped, checks ≤3.0 mm
  - (d) Lin. check stamped/simple stamped, checks >3.0 mm
  - (e) Lin. check stamped/cordmarked
- (5) Check Stamped
  - (a) Check stamped, check ≤3.0 mm
  - (b) Check stamped, check >3.0 mm
- (6) Simple Stamped
  - (a) Parallel "U" simple stamped, stamp ≤2.0 mm
  - (b) Parallel "U" simple stamped, stamp >2.0 mm
  - (c) Cross "U" simple stamped, stamp ≤2.0 mm
  - (d) Cross "U" simple stamped, stamp >2.0 mm
  - (e) Parallel "V" simple stamped, stamp ≤2.0 mm
  - (f) Parallel "V" simple stamped, stamp >2.0 mm
  - (g) Cross "V" simple stamped, stamp ≤2.0 mm
  - (h) Cross "V" simple stamped, stamp >2.0 mm
- (7) Cordmarked
  - (a) Fine parallel cordmarked, cord <1.0 mm
  - (b) Parallel cordmarked, cord 1.0-2.0 mm
  - (c) Heavy parallel cordmarked, cord >2.0 mm
  - (d) Fine cross cordmarked, cord <1.0 mm
  - (e) Cross cordmarked, cord 1.0-2.0 mm
  - (f) Heavy parallel cordmarked, cord >2.0 mm
- (8) Fabric Impressed
  - (a) Fabric impressed, loose weave
  - (b) Fabric impressed, rigid weave
  - (c) Fabric Impressed, unidentifiable weave
- (9) Complicated Stamp
  - (a) Rectilinear complicated stamp
  - (b) Curvilinear complicated stamp
- (10) Miscellaneous
  - (a) Zone-incised punctate

Within site-level proveniences, vessels were identified by a series of attributes that included surface treatment, paste, thickness, rim form, and lip form. Initially, all rim sherds with unique attributes were identified as individual vessels. Secondarily, body sherds that were clearly different from vessels defined by rims were given to different vessels. Vessel-unit analysis proceeded by recording all proveniences from which constituent sherds came, and by coding for exterior surface treatment, lip surface treatment, lip and rim form, and lip and rim thickness (the latter measured 3 cm below lip). Finally, profiles were drawn of all rim sherds larger than 3 cm.

RESULTS OF CULTURAL-HISTORICAL ANALYSIS

An inventory of all ceramic sherds artifacts recovered from survey and testing of the E Area is provided in Table 5-2. A tabulation of diagnostic sherds by cultural-historical period is provided in Table 5-3.

Late Archaic - Stallings and Thom's Creek

Only one percent (n = 19) of the E Area ceramic assemblage can be confidently assigned to the Late Archaic period. Being among the oldest in North America, Late Archaic ceramics in Georgia-Carolina date from 4500 to 3000 B.P. and are classified within the Stallings and Thom's Creek series. Vessels of these series consist of "hemispherical or flat bottomed bowl-like forms, with larger straight-sided rounded to conoidal based jars sometimes observed within Thom's Creek assemblages" (Sassaman

Table 5-2. Ceramic Sherd Inventory for the E Area by Surface Treatment/Temper and Provenience Type.

Type	Surface	STPs	Test Units	TOTAL
Plain sand-tempered	51	49	156	256
Plain fiber-tempered (Late Archaic)			2	2
Thom's Creek (Late Archaic)		2	15	17
Simple Stamped				
Refuge (Early Woodland)	25	10	74	109
Late Woodland	3		13	16
Other	17	14	21	52
Incised				
Refuge (Early Woodland)			7	7
Check Stamped (Middle Woodland)				
Linear Checked/Simple Stamped	2	3		5
Linear Check Stamped	3	5	25	33
Check Stamped	3		18	21
Other Check Stamped	4	3	8	15
Cordmarked				
Fine (Late Woodland/Mississippian)	10	4	118	132
Regular/Bold (Middle/Late Woodland)	30	40	279	349
Complicated (Middle Woodland-Mississippian)				
Rectilinear	4	3	10	17
Curvilinear	1	1		2
Miscellaneous Surface Treatments				
Other Stamped		1	3	4
Fabric Impressed		1	1	2
Cob Marked (Mississippian)		1	5	6
Punctuated (var. unknown)		1	1	2
Incised (var. unknown)		2		2
Eroded	55	44	144	243
Crumb Sherds				
Plain	4	9	95	108
Decorated	4	9	81	94
Eroded/unidentified	11	27	280	318
Other Ceramics				
Bead			1	1
TOTAL	227	229	1,357	1,813

Table 5-3. E Area Sherd Inventory by Cultural-Historical Period or Phase.

Period or Phase	Sherd Count	Sherd Percent
Stallings Late Archaic	2	0
Thom's Creek Late Archaic	17	
Refuge Early Woodland	116	1
Deptford Middle Woodland	59	8
Late Middle Woodland/Late Woodland[a]	349	4
Late Woodland/Early Mississippian[b]	165	2
Total	708	100.0

[a]Regular cordmarked sherds, [b]includes fine cordmarked, cordmarked with folded rims, corncob impressed, Late Woodland simple stamped, Etowah complicated stamped, Woodstock complicated stamped, and unidentified curvilinear complicated stamped.

and Anderson 1990:185). Surface treatments include plain, punctated, incised, and simple stamped, with motifs ranging from simple linear to complex geometric designs (Sassaman and Anderson 1990:185). Stallings pottery occurs at sites along coastal South Carolina and Georgia and inland along the rivers of the Coastal Plain, predominantly the Savannah. Thom's Creek pottery is found at sites on the coast of South Carolina and along the Santee, Edisto, and Lower Savannah rivers, their tributaries, and intervening waterways and uplands.

Stallings sherds are identified by the presence of fiber temper while Thom's Creek ceramics contain sand temper, or lack visible traces of temper. Fiber-tempered pottery is identified by holes in the paste, both on the interior and exterior, left after fibers disintegrated during the firing process. Stratigraphic and radiometric evidence indicate that Stallings ceramics were used earlier than Thom's Creek pottery, although the two wares were largely contemporaneous. Surface treatment and lip form data have been used to divide Stallings ceramics into three subphases spanning 4500-3000 B.P. (Sassaman 1991a, 1993b) These subphases appear to have coincided with the emergence, peak, and dissolution of sociopolitical integration in the middle Savannah River valley.

The Thom's Creek sequence for coastal South Carolina was developed by Trinkley (1980a, 1980b, 1990). Dating from about 4000-3000 B.P., Thom's Creek pottery is distinguished from Stallings wares by its lack of fiber. Otherwise the two wares are similar in surface treatment, although some of the coastal Thom's Creek finishes, such as finger-pinching, are generally absent in Stallings assemblages. Sand temper in Thom's Creek ceramics ranges from fine sand to grit-sized quartz, with finer sand varieties ("temperless") found in coastal areas. In many cases sand appears to have been incidental to the clay sources utilized, hence not an added temper in the way that fiber appears to have been.

A minor Stallings period occupation of the E Area is reflected in the occurrence of two plain fiber-tempered sherds (Figure 5-1*a, b*). These are small sherds from the same provenience, probably from one vessel. One is a rim sherd with a thinned, flat lip. The paste of these sherds contains abundant fiber vesicles and visible sand grains. Both the sandy paste and lip form are features of late Stallings assemblages (i.e., post-3500 B.P.), when plain surface treatments make a resurgence in popularity after a 200-300 year period of elaborate punctation designs. Plain vessels also dominate the earliest centuries of the Stallings period (ca. 4500-3800 B.P.), although they often have thickened and flanged lips and pastes lacking visible aplastics (Sassaman 1993b).

Figure 5-1. Stallings (a, b) and Thom's Creek (c-g) sherds from E Area. Provenience: (a) 38AK579-14C; (b) 38Ak579-14C; (c) 38AK580-7C/D; (d) 38AK155-23X-2; (e) 38AK580-7C/D; (f) 38AK564-C/D; (g) 38AK564-5C/D.

At least 17 sherds represent the Thom's Creek series in the E Area assemblage. These consist of 10 sherds with drag and jab punctations, one with separate linear punctations, and six plain sherds from the lower, undecorated portion of a drag and jab punctated vessel (Figure 5-1*c*-*g*). Four distinct vessels are represented by these sherds.

The design repertoire of punctations in the E Area assemblage is typical of Thom's Creek pottery from the middle Savannah River area. Bands of linear drag and jab punctations oriented parallel to the rim is the most common design in the assemblage (Figure 5-1*f*, *g*). Also present are single examples of multidirectional drag and jab punctation (Figure 5-1*c*) and separate linear punctation (Figure 5-1*d*). All but one of the decorated Thom's Creek sherds are thick. Tempers range from coarse sand to grit, and 12 sherds have smoothed ("floated") surface finishes.

In addition to the punctated sherds, a number of plain sherds may also be attributed to the Thom's Creek tradition (examples of which are shown in Figure 5-2*a*, *b*). Coming from excavated contexts (38AK563, 38AK580) that included punctated sherds and lacked other diagnostic types, these plain sherds are similar to the decorated Thom's Creek wares in thickness, form, and paste. At least 25 plain sherds from three or four different vessels meet these criteria. Interestingly, the three rim sherds among the probable plain Thom's Creek vessels differ from an assemblage of plain Thom's Creek vessels from 38AK157. At this nearby site, plain sand-tempered sherds in association with punctated Thom's Creek pottery included many examples of cordmarked lips (Sassaman 1993a:104-109). Because this lip treatment is not so prevalent in other Thom's Creek assemblages from the area (e.g., Phelps 1968), its high frequency at 38AK157 suggests, perhaps, that cordmarked lips were a stylistic hallmark of local groups. The lack of such types in the admittedly small E Area sample is notable.

Early Woodland - Refuge

During the Early Woodland period, ca. 3000 to 2600 B.P., use of ceramics became widespread in the Southeast. In the middle Savannah River valley, this period is represented by the Refuge tradition of simple-stamped pottery. The Refuge tradition is believed to have evolved from the Stallings and Thom's Creek ceramic traditions (Sassaman 1993a:118). It appears that most Refuge Simple Stamping was applied with a dowel, in contrast to the paddle-applied stamping of the subsequent Deptford tradition.

Refuge Simple Stamping involves a variety of impressions, ranging from sharp (V-shaped) to broad (U-shaped) in cross section. The most prevalent type of the tradition, Refuge Simple Stamped, has been described as "random and quite sloppy" (Waring 1968:200). Seemingly random and cross-stamped impressions are typical, but carefully executed parallel stamping is not uncommon. Other surface treatments include plain, dentate, punctate, and incised, which were also usually applied in an irregular fashion. Vessels with punctations and/or incising either over simple stamping on the exterior, or on the interior rim appear to be mark the first couple of centuries of the Refuge tradition (ca. 3000-2800 B.P., or Refuge I), while plain and simple stamped surface treatments are the exclusive traits of the latter portion of the tradition (ca. 2800-2600 B.P., or Refuge II) (Sassaman et al. 1990:190-191).

Refuge lip treatments often are as diagnostic as exterior surfaces, and include simple stamping, punctation, and incising. Again, the use of punctation and incising appears to be indicative of the earliest centuries of Refuge. The cordmarked lips of the Thom's Creek tradition are not observed in the Refuge series.

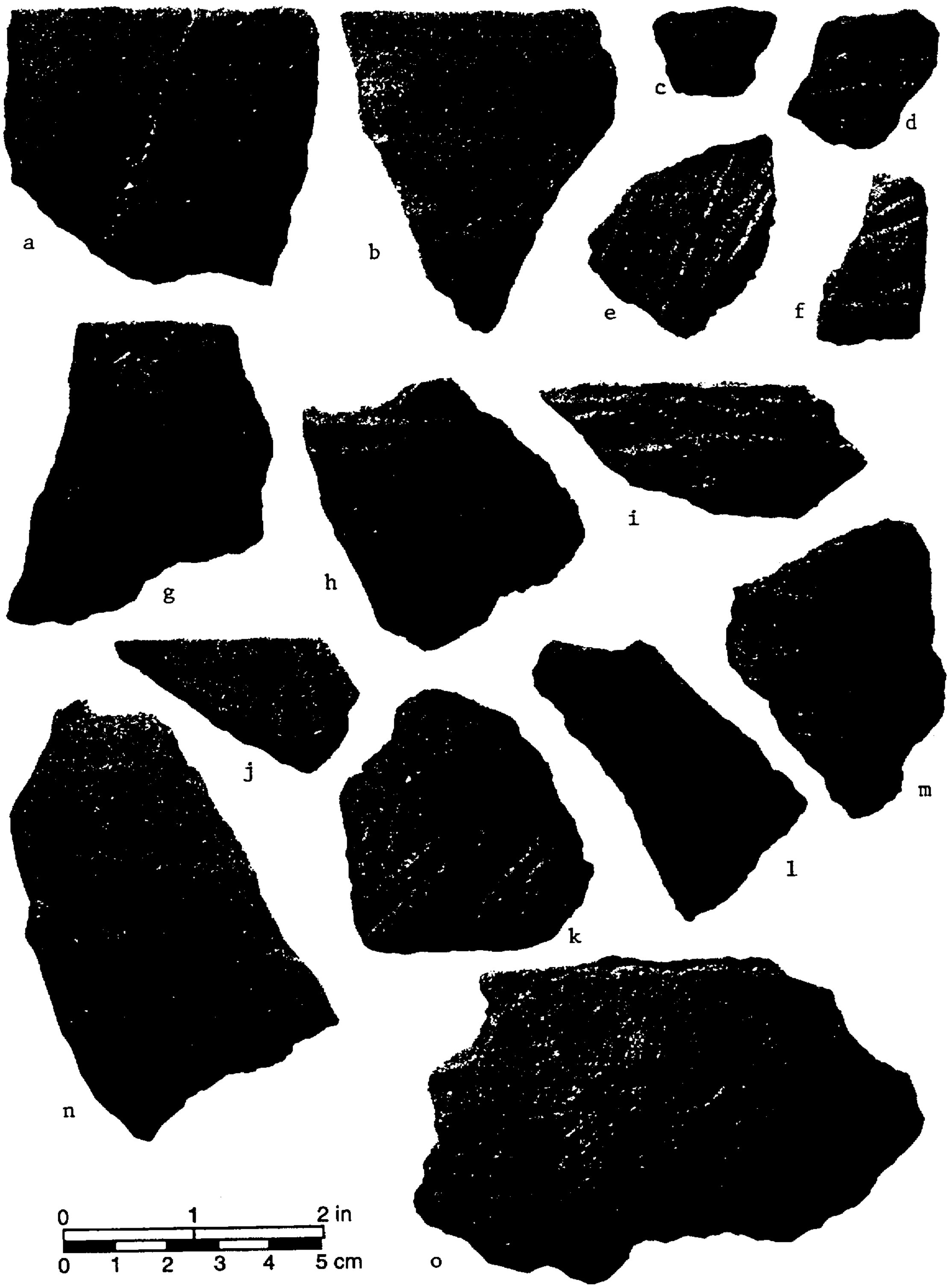

Figure 5-2. Plain sand-tempered (a, b), incised (c-f), and Refuge Simple Stamped sherds (g-o) from E Area. Provenience: (a) 38AK155-18D; (b) 38AK580-7C; (c-f) 38AK546-23C/D; (g) 38AK546-27Ø; (h) 38AK564-4X-2; (i) 38AK155-Feat. 2; (j) 38AK564-5D; (k) 38AK106-13C/D; (l) 38AK546-18X-2; (m) 38AK547-7C; (n) 38AK579-13E; (o) 38AK155-5X-6.

Refuge pottery in the study area generally includes large granules of quartz in an otherwise heterogenous, sandy paste. The paste is also often creamy in appearance, with large pieces of temper apparent on exterior and interior surfaces. Tall, straight-side jars are the most common vessel form, but small hemispherical bowls occur in lesser numbers. Vessel walls are usually thin, eat least compared to the Thom's Creek wares. The lips of Refuge Simple Stamped vessels are generally tapered, rounded, or slightly flattened.

Distinguishing between the simple stamped pottery of the Refuge and Deptford traditions is, at best, a frustrating task. The problem stems from the long popularity of simple stamping and the historical linkages among its various applications. In the analysis of pottery from 38AK157, Sassaman (1993b:116-122) attempted to refine our ability to sort simple stamped pottery assemblages for chronologically purposes by analyzing the associations among a variety of time-sensitive traits, ceramic and otherwise. The results were inconclusive, but they did not refute the observation made long ago by Waring (1968), namely, that Deptford Simple Stamping was more carefully executed and evenly applied that Refuge, indicating, it would appear, that Deptford marks the first use of a carved paddle technique. Unfortunately, at the level of sherd analysis, it is not usually easy to determine whether simple stamping was applied with a dowel or a paddle. The relative proportions of parallel and crossed stamping proved less than useful as a chronological marker for the SRS assemblages compared in the 38AK157 report.

One-hundred-and-sixteen sherds from the E Area are classified as Refuge. Included in this sample are seven incised sherds found between 10 and 40 cm BS in a 1 x 2-m test unit at 38AK546 (Figure 5-2*c-f*). Apparently from a single vessel, all seven are small body sherds with similar design, thickness, and paste. The incising appears to have been applied irregularly, although the sherds are too small to discern any patterning.

The remaining 109 sherds identified as Refuge are simple stamped (Figure 5-2*g-o*). All but one of these consist of U-shaped stamping, and 85 percent (n = 93) are crossed stamped. Only a very few have well-executed, parallel stamping. Hence, we are certain that the assemblage is virtually exclusively Refuge, with little or no Deptford Simple Stamping represented. This inference is strengthened by the relatively limited number of classic Deptford Check-Stamped sherds across most of the E Area (see below). Further support is seen in the paste of the simple stamped sherds, which consists predominately of a gritty temper in a creamy paste.

Among the U-shaped stamped sherds, the width of stamping varies, although 89 percent (n = 96) have stamping wider than 2 mm. The three possible examples of paddle-stamped sherds have some of the widest stamping in the sample, and resemble the form and execution of the linear check/simple-stamped pottery of the Deptford series, a few sherds of which were found in the E Area (see below).

The single example of V-shaped simple stamping is a small body sherd. V-shaped stamping is not uncommon to some Refuge assemblages from the SRS (e.g., 38BR259; Brooks and Hanson 1987), and is believed to have been most prevalent during the early years of the Refuge tradition, although proof of this has not been forthcoming (Sassaman 1993a:121-122). The virtual absence of V-shaped stamped shreds in the E Area assemblage duplicates the lack of other possible early Refuge traits (e.g., punctation over stamping) and indicates that the project area-wide Refuge assemblage dates to the latter half of the period (i.e., ca. 2800-2600 B.P.).

The several rim sherds in the Refuge Simple-Stamped assemblage have a consistently straight profile and tapered or rounded to slightly flattened lips. Weak simple stamping is evident on the lips of two rim sherds from two different vessels.

Seventy percent (n = 81) of the Refuge sherds were recovered during test-unit excavation, while the remaining sherds were found during surface reconnaissance (n = 25) and shovel testing (n = 10). The high percentage of Refuge sherds from test-unit excavation is due to test units placed in the location of "pot busts"; 60 of the test-unit sherds are from two, possibly three, vessels.

Middle Woodland - Deptford

The ceramics of the Middle Woodland Deptford tradition include simple-stamped, linear check/simple-stamped, linear check-stamped, check-stamped, and complicated-stamped wares (Caldwell and Waring 1939; Waring and Holder 1968). The hallmark ceramics of Deptford are the check-stamped varieties, all of which were executed with a carved paddle technique. Linear check-stamped sherds contain a series of longitude and transverse lands that vary in size and shape; the longitude lands are usually heavier and higher than transverse lands. Check-stamped sherds contain equal size longitude and transverse lands. The linear check/simple-stamped wares involve the use of alternating lines of linear check and simple-stamped designs. Considerable size and variation exists in the size and execution of check stamping on Deptford vessels, and ambiguity exists in sorting sherds into check- and linear check-stamped varieties. Deptford assemblages in the SRS area are dominated by jars of various sizes and a few globular pots (Kenion 1989; Sassaman 1993a).

At sites near the mouth of the Savannah River, where the Deptford series was first defined (DePratter 1991; Waring and Holder 1968), Deptford is believed to have begun at about 2900 B.P., when check stamping first appears. In the middle Savannah area, check stamping, and by definition, Deptford, does not appear until about 2600 B.P. (Anderson 1987; Sassaman and Anderson 1990:193). Excavations in the middle Savannah area, particularly at the G. S. Lewis site (38AK228W), provide evidence for two Deptford phases (Anderson 1987; Sassaman and Anderson 1990:193). Linear check-stamped, check-stamped, simple-stamped, and plain finishes occur throughout both phases. But the earlier phase, Deptford I (2600 to 2000 B.P.), includes surface treatments with alternating rows of simple and check stamping. Known locally as Deptford Linear Check/Simple Stamped *var. Katherine* (Anderson 1987), this type appears to be an especially sensitive trait of the early centuries of Deptford, as it combines the existing character of simple stamping with an emergent check-stamping design. In this same sense, Deptford Simple Stamped is believed to mark the earliest use of a paddle technique for stamping and is thusly distinguished from Refuge Simple Stamped, which was typically applied with a dowel. As indicated above, distinguishing between the two wares on a sherd-by-sherd basis is not easy. Slight differences in paste are useful on an assemblage level, although paste variation within wares is sufficiently large to pose occasional difficulties. By and large, Deptford wares in the SRS area have a well-sorted, sandy to gritty paste, a quality that extends through the Middle and Late Woodland periods and hence not especially sensitive to time.

A second phase of the Middle Woodland in the Middle Savannah area is defined as Deptford II (2000-1500 B.P.) (Anderson 1987; Sassaman and Anderson 1990). This phase is marked by the appearance or increasing popularity of complicated stamped and zones incised punctated surface treatments. Actually, very few sherds with such elaborate decoration have been recovered from the SRS. For instance, the coeval varieties of Swift Creek pottery so prevalent in much of neighboring Georgia are virtually

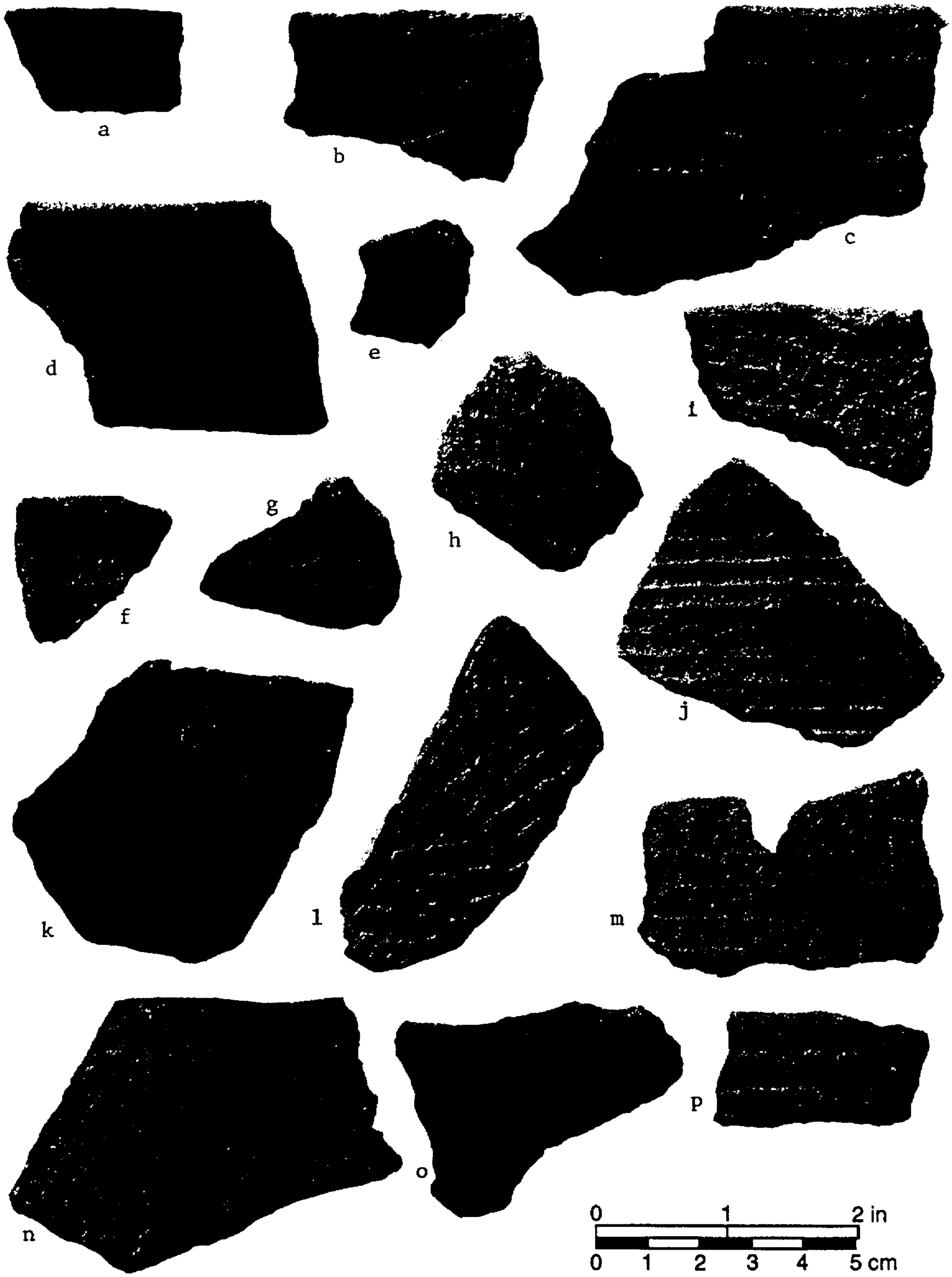

Figure 5-3. Deptford sherds from E Area. Provenience: (a) 38AK373-18X-2; (b) 38AK546-11X-3; (c) 38AK155-7Ø; (d) 38AK155-7Ø; (e) 38AK546-26Ø; (f) 38AK155-17B; (g) 38AK155-17C; (h) 38AK155-17E; (i) 38AK373-2D; (j) 38AK581-7C; (k) 38AK155-16A/B; (l) 38AK552-3Ø; (m) 38AK373-18X-1; (n) 38AK155-25Ø; (o) 38AK155-23X-1; (p) 38AK546-26Ø.

absent from the SRS. Nevertheless, some of the complicated stamped ceramics of the lower Savannah Deptford series do comprise small fractions of SRS Deptford assemblages, and the Lewis-West site (38AK228W) has an appreciable assemblage of zoned incised punctate reminiscent of the Brewton Hill variety of the lower Savannah. There may be a direct correlation between site size/complexity the occurrence of these elaborate wares, although this proposition has yet to be tested.

The Deptford sherd assemblage from the E Area is relatively small. Less than four percent (n = 74) of the sherds recovered are identified as some variety of Deptford check stamped. Among these are only five examples of linear check/simple stamped (Figure 5-3*a-d*). The low incidence of this early Deptford type reinforces the conclusion made earlier about the lack of substantial late Refuge-early Deptford components in the E Area. Its limited occurrence is all the more interesting when we consider that excavations at the nearby site 38AK157 yielded 130 such sherds, 19 percent of the entire Deptford assemblage (Table 5-4).

Other varieties of Deptford check stamped (Figure 5-3*e-o*) occur in the E Area in proportions similar to those from 38AK157 (Table 5-4), although at much smaller absolute numbers due to the differences in excavation area. However, the differences are not due to sample proportions alone. The collective assemblage of all varieties of Deptford check stamped pottery in E Area is only about 10 percent of all diagnostic sherds, compared to about 31 percent at 38AK157, 49 percent at 38AK158, and 20 percent in an aggregate sample of 421 sites from the SRS (Sassaman and Anderson 1990:214). Two points can be made about these numbers. First, the E Area was simply underutilized for activities leading to the discard of pottery during much of the Deptford period. Second, Deptford land use in the Aiken Plateau is spotty, with some areas such as 38AK157 and 38AK158 experiencing intensive use, and others, such as E Area, the Tinker Creek site, and 38BR259, experiencing very limited use. This is not all that surprising considering the existence of large riverine base camps like Lewis-West, where the resident Deptford population obviously spent a great deal of time. In contrast, land use during the prior Refuge phase and subsequent Late Woodland period appears to have been more widespread.

Aside from the divergent patterns of land use, to which we return in Chapters 6 and 7, the E Area Deptford assemblage exhibits considerable variation in the sizes and orientations of checks and lands. Such variation is not unusual for Deptford pottery, and we have had no success in locating meaningful chronological patterning to check and

Table 5-4. Comparison of the Proportions of a Variety of Deptford Check Stamped Sherds Between the E Area and 38AK157.

	E Area		38AK157	
Type	Count	Percent	Count	Percent
Linear Check Stamped /Simple Stamped	5	6.8	130	19.0
Linear Check Stamped	33	44.6	248	36.4
Check Stamped	21	28.3	199	29.2
Other Check Stamped	15	20.3	105	15.4
Total	74	100.0	682	100.0

land morphology at other SRS sites. We add, however, that none of the E Area sherds has the fine, well-executed check attributes of the Mississippian period Savannah Check-Stamped wares (see DePratter 1991). We seriously doubt that any of the E Area check-stamped sherds post-dates A.D. 500.

On technological grounds, the E Area Deptford assemblage reflects a considerable amount of paste variation. The usual well-sorted sand- and grit-tempered wares are well represented, but included too are examples of fine sand and poorly sorted grit temper. A few examples of creamy pastes resembling Refuge sherds are observed as well. The chronological relevance, if any, of these divergences from "typical" Deptford paste is not known.

An interesting example of manufacture technology is seen in a check stamped sherd with unaltered coils (Figure 5-3*o*). A portion of the sherd shows how paddle stamping was used to compress coils, while the uncompressed portion shows the original configuration of three 8-mm-thick coils. The joints between coils are clearly visible on the fracture edge of the uncompressed side, whereas stamping has completely obliterated the joints on the opposite side. None of these differences are evident on the interior surface, where smoothing, but not anvil compression, produced a uniform surface. These features show that the paste was quite wet when paddle stamping was applied.

In terms of lip and rim form, the E Area Deptford sherds embody some notable differences. We discuss these features in greater detail later in this chapter. For now we simply note the presence of both straight and outflaring rims, and tapered, flattened, and rounded lip forms.

The majority of the Deptford sherds from E Area were recovered from test unit excavation ($n = 51$). The remaining sherds were recovered during shovel testing ($n = 11$) and pedestrian surface collection ($n = 12$).

Middle-Late Woodland Cordmarked

Cordmarking has a long history in the middle Savannah area after entering from the north around 500 B.C. (Caldwell 1958; Sassaman 1993a). Cordmarking on lips has an even earlier history with the Thom's Creek series, although as an exterior surface treatment, cordmarking does not constitute a significant element of local pottery traditions until Deptford times. From about 500 B.C. until at least A.D. 800, cordmarking rose in popularity at the expense of check stamping and other forms of carved paddle stamping. Between about A.D. 300 and 800 cordmarking appears to have been the dominant surface treatment, accompanied by a variety of simple stamped, complicated stamped, and other minority types.

Variation in the cord width, cord twist, spacing, orientation, and execution of cordmarked pottery is considerable. Other than the general trend for cordmarking to become finer through time, chronological control over stylistic variation in the middle Savannah area is not very good. The earliest cordmarked ceramics appear to be characterized by irregular, widely spaced impressions. Later, Deptford II Cord Marked pottery is characterized by parallel cord impressions ranging from 1-2 mm in width. Cordmarked pottery of the subsequent Late Woodland period is believed to undergo an evolution from bold, irregularly spaced cordmarking (the interior equivalent of Wilmington Bold Cord Marked) to closely spaced, finely executed, and thinner cord impressions (Anderson 1987; Sassaman and Anderson 1990:202-203). Certainly by the end of this period and into the Mississippian period, cordmarking includes very fine cord impressions, as in the lower Savannah River and coastal types St. Catherines cord marked and Savannah Fine Cord Marked (DePratter 1979, 1991). From ca. A.D. 500 to 1200, middle Savannah cordmarked pottery is distinguished from coastal equivalents by its temper. While the latter are tempered with grog or clay, the middle Savannah varieties are tempered with sand and grit. We have long assumed that most of the Late Woodland cordmarked pottery from the middle Savannah is an interior equivalent of the coastal grog-tempered cordmarked pottery of the Wilmington I (A.D. 500-600) and II (A.D. 600-1000) phases of the coast (DePratter 1979, 1991). Without more chronological data this supposition cannot be tested, and even with better time control, the nature of sociocultural relationships between coastal and interior groups is not readily apparent. Equally elusive is the nature of sociocultural connections with Late Woodland populations of the Piedmont, whose ceramic repertoire included a variety of complicated stamped designs, as well as simple stamped. We return to a consideration of the Piedmont-derived types in later sections of this chapter.

Folded rims on cordmarked pottery are sometimes observed in the latter centuries of the Late Woodland period (Sassaman and Anderson 1990:203). In the Ocmulgee Big Bend area of south-central Georgia, for instance, a folded rim variety of cordmarked pottery defined as Ocmulgee Cord Marked dates from A.D. 800-1200 (Stephenson 1990a, 1990b). A few such sherds have been recovered from the SRS, including the present survey (see below), and the type occurs in small frequencies at a very few sites on Groton Plantation in Allendale County, South Carolina (Chester DePratter, personal communication, 1996). Its occurrence in the middle Coastal Plain of the Savannah River valley appears to comprise the northern extent of indigenous south-central Georgia populations, ones that existed during the early centuries of Mississippian expansion across much of the region. Chester DePratter (personal communication, 1996) views it as an interior equivalent to the St. Catherines wares of his coastal Georgia sequence, ca. A.D. 1000-1200. Folded rim cordmarked sherds on the SRS have been previously attributed to the early centuries of the Late Woodland period (Sassaman and Anderson 1990:202).

Cordmarked sherds comprise the clear majority of diagnostic sherds in the E Area inventory. A total of 481 specimens were recovered from surface (n = 40), shovel test (n = 44), and test unit (n = 397) proveniences. Sorting these sherds by cord impression width categories (see Table 5-1), approximately one-third (n = 132) of the assemblage consists of fine cordmarked (i.e., cord impressions <1 mm wide) (Figure 5-4*a-d, l, k*). Most fine cordmarked ceramics were found in test units (n = 118), and at least 82 originated from one vessel with an excurvate rim. Collectively, the fine cordmarked specimens are dominated by closely spaced, parallel impressions. A minority subsample includes sherds with irregular, occasionally crossed impressions. Surface treatment variation is not mirrored in paste attributes, as all of the fine cordmarked sherds have compacted, moderately well-sorted pastes with medium to very coarse sand or grit. No examples of grog temper were observed.

Excavations at 38AK157 supported the distinction between early and late cordmarked pottery manifested in the width of cord impressions (Sassaman 1993a:127). The E Area cordmarked assemblage duplicates this pattern (Table 5-5). Fine cordmarked sherds have a peak occurrence in the plowzone (0-20 cm BS), while regular cordmarked pottery peaks in 20-30 cm BS levels. If, in fact, most, if not all of the fine cordmarked pottery is an interior equivalent to Savannah I on the coast (ca. A.D. 1200-1300), its stratigraphic position over regular cordmarked pottery (all of which should predate A.D. 1200) is not unexpected.

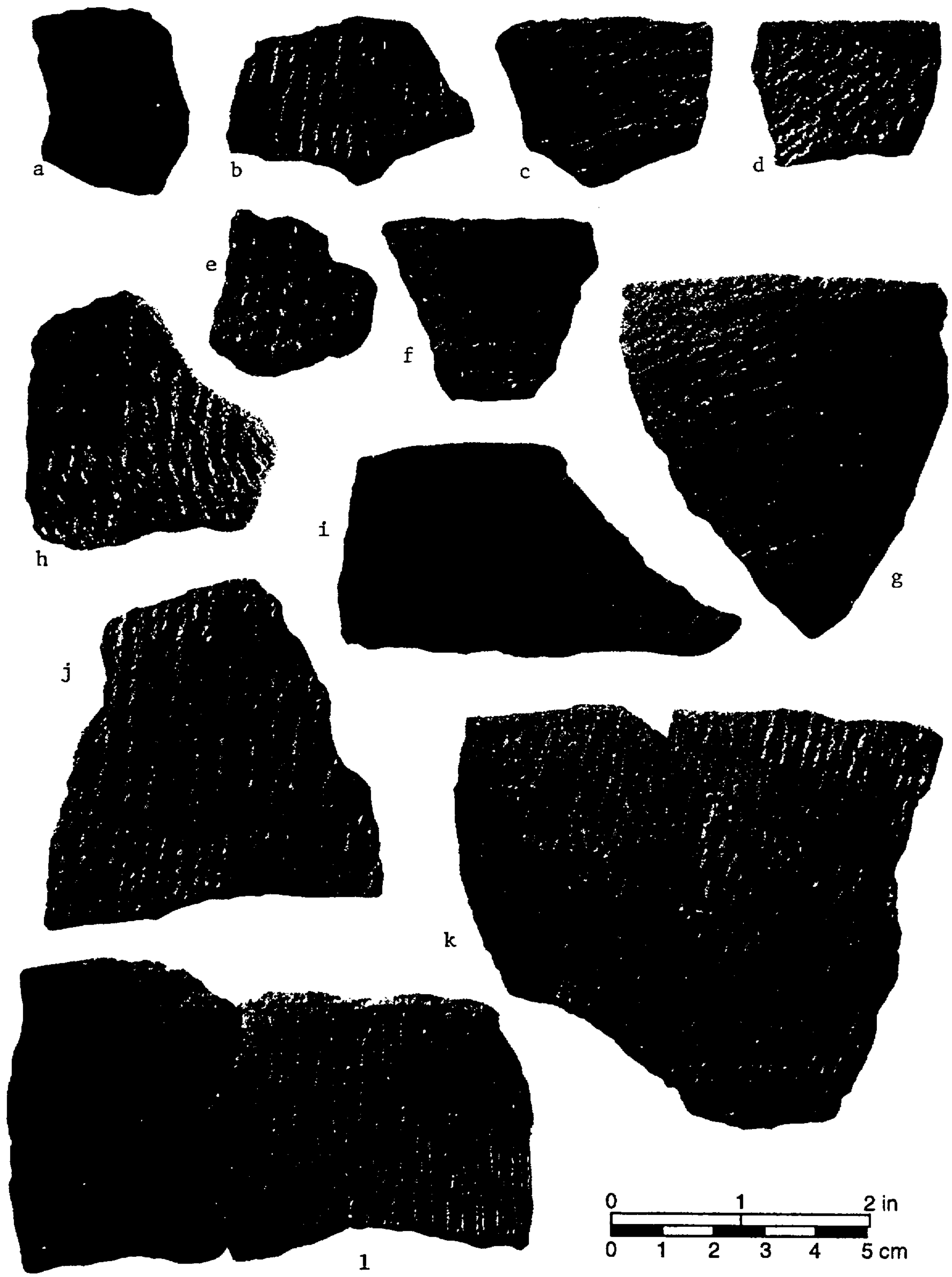

Figure 5-4. Cordmarked pottery from E Area. Provenience: (a) 38AK151-13Ø; (b) Occurrence 16; (c) 38AK546-26Ø; (d) 38AK151-3Ø; (e) 38AK153-1Ø; (f) 38AK563-9X-3; (g) 38AK155-17C; (h) 38AK155-5Ø; (i) 38AK557-3B; (j) 38AK155-2Ø; (k) 38AK155-17D; (l) 38AK557-3B.

Table 5-5. Frequencies of Varieties of Cordmarked Sherds by Level for the E Area.

Level (cm BS)	Fine Cordmarked Count	Fine Cordmarked Percent	Regular Cordmarked Count	Regular Cordmarked Percent
A (0-10)	12	10.2	14	5.0
B (10-20)	74	62.7	51	18.3
C (20-30)	19	16.1	175	62.7
D (30-40)	13	11.0	38	13.6
E (40-50)	0	0.0	1	0.4
TOTAL	118	100.0	279	100.0

Cord impressions ranging from 1 to 2 mm in width occur on 343 of the E Area sherds (Figure 5-4*e-j*). Usually considered late Middle Woodland and Late Woodland in age, such sherds have carefully executed impressions with both crossed and parallel orientations. Fifteen sherds, representing two vessels, contain irregular and widely spaced impressions. With the exception of several folded rim specimens, discussed below, rims on regular-sized cordmarked sherds are straight, with tapered or slightly rounded lips. The exceptions are single examples of excurvate and incurvate rim profiles. Pastes among this subassemblage are similar to those seen in the fine cordmarked sherds. Again, no grog tempering was observed.

Six E Area sherds contain bold cord impressions (examples of which is shown in Figure 5-5*a, d*). As indicated, bold cordmarking is believed to be a trait of the earliest centuries of the Late Woodland period, although solid evidence for this is lacking. There is nothing about the paste or formal properties of the bold cordmarked sherds from E Area that distinguish them from their fine and regular cordmarked counterparts.

Returning to the subassemblage of regular-width cordmarked sherds, at least 70 appear to have originated from a single vessel with a folded rim (Figure 5-5*b*). Two additional vessels with folded rims are represented by a few sherds, although the surface treatment on some was so eroded or too poorly represented to adequately characterize the nature of cord impressions. We have no reason to doubt that all of the folded rim specimens are local equivalents of the Ocmulgee Cord Marked type of south-central Georgia, which dates from A.D. 800-1200. Several folded rim sherds from one of the E Area vessels were recovered from the top of a buried rock cluster (Feature 3) at 38AK155. A small piece of charcoal from the feature yielded an uncorrected AMS date of 880 ± 60 B.P. (C13/C12 corrected to 870 ± 60 B.P.; calibrated at the two-sigma range of A.D. 1025 to 1275, with an intercept of A.D. 1195; Beta-78829). Included among these is the rim sherd of another cordmarked vessel that with an excurvate profile formed by the impression of a corn cob. Also from this context are sherds from at least one fine cordmarked vessel (Savannah Fine Cord Marked?) and sherds from at least three different simple stamped vessels. Lacking are sherds of the coeval complicated stamped wares (e.g., Savannah Complicated Stamped), although a few small sherds of complicated stamped pottery resembling Late Woodland Napier or Woodstock types (Caldwell 1957; Rudolph 1991) were recovered from the 10-cm level immediately below the cobble cluster.

Taken together, the occurrence and associations of folded rim cordmarked pottery in the E Area specifically and SRS in general point to an emergent Mississippian context in which corn was apparently in use, but other elements of Mississippian culture not yet in place. The Early Mississippian era (ca. A.D. 1050-1200) in the middle Savannah has remained poorly documented compared to the Middle Mississippian period (ca. A.D. 1200-1400), partly because of our limited knowledge of the local diagnostic traits. What

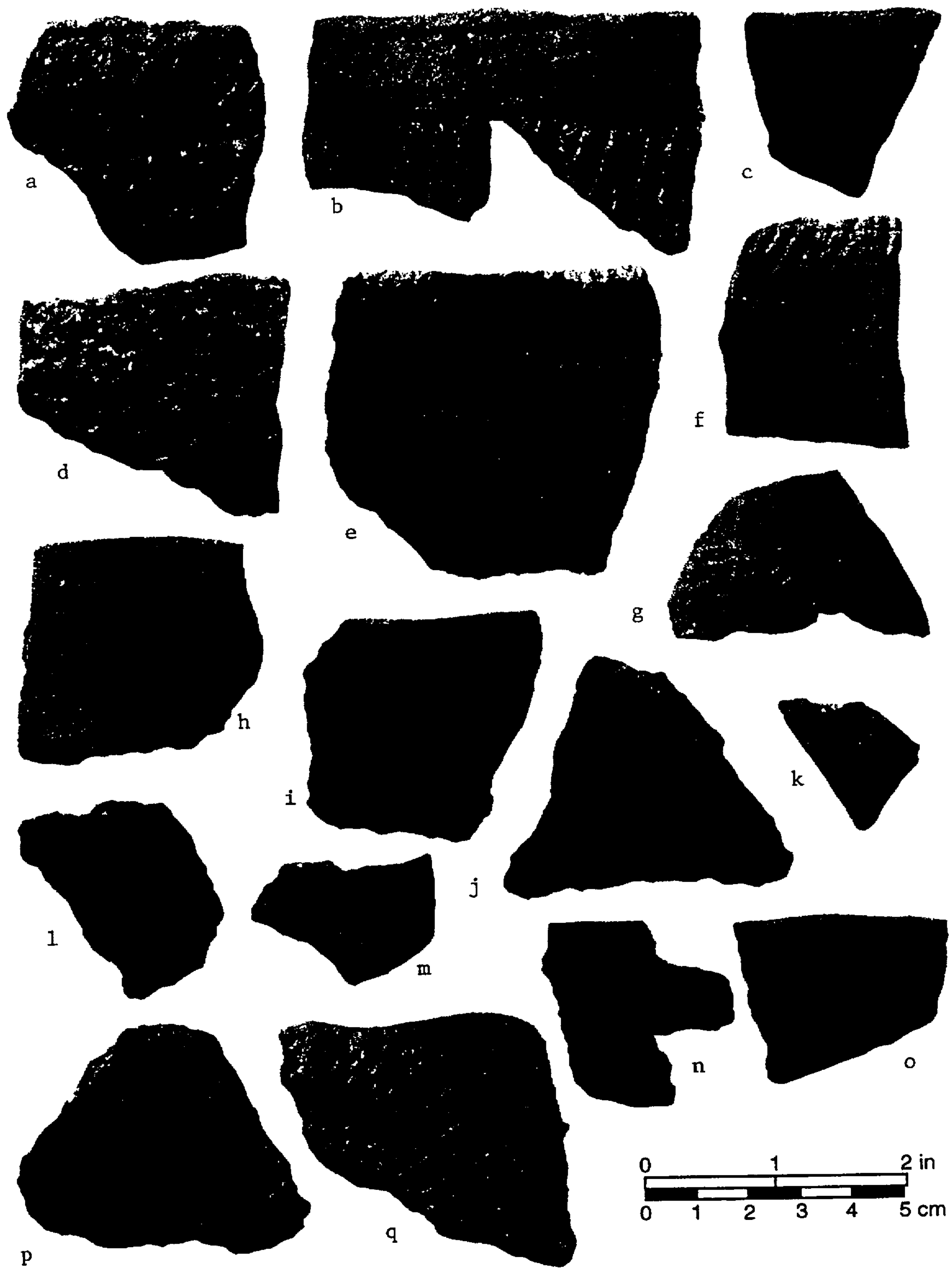

Figure 5-5. Late Woodland, early Mississippian, and miscellaneous sherds from E Area. Provenience: (a) 38AK560-3X-3; (b) 38AK155-19B; (c) 38AK546-34Ø; (d) 38AK546-23C; (e) 38AK155-16D; (f) 38AK155-16C; (g) 38AK155-17C; (h) 38AK151-13Ø; (i) 38AK546-2B; (j) 38AK546-20X-3; (k) 38AK582-45; (l) 38AK547-7B; (m) 38AK555-2X-1; (n) 38AK565-5A; (o) 38AK155-17C; (p) 38AK155-16C; (q) 38AK560-3X-3.

is significant about the late date for the folded rim cordmarked pottery is that it brings to light the possibility that some of the otherwise nondiagnostic cordmarked pottery from the area is much later than previously believed. Aside from its distinctive rim, the folded rim cordmarked pottery has regular-sized cord impressions, qualities of execution, and paste attributes that match a very large percentage of the "typical" cordmarked pottery from the SRS. It seems likely that we have systematically underestimated the existence of eleventh and twelfth-century inhabitants of the SRS by misrepresenting the date range for some cordmarked pottery by as much as 200 years.

Late Woodland - Simple Stamped

Simple stamping reappears in a variety of expressions within the Late Woodland sequences of the Piedmont province (e.g., Anderson and Joseph 1988; Elliott and Wynn 1991; Keel 1976) and in the lower Santee River sequence defined by David Anderson (Anderson et al. 1982). In general, these late varieties are distinguished from Refuge and Deptford Simple Stamping in both stylistic and technological dimensions. Stamping is generally narrow, and usually crossed or overstamped, although wide and parallel applications are not uncommon. Vessel forms include globular pots, as well as tall jars, and lip treatments are usually better executed that in the Refuge and Deptford series.

The most relevant, or at least nearby, evidence for Late Woodland simple stamped pottery comes from recent work at the Mims Point site (38ED9) in Edgefield County, South Carolina. Here a partially excavated wall trench has yielded sherds from at least two simple stamped vessels, along with a large rim sherd from a globular pot with incising, punctation, and complicated stamping (Sassaman 1993a:92-95). Two radiocarbon dates on associated charcoal point to a calibrated date of about A.D. 700-800. Cordmarked pottery is not associated with this feature (although in the original report [Sassaman 1993a:92] the simple stamped sherds were described as "untwisted cordmarked"). Late Swift Creek influence is perhaps seen in the complicated stamped vessel, although we hasten to add that this is not a "typical" Swift Creek design. Time-wise the connection is plausible, but other Piedmont influences involving carved paddle techniques are possible, such as the Napier and Woodstock traditions of ca. A.D. 800-1100.

A total of 16 sherds in the E Area are identified as Late Woodland simple stamped (Figure 5-5*e-h* shows four examples). Fourteen of the sherds were recovered from the unit at 38AK155 containing the rock cluster dating to about A.D. 1195. Most of these are from a vessel with cross stamping and a rim profile that resembles the Mims Point sherds (Figure 5-5*f*), although the present examples have a fine, smooth paste while those from Mims Point are gritty. The other examples include a large rim sherd with an excurvate profile, haphazard, shallow stamping, and a gritty paste (Figure 5-5*e*), and a small rim sherd and possible, small body sherds from an apparently paddle-stamped vessel (Figure 5-5*h*). None of these were in direct association with the feature, although most were within the levels containing the feature. The major exception is the large excurvate rim sherd, which was located in the level directly below the feature, where one small Napier sherd was also found.

The remaining few simple-stamped sherds assigned to the Late Woodland period consist of three sherds from another site (38AK151), two of which probably came from the same vessel. In style and form they resemble the Mims Point simple stamped sherds, including its gritty paste.

Late Woodland and Mississippian - Complicated Stamped Pottery

Complicated stamped pottery began to be first utilized in the region during the Deptford II phase (by ca. A.D. 1) and continued to be used through the Mississippian period. Included are a variety of pottery traditions such as Swift Creek, Napier, Woodstock, Savannah, and Irene. In general, these wares are found in only very limited numbers on the SRS. Nineteen sherds of complicated stamped pottery were found in the E Area (Figure 5-5*i-m* shows five examples). The paste of these sherds ranges from fine to gritty. All but two of these sherds were rectilinear varieties. Nine of these sherds were recovered from exposed surfaces at three locations while four were discovered in STPs and 10 in test units. The high frequency of surface finds in this group is noteworthy from the perspective of site formation processes. None of the Thom's Creek sherds, in contrast, came from surface contexts, owing to processes of deposition that effectively sealed pre-3000 B.P. assemblages from plowing and other near-surface disturbances.

Several complicated stamped design motifs are represented in this sample, including designs that could be identified as Napier (n = 1), Etowah (n = 1), and Woodstock (n = 1). Napier ceramics, diagnostic of the terminal Late Woodland period, are found primarily north of the Fall Line in South Carolina. The Etowah sherd contains a one-bar diamond and was found in the same unit and excavation level as a corncob-impressed sherd. The single Woodstock sherd is from the emergent Mississippian period. Woodstock sherds are found very occasionally on the SRS and, like the example in the E Area, are usually found in isolation. Nine rectilinear sherds exhibit a ladder motif. Sherds with the ladder motif in the middle Savannah River valley may indicate an early Mississippian presence in the region, but excavations at 38AK157 suggests that some ladder-like stamping was present in some numbers during late Middle Woodland times. Sherds with the ladder motif may represent a Woodstock variant or a southern occurrence of the Pisgah ceramic tradition (Sassaman and Anderson 1990:207). The design motifs on seven other sherds are unidentified to ceramic type.

All told, the combined assemblage of complicated stamped pottery from the E Area represents a sweep of time as great as 1400 years. None of the varieties occur with sufficient frequency to state with confidence that they represent actual habitation use of the E Area. However, given the growing recognition of affiliated diagnostic features (such as the folded rim cordmarked pottery), even the limited occurrence of complicated stamped wares helps to improve our admittedly poor recognition of late prehistory, particularly during the period of A.D. 800 to 1200.

Mississippian - Corncob Impressed

Regardless of the diagnostic specificity of ceramic surface treatments for late prehistory, sherds with corncob impressions postdate A.D. 1000 given our current understanding of the arrival of corn agriculture to the region. Corncob-impressed rims have been observed on curvilinear complicated stamped pottery classified as Savannah on the SRS (ca. A.D. 1100-1350). Beyond this, the diagnostic value of corncob impressions has not been documented locally.

Six sherds from the E Area survey exhibit evidence of corncob impressions. Figure 5-5*n, o* provide examples of two such sherds. Represented are at least three different vessels: the cordmarked example mentioned earlier, a complicated stamped example, and one indeterminate. All have relatively fine, compacted pastes, and, for those with sufficiently large rim portions, the distinctive excurvate or S-shaped profiles that were formed with the use of a cob.

Other Ceramics

Other Simple Stamped Fifty-four sherds contained simple stamped impressions that could not be placed in a cultural-historical group. These sherds were recovered during pedestrian survey (n = 17), shovel testing (n = 14), and test unit excavation (n = 23). Due to erosion, the type of simple stamping could not be determined on 20 of these sherds. Parallel stamping was observed on 16 sherds, and cross stamping on 18 sherds. Pastes varied from fine to coarse. Eleven of the parallel stamped sherds contain even impressions of varying width (<1 to 5 mm) that appear to have been applied with a dowel. Cross stamping was applied in a seemingly random fashion, with impressions ranging from 1 to 3 mm wide.

Fabric Impressed. Although it forms a conspicuous aspect of ceramic traditions spanning the Early to Late Woodland periods in regions surrounding the middle Savannah, fabric-impressed pottery is a minority ware on the SRS. Consistent with this generalization, the E Area survey produced only two fabric-impressed sherds, one of which is shown in Figure 5-5*p*. One was located in a test unit and in association with Late Woodland and Early Mississippian ceramics, lithics, and features. The other example was located in a STP on the floodplain of Upper Three Runs Creek. Both sherds contain poorly sorted aplastics ranging from fine sand to very coarse sand.

Other, Minor Occurrences. Sherds with unidentifiable or unusual surface treatments include two examples of incising, four with "textured" surfaces created by stamping or impressing with some corrugated object(s) (one shown in Figure 5-5*q*), a small, punctated rim sherd, and another punctated sherd too eroded to classify with greater specificity.

Plain and Eroded Sherds. A total of 256 undecorated sherds were collected during the E Area survey from exposed surfaces (n = 51), shovel tests (n = 49), and test units (n = 156). Except for the 25 possible Thom's Creek sherds described earlier, cultural affiliation could not be determined for the plain sherds. However, three plain sherds with simple stamped lips are likely Early Woodland in age. Sand- or grit-tempered sherds with eroded surfaces are represented by 243 specimens in the E Area assemblage.

Crumb Sherds. As previously stated, crumb sherds are all sherds smaller than 1/2-inch in maximum dimension and were not subject to detailed analysis. A total of 520 crumb sherds was recovered during survey. These sherds consisted of 108 plain, 94 decorated, and 318 eroded/unidentified sherds. Less than four percent of these sherds were collected during surface reconnaissance; this small percentage is probably due to the small size, and hence visibility of these artifacts.. The vast majority (88%) of the crumb sherds were recovered during test unit excavation.

Miscellaneous Ceramics. Miscellaneous ceramics consist of one bead fragment and 689 pieces (273.0 g) of fired clay. The bead was recovered during the excavation of a test unit that contained Late Woodland/Early Mississippian artifacts and features.

Summary of Cultural-Historical Information Derived from Ceramics

The occurrence of pottery provides a means of inferring land-use history for the last four millennia. The E Area assemblage of over 700 diagnostic sherds shows that the area was used intermittently for activities that resulted in the deposition of pottery sherds. The oldest pottery recovered are sherds of the Stallings fiber-tempered and Thom's Creek sand-tempered wares. However, evidence for the earliest Stallings types (ca. 4500-3500

B.P.) is not observed. Rather, the two sandy-paste fiber-tempered sherds and more numerous Thom's Creek specimens point to occupations dating to about 3500-3000 B.P. (ca. 1500-1000 B.C.) These occupations were limited compared to later periods, and, as we discuss in greater detail in Chapter 7, they reveal a very distinctive pattern of floodplain use.

The subsequent Early Woodland period is represented by a large assemblage of simple-stamped and incised pottery of the Refuge tradition. Evidence for use of the E Area during the first two centuries of Refuge (i.e., 3000-2800 B.P., or ca. 1000-800 B.C.) is limited compared to evidence for later Refuge occupations. It appears that the E Area was most intensively occupied in the Early Woodland period from ca. 800-600 B.C.

Middle Woodland Deptford occupations are not very well represented in the E Area, and there is especially little evidence for an early Middle Woodland presence, that is, before ca. A.D. 1. This is the time when linear check-stamped pottery enjoyed local popularity. By A.D. 1, cordmarked pottery had entered the scene and then proceeded to overshadow the check-stamped wares by ca. A.D. 400. The large number of cordmarked sherds from the E Area may signify relatively intensive Middle Woodland occupations. However, the limited assemblage of classic Deptford Check-Stamped and Linear Check-Stamped pottery argues for late Middle Woodland occupations. The typical E Area cordmarked pottery is itself not very useful as a temporal discriminator of the centuries spanning A.D. 1 to 800. However, as we have discussed at length in an earlier section, the occurrence of folded rim cordmarked sherds and other affiliated ceramic traits of definite late occurrence is testimony to land use in E area during the period of A.D. 1000 to 1200.

To conclude, the ceramic sherd assemblage from E Area is evidence for a cyclical pattern of land use. Periods of definite occupation occurred at 1500-1000 B.C., 800-600 B.C, A.D. 200-800, and A.D. 1000-1200. Lesser episodes of use are surely evident in the occurrence of minority or indeterminate types, but on balance the data do not provide evidence for spans of more-or-less regular use in excess of 600 years.

TECHNOFUNCTIONAL ANALYSIS

In the interest of developing data on the technological and functional variation of E Area pottery, analysis shifts from the sherd to the vessel-unit of analysis. Minimum Number of Vessels (MNV) analysis resulted in the identification of 203 vessels, which are listed by surface treatment in Table 5-6. Appendix D provides data for these vessels. As these figures show, far more simple stamped ($n = 53$) and cordmarked ($n = 59$) vessels were identified than any other surface treatment.

Before launching into the few technofunctional inferences we can make from vessel data, some consideration of sample structure and potential biases is in order. The frequency distribution of vessels by surface treatment does not precisely duplicate the frequency distribution based on sherds (Table 5-6), but this is not unexpected. It is much more difficult to assign sherds to particular vessels when the surface treatment is either plain, eroded, or decorated with a nonspecific treatment such as cordmarking. In contrast, the highly diverse array of check stamping is much more readily sorted into individual vessels. Thus, vessels with check stamped surface treatments are much better represented in the vessels assemblage than in the sherd assemblage, while cordmarked, plain, and eroded vessels tend to be underrepresented.

Table 5-6. Vessel Inventory by Surface Treatments for the E Area.

Surface Treatment	Vessel Count	Vessel Percent	Sherd Count	Sherd Percent
Fiber-Temper Plain	1	0.5	2	0.2
Sand-Tempered Plain	22	10.8	256	19.8
Drag & Jab/Linear Punctated	4	2.0	17	1.3
Other Punctated	2	1.0	2	0.2
Incised	2	1.0	9	0.7
Fabric Impressed	2	1.0	2	0.2
Simple Stamped	53	26.1	177	13.7
Linear Check/Simple Stamped	4	2.0	5	0.4
Linear Check Stamped	10	4.9	33	2.6
Check Stamped (Deptford)	14	6.9	21	1.6
Other Check Stamped	8	3.9	15	1.2
Regular/Bold Cordmarked	50	24.6	349	27.0
Fine Cordmarked	9	4.4	132	10.2
Complicated Stamped	9	4.4	19	1.5
Corncob Impressed	3	1.5	6	0.5
Eroded/Other	10	5.0	246	19.1
TOTAL	203	100.0	1,291	100.0

How this analytical bias affects our assessment of the land-use history of the E Area can be judged from the frequencies displayed in Table 5-7. Again, the Middle Woodland Deptford occupation of E Area, as measured by the incidence of check stamped vessels, is greatly increased over the values provided by sherd counts. In fact, all constituent periods/phases are better represented by vessel counts except for those which include cordmarked pottery (i.e., the latest two periods). The extent to which these differences influence our assessment of relative land-use intensity depends, in part, on the rate of vessel use and discard. As one would expect from a sample consisting largely of dispersed shovel tests and test units, the average number of sherds per vessel is very low, consisting of only 3.1 sherds per vessel for the inventory of 148 diagnostic vessels (Table 5-8). The ratio of sherds to vessels is especially low for the Check-Stamped wares, despite the enhanced sorting potential of sherds of these types. This low value is due to the fact that check-stamped sherds were often located in areas (i.e., sites) containing only one or two of these types, and given the low frequency and the distances between Deptford sherds it was often easy to identify distinct vessels. In the one area where Deptford sherds were concentrated (38AK155), stamped impressions among sherds were

Table 5-7. Vessel Inventory by Cultural-Historical Period or Phase.

Period or Phase	Vessel Count	Vessel Percent	Sherd Count	Sherd Percent
Stallings	1	0.7	2	0.3
Thom's Creek	9	6.1	17	2.4
Refuge	32	21.6	115	16.3
Deptford	28	18.9	59	8.4
Middle Woodland/Late Woodland[a]	47	31.8	349	49.4
Late Woodland/Early Mississippian[b]	31	20.9	164	23.2
Total	148	100.0	706	100.0

[a]Regular and bold cordmarked, except with folded rim; [b]includes fine cordmarked, folded rims, cob impressed, Late Woodland Simple Stamped, and all complicated stamped.

Table 5-8. Ratio of Sherds/Vessel by Cultural-Historical Period or Phase.

Period or Phase	Vessel Count	Sherd Count*	Sherds/ Vessel
Stallings	1	2	2.0
Thom's Creek	9	41	4.6
Refuge	32	124	3.9
Deptford	28	49	1.8
Middle Woodland/Late Woodland	47	95	2.0
Late Woodland/Early Mississippian	31	154	5.0
Total	148	465	3.1

*includes only sherds assigned to vessels

highly variable, making it was possible to identify many vessels from relatively few sherds. In contrast, the ratios that are higher than average (i.e., Thom's Creek, Refuge, and Late Woodland/Early Mississippian) are each due to one or more "pot busts" recovered from isolated test units.

A comparison between the E Area and 38AK157 vessel assemblages provides further insight into the distinct properties of the Deptford Check-Stamped assemblage (Table 5-9). The 38AK157 assemblage of 1,098 diagnostic sherds comes from block excavation totaling 418 m^2. As one would expect, the collective average number of sherds per vessel for 38AK157 is greater than for the E Area assemblage. However, the difference lies almost exclusively between the respective Deptford assemblages. In all other respects, the E Area and 38AK157 vessel assemblages are very similar. In fact, the density of diagnostic vessels per unit area is virtually identical: E Area produced 0.48 vessels per m^2 of excavation (total area = 245 m^2) compared to 0.43 vessels per m^2 excavation at 38AK157 (total area = 418 m^2). The overall similarities only emphasize the apparent deviation of the Deptford Check-Stamped assemblage. Clearly, the use of E Area for purposes that resulted in the discard of check-stamped wares differed from that at 38AK157. How it differed is a subject we reserve for Chapters 6 and 7. For now we note only that the greater representation of Deptford in the vessel assemblage compared to the sherd assemblage is not simply an analytical bias.

Turning now to technofunctional parameters of the E Area vessel assemblage, we begin with inferences about vessel form and function. As a variety of studies have

Table 5-9. Comparison of the Ratio of Sherds/Vessel by Cultural-Historical Period or Phase for the E Area and Block Excavation Assemblages of 38AK157.[1]

	E Area			38AK157		
Period or Phase	Vessel Count	Sherd Count[2]	Sherds/ Vessel	Vessel Count	Sherd Count[2]	Sherds/ Vessel
Stallings	1	2	2.0	3	11	3.7
Thom's Creek	9	41	4.6	18	70	3.9
Refuge	32	124	3.9	69	269	3.9
Deptford	28	49	1.8	57	619	10.9
Middle Woodland/Late Woodland	47	95	2.0	33	129	3.9
Total	117	311	2.7	180	1,098	6.1

[1]Late Woodland/Early Mississippian vessels excluded from comparison because the category was not recognized within the 38AK157 assemblage; [2]includes only sherds assigned to vessels.

demonstrated, morphological and metric properties of ceramic vessels vary with function (e.g., Braun 1983; Bronitsky and Hamer 1986; Hally 1986; Linton 1944; Rice 1987; Rye 1976, 1981; Schiffer and Skibo 1987; Skibo 1992). Such properties reveal things about *mechanical performance*—the ability of vessels to perform certain functions (e.g., cooking, storage) at varying levels of efficiency given their morphological and physical make-up. Vessel size and shape, the ratio of orifice diameter to volume, vessel wall thickness, paste composition, and other, related variables determine the degree to which vessels perform particular functions efficiently, and potters can, of course, manipulate these variables to achieve certain functional goals. Some of these same variables have technological parameters that must be not violated. For instance, to improve the thermal conductivity of a vessel, walls can be thinned, but not to the extent that this compromises tensile strength (Braun 1983; Rice 1987:182). Similarly, temper can be added to reduce the thermal shock resistance of a ceramic body, but only if its thermal expansion properties are similar to those of the clay being used (Rye 1976, 1981). Potting therefore involved an intricate balance between technological and functional considerations, not to mention cultural values and actions that affect form and decoration. Here we do not intend to review all of the information on mechanical performance of vessels, for indeed, our assemblage sample is not conducive to detailed analysis of form and function. Rather, we refer the reader to the references we listed above for additional information and restrict our discussion below to only that which can be addressed with the sample at hand.

Vessel Size and Shape

None of the 203 vessels represented in the E Area sample was sufficiently complete or reconstructed to permit an accurate projections of vessel size and shape. However, vessel rim profiles are a useful proxy for vessel form in lieu of better morphological data. The rim portions of 39 vessels were sufficiently large (i.e., at least 3 cm in length, perpendicular to the lip margin) to classify into rim shapes. A breakdown of these forms by cultural-historical type is presented in Table 5-10, and profiles of the diagnostic specimens are illustrated in Figure 5-6.

The vast majority of rim profiles are straight, with lesser and roughly equal proportions of incurvate, excurvate, and S-shaped profiles. Rim profiles do vary with cultural-historical type, however. Consistent with other SRS assemblages, the Thom's Creek vessels from E Area are hemispherical bowls with slightly incurvate rim profiles. The straight-sided, tall jar form that is seen in assemblages from the coast (Espenshade and Brockington 1989:157; Trinkley 1980a:10), the lower Coastal Plain (Anderson 1982:252), and the middle Savannah River valley (Phelps 1968) is not represented in the E Area Thom's Creek assemblage. Jars were also conspicuously absent from the Thom's Creek assemblage from 38AK157 (Sassaman 1993a:131).

Table 5-10. Frequency of Rim Profile Types by Cultural-Historical Period or Phase.

	Rim Profile				
Period or Phase	Straight	Incurvate	Excurvate	S-Shaped	Total
Thom's Creek	1	3	0	0	4
Refuge	4	0	0	0	4
Deptford	3	0	1	0	4
Middle Woodland/Late Woodland	6	1	1	0	8
Late Woodland/Mississippian	6	0	2	3	11
Nondiagnostic	7	1	0	0	8
Total	27	5	4	3	39

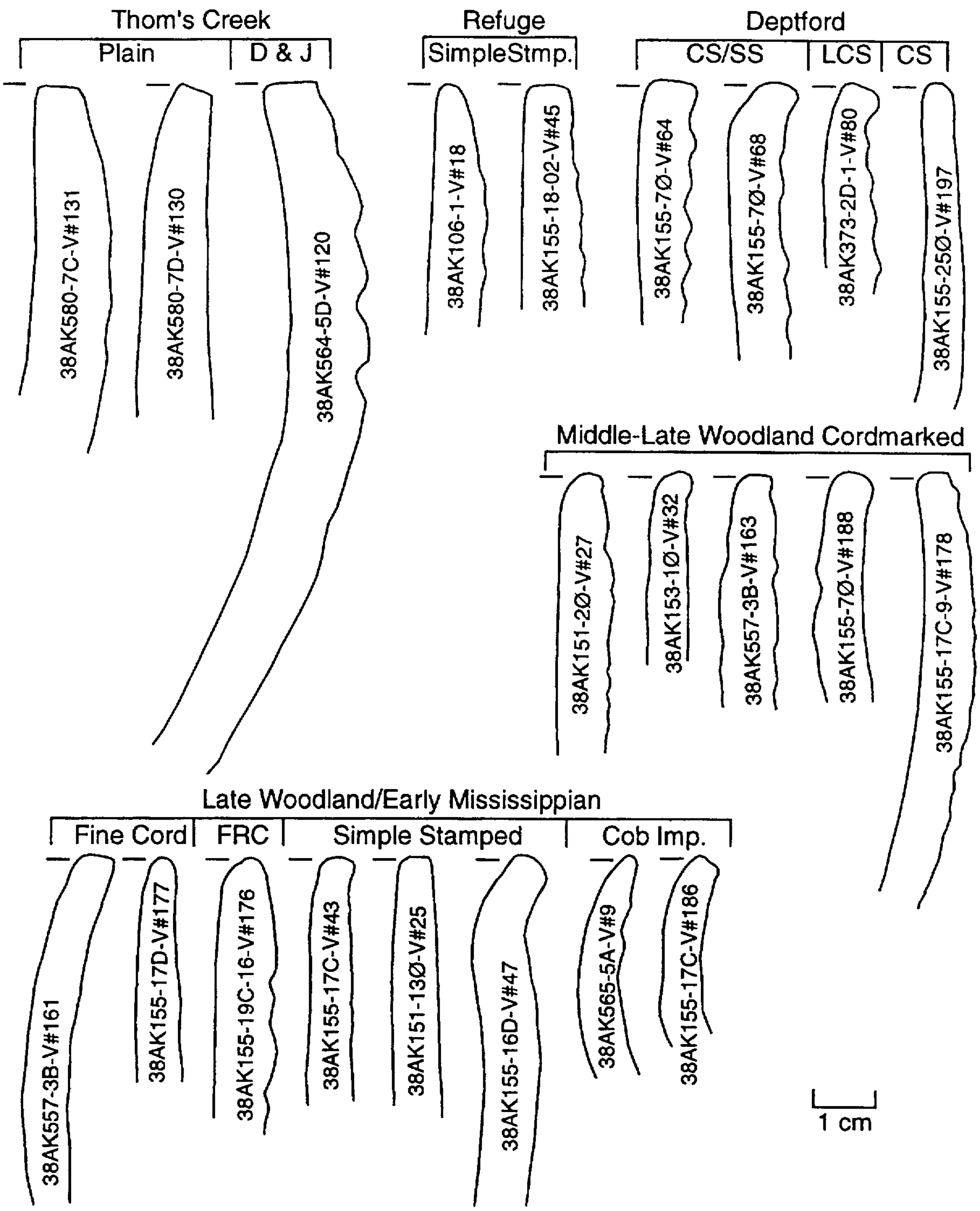

Figure 5-6. Rim profiles of diagnostic ceramic vessels from E Area (D & J: drag and jab punctuation; CS/SS: check stamped/simple stamped; LCS: linear check stamped; CS: check stamped; FRC: folded rim cordmarked; Cob Imp.: corncob impressed rim).

None of the four Thom's Creek vessels have rim portions large enough (i.e., ≥10 cm) to estimate orifice diameter. Three of 18 Thom's Creek vessels from 38AK157 were large enough to show orifice diameters ranging from 28 to 37.5 cm, some of the widest-mouthed vessels in the entire 38AK157 inventory. Wide orifices are conducive to easy access, and this is found not only in the local Thom's Creek wares, but also in the earlier Stallings period flat-bottomed basins. This latter form is believed to be designed for use in indirect moist cooking (i.e., "stone boiling") (Sassaman 1993b). In contrast, the bowl forms which also appear in the Stallings series but comprise such a large part of the local Thom's Creek assemblages may have functioned as serving vessels. The highly decorative nature of these forms supports this notion inasmuch as decoration may have been used on vessels intended for public use (Hally 1986). What is more, there is likely to be some relationship between the size of serving bowls and the scale or complexity of the stylistic messages connoted by surface decoration (Wobst 1977). At 38AK157, the largest of the Thom's Creek bowls were decorated, while smaller forms were plain. The small E Area assemblage includes three decorated Thom's Creek vessels, none of which can be confidently estimated for size, although at least two are seemingly large vessels. Missing from the E Area assemblage, as we noted earlier, are examples of the plain vessels with cordmarked lips that are common to 38AK157.

Tall, straight-sided jars or pots are the exclusive form represented by four Refuge Simple Stamped vessels from E Area. Aside from an occasional bowl, Refuge assemblages from the SRS are dominated consistently by the jar form. The series indeed exhibits little formal variation. If Refuge is in fact a distinct tradition without counterparts from presumed earlier (Thom's Creek) and later (Deptford) traditions, then its ceramic repertoire is extremely narrow. However, we doubt that it is completely distinct in temporal terms, as it is probable that (Thom's Creek) bowls and (Refuge) jars were being used simultaneously in the Aiken Plateau between about 3200 and 2900 B.P.

Straight-sided jars or pots continue to be the dominant vessel type among the E Area vessels dating to the Middle and Late Woodland periods. The diversity of forms begins to increase during the Deptford period, when slightly excurvate profiles are first seen, and continues into early Mississippian times to include forms with "S-shaped" profiles. These latter forms are also excurvate but they rest on a slightly constricted neck. This same trend of diversification was observed in the assemblage from 38AK157 (Sassaman 1993a:131-138).

Possible functions for straight-sided jars were considered in the analysis of vessels from 38AK157 (Sassaman 1993a:136-138). In this report a similar analysis of (Woodland) Yadkin vessels by Espenshade (1986:96-99) was used to support the inference that straight-sided jars served predominantly as dry storage vessels. Also supporting this inference was Kenion's (1989) analysis of Deptford vessels from the G.S. Lewis-West site (38AK228W). Kenion showed that large vessels (ones with orifice diameters >30 cm) have properties conducive to long-term dry storage. Among them are excurvate rims that can accept a flexible covering. This form was identified on 33 percent of the Lewis-West vessels. A comparable percentage was observed in the Deptford assemblage from 38AK157.

If the functional inferences of these various studies are correct, then we are left with little to no evidence for cooking vessels in the Early and Middle Woodland assemblages from the region, and the E Area assemblage is no exception. The formal attributes we expect from efficient cooking pots include a relatively low orifice to volume ratio; low, that is, relative to the wide-mouthed bowls and basins of Late Archaic assemblage, as well as the excurvate, or straight-sided jars of the Woodland period.

It is only within the Late Woodland and Early Mississippian assemblage from E Area that we find evidence for direct-heat cooking functions. The so-called S-shaped profiles in this group represent vessels with slightly globular shapes and slightly constricted necks, properties conducive to efficient thermal functions. Unfortunately, none of these shows use alteration indicative of cooking, although at least one cordmarked vessel from 38AK157 had soot deposits on the exterior surface (Sassaman 1993a:138).

In sum, the vessels from E Area exhibit a temporal trend that begins in the Thom's Creek phase with hemispherical bowls, shifts to uniform, straight-sided jars in the Refuge phase, and continues with this generalized but increasingly diversified form in the Deptford phase and Late Woodland/Early Mississippian period. These findings duplicate the results of vessel analysis from 38AK157 and lend further support for a technological trends to improve the thermal properties of vessels. Additional evidence for this is found in data on ceramic composition.

Thermal Properties of Ceramic Body

Thermal conductivity is directly influenced by the composition and thickness of the ceramic body. All else being equal, thin vessel walls are better conductors of heat than thick vessel walls (Rice 1987:182). Of course, vessel design must also take into account nonthermal factors such as tensile strength, which also affect decisions about wall thickness and composition. For instance, large vessels must have relatively thick vessel walls for structural support, irrespective of function.

Among the 37 vessels from E Area that had sufficiently large rim portions to measure wall thickness (3 cm below lip), values range from 7.1 to 14.1 mm (Table 5-11). A trend for decreasing thickness through time is evident in this limited sample, as is a trend for increasing variation in thickness. Thus, with the exception of the Thom's Creek sample, these data show that vessel walls became increasingly thinner on average, but also more diverse, reflecting, we presume, the growing need for a variety of pottery functions.

The Thom's Creek exception is that one of its four vessels is an especially thin example (7.1 mm thick). This is a plain vessel with simple-stamped lip that we have assigned to the Thom's Creek series by virtue of paste and provenience. All other vessels in this subsample are at least 11 mm thick. Thin-walled vessels are not completely absent from Thom's Creek assemblages in the middle Savannah area (e.g., Phelps 1968), although they appear to be a rarity at SRS sites. Curiously, the antecedent Stallings fiber-tempered series in the immediate area is dominated by thin-walled vessels (Sassaman

Table 5-11. Summary Statistics on Vessel Wall Thickness (mm) by Cultural-Historical Period or Phase.

		Vessel Wall Thickness			
Period or Phase	n	mean	st. dev.	minimum	maximum
Thom's Creek	4	10.63	2.87	7.1	14.1
Refuge	3	9.27	0.64	8.9	10.0
Deptford	4	8.37	0.88	7.4	9.3
Middle Woodland/Late Woodland	8	8.49	1.00	7.6	10.6
Late Woodland/Mississippian	10	7.79	1.34	6.1	10.1
Nondiagnostic	8	8.45	1.31	6.5	10.0
Total	37	8.57	1.56	6.1	14.1

1993b). What is more, Thom's Creek pottery from the lower Savannah and the Congaree-Santee river valleys is routinely thin, averaging 6.8 to 8.5 mm in various assemblages (Sassaman 1993b:140-141). Thus, the thick-walled Thom's Creek vessels from the E Area, as well as other SRS sites, are technologically distinct from their local and regional counterparts. Only the Late Archaic wares of Ogeechee River valley shell middens exceed SRS Thom's Creek pottery in thickness. Analyses of the style and technology for these especially thick wares suggests that they may represent an historical outcome of the demise of Stallings Culture after about 3500 B.P. (Sassaman et al. 1995). The upland Thom's Creek assemblages from the SRS and vicinity may be the South Carolina equivalent of this same process.

Apart from these important cultural-historical issues, what do the thickness data tell us about the function of Thom's Creek vessels from E Area? We can safety suggest that these thick wares were not intended for thermal conductivity. Instead, thick-walled vessels would provide insulation, a property desirable in cooking technology involving indirect-heat sources, as in "stone boiling." Such a technique appears to have been routine throughout the Archaic and perhaps into the later periods. It is during the Late Archaic in the Savannah River valley that innovations for stone boiling were introduced, such as the use of perforated soapstone slabs for cooking stones, and, later on, the development of the very first pottery—flat-bottomed basins that probably served as containers for stone boiling. By about 3700 B.P., however, soapstone slabs and ceramic basins were out of vogue, as pots suited for use over fire came into widespread use. What remains unresolved is the actual use of these later wares, because independent evidence for direct-heat cooking (e.g., sooting) has not been documented in the middle Savannah River valley, as it has on the coast (Sassaman 1993b). It appears that direct-heat cooking had not yet become a routine function of ceramic vessels in the middle Savannah, so after 3500 B.P., when upland areas like the E Area and 38AK157 became locations of relatively intensive occupations, bowls continued to be used for indirect-heat cooking. These same locations include a few examples of soapstone slabs, so even the traditional stone boiling medium persisted for a few more generations.

Vessel wall thickness is reduced in the subsequent Refuge period assemblage from E Area. This small sample shows little variation in thickness, as did the Refuge sample from 38AK157, where vessel walls averaged 9.0 mm thick. While the thinner walls would be a marked improvement in thermal conductivity over Thom's Creek vessels, the large orifice diameter, straight walls, and poorly sorted paste (see below) of the Refuge vessels are not especially conducive to direct-heat cooking. In contrast, Refuge pottery from the lower Coastal Plain and coast (e.g., Anderson et al. 1982; Espenshade and Brockington 1989) is thinner and occasionally bears traces of soot. Evidence for sooting is not observed on Refuge vessels from E Area or other sites on the SRS. Again, as in the Late Archaic series, there appears to be distinct technological trajectories in the middle Savannah and on the coast.

Vessels with variations of Deptford Check-Stamping from E Area have a mean vessel wall thickness of 8.37 mm. This value is greater than the Deptford averages from 38AK157 (7.6 mm) and 38AK228W (6.7 mm), but consistent with assemblages in the lower Coastal Plain and coast (Sassaman 1993a:140). We have no basis for inferring the size of the E Area Deptford vessels to examine the degree to which regional variation in thickness is affected by structural parameters. A comparison from other sites suggests that vessel wall thickness covaries with vessel height and orifice diameter (Sassaman 1993a:141), as we might expect. Irrespective of this, the reduction in wall thickness does not point directly to direct-heat cooking function, for there are no other formal or use-wear data that lead to this conclusion. As indicated earlier, we cannot specify which, if any, of the Deptford vessels from local sites were used for direct-heat cooking.

Cordmarked vessels given to the Middle to Late Woodland periods show a slight increase in mean vessel wall thickness over Deptford. The absolute value (8.49 mm) and relative difference duplicates the evidence from 38AK157 (Sassaman 1993a:142). Here the increase in wall thickness was attributed to increased vessel size.

Finally, the assemblage of Late Woodland/Early Mississippian vessels—which includes Late Woodland simple stamped, cordmarked with folded rim, fine cordmarked, cob impresses, and complicated stamped wares—shows the lowest average wall thickness (7.79 mm) of all E Area subsamples. These vessels also embody the greatest variation in this measure, supporting the argument for functional variation we inferred from rim profile data. Overall, however, the thinner walls, finer pastes (see below), and certain formal properties reflect a demand for improved thermal efficiency. Clearly some, perhaps most, of the vessels dating to this interval in E Area were designed for direct-heat cooking.

A consideration of temper grain size and distribution provides additional information about the thermal properties of E Area vessels. For instance, temper can be manipulated by a potter to alter the thermal shock resistance and heat conductivity of vessels. When temper has a thermal expansion factor equivalent to the clay, thermal shock resistance is enhanced. All of the E Area vessels have quartz particles in the paste. Quartz has a high thermal expansion factor compared to clays, so it is not an ideal temper for ceramics subject to repeated heating (Rye 1976, 1981). However, coarse particles of quartz are less likely to result in thermal shock than are finer particles, so potters can select for clays with desirable aplastics to intentionally add the appropriate aplastics to minimize thermal shock. Studies conducted by Braun (1983) on Woodland period pottery in the Midwest show that sand particles in pastes became increasingly finer to improve the thermal properties of cooking vessels. In addition to improving thermal shock, finer pastes increase conductivity by minimizing the incidence of insulating air pockets. In contrast, a potter may chose to enhance insulation properties by selecting tempers such as fiber for a more porous ceramic (Schiffer and Skibo 1987).

The frequencies of vessels by temper grain size are provided in Table 5-12. Grain size is classified by the Wentworth scale (Davis 1983:7) into fine sand (0.13-0.24 mm), medium sand (0.25-0.49 mm), coarse sand (0.50-0.99 mm), very coarse sand (1.00-1.99 mm), and granules (2.00-3.99 mm). In addition to temper size, each vessel was coded for the level of variation in grain size. Pastes with low variation are those with grain sizes limited to no more than two contiguous size classes (e.g., medium and coarse sand). Pastes with high variation are those with more than two grain size classes present. In all cases, grain size for vessels was determined the largest grain size class present.

Table 5-12. Frequency of E Area Vessels by Temper Grain Size, Size Variation, and Cultural-Historical Period or Phase.

	Temper Grain Size					Size Variation	
Period or Phase	Fine Sand	Medium Sand	Coarse Sand	V. Coarse Sand	Granule	Low	High
Stallings	0	0	1	0	0	0	1
Thom's Creek	0	0	3	4	2	3	6
Refuge	0	0	4	12	16	2	30
Deptford	0	4	11	5	8	15	13
Middle Woodland/Late Woodland	0	2	27	14	4	29	18
Late Woodland/Mississippian	4	6	7	10	4	21	10
Nondiagnostic	3	4	28	13	7	36	19
Total	7	16	81	58	41	106	97

The results of temper analysis show that E Area vessels run the gamut from fine to gritty pastes, and they are nearly evenly split between low and high variation in grain size distributions. There are, however, some obvious cultural-historical patterns to these data. Pastes are consistently coarse-grained through the Refuge period, and thereafter become increasingly finer. What is more, the level of variation in grain size distributions decreases through time. The Refuge series is especially notable for a poorly sorted, gritty paste which includes pieces of quartz and other miscellaneous minerals that exceed the size of granules. These properties are unlikely attributes of a vessel technology designed for direct-heat uses.

Through time, as pastes became finer, the range of granule sizes decreased. This would seem to indicate that potters became increasingly more selective in their use of clays and tempers. This is consistent with the other lines of data presented to this point which show an increased concern for thermal performance, presumably that associated with direct-heat cooking.

As one might expect from the foregoing analyses, there are a number of correlations among vessel form, wall thickness, and temper that reinforce the evidence for direct-heat uses of certain vessels. Specifically, vessels with either S-shaped or excurvate rim profiles tend to have the thinnest walls and finest and most homogeneous pastes of all E Area vessels. Once again, these are largely restricted to types attributed to the Late Woodland and early Mississippian periods. We conclude this discussion, however, by noting again the limited size and highly fragmented condition of the E Area assemblage. Although it tends to recapitulate the findings from 38AK157, the E Area analysis is merely preliminary. Future work with other Aiken Plateau assemblages will help to bolster these findings and hence lend to them some potential for regional-scale generalizations.

CHAPTER 6

DISTRIBUTIONAL ANALYSIS

The subject of this chapter is analysis of the distribution of archaeological materials across the study area. As outlined in Chapter 1, we are interested in examining the spatial patterning that derives from a "nonsite" or "siteless" analysis of artifact distribution. We anticipate that at least three new insights may emerge from a nonsite approach: (1) fine-grained differences in the distribution of technofunctional artifact classes may be observed that are otherwise masked by a site unit of analysis; (2) we might document subtle changes in land-use patterning within, as well as among, sites; and (3) we stand to gain information about activities involving artifact deposition outside of sites.

Before we begin our analysis, some qualifications of the samples at hand are in order. It goes without saying that we do not have a complete, unbiased record of the residues left by 10,000+ years of human activity in the study area. The data available are but a small sample of that record, and are biased toward particular parts of the study area. As we usually do in surveys of the Aiken Plateau, we targeted the margins of upland landforms. The spines of these landforms were tested to some extent, but not at the intensity of ridge margins and toes. This bias is accentuated by the fact that artifact discovery along upland landform margins led to cruciform testing to define the boundaries of clusters. In short, our sample of shovel tests is nonrandomly distributed in space, and its subset of positive tests is even more nonrandom in distribution.

To what extent do the distributional biases of our sample diminish the utility of a nonsite approach? We admit that our sample is inadequate to make claims about the patterning of artifacts within the spatial parameters of the entire study area. However, we are clearly able to assess distributional tendencies of artifacts within the parameters of our sample, that is, among the subsurface tests that we made. To illustrate this point, suppose that artifacts across the entire study area were randomly distributed. It follows that every single shovel test has an equal and independent probability of producing an artifact. We can test this proposition for nonrandom tendencies in artifact patterning with any number of environmental variables. Statistically meaningful differences in locational tendencies between positive and negative shovel tests would suggest that artifacts are not randomly distributed. At one level of analysis, then, we are interested in locating nonrandom tendencies in artifact distribution within the universe of sample points (as opposed to the entire study area) and we do not need a randomly distributed set of shovel tests to do so.

At the level of traditional site cluster our sampling biases have another effect. We have in this survey, as is routine on the SRS, cruciformed the locations of positive shovel tests. Hence, our sample points were expanded in locations already producing artifacts. If such locations are indeed distributional clusters on the landscape (i.e., sites) then the probability of recovering an artifact in each of the cruciform tests is much greater than in an ordinary discovery transect test. Here we have skewed the samples back toward the traditional site unit[1]. However, we believe that the sampling clusters resulting from cruciform testing are mirroring the reality of study area-wide artifact distribution, not simply the bias of sampling. The very large population of negative shovel tests outside of cruciform clusters (i.e., sites) is testimony to the clustered, nonrandom distributions of artifacts in E Area. Sites, as marked peaks in the distribution of artifacts, really do exist within the study area and are not simply a result of our shovel testing methods.

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[1] with the exception of a handful of locations with a positive shovel test in a discovery transect that failed to produce additonal material in subsequent cruciform testing, locations we refer to as "artifact occurrences."

Accepting the clustered nature of artifact distribution as fact, we are yet in a position to examine nonrandom tendencies of particular technofunctional and chronological dimensions of the assemblages *within* clusters. Again, if artifacts were randomly distributed within a given cluster, then shovel tests within the cluster have an equal and independent probability of containing an artifact. Our search at this level is thus, again, a search for nonrandom tendencies at a smaller scale, something akin to intrasite spatial analysis.

Finally, the issue of how well our shovel test and test unit data characterize the entire study area can be addressed by comparing these data to a set of randomly generated points. Deviations in the locational parameters of these two data sets will inform us about our sample biases and allow us to control for them in the analysis that follows. As it turns out, however, our sample is not markedly different from a set of random points, so we are justified in generalizing about the entire study area, at least within the parameters of the locational variables we choose to examine.

LOCATIONAL VARIABLES: PARAMETERS AND RATIONALE

We select for this study a limited set of locational variables that are considered relevant to decisions about land use. The variables include elevation, slope, aspect, distance to water, and distance to the Upper Three Runs floodplain. Chapter 3 provided a discussion of the methods for measuring each of these variables using Geographic Information System (GIS) software. Here we wish to summarize the parameters of each variable and to provide some bridging arguments for the relevance of these variables in land-use decisions.

Elevation

Absolute elevation for points within the study area range from 39 to 96 m above mean sea level (AMSL). Elevational differences are largely a consequence of fluvial dissection, including both Upper Three Runs Creek, which accounts for the lowest elevations, and the five feeder streams of the upland unit, which account for mid-range elevations. The larger-scale gradient formed by downstream fluvial dissection of Upper Three Runs, and, ultimately, the Savannah River, has little consequence in the elevation ranges of the study area.

In practical terms, elevation is a measure of the position of a location relative to three distinctive topographic settings. Elevations in the range of 75-96 m represent the tops and upper slopes of the five ridges of the study area. Side slopes of these ridges leading to the five feeder streams account for elevations some 49-74 m. Bottoms of these streams and the floodplain of Upper Three Runs fall in the 39-48 m range.

Slope

Topographic gradients in the study area vary widely. The majority of area consists of moderately sloping land, with values in the range of 10-20 percent. Steeper slopes (20-35%) exist along the lower reaches of Rank 1 and 2 stream valleys, as well as the bluff margin of Upper Three Runs. The latter zone is, in fact, much steeper in places than our topographic data show. Relatively flat ground (<5% slope) exists in the floodplain of Upper Three Runs and along the spines of ridges. Slopes less than 5 percent are preferable for habitation purposes, but small shelves on steeper slopes are not apparent on the topographic layer. Accordingly, habitation uses on locations recorded as having slopes of around 10 percent are not unexpected.

Aspect

All slope aspects are well-represented in the project area with the exception of south- and southeast-facing slopes. Northeast-, northwest-, and southwest-facing slopes are especially common. The relevance of aspect is twofold. First, aspect will determine exposure to solar radiation, which, in turn, will have great effects on relative warmth and dryness of a given location and its attendant biota. In general, south-facing slopes offer the greatest exposure to sun, whereas north-facing slopes offer the least. The relative amounts of exposure on these slopes varies seasonally, but at no time during the year are north-facing slopes as exposed to sun as much as south-facing slopes. Lacking direct southern exposures, the project area offers its best solar exposures on southwest-facing slopes.

The second relevant factor of aspect concerns exposure to prevailing winds. Northwesterlies prevail in the study area, so occupation of northwest-facing slopes provides the greatest wind exposure. This alone may be desirable, but we must take into account seasonal temperature, as well as nonclimatic factors, such as game surveillance. Positions downwind of game would be advantageous for hunters. Given the topography of the study area, it follows that southwest facing slopes would offer both good solar exposure during the cool seasons, as well as downwind position relative to stream bottoms they parallel. Some of the north-facing slopes might be advantageous for habitation locations during warm seasons of the year, but they do not provide as good a position for game surveillance as do the southwest-facing slopes.

Distance to Water

Proximity to water is necessary for long-term habitation and some food processing activities (acorn leaching), and it is an indirect, though no less important factor in foraging and farming success. The study area is relatively well-endowed with water sources for an Aiken Plateau locale. No location within the study area is more than 375 m from running water. However, the volume of water available from these small streams increases in downstream direction, leading, ultimately, to the largest source of water, Upper Three Runs Creek. We employ a second distance variable (distance to Upper Runs Creek floodplain; see below) to monitor locations relative to this major source of water. We recognize, nevertheless, that Upper Three Runs was not required as an onsite water source for relatively long-term habitation and water-consumptive activities. Rather, both habitation and water-consumptive activities could have taken place at locations of smaller water sources insofar as the scales of habitation and activities were equally small. In any event, distance to water varies with elevation as both are a reflection of proximity to bottomland. Notable exceptions to this are found at locations overlooking steep slopes close to stream segments.

Distance to Upper Three Runs Floodplain

As indicated above, distance to Upper Three Runs floodplain monitors locational tendencies relative to the dominant source of running water in the study area. The selection of sites for proximity to the floodplain involves not only concerns for water access, but also the associated bottomland soils and its flora and fauna. Floodplain locations would be favored for horticultural purposes, aquatic plants, aquatic birds, semiaquatic mammals, reptiles, and amphibians.

As a distinct microenvironment, the floodplain represents the most dynamic in the study area, involving both long-term changes and short-term, seasonal changes. Regarding the long-term, the Upper Three Runs floodplain has evolved over the millennia to become a broader, aggradating, seasonally-flooded environment. Based on geoarchaeological work at other sites on the SRS (Brooks and Hanson 1987; Brooks and Sassaman 1990), the floodplain began to assume its present configuration and behavior after about 3500 B.P. Prior to this time it was probably more narrow and erosional, with rapid, flashy discharge due to episodic rain. Its seasonal flooding behavior after about 3500 B.P. may have precluded substantial habitation during the winter and spring, and occasionally during the summer when thundershowers prevail.

Discussion

No single locational variable is sufficient to characterize the land-use tendencies of a particular activity or type of habitation. Obvious criteria for long-term habitation include proximity to water, relatively level, well-drained land, and favorable aspect. Size criteria for habitation location will depend on co-resident size, at least as this applies to the minimal requirements for large-sized groups. Other, less obvious criteria include access to biotic and abiotic resources, social spacing, and cultural preference. Aside from flooded bottoms and steep slopes, there are few locations in the study area that could not have supported small habitations, that is, as long as residents were willing to walk a few hundred meters for water. However, the suite of anticipated tasks that took place during a given period of habitation influenced site selection as much, if not more than the need for water, flat, dry land, and favorable aspect. For instance, a seasonal occupation involving acorn processing and storage may have targeted the mesic slopes of small streams because both the target resource (oak mast) and necessary processing medium (running water) were in close proximity. An even shorter-term occupation focused on deer hunting may have overlooked the flatter, better watered locations in favor of optimum aspect and surveillance perspective.

In launching into the distributional analysis of E Area artifacts, then, we are more concerned with the locational patterning of activity-specific classes of artifacts than we are with the aggregated activities that result in assemblages we recognize as sites. We admit at the start that although many activities involving portable artifacts took place at locations widely distributed across the landscape, many of these items were discarded most frequently at locations of habitation. This is simply a fact of the archaeological record of mobile hunter-gatherers and horticulturalists and one that precludes a literal functional interpretation of the distribution of artifacts. We bear this in mind throughout the analysis that follows.

A final note: Due to the limitations inherent to shovel-test data, we restrict analysis of artifact distributions to simple presence-absence data. Although variables such as artifact density or tool ratios are potentially informative about the association between activities and particular landscape features, shovel-test data are much too limited to indicate more than artifact presence. Even the *absence* of a particular type of artifact at a shovel-test location is not secure, considering that at a minimum, the interval between tests is 10 m. This data restriction must be applied to our test unit assemblages, too, if we are to have comparability across the board. The only major exception to this rule is with the most numerous artifact class, debitage. Wherever sample size allows, values for average flake size and percent cortex are analyzed for spatial patterning.

ARTIFACT DISTRIBUTIONS IN E AREA

The analysis of artifact distributions in E Area is conducted in stepwise fashion. We begin by describing the locational parameters for our complete sample of 1,457 shovel tests and 32 test units. These points are then compared against a set of 500 randomly generated points to locate nonrandom tendencies in our entire sample.

Locational differences between positive and negative shovel tests are next considered, followed by differences between the locational parameters of positive shovel tests and site centroids.

Analysis turns to technofunctional artifact classes in the second half of this chapter, using a synchronic perspective in a search for long-term land-use regularities. Changes in land-use patterning are considered last as we employ chronologically-sensitive data to search for diachronic trends.

Locational Parameters of Shovel Tests and Test Units

Summary statistics of the locations of 1,457 shovel tests and 32 test units are provided in Table 6-1. The collective 1,489 points constitutes our entire sample for the

Table 6-1. Summary Statistics of Locational Variables for All Shovel Tests and Test Units in E Area.

	Shovel Tests	Test Units	Total
Frequency	1,457	32	1,489
Elevation (m)			
mean	67.11	63.19	67.02
st. dev.	13.57	13.76	13.58
minimum	39.00	41.00	39.00
maximum	96.00	89.00	96.00
Slope (%)			
mean	10.09	10.00	10.08
st. dev.	6.01	6.75	6.03
minimum	0.00	0.00	0.00
maximum	30.00	23.00	30.00
Distance to Water (m)			
mean	117.66	94.22	117.16
st. dev.	70.21	62.42	70.12
minimum	0.42	2.85	0.42
maximum	323.49	263.11	323.49
Distance to UTR Floodplain (m)			
mean	348.98	302.11	346.70
st. dev.	234.05	234.75	230.55
minimum	0.00	0.00	0.00
maximum	939.27	736.10	939.27
Aspect n (%)			
None	24 (1.6)	0 (0.0)	24 (1.6)
NNE	444 (30.5)	9 (28.2)	453 (30.4)
ENE	99 (6.8)	1 (3.1)	100 (6.7)
ESE	35 (2.4)	1 (3.1)	36 (2.4)
SSE	21 (1.4)	0 (0.0)	21 (1.4)
SSW	141 (9.7)	3 (9.4)	144 (9.7)
WSW	292 (20.0)	9 (28.2)	301 (20.2)
WNW	167 (20.0)	7 (21.9)	174 (11.7)
NNW	234 (16.1)	2 (6.2)	236 (15.8)

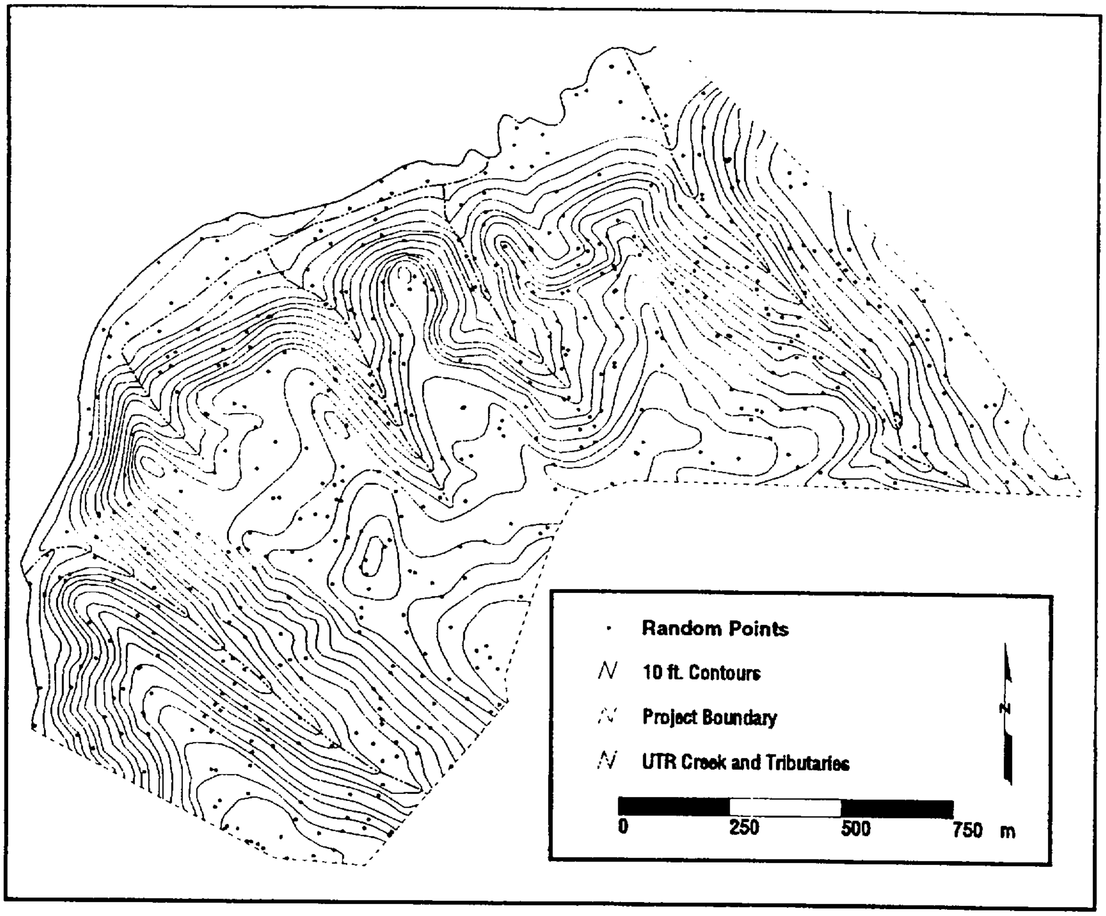

Figure 6-1. Locations of 500 randomly-generated points in E Area.

analyses that follow. As the figures show, test units are, on average, at lower elevation, closer to water, and closer to Upper Three Runs floodplain than are shovel tests. They also reflect a more limited range of aspect values than do shovel tests. This is in part due to the relatively small sample of test units. Small sample size plagues many of the analyses that follow as we begin to examine finer-grained aspects of the assemblage.

The 1,489 points of our subsurface sample can be considered the entire sampling universe for most of our analytical purposes. That is, we are interested in locating deviations from the locational parameters of the entire sample that are indicative of human land-use patterns. As we stated earlier, we cannot extrapolate from our sample to the entire 550-acre study area because our sample is not random. However, we can generate a sample of random points to determine the directions and extent to which our subsurface sample is biased.

To do so, we projected 500 random points onto the study area (Figure 6-1) with Arc/Info® and derived locational data for each point. The summary statistics for these data are given in Table 6-2. The mean values of continuous variables for the random and subsurface samples were then compared with t tests to locate statistical deviations. These tests show that the two samples deviate significantly in only slope values, as random points have a smaller mean slope value. Another deviation exists in the mean values for distance to Upper Three Runs floodplain, but it is not significant.

A comparison of the two samples for aspect, a nominal variable, reveals a sizable deviation in the proportion of northeast and west aspects. The random sample has a much smaller fraction of northeast aspects (NNE, ENE) and a correspondingly higher fraction of west aspects (WSW, WNW). Otherwise the samples are very similar.

The sampling differences listed above are due to the fact that the random points include more locations along ridge spines and tops than does our sample of subsurface tests. We created this bias by targeting the margins of landforms for survey. As we noted before, ridge spines were not completely ignored; several transects bisected these portions of the study area. Our limited success in locating artifacts reconfirmed the

Table 6-2. Summary Statistics and Comparison of Means of Locational Variables for All Tests and Randomly Generated Points in E Area.

	All Tests	Random Points	Difference	*t* test unpool.	*t* test pooled	d.f.
Frequency	1,489	500	-			
Elevation (m)						
mean	67.02	67.30	+0.28	-0.37	-0.39	1,957
st. dev.	13.58	14.94	+1.36			
minimum	39.00	39.00	0.00			
maximum	96.00	96.00	0.00			
Slope (%)						
mean	10.08	9.27	-0.81	2.60	2.60	1,957
st. dev.	6.03	6.03	0.00			
minimum	0.00	0.00	0.00			
maximum	30.00	29.00	-1.00			
Distance to Water (m)						
mean	117.16	118.52	+1.46	-0.32	-0.36	1,957
st. dev.	70.12	84.71	+14.59			
minimum	0.42	0.12	-0.30			
maximum	323.49	371.48	+47.99			
Distance to UTR Floodplain (m)						
mean	346.70	363.79	+17.09	-1.33	-1.39	1,957
st. dev.	230.55	254.94	+24.39			
minimum	0.00	0.00	0.00			
maximum	939.27	947.19	+7.92			
Aspect n (%)						
None	24 (1.6)	9 (1.8)	(+0.2)			
NNE	453 (30.4)	102 (20.4)	(-10.0)			
ENE	100 (6.7)	23 (4.6)	(-2.1)			
ESE	36 (2.4)	10 (2.0)	(-0.4)			
SSE	21 (1.4)	7 (1.4)	(0.0)			
SSW	144 (9.7)	42 (8.4)	(-1.3)			
WSW	301 (20.2)	141 (28.2)	(+8.0)			
WNW	174 (11.7)	85 (17.0)	(+5.3)			
NNW	236 (15.8)	81 (16.2)	(+0.4)			

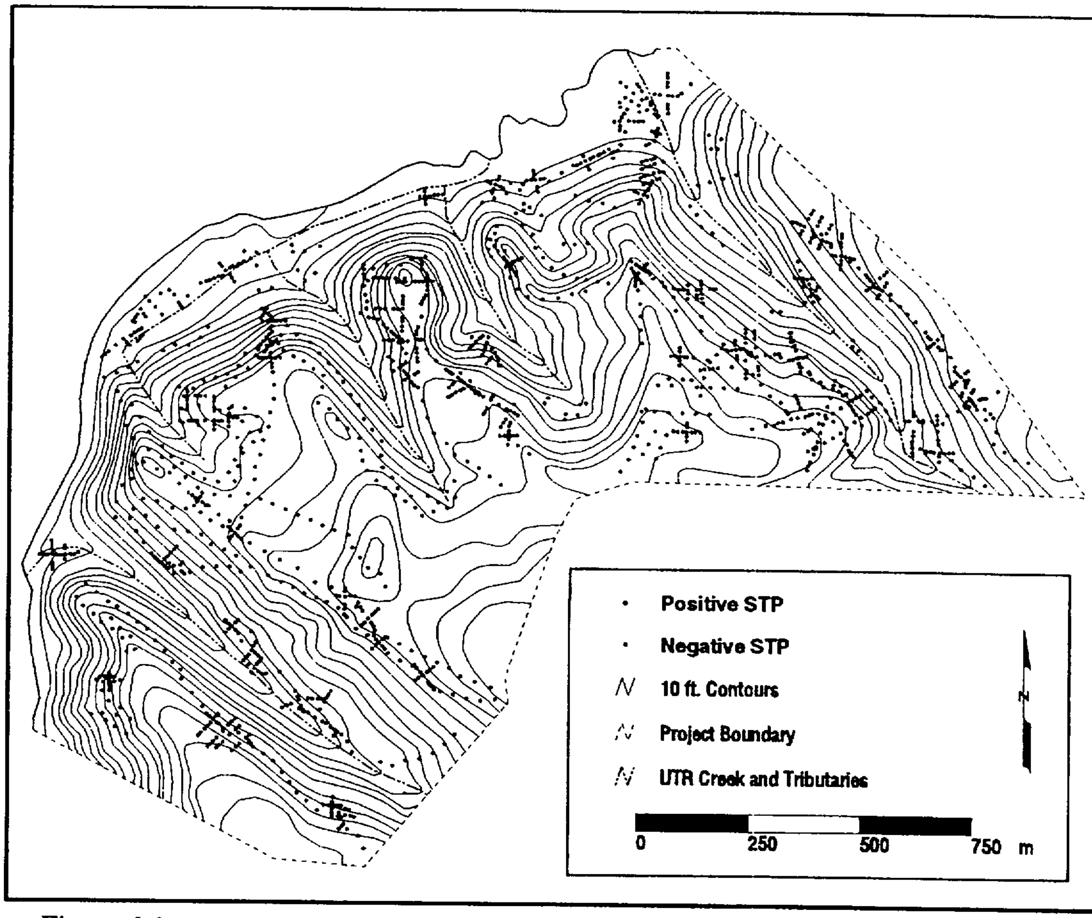

Figure 6-2. Locations of all shovel tests in E Area, coded for positive and negative.

results of earlier work we summarized in Chapter 2: ridge tops and spines were not utilized prehistorically in ways that resulted in the accumulation of dense artifact assemblages. Irrespective of this fact, our subsurface sample does not constitute a random sample, so we must exercise caution in drawing inferences about land-use patterning. Our goal, again, is to locate nonrandom tendencies within the sampling universe we created, that is, within the universe of places we tested. The extent to which our observations characterize study area-wide patterning will have to wait for a completely random sample of subsurface points, although given the limited differences between our two samples and our prior experience with Aiken Plateau landforms, we remain confident that the inferences drawn from our subsurface sample are legitimate.

Locational Parameters of Positive vs. Negative Shovel Tests

Our first search for nonrandom patterning is in the locational differences between negative and positive shovel tests. Three-hundred and sixty-one (24.8%) of the 1,457 shovel tests excavated in E Area yielded prehistoric artifacts (Figure 6-2). Summary statistics for these subsamples reveal statistically significant differences in elevation and distance to water (Table 6-3). Shovel tests producing artifacts tend to be closer to water and at lower elevation that tests lacking artifacts. Distance to water appears to be particularly critical, while elevation, to a large extent, covaries with distance to water (i.e., proximity to water varies positively with elevation).

Table 6-3. Summary Statistics and Comparison of Means of Locational Variables for Negative and Positive Shovel Tests in E Area.

	Negative Tests	Positive Tests	Difference	-----------*t* test----------- unpool.	pooled	d.f.
Frequency	1,096	361	-			
Elevation (m)						
mean	68.30	63.47	-4.83	5.77	5.93	1,455
st. dev.	13.23	13.96	+0.73			
minimum	39.00	40.00	+1.00			
maximum	96.00	96.00	0.00			
Slope (%)						
mean	10.11	10.00	-0.11	0.29	0.30	1,455
st. dev.	5.92	6.30	+0.38			
minimum	0.00	0.00	0.00			
maximum	30.00	25.00	-5.00			
Distance to Water (m)						
mean	124.51	96.86	-27.65	7.07	6.58	1,455
st. dev.	71.44	61.93	-9.51			
minimum	0.42	1.59	+1.17			
maximum	323.49	284.72	-38.77			
Distance to UTR Floodplain (m)						
mean	348.12	335.45	-12.67	0.84	0.89	1,455
st. dev.	226.96	254.46	+27.50			
minimum	0.10	0.00	-0.10			
maximum	939.27	805.93	-133.34			
Aspect n (%)						
None	9 (0.8)	15 (4.1)	(+3.3)			
NNE	329 (30.0)	115 (31.9)	(+1.9)			
ENE	75 (6.8)	24 (6.7)	(-0.1)			
ESE	22 (2.0)	13 (3.6)	(+1.6)			
SSE	13 (1.2)	8 (2.2)	(+1.0)			
SSW	117 (10.7)	24 (6.7)	(-4.0)			
WSW	220 (20.1)	72 (19.9)	(-0.2)			
WNW	130 (11.9)	37 (10.2)	(-1.7)			
NNW	181 (16.5)	53 (14.7)	(-1.8)			

The mean values for slope and distance to Upper Three Runs floodplain are not significantly different between the two subsamples. The limited difference in distance to floodplain is notable as it signifies the tendency for certain artifact classes to be concentrated at the heads and upper segments of feeder streams. Aspect values also differ little between the subsamples, except that positive tests have an appreciably higher, albeit still minority, fraction of flat locations (i.e., no aspect) than do negative tests.

The overriding difference between the locations of positive and negative shovel tests lies in distance to water. Because distance to Upper Three Runs floodplain is not a factor, the scale of water source appears inconsequential. Locations adjacent to Rank 1 and 2 streams are just as likely to yield artifacts as locations along Upper Three Runs Creek. It remains to be seen, of course, whether these locations supported different types of activities or levels of use intensity.

Comparison with Site Centroids

We turn now briefly to a consideration of the differences between the locational parameters of our sample of positive shovel tests and the traditional site unit of observation as defined in Chapter 3. For this purpose we determined the center point (centroid) of each of the 32 site polygons (see Figure 3-11) and derived locational data for each. A comparison of summary statistics for site centroids and positive shovel tests is given in Table 6-4. As the results of *t* tests show, there exist no statistically meaningful differences in the mean values of any of the continuous variables. Nevertheless, the values for each locational attribute exhibits greater variation in the shovel test sample than in the site centroid sample. This is not simply a matter of sample error. As one might expect, the range of values is greater for shovel tests because they range spatially across the entire expanse of polygons, whereas centroids are constrained. It follows that the analysis of shovel test data, as opposed to site data, has greater potential for locating nonrandom tendencies in the location of particular artifact classes or attributes.

Differences in aspect values for shovel tests and site centroids are apparently stronger than differences among the continuous variables. Site centroids comprise a higher fraction of southwest aspects (SSW, WSW) and corresponding smaller fractions of east-southeast and north-northwest aspects. Overall the shovel tests exhibit greater diversity in aspect values. This stands to reason given the fact that a couple of the sites span either side of small ridgenoses, while others "wrap around" ridge slopes with variable aspect. Again, the shovel tests allow for greater sensitivity to aspect. This will prove to be an important factor in detecting diachronic trends later in this chapter.

A small subset of the positive shovel tests included in Table 6-4 consists of isolated finds that are usually referred to as "occurrences." Table 6-5 provides summary statistics on locational data for these 19 cases. As these figures show, occurrences tend to be at low elevation and close to Upper Three Runs floodplain but at slightly greater distance from water than all positive shovel tests. The most notable feature of occurrences is their aspect: 16 of 19 occurrences have northern aspects, most to the north-northwest. This is an unequivocal nonrandom tendency. Considering that north-northwest aspects account for only 14.7 percent of positive shovel tests and only 16.2 percent of random points, this tendency for occurrences points to a distinct land-use pattern, one that is exclusive of repeated or multipurpose use. Nearly all of the occurrences are small flakes; we return to the land-use implications of these finds in the section on debitage below.

Locational Parameters of Technofunctional Artifact Classes

More refined analyses of locational tendencies proceed with technofunctional classes of artifacts. Here we are interested in examining patterns across classes of artifacts without regard for temporal variation. Naturally, some differences in locational patterning are masked by a synchronic approach. However, long-term trends and regularities in land use might also be apparent, and it is our intention here to search first for such patterning before turning to analyses of a diachronic nature.

Five general classes of artifacts are the subjects of our analysis: hafted bifaces, artifacts of tool manufacture (preforms, hammerstones, cores), debitage, utilized flakes, and pottery sherds. Summary statistics on the locational data for these classes are provided in Table 6-6. Sample sizes are relatively small for hafted bifaces and lithic manufacture, despite the large absolute numbers of these artifact classes. The limits to sample size stem from co-occurrence. Because the analysis is restricted to presence-absence data, instances of co-occurrence are masked.

Table 6-4. Summary Statistics and Comparison of Means of Locational Variables for Positive Tests and Site Centroids in E Area.

	Positive Tests	Site Centroids	Difference	t test unpool.	t test pooled	d.f.
Frequency	361	32	-			
Elevation (m)						
mean	63.47	66.22	+2.75	-1.04	-1.06	391
st. dev.	13.96	14.07	+0.11			
minimum	40.00	41.00	+1.00			
maximum	96.00	89.00	-7.00			
Slope (%)						
mean	10.00	10.09	+0.09	-0.09	-0.08	391
st. dev.	6.30	5.26	-1.04			
minimum	0.00	0.00	0.00			
maximum	25.00	22.00	-3.00			
Distance to Water (m)						
mean	96.86	112.50	+15.64	-1.14	-1.34	391
st. dev.	61.93	73.94	+12.01			
minimum	1.59	2.54	+0.95			
maximum	284.72	269.23	-15.49			
Distance to UTR Floodplain (m)						
mean	335.45	334.30	-1.15	0.03	0.02	391
st. dev.	254.46	230.28	-24.18			
minimum	0.00	0.00	0.00			
maximum	805.93	800.68	-5.25			
Aspect n (%)						
None	15 (4.1)	1 (3.1)	(-1.0)			
NNE	115 (31.9)	11 (31.3)	(-0.6)			
ENE	24 (6.7)	2 (6.3)	(-0.4)			
ESE	13 (3.6)	0 (0.0)	(-3.6)			
SSE	8 (2.2)	0 (0.0)	(-2.2)			
SSW	24 (6.7)	3 (9.1)	(+2.4)			
WSW	72 (19.9)	9 (28.1)	(+8.2)			
WNW	37 (10.2)	3 (9.4)	(-0.8)			
NNW	53 (14.7)	3 (9.4)	(-5.3)			

Table 6-5. Summary Statistics of Locational Variables for Occurrences (n =19).

Elevation (m)		Slope (%)		Distance to Water (m)	
mean	53.84	mean	7.89	mean	105.20
st. dev.	15.61	st. dev.	3.48	st. dev.	71.24
minimum	41.00	minimum	1.00	minimum	17.05
maximum	86.00	maximum	15.00	maximum	284.72
Distance to UTR Floodplain (m)		**Aspect n (%)**			
mean	157.81	NNE	5 (26.3)		
st. dev.	221.83	SSW	2 (10.5)		
minimum	0.00	WNW	1 (5.3)		
maximum	675.72	NNW	11 (57.9)		

Table 6-6. Summary Statistics of Locational Variables for Technofunctional Artifact Classes.

	Hafted Bifaces	Lithic Manufacture*	Debitage	Utilized Flakes	Pottery
Frequency	19	16	335	52	126
Elevation (m)					
mean	57.63	60.13	63.48	60.15	60.86
st. dev.	14.41	14.21	14.12	14.79	13.06
minimum	41.00	41.00	40.00	40.00	40.00
maximum	78.00	77.00	90.00	89.00	88.00
Slope (%)					
mean	8.68	8.13	9.84	8.71	9.86
st. dev.	6.03	6.12	6.42	6.92	6.10
minimum	0.00	0.00	0.00	0.00	0.00
maximum	17.00	19.00	25.00	23.00	23.00
Distance to Water (m)					
mean	62.15	88.83	98.88	84.17	75.33
st. dev.	47.59	61.67	61.38	59.92	55.04
minimum	4.53	2.42	1.59	3.93	1.59
maximum	152.45	164.19	284.72	263.11	270.64
Distance to UTR Floodplain (m)					
mean	295.42	252.78	331.70	283.89	369.01
st. dev.	285.30	236.43	255.28	249.04	272.61
minimum	0.00	0.00	0.00	0.00	0.00
maximum	736.10	736.10	805.93	736.10	768.60
Aspect n (%)					
None	0 (0.0)	0 (0.0)	14 (4.2)	2 (3.8)	6 (4.8)
NNE	4 (21.1)	4 (25.0)	108 (32.2)	18 (34.6)	47 (37.3)
ENE	1 (5.3)	1 (6.3)	21 (6.3)	2 (3.9)	6 (4.8)
ESE	1 (5.3)	1 (6.3)	14 (4.2)	3 (5.8)	3 (2.4)
SSE	0 (0.0)	0 (0.0)	7 (2.1)	0 (0.0)	0 (0.0)
SSW	2 (10.5)	0 (0.0)	18 (5.4)	3 (5.8)	9 (7.1)
WSW	7 (36.8)	4 (25.0)	66 (19.7)	11 (21.2)	30 (23.8)
WNW	3 (15.8)	4 (25.0)	36 (10.8)	7 (13.5)	12 (9.5)
NNW	1 (5.3)	2 (12.5)	51 (15.2)	6 (11.5)	13 (10.3)

Hafted Bifaces. Despite small sample size, the 19 subsurface locations of hafted bifaces display some interesting patterning (Figure 6-3). As a collective, hafted biface finds are at the lowest elevation and closest to water of any of the five classes considered here. This is partly due to the sizable proportion of hafted bifaces in the Upper Three Runs floodplain. But it also has much to do with the occurrence of hafted bifaces at locations on the lower slopes of tributary stems. This is the case for both small clusters adjacent to streams, and for larger clusters that span upper and lower slopes. A definite orientation of hafted bifaces to running water is indicated here.

Hafted biface locations are also distinguished by their tendency to occupy west-facing slopes (WSW, WNW). These occurrences are nearly double the proportion of west-facing slopes among all subsurface tests.

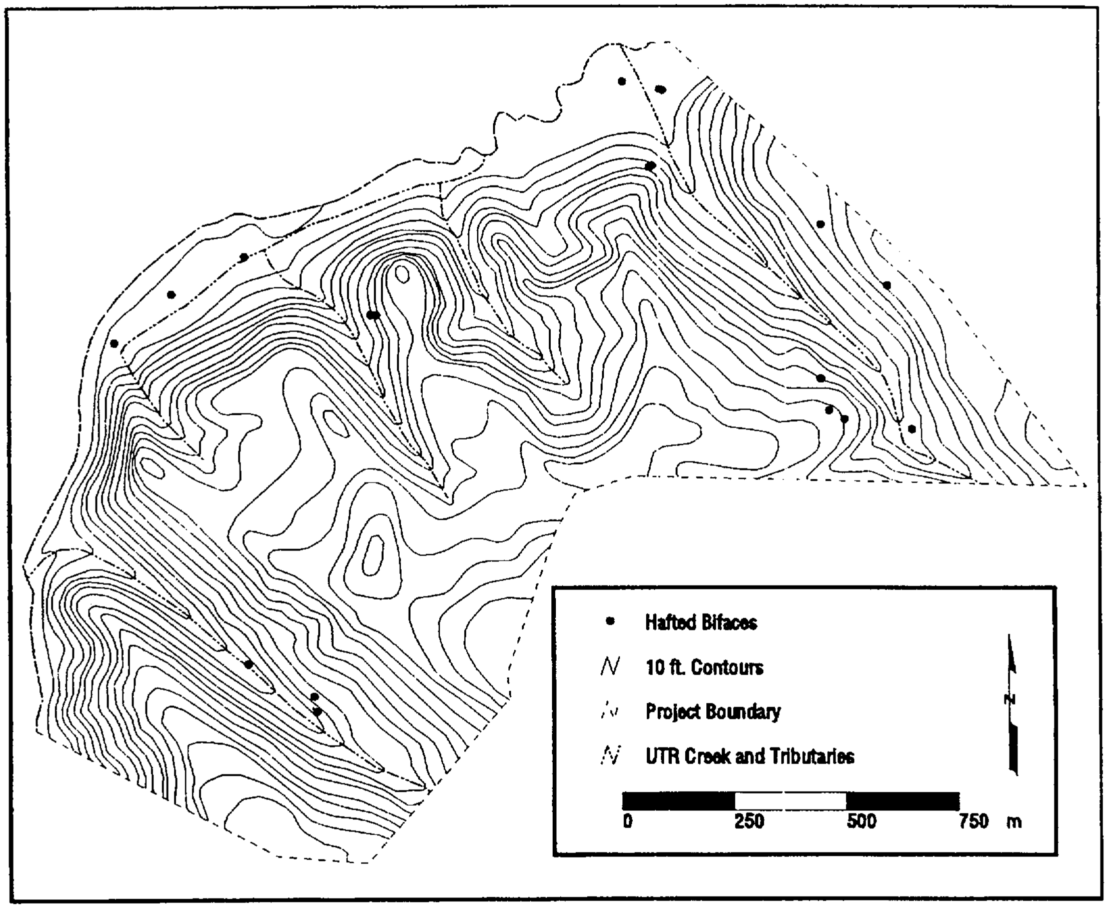

Figure 6-3. Locations of hafted bifaces in E Area.

Lithic Manufacture. Evidence for lithic tool manufacture (preforms, cores, hammerstones), excluding debitage, matches the hafted biface pattern for aspect, but it deviates from hafted bifaces in elevation and distance to water (Figure 6-4). The difference lies in locations in the upland unit, for Upper Three Runs floodplain yielded roughly equal numbers of both classes. Lithic manufacture items in the uplands occur more frequently on the upper slopes of ridges. Also, there is a tendency for lithic manufacture items to be oriented more towards Upper Three Runs than hafted bifaces, resulting in a lower average distance to the floodplain for the former. We suspect that this tendency is related to proximity to Upper Three Runs, a source of local raw materials (orthoquartzite, low-grade chert) as well as a probable conduit for imported materials (high-grade chert).

Debitage. We consider debitage separately in our synchronic analysis of technofunctional classes because it results from a wide range of tasks, including tool manufacture, maintenance, and use. In a more detailed analysis below we examine assemblage attributes that allow for some control over its technofunctional variation. For now we simply note that debitage is widespread in the project area, occurring in 335 of the 393 subsurface locations yielding artifacts (Figure 6-5). Locations of debitage therefore match quite closely the locational parameters of all positive tests. More importantly, they even approximate the locational parameters of *all* subsurface tests, except that debitage locations are slightly lower in elevation and slightly closer to water

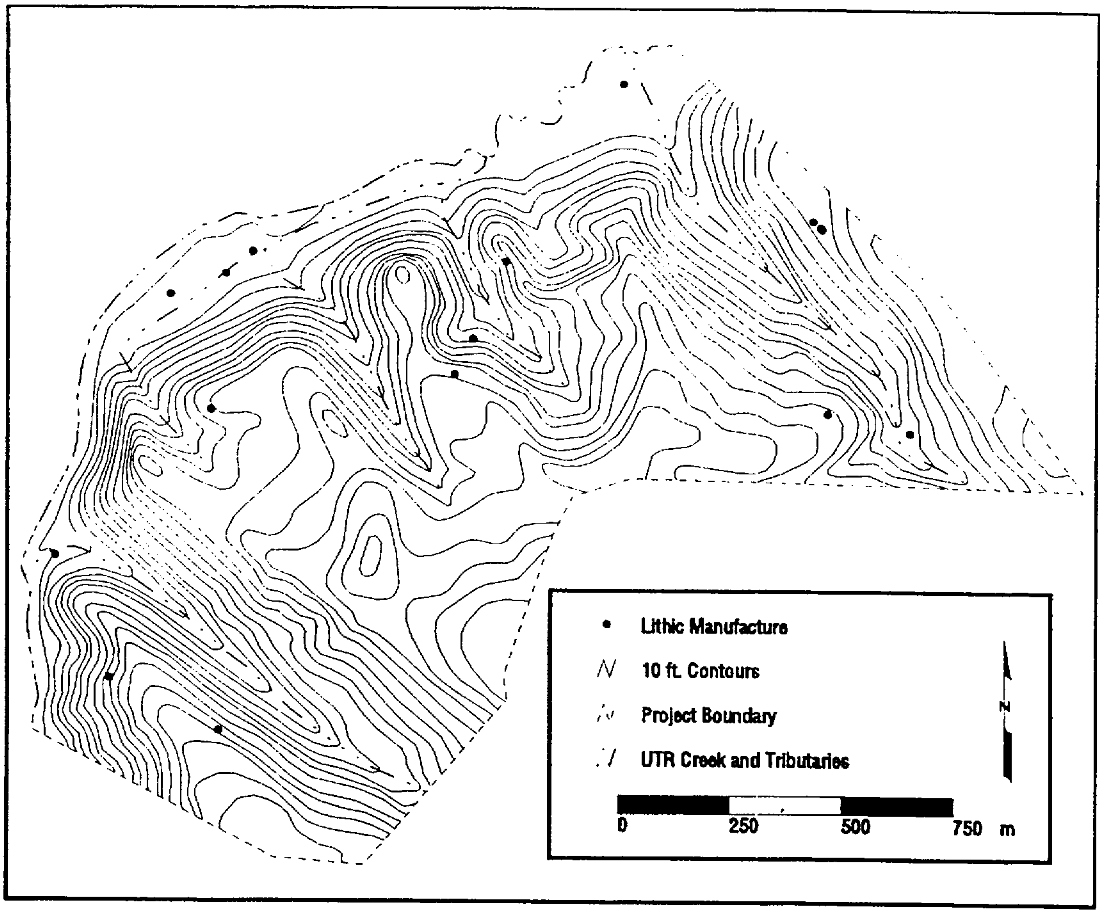

Figure 6-4. Locations of lithic manufacture artifacts in E Area.

and to Upper Three Runs floodplain. Without considering technofunctional variation in debitage, we might conclude that debitage is randomly distributed across the landscape. This would be a specious claim on at least two counts. First, debitage was not usually recovered from tests along the spines and upper slopes of all study area ridges, particularly the largest ridge. This alone accounts for the slight deviation in values between debitage locations and all subsurface tests. Second, variation in the density, percent cortex, and size of debitage coincides with locational gradients in statistically meaningful ways (see below). Debitage is, indeed, a particularly good barometer of land-use variation.

Utilized Flakes. Utilized flakes are the subset of debitage exhibiting edge wear. If, as we suspect, utilized flakes were tools that were drafted into use and discarded at locations where debitage was available, then the locations of utilized flakes would also be a subset of debitage locations in our sample. This may be the case, but if so, it is a biased subset. The 52 locations of utilized flakes are, compared to locations of debitage, at lower elevation, on gentler slopes, and closer to water and to the floodplain (Figure 6-6). From intrasite analyses of 38AK158 and 38AK157 we have determined that the incidence of utilized flakes coincides with the "arm's reach" availability of flakes and with flake size. If the E Area data are likewise structured, then the locational tendencies among utilized flake will be matched by flake density and size of flakes. We redress these issues in a section below.

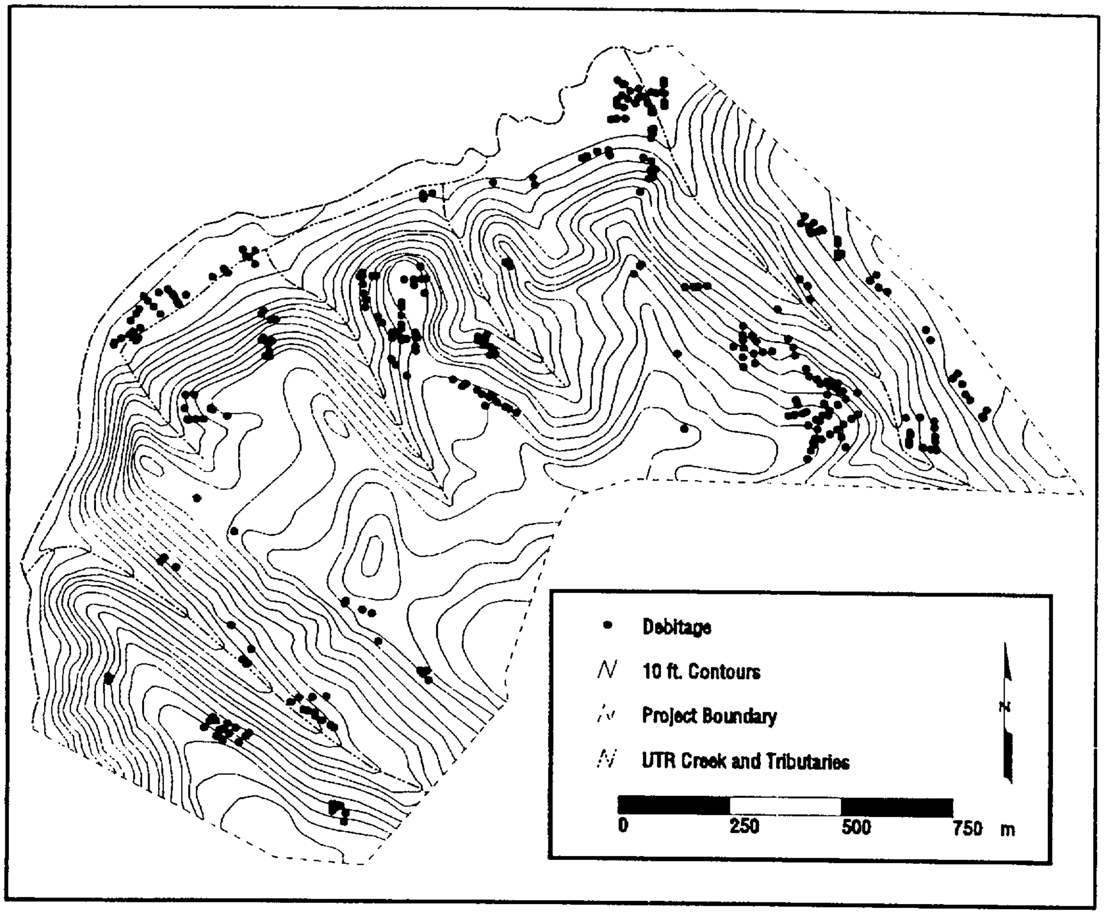

Figure 6-5. Locations of debitage in E Area.

Pottery Sherds. Pottery sherds represent a truly distinct class of artifact in the five classes considered here. Sherds, of course, have not only technofunctional distinction in an otherwise lithic-dominated assemblage but they also signify the later millennia of local prehistory. One-hundred and twenty-six subsurface locations in E Area yielded pottery (Figure 6-7). Their distribution is among the most clustered observed. Only hafted bifaces have closer proximity to water on average, but pottery displays the greatest average distance to the floodplain of the five classes examined. This is largely due to major clusters of pottery at the upper ends of the Rank 2 stream and the westernmost Rank 1 stream. If it were not for two upslope clusters in these locations, pottery would easily have the closest mean distance to water. As we discuss in the section of diachronic patterns below, these upslope clusters consist largely of late period or nondiagnostic sherds.

The clustered and stream-oriented distribution of sherds points to selective land-use patterning for activities involving pottery. From testing at 38AK155 we know that intensive food processing took place in locations immediate adjacent to running water, locations that would not necessarily support habitation functions. However, there also exist upslope complements to these stream-side clusters, suggesting at least two different roles for pottery, or at least two distinct contexts of sherd deposition. It would be useful to examine some of the technofunctional variation of pottery in locational terms, but sample sizes for relevant attributes (e.g., orifice diameter, vessel wall thickness) are a bit

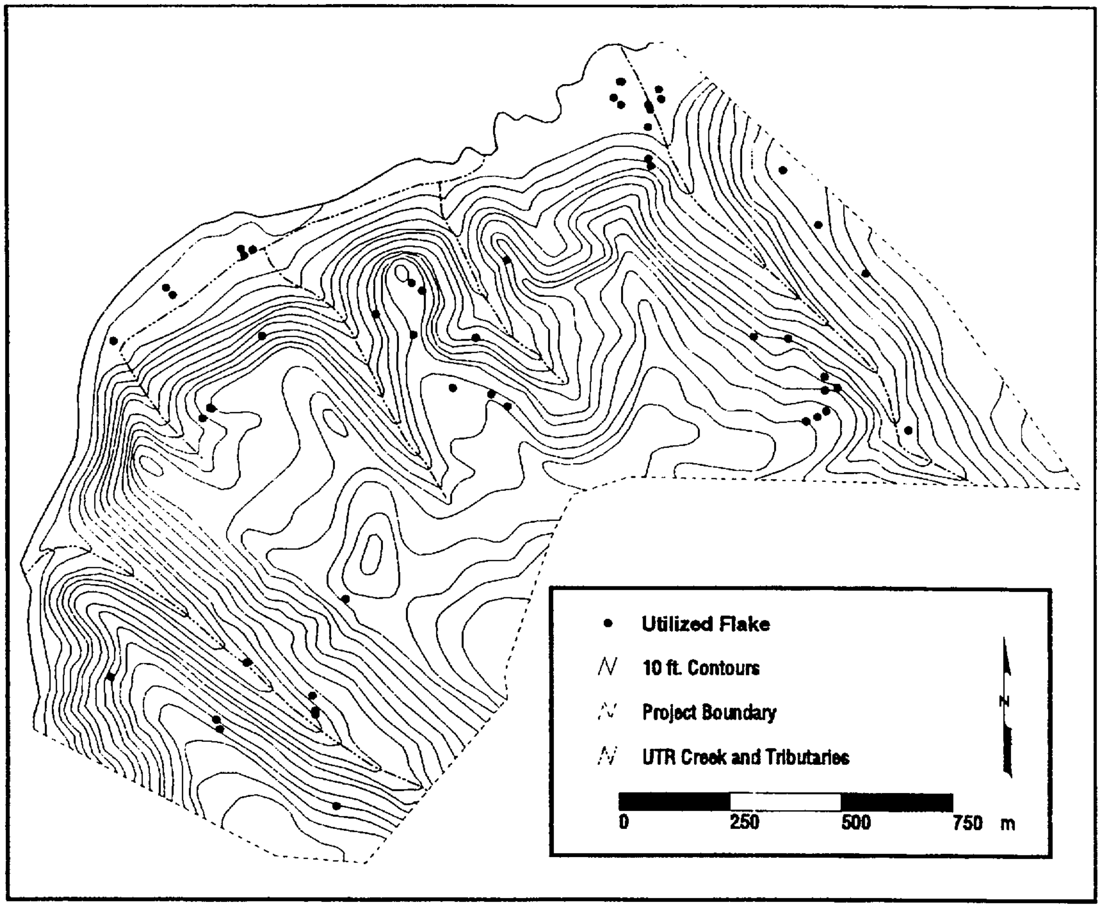

Figure 6-6. Locations of utilized flakes in E Area.

too small. In lieu of this, the culture-historical breakdown provided later gives some preliminary insight into locational variation of different pottery uses.

More on Debitage. Having now taken a preliminary look at the distribution of general technofunctional classes, we return to a more detailed consideration of the most numerous artifact class, debitage. Because debitage results from the reduction of a mass of stone, it reflects a technological *process*, not simply a state or condition Furthermore, because the process sometimes is protracted over time and space, debitage is a reflection of long-term and mobile land use. Finally, because the design of lithic technology embodies solutions to the logistic of undertaking tasks away from natural sources of rock, debitage reflects the overarching strategies of technological organization. From the standpoint of assemblage formation, debitage is believed to be primary or de facto refuse, so it is a direct reflection of the stone reduction activities that occurred in a given area.

In the simplest of terms, the reduction of a mass of stone from raw core to finished and then maintained tool results in by-products (i.e., debitage) that is increasingly less cortical and smaller in size. In Chapter 4 we discussed some of the factors that affect this simplified relationship. One of the major factors is core design. In our analysis of debitage in Chapter 4 we divided flakes into two general groups: flakes of bifacial retouch (FBRs), and "other" flakes. The former are, of course, considered the by-

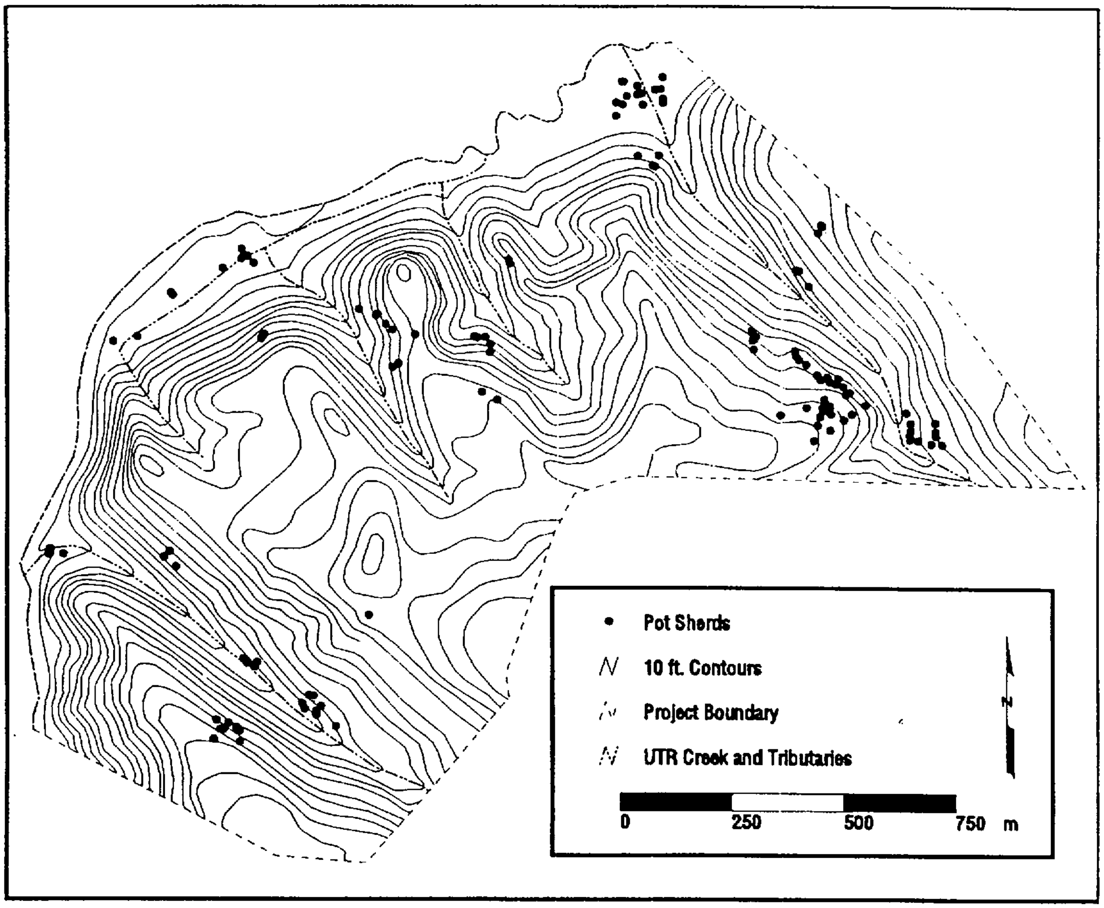

Figure 6-7. Locations of pottery sherds in E Area.

products of bifacial core reduction, whereas the later derive from blocky and amorphous cores.

Earlier work in the Aiken Plateau (e.g., Sassaman 1993a) was influenced by arguments that amorphous core technology was nonportable, on-site technology employed in locations with good access to raw material and by relatively stationary tool users (e.g., Johnson 1986, Parry and Kelly 1987). In contrast, biface technology was designed for portability and maintainability at widespread locations of application by mobile tool users (Kelly 1988; Nelson 1987). The implications of this distinction for the present study is that FBRs and other flakes will have distinct locational parameters. There are indeed 114 subsurface locations of FBRs in E Area that lack other flakes, and 94 locations of other flakes that lacked FBRs. Both flake types occurred at another 127 subsurface locations. Yet the locational parameters of the distinct subsets are very similar. The only statistically significant difference between the two is in distance to Upper Three Runs floodplain, with other flake locations averaging 383.75 m and FBR locations averaging 315.47 m. The difference can be attributed to the predominance of Woodland period amorphous cores at locations at the headwaters of the Rank 2 stream. There are also some differences in aspect between the two subsamples. With the exception of FBRs exclusive to locations with no aspect (n = 8), the differences are very subtle, however, usually involving switches in the relative values of adjacent aspect categories (e.g., ±10% for ENE and NNE). The noted exception is attributed to Archaic activities on the floodplain or on the top of a small ridge in the north-central portion of the study area.

Other reasons for a lack of differences can be cited. We have yet to consider the differences between stages of reduction and how these are manifested in the two different core types. Early stage reduction for either core type may have more often than not taken place at similar locations (habitations), whereas late-stage reduction may have been displaced from these locations in biface technology alone. It follows that differences in land use involving these different core types may be evident in only assemblages of exclusively small debitage. Another factor may be changes in the relative dependent on core designs through time. Bifacial cores dominate assemblages predating the Woodland period, while amorphous cores are the dominant type in late prehistory. Changes in land-use patterning independent of the manufacture and use of cores will affect the synchronic comparisons attempted here. Finally, our ability to discriminate between bifacial and amorphous cores from debitage alone may not be as acute as we have assumed. Certainly interanalyst bias in applying such subtle sorting criteria (see Chapter 4) is legion.

Because of the lack of strong differences in the locations of FBRs and other flakes, we proceed with our analysis of assemblage properties by combining these two flake classes. This returns us to the original 335 locations of debitage given in Table 6-6. For this collective sample we calculated three assemblage properties: flake density, percent cortex, and average whole flake size (see Chapter 4 for sorting criteria). The first variable, density, was calculated as total number of flakes per cubic meter. The range of values (3.3-4,821.1; mean = 91.3, st. dev. = 373.5 flakes/m^3) was divided into three categories: low (<25 flakes), moderate (26-200 flakes), and high density (>200 flakes). For percent cortex we restricted analysis to units producing at least 10 flakes. The qualifying subset of 69 units yields values ranging from 0 to 40 percent, with a mean of 8.2 percent (st. dev. = 9.9%). The mean was used to subdivided the values into low percent (0-8.2%) and high percent (>8.2%) cortex. For average flake size we restricted analysis to units with 10 or more whole flakes. The qualifying subset of 51 units has mean size values ranging from 1.17 to 3.62, with a population mean of 2.00 (st. dev. = 0.41). Again, the mean was used to subdivide the values into small (1.17-2.00) and large (>2.00) mean whole flake size. These various groupings formed the basis for locational statistics provided in Table 6-7.

The breakdown of debitage reveals some decidedly nonrandom tendencies. Beginning with the density data, the continuum from low to high values coincides with most of the environmental gradients. Density shows an inverse relationship to elevation, slope, and distance to water. Only distance to Upper Three Runs floodplain fails to duplicate this pattern, although the 20 locations classified as high density have the lowest mean distance to the floodplain. High density locations are divided between the floodplain and ridge slopes of the Rank 2 stream (Figure 6-8). Two outliers exist on ridgenoses at the west end of the upland unit.

Locations of high debitage density can be thought of as locations of redundant activity, and hence they likely coincide with habitation functions or other prolonged uses. More specifically, the high density locations signify places of tool manufacture. As such they also embody some of the technological signatures of early-stage core reduction. For instance, locations with assemblages with a high percent of cortex and large mean flake size also tend to be concentrated at low elevation, on gentle slopes, close to water, and close to the floodplain. In contrast, assemblages dominated by small, noncortical flakes are at higher elevation, farther from water, on steeper slopes, and more distant from the floodplain. We should remind the reader here that due to sample size limits we imposed earlier, the values for percent cortex and mean whole flake size are subsets of the cases

Table 6-7. Summary Statistics of Locational Variables for Debitage Assemblage Attributes.

	Low Density	Moderate Density	High Density	Low% Cortex	High% Cortex	Small Flakes	Large Flakes
Frequency	182	133	20	43	26	29	22
Elevation (m)							
mean	64.58	62.95	57.00	62.02	60.23	63.38	60.41
st. dev.	14.18	13.74	14.87	13.13	12.63	13.07	13.94
minimum	40.00	40.00	41.00	41.00	41.00	41.00	41.00
maximum	90.00	82.00	80.00	81.00	79.00	81.00	78.00
Slope (%)							
mean	10.46	9.61	5.70	9.88	8.65	9.03	8.41
st. dev.	6.21	6.68	5.14	7.28	6.44	6.77	6.24
minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
maximum	25.00	22.00	19.00	22.00	23.00	22.00	19.00
Distance to Water (m)							
mean	105.94	92.69	75.80	81.89	84.40	94.55	80.14
st. dev.	64.91	55.71	56.70	51.69	54.27	54.26	52.94
minimum	2.00	2.00	7.00	3.93	6.32	4.53	7.00
maximum	285.00	262.00	176.00	263.11	164.19	183.44	164.19
Distance to UTR Floodplain (m)							
mean	329.56	341.61	285.30	337.98	326.53	367.70	309.88
st. dev.	246.42	259.16	312.28	267.91	279.31	261.46	283.98
minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
maximum	806.00	779.00	758.00	758.00	738.00	732.00	758.00
Aspect n (%)							
None	6 (3.3)	7 (5.3)	1 (5.0)	2 (4.7)	1 (3.9)	0 (0.0)	1 (4.6)
NNE	60 (33.0)	46 (34.6)	2 (10.0)	14 (32.6)	6 (23.1)	7 (24.1)	7 (31.8)
ENE	9 (5.0)	10 (7.5)	2 (10.0)	3 (7.0)	1 (3.9)	3 (10.3)	0 (0.0)
ESE	6 (3.3)	6 (4.5)	2 (10.0)	1 (2.3)	1 (3.9)	1 (3.5)	1 (4.6)
SSE	5 (2.8)	2 (1.5)	0 (0.0)	1 (2.3)	0 (0.0)	1 (3.5)	0 (0.0)
SSW	13 (7.1)	5 (3.8)	0 (0.0)	0 (0.0)	1 (3.9)	1 (3.5)	0 (0.0)
WSW	32 (17.6)	27 (20.3)	7 (35.0)	14 (32.6)	7 (26.9)	10 (34.5)	6 (27.3)
WNW	16 (8.8)	16 (12.0)	4 (20.0)	6 (14.0)	6 (23.9)	5 (17.2)	5 (22.7)
NNW	35 (19.2)	14 (10.5)	2 (10.0)	2 (4.7)	3 (11.5)	1 (3.5)	2 (9.1)

included under the moderate and high density categories. This bias effectively eliminates low-density cases from consideration while providing a more sensitive measure of the technofunctional variation of higher-density clusters.

Aspect values are somewhat difficult to interpret because of the limitations of nominal data. Nevertheless, some notable deviations from the distribution of all subsurface tests include the higher-than-expected incidence (19.2%) of low-density occurrences with north-northwest aspects. These finds include several of the so-called occurrences of isolated flakes. Such locations did not support any other loadings in the artifact classes examined in this study. Another deviation is seen in the differences between locations dominated by small, noncortical flakes, and large, cortical flakes. The former fall more often on west-southwest slopes, while the latter occur more often on

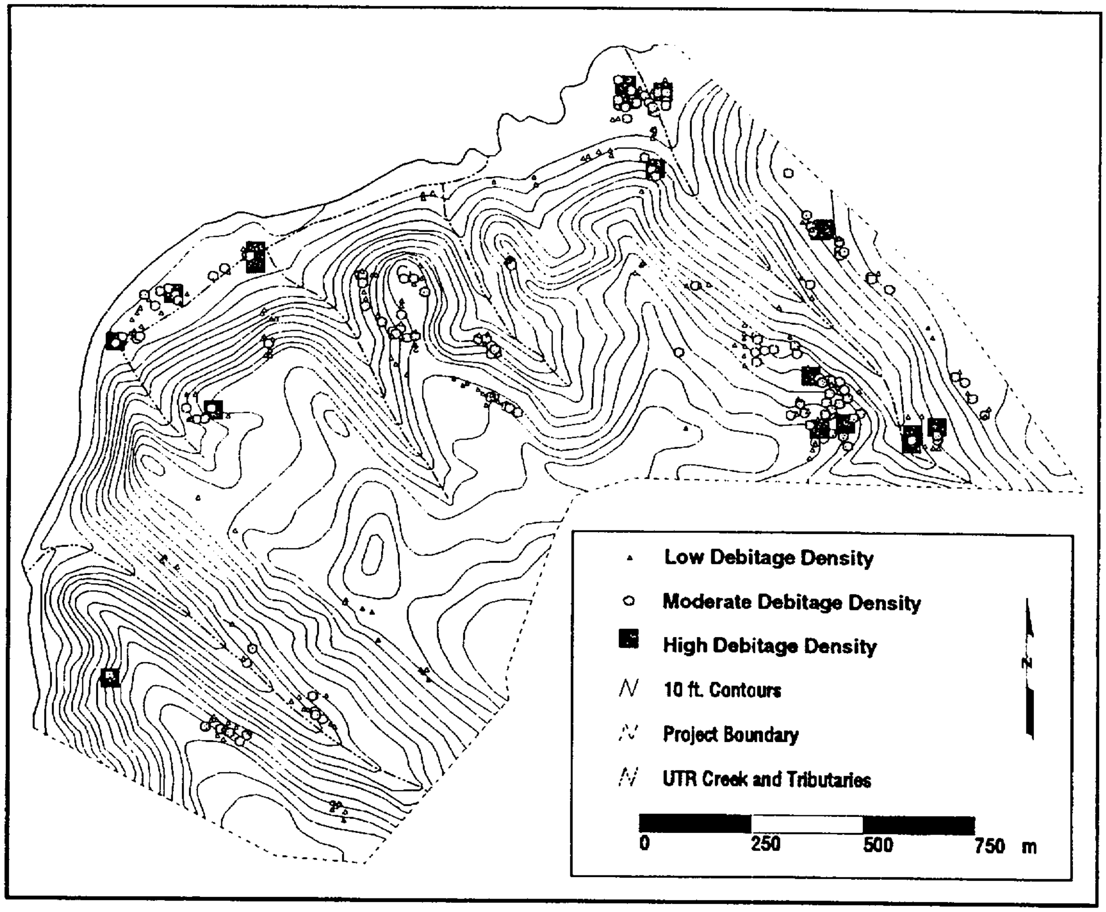

Figure 6-8. Locations of debitage in E Area by density class.

west-northwest slopes. Together these subsets of moderate-to-high density clusters occur more than 20 percent more on west-facing slopes than all subsurface tests or all positive tests.

To summarize, debitage data show clear locational trends corresponding to environmental gradients. Debitage density, mean whole flake size, and percent cortex increase with decreases in elevation, distance to water, and slope. The flake size and cortex data are especially sensitive to variation in the land-use patterns of core reduction because they represent a limited subset of moderate-to-high density clusters located no more than 81 m in elevation, 263 m from water, and 758 m from the Upper Three Runs floodplain. Outside this range, low-density occurrences are located as much as steeper slopes, and as much as 90 m in elevation, 285 m from water, and 806 m from the floodplain. A disproportionate number of low-density scatters exist on north-northwest-facing slopes, locations that produced few other artifact classes. Because of the limits to sample size, we do not have figures for the mean whole flake size and percent cortex of these low-density assemblages, but casual inspection suggests they are generally small, noncortical flakes.

Changes in Land Use

Our final consideration in this chapter is to the diachronic or changing patterns of land use evident in the distribution of diagnostic artifact classes. Our efforts in this regard are limited to the availability of unambiguous temporal markers. The availability of diagnostic markers varies from period to period. For the Early Archaic we benefit from the existence of a variety of formal tool types in addition to the usual hafted bifaces, and from the fact that weathering on Coastal Plain chert is so advanced in early Holocene assemblages to render even unmodified flakes as diagnostic. Middle and Late Archaic assemblages are not so well-endowed with diagnostics. This situation does not improve until the appearance of pottery at the end of the Late Archaic period. From this point forward pottery is our chief diagnostic tool. Hafted bifaces continue to have diagnostic value, but there exists much more typological ambiguity than in earlier assemblages. Soapstone cooking stones are an added diagnostic trait of the Late Archaic period.

Table 6-8. Summary Statistics of Locational Variables for Temporally Diagnostic Artifact Classes.

	Early Archaic	Late Middle Archaic	Late Archaic	Early Wdld.	Middle Wdld.	Mid./Late Wdld.	L. Wdld/ Miss.
Frequency	51	6	8	16	19	39	15
Elevation (m)							
mean	64.43	58.17	45.00	60.19	61.79	62.87	61.00
st. dev.	13.91	18.91	9.75	12.05	10.97	11.24	12.55
minimum	41.00	41.00	41.00	41.00	41.00	41.00	41.00
maximum	89.00	79.00	69.00	77.00	77.00	79.00	81.00
Slope (%)							
mean	10.61	3.00	2.63	10.69	10.11	11.80	9.87
st. dev.	6.99	2.76	3.20	5.42	6.00	6.48	4.27
minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
maximum	23.00	8.00	8.00	20.00	20.00	23.00	17.00
Distance to Water (m)							
mean	102.23	62.02	41.44	84.46	49.76	83.60	72.17
st. dev.	53.12	56.89	24.32	47.28	35.88	52.32	55.25
minimum	6.76	6.32	6.32	18.43	4.53	4.53	2.85
maximum	263.11	152.31	84.98	157.28	141.49	172.21	190.63
Distance to UTR Floodplain (m)							
mean	306.48	149.38	99.19	402.23	445.03	368.26	381.21
st. dev.	238.48	195.98	258.90	289.23	272.69	249.91	261.63
minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
maximum	736.10	495.19	738.13	758.23	272.69	759.24	742.16
Aspect n (%)							
None	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
NNE	19 (37.3)	0 (0.0)	1 (12.5)	9 (56.3)	4 (21.1)	12 (30.8)	5 (33.3)
ENE	3 (5.9)	0 (0.0)	0 (0.0)	1 (6.3)	1 (5.3)	1 (2.6)	1 (6.7)
ESE	2 (3.9)	1 (16.7)	1 (12.5)	1 (6.3)	1 (5.3)	1 (2.6)	1 (6.7)
SSE	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
SSW	2 (3.9)	1 (16.7)	0 (0.0)	0 (0.0)	1 (5.3)	4 (10.3)	2 (13.3)
WSW	12 (23.5)	2 (33.3)	1 (12.5)	4 (25.0)	10 (52.6)	13 (33.3)	2 (13.3)
WNW	9 (17.6)	0 (0.0)	3 (37.5)	1 (6.3)	1 (5.3)	2 (5.1)	3 (20.0)
NNW	4 (7.8)	2 (33.3)	2 (25.0)	0 (0.0)	1 (5.3)	6 (15.4)	1 (6.7)

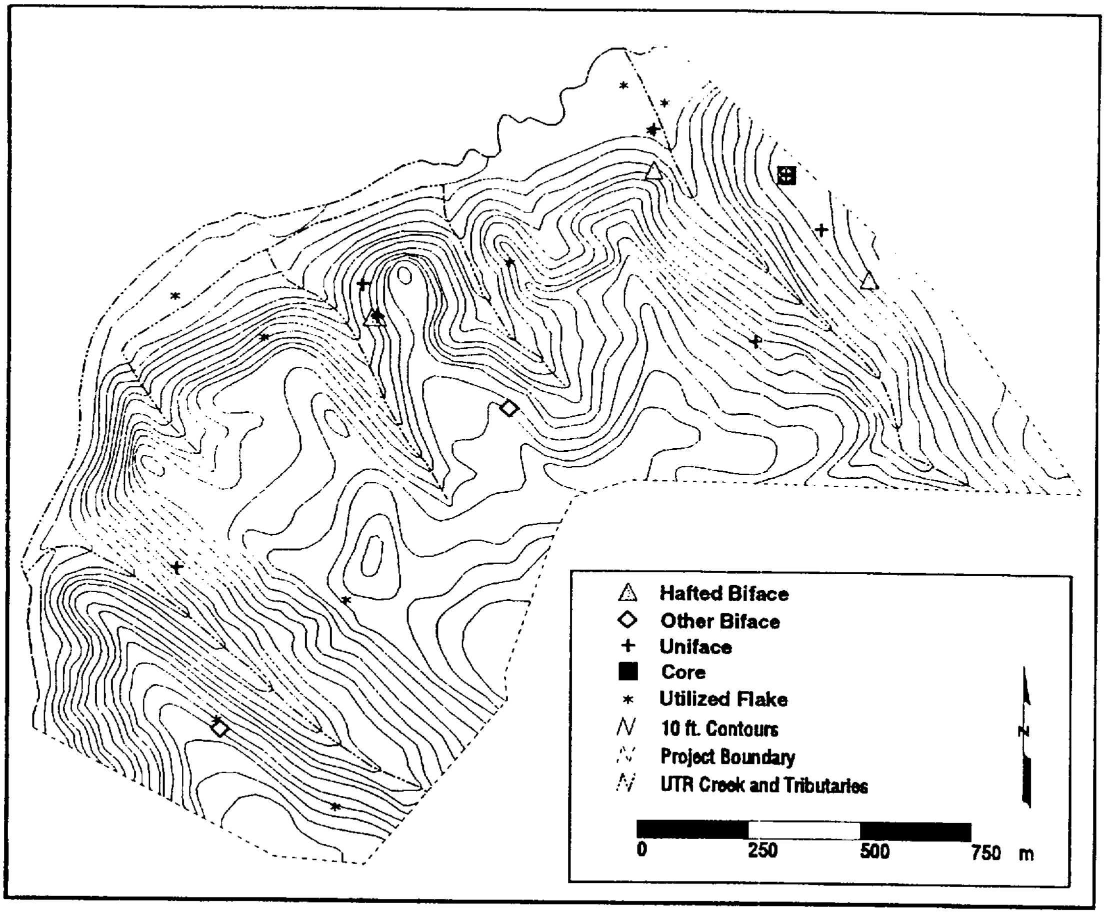

Figure 6-9. Locations of Early Archaic artifacts in E Area.

Using what we have to sort subsurface finds into culture-historic groupings results in the breakdown provided in Table 6-8. As these figures show, samples sizes vary from a low of six to a high of 51 cases. Despite of limited sample sizes in some cases, the data show some unequivocal, often radical, changes in land use. In the sections that follow, we review these data and their graphic counterparts, using breakdowns of technofunctional classes within time periods whenever possible. Our treatment of these data follows prehistoric chronology from early to late.

Early Archaic. Fifty-one locations with artifacts of Early Archaic age are distributed widely across the study area (Figures 6-9, 6-10). Not surprisingly, many of the locations produced only patinated flakes, the distribution of which does not deviate markedly from the total debitage sample (Table 6-6). Given that other classes of Early Archaic material have distributions that deviate strongly from those of later time periods (see below), the spatial isomorphism of debitage classes is a bit surprising. We documented in Chapter 4 some examples of lithic scavenging and recycling among Woodland assemblages. It seems reasonable to suggest that some of the locations of patinated flakes that failed to produce other classes of Early Archaic material may represent late period scavenging. In particular, some of the northeast-facing slopes of the upland unit with patinated flakes also yielded Woodland pottery. On the other hand, two locations of patinated flakes with northwest aspects lacked Woodland materials. These latter examples may be bona fide locations of Early Archaic activity involving biface

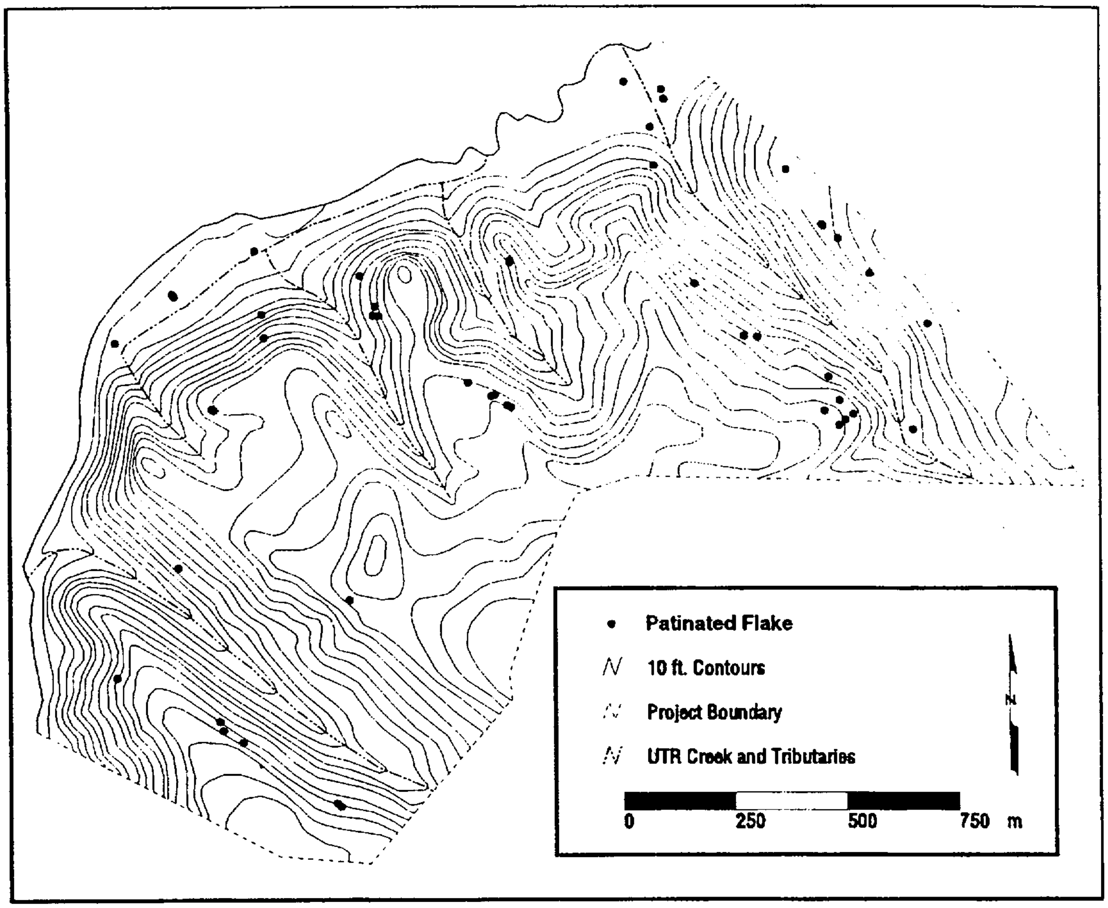

Figure 6-10. Locations of patinated flakes in E Area.

reduction but not tool discard. Both are ideal vantage points for game surveillance over the bottoms of Upper Three Runs and lower segments of its feeder streams.

Considering now the formal tools of Early Archaic age, there is a marked predilection for hafted bifaces and unifaces to occur on west-facing slopes (Figure 6-9; Table 6-9). Elevation, distance to water, and distance to Upper Three Runs floodplain vary appreciably among these locations, but only two of 11 spots have aspects other than western. West-southwest exposures are especially frequent. Midslope locations in the upland unit are favored, with many of the finds positioned towards Upper Three Runs. These locations may have been ideal cold-weather habitation sites, although the limited flat ground in these locations provided limited options for positioning. Exceptions are seen in a couple of locations on the higher slopes of the upland unit, locations that produced preform fragments (listed as "other" biface in Table 6-9) and patinated debitage, but not usually other tool classes. These wider areas of relatively flat ground may have been locations of habitation, although we note again the possibility of later scavenging. If habitation locations, at least two with northeast aspects would not have been ideal cold-weather locations.

Finally, use of tested floodplain locations resulted in the discard of only utilized flakes and a single uniface of Early Archaic age. The lack of more substantial finds suggests that the floodplain was not selected for long-term or repeated use. Its northwest

Table 6-9. Summary Statistics of Locational Variables for Early Archaic Artifacts by Technofunctional Class.

	Hafted Biface	Other Biface	Debitage	Utilized Flake	Flake Core	Formal Uniface
Frequency	4	3	48	11	1	7
Elevation (m)						
mean	65.75	74.00	65.44	60.45	-	62.29
st. dev.	14.57	5.57	13.46	17.08	-	10.23
minimum	44.00	68.00	41.00	41.00	68.00	41.00
maximum	75.00	79.00	89.00	89.00	68.00	72.00
Slope (%)						
mean	13.50	11.67	10.75	7.73	-	11.29
st. dev.	4.73	7.51	6.75	8.33	-	7.23
minimum	7.00	3.00	0.00	0.00	3.00	3.00
maximum	17.00	16.00	23.00	23.00	3.00	22.00
Distance to Water (m)						
mean	79.74	152.16	105.63	101.48	-	101.87
st. dev.	43.29	28.85	52.46	75.85	-	56.78
minimum	49.69	126.59	6.76	25.68	183.44	19.05
maximum	143.69	183.44	263.11	263.11	183.44	183.44
Distance to UTR Floodplain (m)						
mean	219.59	357.27	322.88	205.15	-	232.30
st. dev.	142.00	120.24	235.77	215.91	-	152.74
minimum	55.41	255.63	0.00	0.00	255.63	0.00
maximum	402.20	490.01	736.10	582.68	255.63	473.74
Aspect n (%)						
None	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
NNE	1 (25.0)	2 (66.7)	19 (39.6)	3 (27.3)	0 (0.0)	1 (14.3)
ENE	0 (0.0)	0 (0.0)	3 (6.3)	0 (0.0)	0 (0.0)	0 (0.0)
ESE	0 (0.0)	0 (0.0)	1 (2.2)	1 (9.1)	0 (0.0)	0 (0.0)
SSE	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
SSW	0 (0.0)	0 (0.0)	2 (4.2)	1 (9.1)	0 (0.0)	1 (14.3)
WSW	3 (75.0)	1 (33.3)	12 (25.0)	2 (18.2)	1 (100.0)	3 (42.9)
WNW	0 (0.0)	0 (0.0)	7 (25.0)	2 (18.2)	0 (0.0)	2 (28.6)
NNW	0 (0.0)	0 (0.0)	4 (8.3)	2 (18.2)	0 (0.0)	0 (0.0)

exposures and moist substrate would make for miserable cold-weather conditions. As the Late Archaic record shows, intensive use of floodplain locations was not out of the question, but we suspect, as we discuss later in the chapter, that such use was limited to the warm-weather months.

To summarize, the Early Archaic land-use record of E Area appears to be functionally differentiated and well patterned. Locations of formal tool discard occurred most frequently on west- and southwest-facing slopes. The degree to which such locations were used repeatedly may be correlated with the size of relatively flat shelves on side slopes, and, if so, the density of materials may correlate directly with the upslope gradient within a range limited to about 200 m from running water. Use of Upper Three Runs Creek floodplain locations was apparently very limited and did not routinely involve the discard of formal tools. We infer from this differentiated record locations of hunting camps and stands (southwest-facing side slopes) and kill loci processing activities in the bottoms. All evidence points to cold-season, short-term use of the study area by small groups with seasonal habitations elsewhere. The data conform nicely with the expectations put forth by Hanson (1988) for the regional-scale settlement model he developed with David Anderson (Anderson and Hanson 1988).

Middle Archaic. The meager Middle Archaic record of eight locations consists of two diagnostic hafted biface fragments, one Morrow Mountain and one Guilford, and six "other" biface fragments attributed to the late Middle Archaic period (MALA/Brier Creek, ca. 6000-5000 B.P.) (Figure 6-11). There is little that can be said about the two hafted bifaces; they match the previous pattern for scattered, isolated occurrences throughout the Aiken Plateau. This pattern seems to be the result of transient use of the area for hunting. Morrow Mountain and Guilford points were indeed projectiles, as were the subsequent MALA and Brier Creek forms.

None of the six late Middle Archaic items has a haft element. The four specimens in floodplain locations are tip and midsection fragments of finished products, while the two in the isolated upland locations are late-stage preform fragments. Although this is a meager sample from which to draw inferences about land use, we are confident that it represents very well a transient use pattern of cold-weather hunting. Unlike the Early

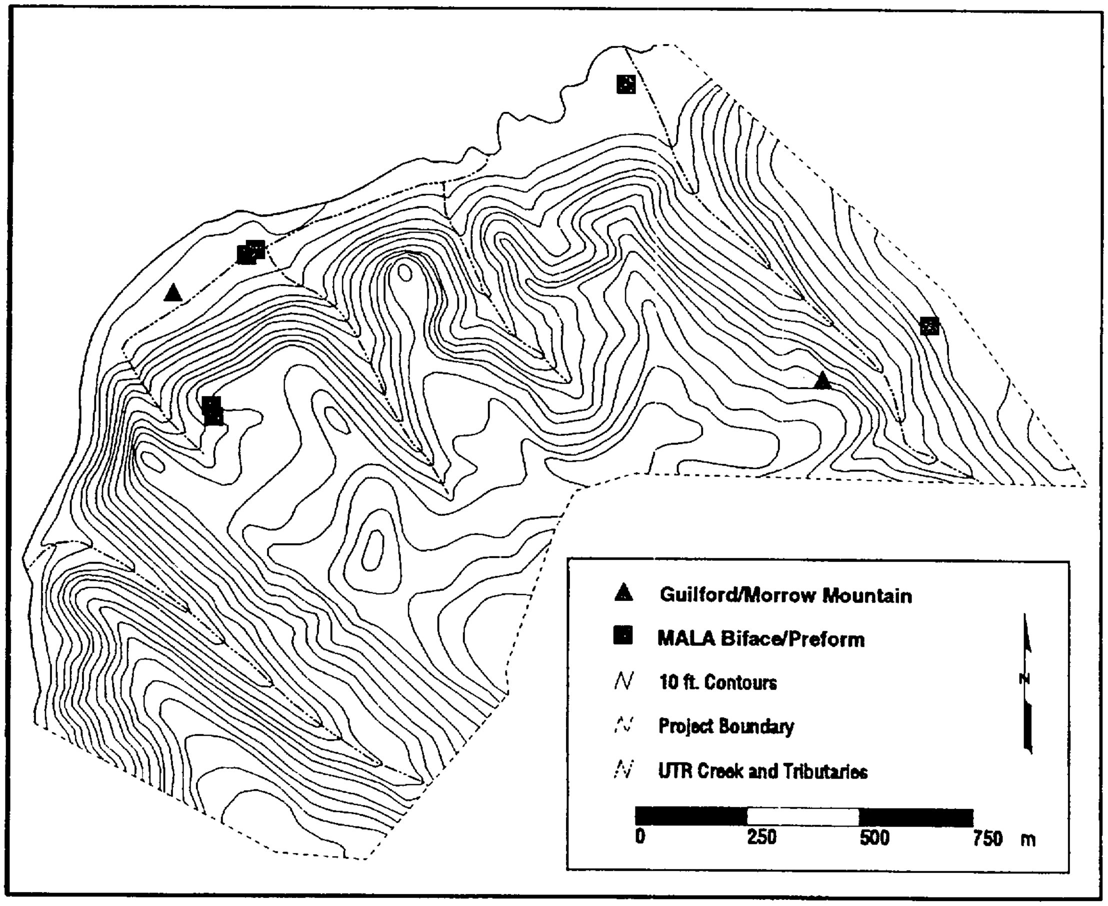

Figure 6-11. Locations of Middle Archaic artifacts in E Area.

Archaic hafted bifaces discussed above, which were primarily hafted cutting tools, the finished MALA and Brier Creek bifaces were projectiles. That only tips and midsections are found in floodplain context suggests that the floodplain was used for dispatching game, but not for activities involving retooling or the abandonment of hafted elements. These latter activities no doubt took place at habitation locations outside the project area, and maybe too at the upland location in E Area where two preform fragments were found. This spot has a west-southwest aspect similar to many of the presumed winter hunting stands/camps of Early Archaic age. Its proximity to the Upper Three Runs floodplain also seems ideal as a vantage point for bottomland hunting.

It follows then that the small Middle Archaic assemblage from E Area has a land-use pattern that continues on the Early Archaic theme of cold-weather hunting. Importantly, the Middle Archaic record is an even better measure of hunting activity because of the functional specificity of its hafted bifaces. We have no precise information on what the Early Archaic equivalents may have been, although organic media are likely. In lieu of projectile fragments, the proxy measure of game dispatching in the floodplain during the Early Archaic is the occurrence of utilized flakes we noted earlier.

Late Archaic. A radical change in land-use patterning is observed in the Late Archaic record of E Area. With very few exceptions, Late Archaic artifacts are confined to locations in the floodplain of Upper Three Runs Creek (Figure 6-12). This decidedly bottomland pattern points to warm and dry season occupation. The associated assemblage include both flakes stone and pottery, as well as soapstone cooking stones. The flaked stone assemblage includes few diagnostic pieces, but large bifacial cores typical of the period were recovered.

The only subsurface occurrences of Late Archaic artifacts outside the floodplain are Thom's Creek sherds at two locations: one at the edge of the upland unit overlooking Upper Three Runs, and another at the upper end of the Rank 2 stream in the bottoms location where fire-cracked rock clusters were found.

How well does the E Area Late Archaic distribution accord with the extant settlement models for the region? To address this issue we first need to reiterate some of the complexity of the Late Archaic situation that we discussed in Chapter 2. In the earliest centuries of this period, until about 3700 B.P., the Aiken Plateau appears to have been used occasionally for fall-winter settlement by small, dispersed groups. Between about 3700 and 3500 B.P., the area was apparently not utilized for seasonal dispersal or other habitation functions as classic Stallings Culture flourished in the middle Savannah River valley. After 3500 B.P., with the collapse of river-based Stallings settlement, the use of upland locations burgeoned to include year-round, albeit mobile settlement by small groups. Vestiges of classic Stallings Culture (e.g., drag and jab fiber-tempered and sand-tempered pottery) persisted for a couple of centuries, and by about 3200 B.P. elements of Early Woodland material culture (e.g., simple stamped pottery) begin to emerge.

We have no absolute means of dating the Late Archaic finds of the E Area floodplain zone, although the pottery (i.e., Thom's Creek drag and jab and sandy pasted plain fiber-tempered) almost certainly dates to about 3500-3400 B.P. One of the rock clusters found at the upstream bottoms location designated 38AK155 yielded a date of 3540 ± 60 B.P. (see Chapter 3 and Appendix A). Although diagnostic Late Archaic sherds were not found in this feature, a Thom's Creek drag and jab sherd was located nearby in a shovel test. We suspect that this radiocarbon date is a good estimate of the Late Archaic activity in E Area.

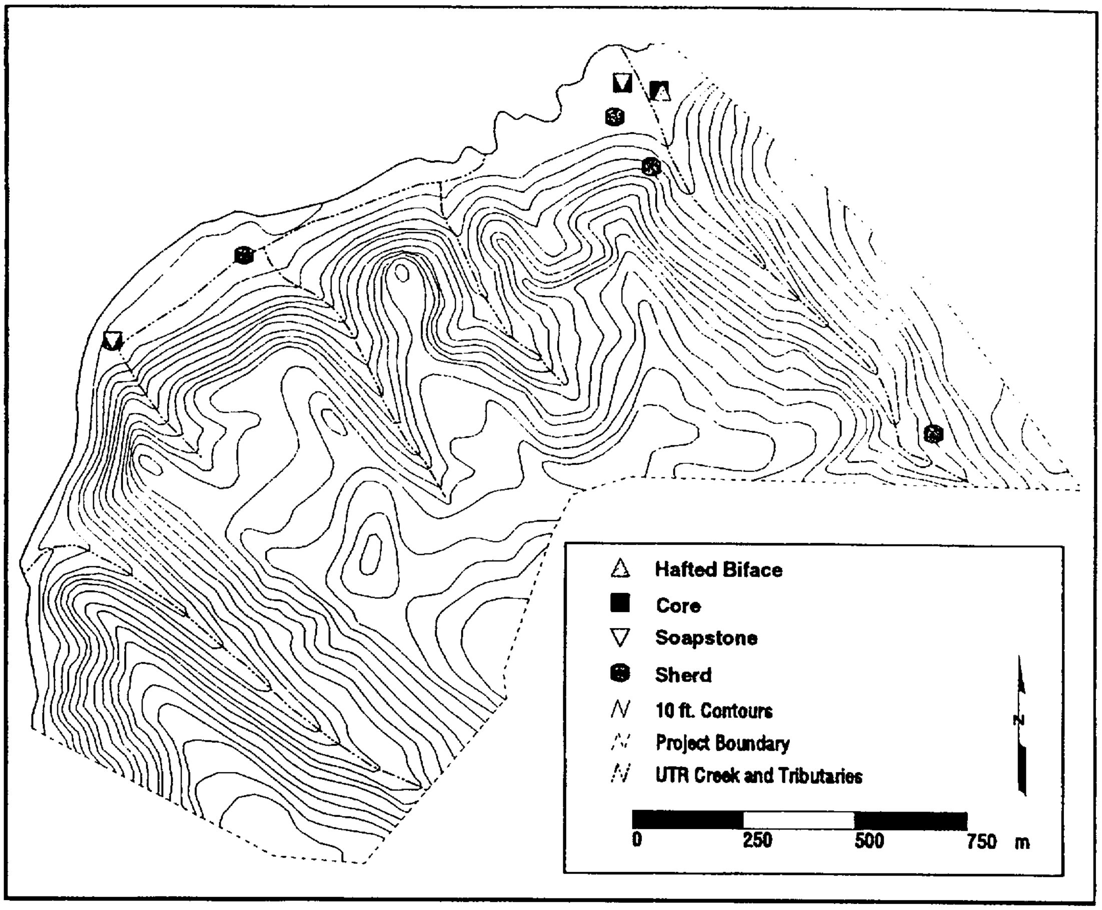

Figure 6-12. Locations of Late Archaic artifacts in E Area.

Accepting our extrapolation of chronology, the E Area record accords well with warm-season use of the Upper Three Runs floodplain, coupled with cold-weather habitation at sites such as Tinker Creek (see Chapter 2). The use of floodplain locations would essentially have been an extension of the classic Stallings land-use pattern into the Aiken Plateau after the abandonment of the middle Savannah River floodplain. Aiken Plateau locations were likely selected for some of the same ecological/economic reasons as site selection in the middle Savannah, but at a much smaller scale. It is noteworthy, too, that research by Mark Brooks (Brooks and Hanson 1987; Brooks et al 1986) has suggested that Aiken Plateau tributaries had begun to mature after 4000 B.P. in response to changes in base level, changes ultimately tied to sea level rise. Climatic changes could have produced this same effect. Either way, it follows that sustained use of tributary floodplain locations may not have been possible until about 3500 B.P. Ironically, the same conditions that improved floodplain habitat, however, probably also accentuated flood potential. Clearly, year-round occupation of the bottoms would not have been possible. By Early Woodland times, floodplains appear to have been completely ignored as habitation loci.

Early Woodland. The Early Woodland record of 13 subsurface locations stands in marked contrast to Archaic patterns. Finds of Refuge Simple-Stamped pottery are concentrated on the northeast-facing slopes along the Rank 2 stream (Figure 6-13). What is not seen in the subsurface sample is the large number of Refuge sherds found on the

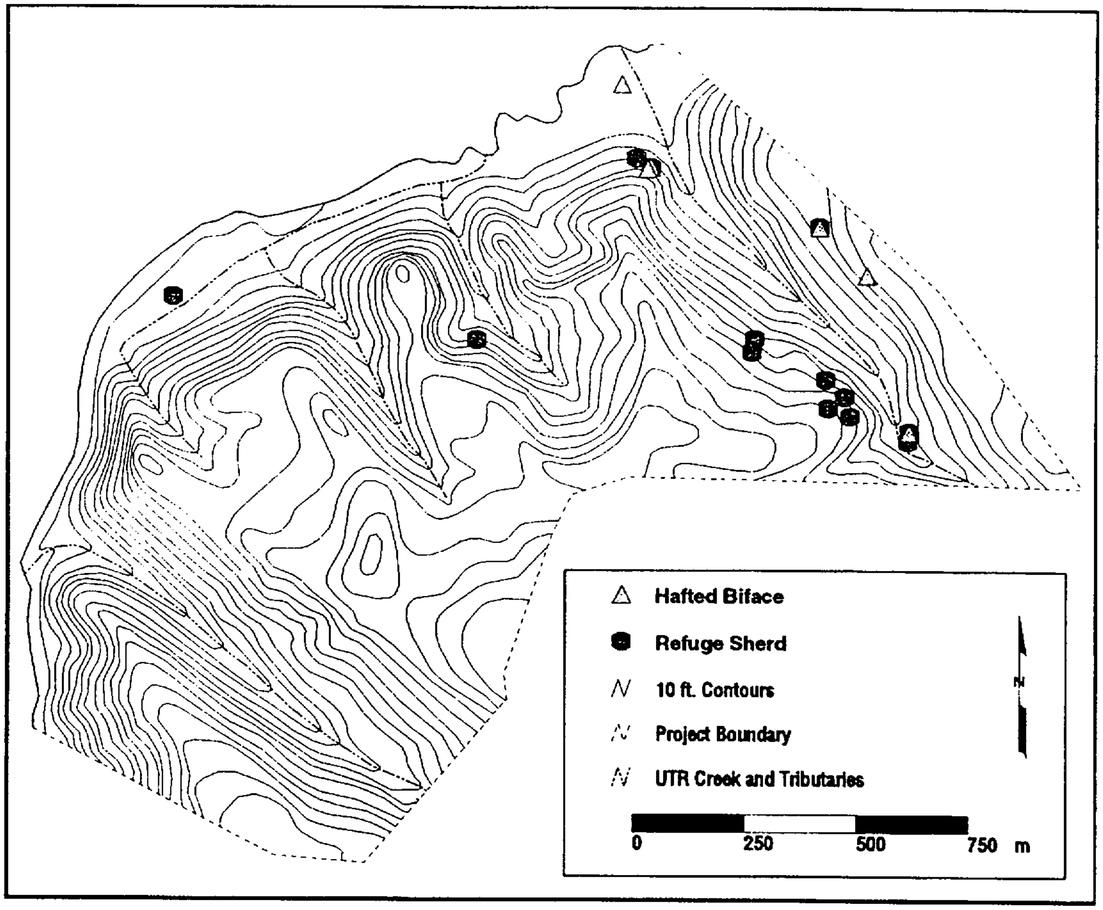

Figure 6-13. Locations of Early Woodland artifacts in E Area.

exposed ground surface along the opposite, southwest-facing slopes of this stream. Elsewhere, subsurface finds of Refuge pottery are limited to a few isolated cases.

Hafted bifaces of presumed Early Woodland age are likewise located along the Rank 2 stream of E Area, but at locations oriented closer to Upper Three Runs Creek. One such find was found in the floodplain of this creek. The apparent difference between sherds and hafted bifaces may signify a division of labor or task differentiation. The sample size is too small, however, to draw definitive conclusions.

Overall, the Refuge Early Woodland land-use pattern is one of focused habitation in the upland unit with only specialized, transient use of Upper Three Runs floodplain. An equal division of Refuge occupations on southwest- and northeast-facing slopes in E Area and elsewhere (see Chapter 2) supports an inference for perennial use of the uplands, with seasonal movements to take advantage of favorable aspect and resource accessibility. That other upland streams in E Area were overlooked for settlement suggests that Refuge phase populations in the area were relatively small and culturally short-lived. The Refuge record in E Area may, in fact, be as short as a generation or two. The period itself is but a few centuries in duration and its temporal relationship to the check stamped tradition of the Middle Woodland is uncertain. In a sense the Refuge population never seems to have needed to expand settlement into every corner of the Aiken Plateau. As far as E Area is concerned, they passed over the smaller streams for

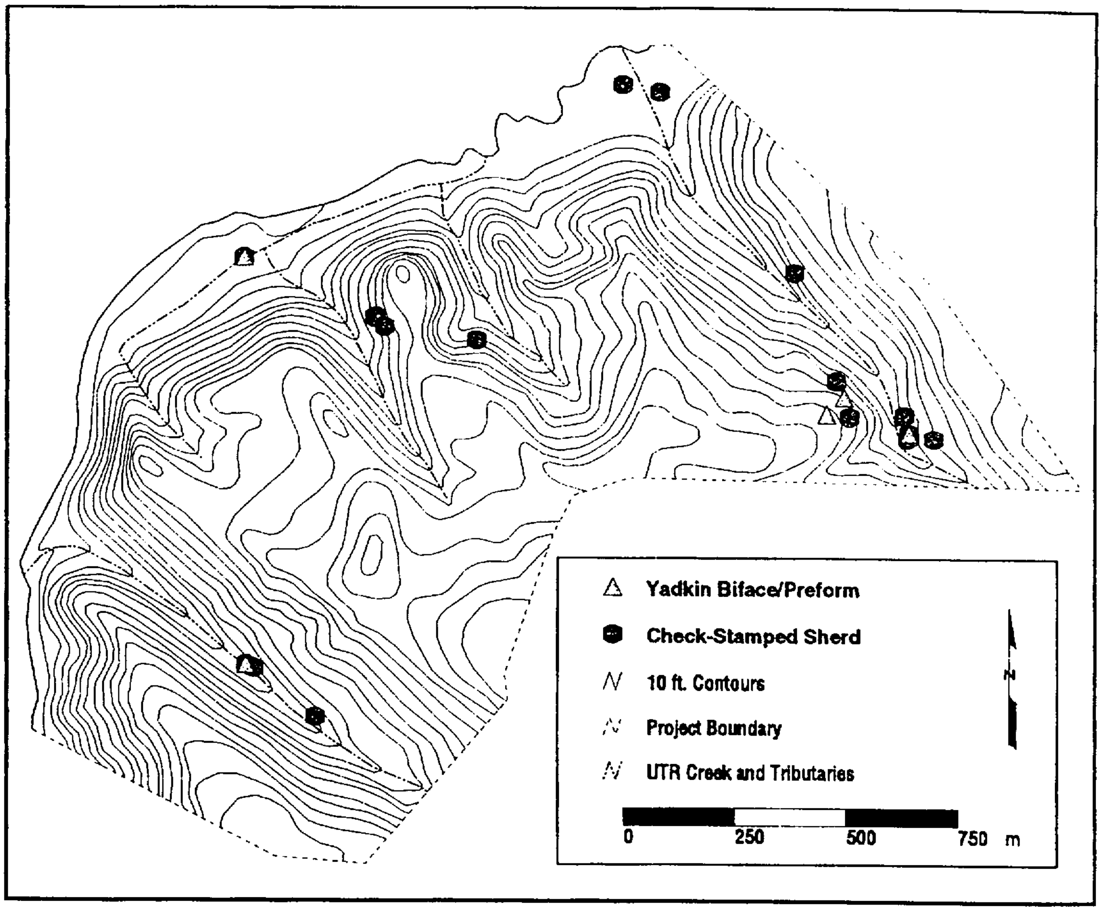

Figure 6-14. Locations of Middle Woodland artifacts in E Area.

the largest stream, but staying with upland locations. At a larger spatial scale, Refuge settlement was dispersed but not pervasive. It appears to have been circumscribed in various portions of the Aiken Plateau, perhaps being repositioned every generation or so to take advantage of new opportunities. From our work elsewhere in the Aiken Plateau, it appears that E Area may have formed the western margin of a settlement range that included 38AK157, 38AK158, and perhaps Tinker Creek.

Middle Woodland. A record of 19 subsurface locations of Middle Woodland artifacts consists of 17 with Deptford check stamped pottery and 5 locations with Yadkin points or preforms (Figure 6-14). The two classes coincide in virtually all cases, although the fewer number of Yadkin finds means that pottery sherds are often found exclusively. The collective pattern is widespread, but most definitely stream-oriented. The record includes the first evidence for habitation use of the westernmost stream, as well as pottery finds in the central portion of the project area. Both floodplain and upland locations were used, as were northeast- and southwest-facing slopes.

Besides the expansion of land use to include the smaller project area streams, the Middle Woodland record is the first to show a concentration of activity on small streamside shelves of the upland unit. This is pattern of use that may have begun at about 3500 B.P. with Feature 1, the rock cluster at 38AK155. However, it appears to have intensified during the Middle Woodland. These streamside locations would not have made suitable long-term or large-scale habitation sites, for they are small, relatively steep, and subject to flash flooding. They may have been ideal for food-processing activities requiring running water. The rock clusters found at the downslope location of 38AK155 are evidence that heat was involved as well. Nut processing is implicated here, although other processes may have been involved. The presence of flaked stone tools and debris may be indicative of a wider range of activities than imagined.

Coupled with the streamside activity clusters on the Rank 2 stream are upslope locations of pottery and Yadkin points. These locations lack the rock clusters of their downslope counterparts. We speculate that the upslope components are locations of habitation, while the streamside components reflect food-processing and other specialized activity locations of work parties.

Inferences about seasonality are difficult to draw. There is a bias for southwest aspects in the Middle Woodland sample, but because most of these locations are short-term, albeit repeatedly visited, activity areas, not likely habitations, the relevance of aspect is weakened. Our extant models of Middle Woodland settlement in the area remain ambiguous. We have at the mouth of major Savannah River tributaries on the SRS evidence for long-term intensive habitation not unlike the pattern of classic Stallings times. Does this mean that we have a return to only seasonal use of Aiken Plateau sites by river-based groups, or, alternatively, might there have been multifaceted settlement with dispersed upland sites coexisting with nucleated riverine settlements? The answer to this question awaits much more data. If we take the E Area data at face value, the evidence for probable mast processing coupled with selection for southwest-facing slopes points to a pattern of cold-season occupations. Although there is nothing from nearby areas to dispute this inference, we remain suspicious that the Deptford record encapsulates a more varied, complicated record of land use. The distributional analyses has helped to bring into focus some of the specialized land-use pattern of the Deptford phase. Much more work is required to put this into its broader seasonal and organizational contexts.

Middle-Late Woodland. The transition from Middle to Late Woodland times that is signified by cordmarked pottery and small triangular points is represented in our study by 39 subsurface locations (Figures 6-15 and 6-16). The cordmarked pottery are widespread, matching in most respects the distribution of check stamped pottery. The paired upslope-streamside pattern of locations persists, and there is a slight increase in the incidence of Upper Three Runs floodplain locations.

The seemingly increased use of floodplain locations during this time would suggest that horticulture was beginning to make an impact to the local subsistence economy. Without independent evidence for farming, we are hesitant to extend this inference much further. Still, the increasingly widespread land use of the Middle-late Woodland era signifies some level of expansion, probably on the existing pattern of land use with more people and/or more circumscribed land use. Repositioning of settlement systems may be indicated too. As we have seen from this and previous work, occupations of Upper Three Runs did not simply expand out from a core area of initial occupation, but were instead gradually reoriented to target different upland tributaries. Within the greater area of E Area, for instance, Refuge settlement was focused to the east, whereas Middle and then Late Woodland locations were moved progressively westward. Such long-term repositioning may have both ecological and sociocultural causes, but regardless of the source of change, the resultant pattern can only be understood in scales of observation that transcend the study area.

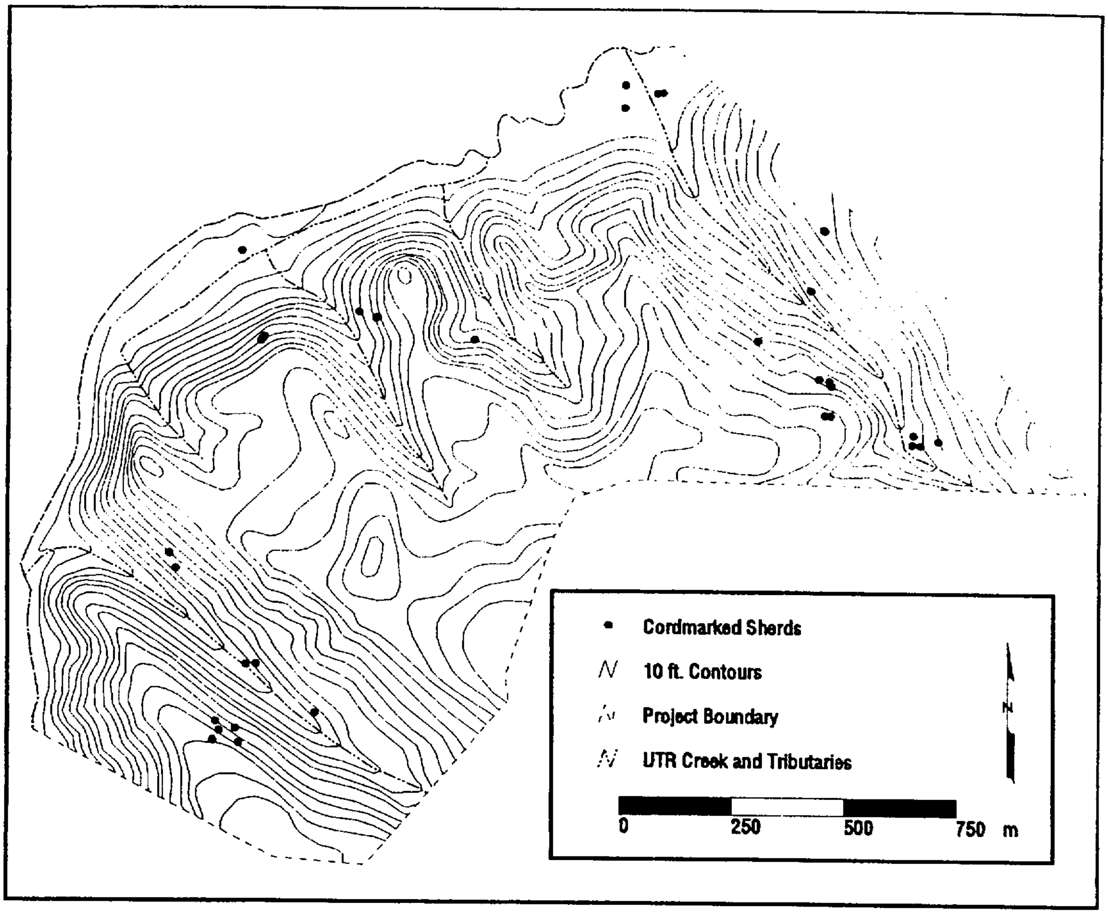

Figure 6-15. Locations of cordmarked sherds in E Area.

Late Woodland/Mississippian. Fifteen locations with complicated stamped, corncob impressed, and folded-rim cordmarked pottery signify the Late Woodland-early Mississippian transition (Figure 6-17). Except for a substantially lower mean slope value and lesser use of southwest-facing slopes (Table 6-8), the Late Woodland-early Mississippian distribution does not deviate markedly from its predecessor. There are, however, fewer locations in the floodplain with late period diagnostic sherds. This is a bit surprising considering that corn farming was by this time a certain consideration of land use. We, of course, have no direct material correlates of farming, such as hoe bits, so inferences about changes in land use remain speculative. Again, the overall pattern is one of continuity with the receding period.

Artifacts of Late Woodland-early Mississippian age other than pottery are limited to the small triangular points we mentioned above. Our analysis of these points in Chapter 4 showed that most probably date to the early centuries of the technology, that is, during the first half of the Late Woodland period. The only notable incidence of cluster of points of probable Mississippian age occurred at the streamside rock cluster location of the Rank 2 stream (38AK155). One of the rock clusters at this location was dated to 870 ± 60 B.P. (see Chapter 3). Thus, the activities involving pottery and heated cobbles recurred intermittently from as early as 3500 B.P. on. This is yet another indication of persistent land use throughout later prehistory.

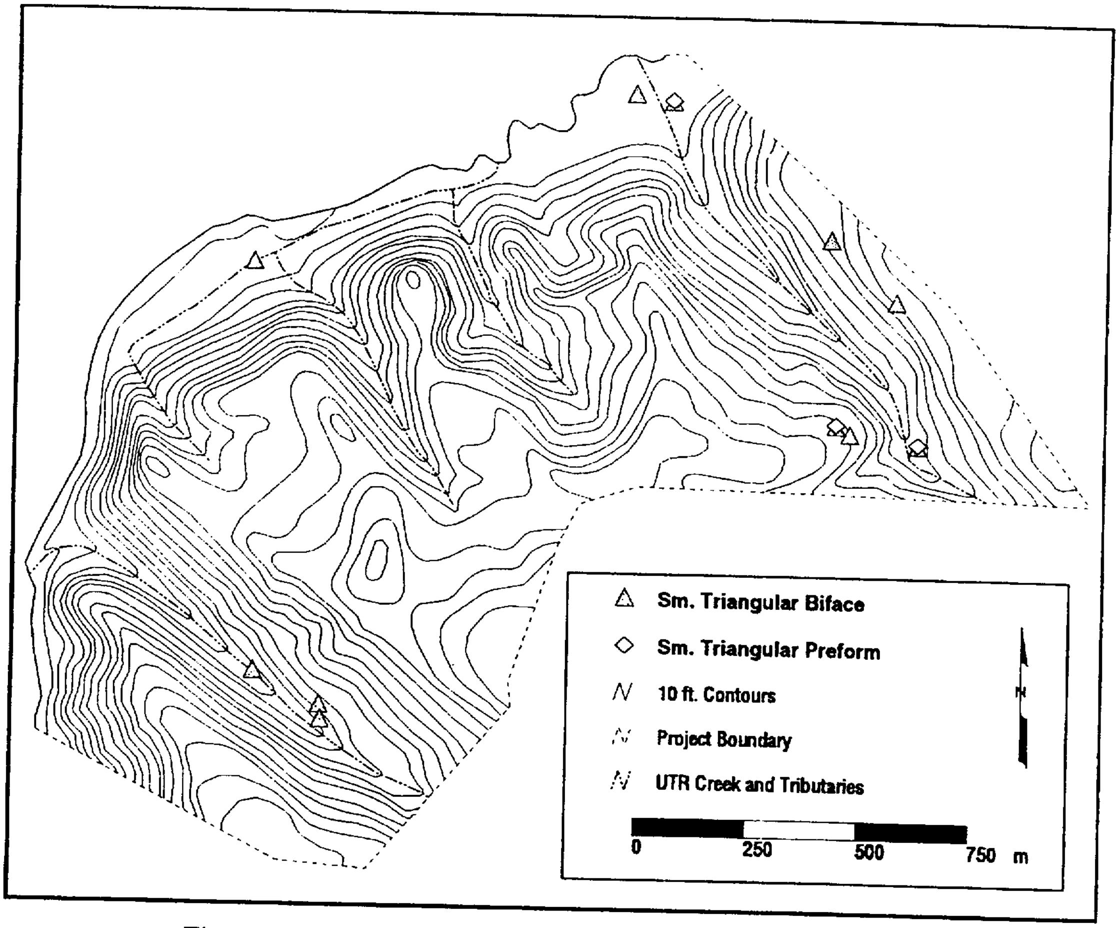

Figure 6-16. Locations of small triangular points in E Area.

The only other pattern of note in the Late Woodland-early Mississippian distribution of E Area is its evenness. Locations are spread out evenly in three clusters coinciding with the Rank 2 stream, the intermediate smaller streams, and the westernmost Rank 1. We could infer from this a pattern of dispersed households paced evenly across the study area about 750 m apart. Without independent evidence for contemporaneity, however, we could argue equally well that these clusters are the serial locations of one household/hamlet. Evidence to evaluate these alternative hypotheses will involve much finer temporal control than is currently possible.

CONCLUSIONS

In this chapter we ignored the site unit of analysis to explore distributional tendencies among artifacts for technofunctional and chronological patterning. Our sample of 1,457 subsurface points is inherently biased for the margins of landforms, although a comparison with 500 randomly generated points shows very limited deviation from our sample within the parameters of the locational variables we chose to examine.

Positive subsurface tests have a decidedly nonrandom distribution within our sample universe. As one might expect, locations at low elevation and close to sources of running water are more likely to yield artifacts than are locations on ridge tops and distant from water. Several other nonrandom distributional tendencies were identified among

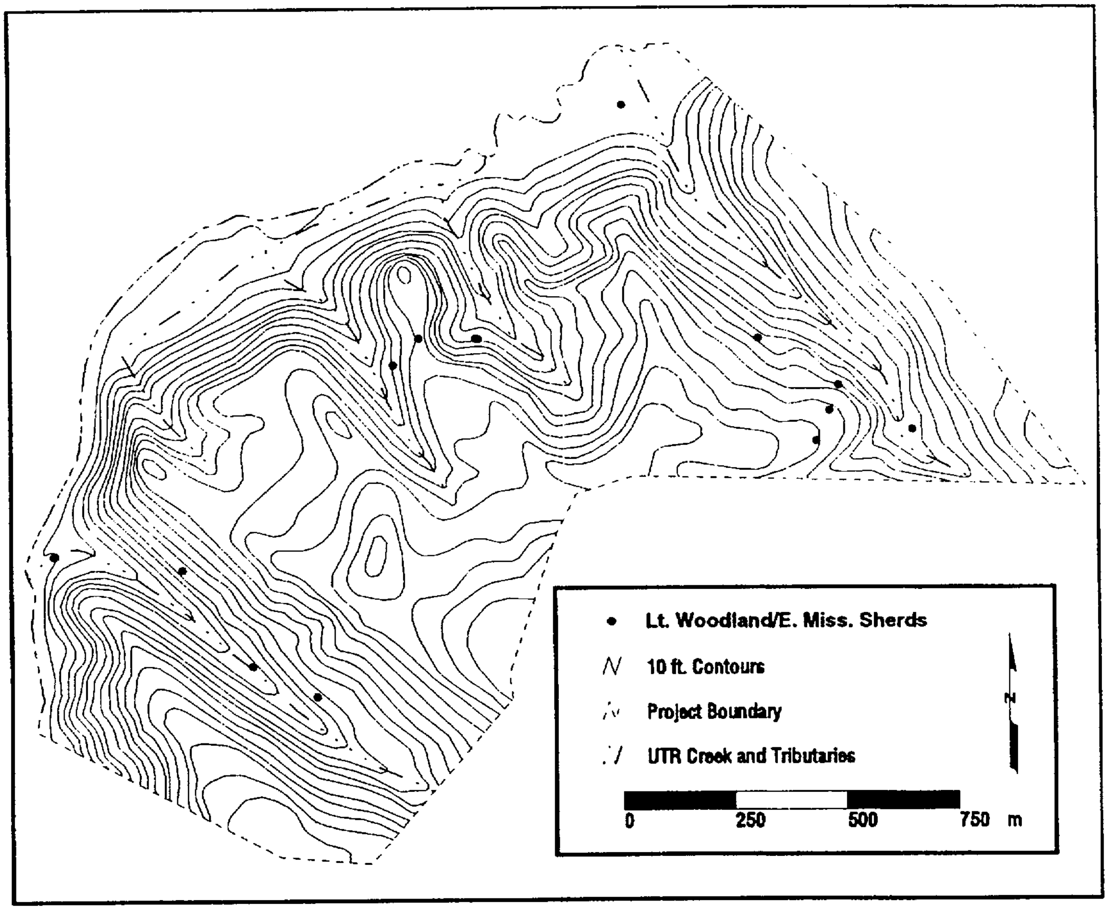

Figure 6-17. Locations of Late Woodland/early Mississippian sherds in E Area.

technofunctional classes of artifacts. Hafted bifaces are more often located close to water than are the material correlates of their manufacture. Debitage is widely distributed across the study area and when sorted into stages of core reduction, covaries negatively with distance to water and elevation. Pottery is highly clustered in its distribution and shows the greatest average distance from the major floodplain zone of the study area.

Another layer of spatial variation was explored in our diachronic analysis of artifact distribution. Marked changes in land-use patterning are evident throughout early prehistory. For the late period changes appear to reflect more the infilling of the landscape with a longstanding tradition of dispersed upland settlement. The development of a farming economy in the region after about A.D. 1000 had no measurable effect on E Area land use.

Many new insights about prehistoric land use been made possible by a distributional approach. These new findings center on the organization of hunting, seasonality, and task differentiation. In the final chapter of this report we discuss in greater detail the benefits of distributional archaeology to these findings in particular and to the investigation and management of SRS sites in general.

CHAPTER 7

SUMMARY AND CONCLUSIONS

Survey of the 550-acre E Area on the Savannah River Site resulted in the recovery of over 28,000 prehistoric artifacts. Except for a handful of isolated finds, these artifacts were distributed among 32 clusters. By convention, the clusters represent archaeological sites—locations of prehistoric activity that are bounded and defined by archaeologists for purposes of management and research. The site concept is fundamental to archaeological reasoning and it is the foundation of federally-mandated archaeology. However, the extent to which sites represent accurately the land-use practices of prehistoric Native Americans is a matter of considerable debate.

The E Area survey was our first attempt to go beyond the site-unit of analysis to examine the distribution of artifacts and assemblage attributes across the landscape. We are well aware that artifacts indeed cluster at certain locations on the landscape and that these locations were used by prehistoric inhabitants or visitors for specific purposes. But we are also well aware that most of the clusters are composites of the residues of a variety of activities that occurred over long periods of time. We are sometimes able to unravel this complexity with intrasite spatial analyses of large excavations. More often, however, we are forced to pass judgment about the functional roles of sites based on small samples of assemblage content, density, and diversity. If we relax the site concept to examine artifact distributions across larger tracts of land we ought to be able to locate greater variation in the relationship between particular activities and locational features. This has the potential to improve our understanding of prehistoric land use while sharpening our ability to interpret clusters (i.e., sites) as unique features of broader distributions.

An added advantage to a nonsite approach is that it allows greater access to information from finds located outside of traditional site boundaries. The so-called isolated finds or occurrences of prehistory have been systematically overlooked because of investigator bias and the regulations of compliance archaeology. This is unfortunate because they represent activities that are not duplicated within traditional site boundaries. We tend to classify such activities as "resource extraction" or "specialized," and in so doing downgrade their relevance to site interpretation. Yet, these activities were not only launched from other locations that potentially contain residues of task preparation, but they also are the sources of many of the material inputs into "sites." What is more, the land-use patterning of such activities is a direct measure of task organization, including division of labor, specialization, provisioning, and logistical strategies.

In short, a nonsite or distributional approach to the study of prehistoric land use has the potential to improve our recognition and interpretation of archaeological variability by looking past the conceptual limits of "sites" to explore relationships between the material residues of particular activities and locational features. How well has this potential been realized in the present effort? To answer this question we aim in this last chapter to address first some of the insights gained from a distributional analysis and how these insights would have remained hidden in a site-level analysis. We then follow with some of the limitations of this study, and conclude with recommendations for the future.

INSIGHTS FROM A DISTRIBUTIONAL APPROACH

Much has been gained from our first effort at distributional archaeology. The preceding chapter presented the results of this effort in an inductive manner with only limited attention to interpretation or explanation. Here we wish to synthesize some of these findings without undue repetition of the empirical evidence. Our treatment is divided into three topics that encapsulate the more salient results.

Organization of Hunting

Deer hunting is a pursuit involving materials preparation, surveillance, tracking, dispatching, processing, and transportation. The many tasks involved are protracted over a period of time and a large amount of space. Deer hunting can vary from single encounter events by individual hunters, to mass killings and processing over days or weeks by several hunters. The archaeological patterns of deer hunting depend on many factors including weaponry technology; organization of labor; scale of activity; spatial congruence among locations of kills, processing, and consumption; and transportation constraints.

The archaeological residues of deer hunting have figured prominently in our models of Early Archaic land use in the upper Coastal Plain of South Carolina. According to Anderson and Hanson (1988), the area was used during the winter by bands that traveled the full length of the Savannah Basin on a annual basis. Winter camps positioned along the terraces of the Savannah River formed the residential locations from which logistical forays into the uplands were launched (see also Hanson 1988). These inferred forays were designed primarily to dispatch and process white-tailed deer for transport and consumption at riverine base camps. The hunts are presumed to have been specialized and relatively large-scale, sufficient to supply both meat and hides for winter during a period of greater seasonality than at present.

Evidence to support these inferences has been drawn largely from the intersite assemblage variability among riverine and upland sites. Riverine sites like G. S. Lewis-East have produced dense and diverse assemblages of flaked stone, fire-cracked rock, hematite, and cobble tools. Upland sites, in contrast, tended to contain a few broken and worn bifaces, some unifaces, and little else. There have been no attempts to examine interassemblage variation from upland sites. Rather, the sites tend to be generalized as hunting stands or stations. Contributing to this lack of recognized variation is our limited knowledge about weapons technology. Contrary to popular belief, the typical side-notched and corner-notched bifaces of the Early Archaic toolkits were not used routinely as projectiles. They were, instead, curated knives. As such, they were certainly integral elements of a mobile hunter's toolkit, as were the hafted endscrapers, which, according to Cable (1996), were used for mass processing of hides.

Both classes of Early Archaic tool—the hafted knife and hafted endscraper—represent elements of a technology designed for relatively intensive, focused task performance at locations distant from home bases. The design fits precisely the predicted economic requirements of winter provisioning. But it tells us virtually nothing about the organization of activities involved in winter deer hunting within the Aiken Plateau specifically. Our greatest constraint in this regard is the limited utility of a site typology that classifies all upland Early Archaic finds as "hunting stations."

Our distributional analysis has succeeded in improving our understanding of Early Archaic winter hunting by exploring variation in the location of specific elements of upland assemblages. We benefited in this regard by having so many diagnostic traits with which to work, including advanced patination on otherwise nondiagnostic material remains, such as debitage.

The analysis reveals three distinct elements of hunting organization in the study area (Figure 7-1). First, locations for logistical camps tend to be located on southwest-

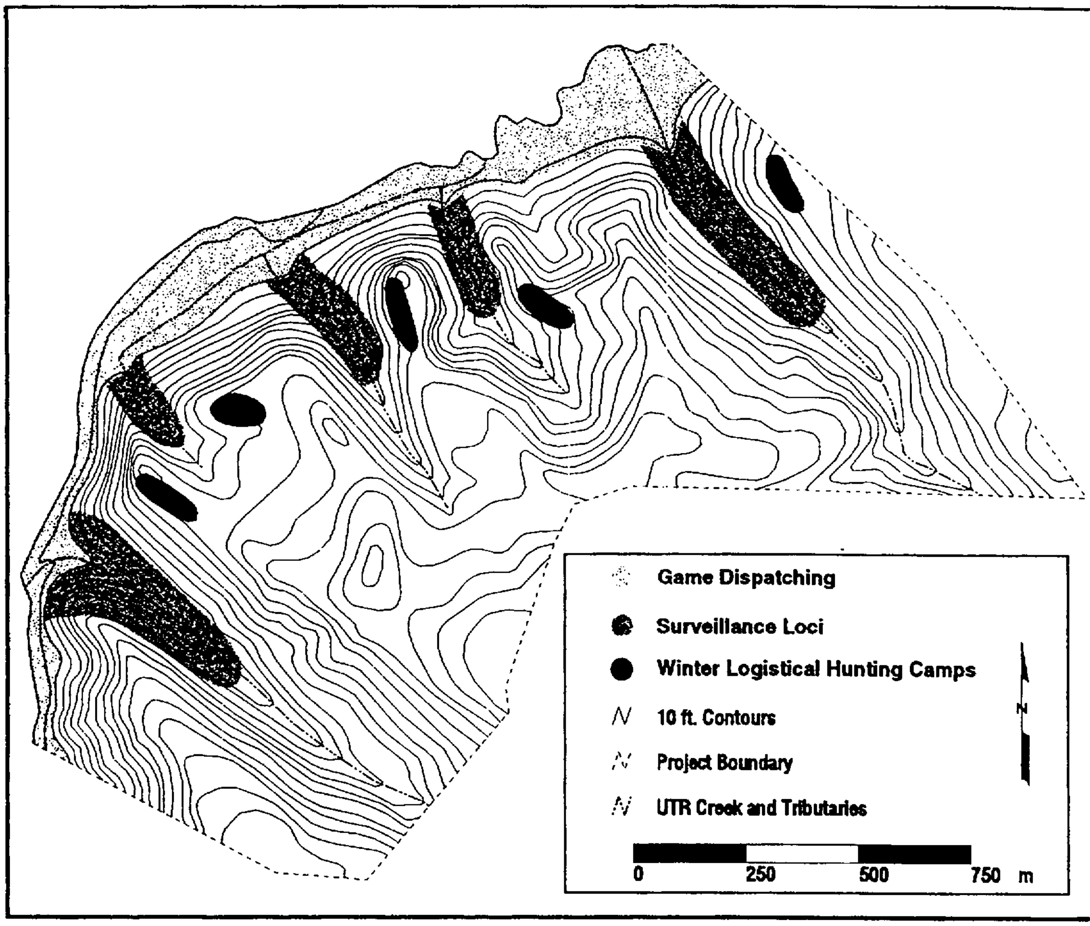

Figure 7-1. Schematic diagram of Early Archaic land use in E Area.

and west-facing slopes, distant from water but relatively close to the Upper Three Runs Creek floodplain. Hafted bifaces and unifaces, flake cores, and debitage are the residues of these locations. Their distance to water is in marked contrast to the locations chosen for habitation by later groups, and this confirms the short-term use of these hunting camps that appears evident in their limited artifact density. The west and southwest aspects of these locations reflects the need for exposure to the sun, hence an independent confirmation for winter use.

A second set of locations occur closer to water in the downslope flanks of feeder streams and are marked by an occasional worn or broken hafted biface or biface and a few flakes. These locations are downwind and upslope from the mouths of feeder streams as they empty into the Upper Three Runs floodplain. We interpret these locations as hunting stands or surveillance points and imagine they were occupied for only brief periods to sight deer moving up and down slope in their patterns of diurnal feeding.

Finally, the floodplain zone itself appears to have been the location of most deer killing and initial processing. The orientation of hunting camps toward the floodplain side of the study area (a marked contrast with later period habitation sites) supports the notion that the floodplain was primary hunting ground. Direct evidence for the dispatching of deer is not available; again, we have no sound knowledge about Early

Archaic weaponry. However, floodplain locations produced isolated patinated flakes with use damage. We suggest that these items were used for initial processing of kills for transport back to hunting camps. Additional processing involving hafted knives and endscrapers took place at hunting camps before products were transported back to winter camps at considerable distance (12+ km) from the project area.

Our meager Middle Archaic record from E Area helps to support a pattern of floodplain hunting. The bifaces of this period are unequivocal projectiles. Tips and midsections of these tools occur at floodplain locations while preform fragments are found at a location of the southwest-facing slopes in the adjacent uplands. A pattern of winter hunting appears to have continued into the late Middle Archaic period. Like the Early Archaic, we have absolutely no evidence for longer-term habitation in and around the project area during the Middle Archaic.

The pattern of logistical winter hunting that appears to have persisted through the Middle Archaic period is not evident in the E Area records of subsequent periods. After about 5000 B.P. the settlement ranges of regional groups appear to have dwindled in size. This alone does not preclude long-distance winter hunting, although we suspect that more fundamental changes in the subsistence economy made it either impossible or unnecessary to launch such efforts. Climatic change was obviously a factor, too. Certainly the need for winter supplies of hides and meat diminished as climate ameliorated and as population densities made it possible to buffer seasonal shortages through resource pooling and other social means. Above all, perhaps, is that fact that E Area, like similar locations in the Aiken Plateau, became the location of habitation. Deer hunting launched from E Area habitation locations was most likely a shorter-term, smaller-scale venture, perhaps rarely involving trips of overnight duration. We therefore see neither the formalized, mobile toolkit that ensured reliable and maintainable technology away from home, nor the level of assemblage variation that derives from specialized hunting forays.

An organizational approach has benefited our understanding of Early Archaic winter hunts by including data from small clusters that would otherwise be dismissed at the site unit of analysis. Our recognition of assemblage variation has been expanded to include surveillance and kill locations, as well as hunting camps. The locations have relatively distinct locational properties that should enable us to predict the locations of similar activities in other portions of the Aiken Plateau.

Seasonality of Habitation

The settlement models that we reviewed in Chapter 2 suggest that seasonal habitation in upland locations such as E Area began during the Late Archaic period and then intensified during the Early Woodland period to include year-round habitation. The models were developed from a combination of regional comparisons and large-scale excavations on the SRS. Not until this study have the microenvironmental implications of these models been explored.

Our record of Late Archaic and Early Woodland artifacts from E Area includes the usual array of hafted bifaces, pottery, soapstone, and nondiagnostic flaked and cobble stone tools. The respective diagnostics of these periods show remarkably divergent locational patterning. Those of the Late Archaic period were concentrated in locations in the Upper Three Runs Creek floodplain, while those of the Early Woodland period were concentrated at locations along the flanks of the project area's Rank 2 stream. Within each of the respective subsamples we found little in the way of interassemblage variation. Given the co-occurrence of a variety of artifact classes and generally appreciable density,

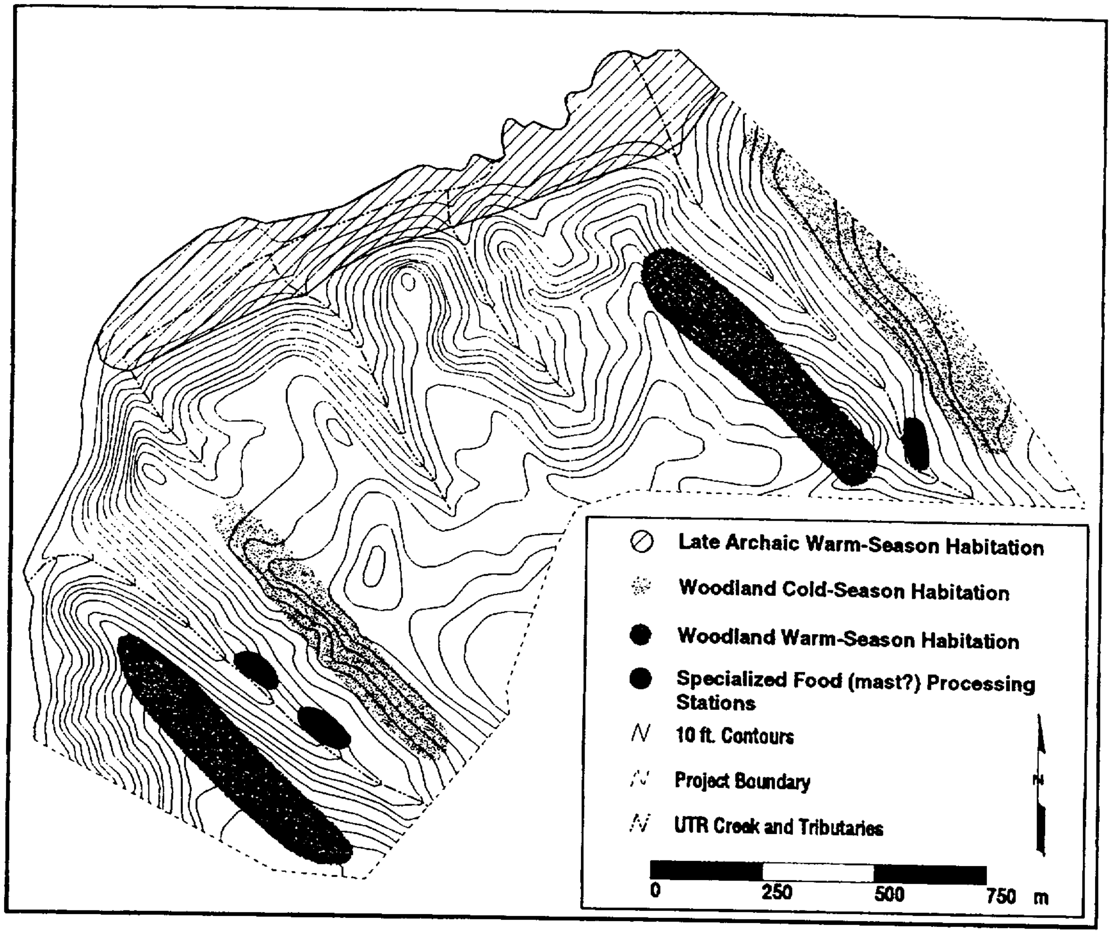

Figure 7-2. Schematic diagram of Late Archaic and Woodland period land use in E Area.

we conclude that these locations were used for habitation. The locations of other sorts of activities apart from habitation clusters were not detected.

Aside from the obvious difference in microenvironments between Late Archaic and Early Woodland habitation, other locational attributes suggest some things about seasonality (Figure 7-2). The northwest aspect of Late Archaic habitation implies warm-season occupations. Floodplain locations would be most accessible for habitation at this time of year, while winter and early spring occupations may have been prohibited due to flooding. Warm-season occupation is also implicated in the subsurface locations of Early Woodland clusters on northeast-facing slopes of the upland unit, but we also find on the opposite, southwest-facing slopes equivalent surface material. We interpret these paired clusters as evidence for perennial, albeit shifting habitation along upland streams. Equivalent cold-weather locations of Late Archaic habitation were not located in the project area. Presumably such habitations were located far outside E Area, at places such as Tinker Creek.

Our attention to solar aspect has indeed paid off in terms of seasonality inferences. It certainly improved the evidence we have for winter activities during the Early Archaic, and it appears to be a useful means of discriminating between warm- and cold-weather habitation for later periods (including later Woodland and Mississippian periods). The accuracy of our inferences about seasonal habitation must await independent evidence, however, such as interassemblage variation, architectural differences, and the like. In any event, a distributional approach has avoided the generalizations about aspect inherent to site-unit characterizations. For large sites in hilly terrain this is an especially acute problem. Such sites might have aspects spanning 180° or more. Fine-grained analysis of artifact distribution would reveal possible differences in seasonal habitation, while a site-unit study would mask such variation. Of course, such fine-grained analyses also have the potential for studies of activity patterns and site structure, typical subjects of intrasite analysis and our next topic of consideration.

Activity Differentiation

The various artifact classes that comprise presumed habitation clusters represent a wide variety of activities that take place in and around domestic contexts. Insofar as these various activities produce artifact distributions that are coterminous and overlapping with actual habitation areas (i.e., structures and related facilities such as hearths), they get conflated with habitation functions at the site-unit of analysis. Considering the long-term conflation of activity loci of diverse function, a site-unit of analysis clearly hinders analyses of land use. Detailed intrasite patterning circumvents these problems by teasing apart different activity areas, temporal components, and even aspects of assemblages that relate to off-site activities. Unfortunately, archaeological surveys do not lend themselves to intrasite analyses. They too often rely on the site concept to classify and evaluate artifact clusters within an established array of site types.

A distributional approach to survey analysis is, in a sense, a macroscopic intrasite spatial analysis. The "site" in this case is the entire E Area, and our units of analysis the artifact class. Our analysis of the locational patterning of technofunctional classes showed some marked differences in the distributions of hafted bifaces, lithic manufacturing debris, debitage, utilized flakes, and pottery. These seemingly meaningful differences are intriguing, but without better chronological control and more refined information about tool function, the significance of these differences is diminished.

One class of artifact that afforded more detailed locational analysis was debitage. Because debitage is derived from reductive technology, its cortical and size properties reflect stages in a process of tool manufacture, use, and maintenance. We restricted our analysis of these properties to samples of sufficiently large size (see Chapter 6). Thus, our study is biased towards high density debitage clusters, which, in independent analysis, proved to covary inversely with elevation, distance to water, and slope. The size and cortex data of the high density subsample showed a similar pattern of inverse correlation, this time at a microtopographic scale. What this suggests is that within high density cluster areas (i.e., traditional sites) locations at the higher elevation and farthest from water and the floodplain typically produced only small, late-stage debitage. These locations constitute the upslope portions of "sites," locations removed from concentrations of primary habitation refuse. What they also represent, we suspect, is the veneer of low density, small noncortical debitage that blankets the majority of the Aiken Plateau. Transient uses of these upslope, water-poor areas is indicated.

It is noteworthy that hafted bifaces and high density debitage clusters coincide at downslope locations near water and oriented toward Upper Three Runs floodplain. Core reduction and retooling at streamside and floodplain locations is indicated by these data. Proximity to the riverbank beds of low-grade chert and orthoquartzite may contribute to this pattern, though we note that most of the debitage and biface assemblage came from cores of high-grade Coastal Plain chert that was presumably transported into E Area from sources along the Savannah River. Also, the pattern of lithic manufacturing debris other than debitage (i.e., preforms, cores, hammerstones) does not match the hafted biface and high density debitage pattern. Much of the manufacturing assemblage lies at higher elevations and distant from water because it dates to the Early Archaic period, which, as we have shown, involves land-use patterning less affected by proximity to water. This exception exemplifies the limitations of synchronic analyses of technofunctional classes.

Distributional analysis of pottery was severely limited by a lack of technofunctional variation in vessel forms and a small sample size. Nevertheless, one interesting patterning was found in the cluster of Middle Woodland through Mississippian pottery at streamside locations along the upper reaches of the project area's two largest upland streams. In the case of the Rank 2 stream, clusters of pottery were found in features of fire-cracked rock at downslope, streamside locations. These clusters were distinct from upslope clusters of pottery and associated debris, suggesting functionally differentiated, but complementary locations of activity. The small streamside locations would often be missed by conventional survey methods because they are not only small in extent, but the shelves of flat land on which they lie are so small as to be overlooked altogether. Their role in area activities was obviously more than passing. The reuse of the Rank 2 stream location was so intensive as to create a thick concentration of rock clusters, pottery, and lithic tools and debitage. It stands to reason that the activities reflected here had much to do with the positioning of habitation area upslope. Mast processing is a likely candidate.

In a site unit of analysis, the detection of evidence for activities such as mast processing and tool manufacture that took place away from areas of habitation would depend in large measure on the intervening distribution of artifacts. This, in turn, would seem to depend not so much on the nature of activities taking place at a given time, but rather, the long-term consequences of overlapping occupations. It follows that few of the isolated tasks apart from habitation areas are evidenced at single component sites using typical survey methods. This is unfortunate because, as we noted, these very tasks may represent the chief economic pursuit of a given habitation episode, one for which site selection and duration depended heavily. A distributional approach to the residues of these tasks has helped to identify some of the spatial differentiation we normally miss in site surveys, and thus, enhanced the potential for research into labor organization and gender roles.

LIMITATIONS OF A DISTRIBUTIONAL APPROACH

In theory, a distributional or nonsite approach to archaeology is inherently appropriate, for indeed the archaeological record is continuous and all parts of the distribution have significance to studies of human land use. In practice, a distributional approach is fraught with limitations. In this section we review some of the limitations of our first attempt at distributional archaeology, and follow this with brief consideration of the problems with Eastern Woodlands applications in general.

Our first and perhaps most damaging limitation in this study is the perennial archaeological bugaboo—sampling. The E Area survey was neither a random nor fully systematic survey. The survey effort was among our most intensive, but it was biased towards landform margins. This bias was compounded by testing at locations of positive shovel tests to define site boundaries. We were compelled to do so because of federal mandates to identify and evaluate archaeological *sites*, not archaeological *distributions* or *landscapes*. We feel confident that no *site* was missed by this effort. However, we potentially missed parts of distributions, particularly those lying in the interfluvial portions of upland ridges.

To calculate the effects of our sampling bias on locational analysis, we generated 500 random points and compared these locations to our sample. We found remarkably few differences between the two samples, suggesting that analyses could still be generalized to the entire study area within the locational parameters we chose to examine. Still, we exercised due caution in interpreting seemingly nonrandom patterning in artifact location. A more reliable distributional study will depend on a completely random or systematic survey sample (see below).

Another problem lies in the limited amount of temporal control we have over artifacts classes other than hafted bifaces and pottery. This bias has differential effects on our analysis of various time periods of prehistory. As we noted repeatedly, the Early Archaic period is well-endowed with a variety of diagnostic tools and the tell-tale traces of patination. Subsequent periods are not so well off. Thus, consideration of activities involving nondiagnostic artifact residues is not time sensitive. In certain instances, little temporal variation may have existed, as in, for example, the distribution of debitage due perhaps to fixed sources of lithic raw material. But clearly other activities would have shifted drastically with changes in environment, the positioning of habitation locations, differences in group size, and assorted other factors.

A related problem lies in our limited data on functional variation within tool classes. We noted the difficulty in interpreting distributional patterns for hafted bifaces. This technological class includes functions ranging from spearpoint to arrowpoint to knife, among others. With few exceptions, we have no sound knowledge about the actual uses of particular bifaces. Use-wear analyses could be brought to bear on this, but it is expensive and time-consuming, its conclusions could not be generalized, and it would have little utility on heavily patinated chert and orthoquartzite. The data on breakage patterns presented in Chapter 4 is an additional source of functional information, one that we did not pursue in this study because of small sample sizes, but could better exploit in future studies. Our consideration of pottery was also not as sensitive to functional variation as we would like. Here the problem lies in limited data on vessels, as opposed to sherds. Without more vessel-unit data, distributional analyses in vessel function is not possible. Unfortunately, survey data do not provide the large assemblages needed to reconstruct sufficient vessel portions to get adequate samples of orifice diameters and wall profiles.

Analytical limitations extend too into the realm of locational data. Our topographic data layer for the GIS was derived from a USGS 7.5' quad sheet. The 10-ft contour interval of this source is simply too coarse-grained to provide accurate information of slope and aspect. Even small landforms in the project area go undetected on the USGS map. In one case a small ridgenose extending over the floodplain of Upper Three Runs is missing entirely. We know this not only from ground truthing the map, but from the 2-ft contour engineering maps that were made available for this project. These finer-grained maps have their problems too, but they are very detailed as regards topography. We considered digitizing these sources for this study but rejected this due to resource constraints and because our results would be incomparable to projects attempted outside the SRS. In the interest of comparability and economy, then, we have produced a less-than-realistic electronic landscape for analysis. Despite this shortcoming, the topographic layer is internally consistent and thus a valid source of relative comparisons within the project area.

As for Eastern Woodlands applications of distributional archaeology in general, the limitations should be obvious. The approach was developed for applications in the open, unvegetated terrain of the desert Southwest and Great Basin. The few applications attempted in the Eastern Woodlands have been stymied by ground cover and depositional contexts. It goes without saying that one can never recovery all of the artifacts left behind by prehistoric inhabitants, even if they were all still left in place. Our samples are but very small samples of subsurface materials. And, with all the changes in environment and culture that have taken place over the 10,000+ years of Eastern Woodlands prehistory, we have no basis for making the claims for long-term stability in land-use patterns that our desert counterparts have made. Thus, our lack of chronological control over most artifact classes is am especially acute problem. With all this going against us, is it wise to even experiment with distributional archaeology?

RECOMMENDATIONS FOR FUTURE RESEARCH AND MANAGEMENT

We trust that the insights gained from our first attempt at distributional archaeology outweigh the shortcomings of our analysis. For future applications of distributional archaeology on the SRS we recommend some adjustments to the methods we used here.

We would clearly benefit from better sampling. Ideally, our sample should be completely random, without imposed stratification of environmental zones or other criteria. This may sound impossible, but with GPS technology it is possible to locate randomly generated points on the landscape. To do, say, 1500 shovel tests in a project the size of E Area would be time consuming, but it is the only way to guarantee total randomness in where we collect subsurface data. As it stands now, with a site-unit of data collecting, we concentrate shovel tests in clusters, and hence recapitulate the site concept in distributional analysis. The downside to avoiding this bias is very small artifact samples. We would have had very little to analyze had we dug most of our shovel tests outside traditional site boundaries. Also, we would have altogether missed some of the artifact classes of our sample had we not excavated test units at most sites.

Regardless of sample parameters, distributional analyses would clearly benefit from better means of characterizing artifact form and association at locations. We used presence-absence values for basic technofunctional and culture-historic classes because they helped to circumvent some of our sampling biases and because they were simply convenient. What we did not explore at all in this study is association among artifact classes, that is, assemblage properties. Without better chronological control such analysis may be ill-advised. However, it seems counterproductive to ignore associations among classes if these associations are telling us something about the locational parameters of interdependent activities or even long-term reuse of locations. At a minimum, such information is potentially useful from a management perspective, as it could help us to better characterize the locational parameters of multicomponent sites.

As for resource management, distributional archaeology runs counter to the traditional, federally-mandated rules about resource classification and evaluation. The approach changes our focus from sites to artifacts and from point locations to landscapes. We cannot mesh the imperatives of resource management with distributional archaeology without first giving up on the site concept. Is this possible? We think so. For this project, for example, our mitigation recommendations would be to excavate small blocks at a wide range of locations, from floodplains to ridge sideslopes, and at locations with low as well as high density remains. The goal would be to capture larger samples of related activity sets, not sites. For instance, sampling the Early Archaic hunting activity set would require testing at locations of hunting camps, surveillance points, and kill spots. Sampling would thus be extensive, not intensive.

All of this is possible, but is it practical? Have we learned a sufficient amount of new information to warrant the added expense of time and money, and to ask our compliance review colleagues to abandon the site concept? On the first count it is hard to judge the actual time and money budget for this project. It coincided with the establishment of our first GIS facility, with its great start-up costs and long learning curve. As with most large projects, we also had our share of data problems to iron out. All in all this initial effort was rather costly. Future efforts will no doubt be much more timely and cost effective.

On the second count, the abandonment of the site concept, we do not recommend distributional archaeology as a panacea. Its greatest potential seems to be in the analysis of mobile hunter-gatherer archaeological records. It is the record of these prehistoric populations that all too often is dismissed as a bunch of lithic scatters. Some may feel we have reached the limits of our knowledge about their records, and that it is unreasonable to ask citizens to continue paying for data recovery at such seemingly insignificant sites. This conclusion is unjustified in our opinion. We believe that some of the limitation to knowledge of these records rests squarely on the site concept and our tendency to impose strict classificatory criteria in evaluating sites. We have been unable to recognize variation in the sorts of activities that created so-called sites because the constituent components that comprise site assemblages are not unwrapped to explore locational variation among them. Doing so enables new insight into land-use practices, including seemingly intractable things such as seasonality. From our experience in this project we suspect that distributional studies will be most rewarding in applications to hilly terrain, where aspect and slope are such critical factors in land use. However, we encourage applications in other sorts of landscapes such as coastal and riverine, where hydrological and soils factors may weigh most heavily.

Our first attempt at distributional archaeology will hopefully not be our last. The many problems with this approach in general and our application in particular will hopefully not overshadow its potential for improving both research and management of cultural resources at a time when some authoritative voices have questioned the wisdom of continuing federally-mandated resource management.