DOE/SR/15199--3

DE92 014138

ANNUAL REVIEW OF CULTURAL RESOURCE INVESTIGATIONS BY THE SAVANNAH RIVER ARCHAEOLOGICAL RESEARCH PROGRAM

FISCAL YEAR 1990

Prepared by
the staff of the

SAVANNAH RIVER
ARCHAEOLOGICAL RESEARCH PROGRAM

This report was prepared through funding provided by the United States Department of Energy under contract DE-FC09-88SR15199.

SAVANNAH RIVER ARCHAEOLOGICAL RESEARCH PROGRAM
SOUTH CAROLINA INSTITUTE OF ARCHAEOLOGY AND ANTHROPOLOGY
UNIVERSITY OF SOUTH CAROLINA

November 1990

SAVANNAH RIVER ARCHAEOLOGICAL RESEARCH PROGRAM

Staff

Mark J. Brooks	Co-Program Manager Prehistoric Archaeology Geoarchaeology
Richard D. Brooks	Co-Program Manager History Historic Archaeology
Kenneth E. Sassaman	Special Projects Archaeologist Prehistoric Archaeology
David C. Crass	Curator Historic Archaeology
George S. Lewis	Administrative/Archaeological Assistant
D. Keith Stephenson	Field and Laboratory Assistant (from June 1990)
William Green	Field and Laboratory Assistant

Graduate Students

David G. Anderson	Ph.D. Program, Department of Anthropology University of Michigan, Ann Arbor Oak Ridge Associated Universities Program Fellowship: 1988-1990
D. Keith Stephenson	M. A. Program, Department of Anthropology University of Georgia, Athens Graduate Assistantship: 1990
Ty Fuglseth	M.S. Program, Marine Science University of South Carolina, Columbia Graduate Assistantship: 1990 with Radiocarbon Laboratory, USC

MANAGEMENT SUMMARY

During Fiscal Year 1990 a Programmatic Memorandum of Agreement (PMOA) was implemented to enable the Savannah River Archaeological Research Program (SRARP) to continue working with the United States Department of Energy-Savannah River Site in a threefold mission of cultural resource management, research and public education.

Three major reports in FY90 resulted from cultural resource management activities of the SRARP. One comprises a synthesis of prehistoric archaeological investigations conducted on the SRS since 1973. These results were combined with data on historic period resources to produce an Archaeological Resource Managment Plan. This document, which includes the PMOA, specifies the extant knowledge of archaeological site distribution and significance on the SRS, details potential impacts resulting from SRS operations, and provides a predictive model for locating and evaluating these resources. The third management document contains the results of archaeological testing in the impact zone of the proposed Hazardous Waste/Mixed Waste Disposal Facility

Over 12,000 acres of land on the SRS came under cultural resources review in FY90. This activity entailed 190 records searches, 60 field surveys resulting in the recording of 25 new sites, and the mitigation of adverse effects to one prehistoric site (38AK157).

Research conducted by SRARP was reported in four journal articles and four book chapters published during FY90. SRARP staff also presented research results at three professional meetings, and participated in two workshops on the cultural resource management activities of DOE.

In the area of public education, the SRARP intensified its service activities in FY90. Volunteer excavations at the Tinker Creek site (38AK224) were resumed this year with the Augusta Archaeological Society and other avocational groups. Also provided were over two dozen public presentations and displays for museums, schools, and civic and church groups.

TABLE OF CONTENTS

INTRODUCTION

The Savannah River Archaeological Research Program (SRARP) of the South Carolina Institute of Archaeology and Anthropology, University of South Carolina, is funded through a direct contract with the United States Department of Energy to provide services required under federal law for the protection and management of archaeological resources on the Savannah River Site (SRS). Because the significance of most archaeological resources is dependent upon research potential, the SRARP is guided by research objectives. An on-going research program provides the problems, methods and means of assessing site significance within the compliance process specified by law. In addition, the SRARP maintains an active program of public education to disseminate knowledge about prehistory and history, and to enhance public awareness about historic preservation. The following report summarizes the management, research and public education activities of the SRARP during Fiscal Year 1990.

SRARP management procedures over the last year were modified through the implementation of a Programmatic Memorandum of Agreement (PMOA) among the Savannah River Operations Office, the South Carolina State Historic Preservation Officer and the Advisory Council on Historic Preservation. The PMOA supercedes prior regulations and procedures for managing archaeological resources on the SRS by streamlining the process of review as specified in 36 CFR 800 Section 106. Provided by the PMOA is a means of compiling the results of routine archaeological review into year-end summary reports. Beginning with FY91, the SRARP will be required to produce an annual review of all cultural resource activities conducted during that year. In the interest of gaining experience with the new procedure, the SRARP staff prepared this report for review under the PMOA.

Anticipating the need for standardization and accountability under the PMOA, SRARP staff drafted new planning procedures for archaeological survey and testing. Likewise, new databases were developed to accomodate the procedural changes. Because they have not been reported elsewhere, and given their relevance to the annual review of activities required under the PMOA, the new procedures and databases are described in the first section of this report. Accompanying this description are the results of FY90 Site Use, Timber Compartment and Clearcut surveys on the SRS. The results of these efforts, along with those of other compliance activities, form the basis for the type of annual review envisioned in the PMOA.

In the course of meeting compliance needs for DOE, the SRARP completed four technical reports in FY90. One of these, the *Prehistoric Synthesis*, along with the *Close Out Report for Archaeological Investigations on the Savannah River Site, South Carolina*, completed the programs obligations under contract DE-AC09-81SR10749. The *Archaeological Resource Management Plan* was also completed under that contract as well as being a partial fulfillment of the current cooperative agreement (DE-FC09-88SR15199). The PMOA is contained within the latter document. The report *Archaeological Testing at 38AK157 Savannah River Site, Aiken County South Carolina* precipitated a task order to mitigate the adverse effects from construction of the Hazardous Waste/Mixed Waste Disposal Facility. These technical reports are made available to the general public and to the professional community. Summaries of the prehistoric synthesis and testing at 38AK157 are included in this report.

Fiscal Year 1990 also marked the beginning of a program to comply with laws and regulations on the curation of archaeological materials owned by federal agencies (36CFR79). Dr. David C. Crass joined the SRARP staff in July 1990 to direct the

curation program. Dr. Crass gained experience in collections managment at Southern Methodist University in Dallas, where he recently completed his Ph.D. Dr. Crass also brings to the SRARP additional expertise in historical archaeology and database management. Details of his curation efforts to date comprise the final portion of the Cultural Resource Managment section of this report.

Research activities of the SRARP are summarized in Part II. The interface between research and compliance is exemplified in the *Prehistoric Synthesis*, a document that not only summarizes over 15 years of archaeological investigation on SRS, but also distills the work into a series of research domains that are shaping the direction of compliance activities today and into the future.

Research into the historic period occupations of the SRS were expanded in a number of directions during FY90. David C. Crass and Richard D. Brooks have developed a model of site location that accomodates a series of agricultural and economic constraints to settlement. Using data compiled for the *Historic Synthesis* of the SRS, they evaluate the model with variables relating to environment, economy, technology and social organization. The results will be incorporated into a research design for future managment of historic resources on the SRS. Crass and Brooks also initiated the Oral History Project in FY90. The project aims to gather information from past residents of the SRS who currently reside in the area, and to utilize this information to enhance our efforts at site location, evaluation and management.

Geoarchaeology comprises a major portion of the SRARP research agenda. In FY90 Mark J. Brooks continued to expand his geoarchaeological research to the greater Coastal Plain region of South Carolina. An extralocal perspective is required to understand the effects of regional and global processes on the formation and evolution of landforms on the SRS. As described in the research summaries of this report, the integration of archaeological and geological data enhances our ability to predict site locations, to interpret their contexts, and, in the long run, to more effecitvely manage the cultural resources of the SRS.

Other research of the SRARP in FY90 includes graduate student thesis and dissertation work, and extralocal projects in prehistoric archaeology. Summaries of these research projects by David G. Anderson, Kenneth E. Sassaman, William Green, and D. Keith Stephenson complete the research section of this report.

Public education activities of the SRARP are summarized in Part III. Highlighted are the results of volunteer excavations conducted on the SRS with the Augusta Archaeological Society and other avocational groups. Other involvement with school programs and Westinghouse public relations is described as well.

In sum, Fiscal Year 1990 marked a smooth transition in the operations and direction of the SRARP. Implementation of the PMOA has provided an integrated plan for compliance, research and public education that ensures not only sound management for the cultural resources of the SRS, but also opportunities to share knowledge about South Carolina's prehistory and history with the profession and public alike.

PART I. CULTURAL RESOURCE MANAGEMENT

ARCHAEOLOGICAL RESPONSE TO SR-88 SITE USE APPLICATIONS AND TO SRFS TIMBER COMPARTMENT PRESCRIPTION PLANNING

In anticipation of increased survey responsibilities under the PMOA, formal guidelines and procedures were developed in February 1990 by the SRARP staff to systematize archaeological responses to SR-88 Site Use Applications and to SRFS Timber Compartment Prescription Planning. Simultaneous with this effort came the design and implementation of new data bases to manage information pertinent to survey planning and reporting. These resources serve to formalize the process of archaeological review that has been used in the past, and to integrate new procedures developed from recent analyses of SRS archaeological data. The guidelines, procedures and databases, implemented first in March 1990, are summarized in the sections that follow.

Background

Archaeological responses to SR-88 Applications previously consisted of reviews of the existing SRS archaeological site files for information on site content, extent and integrity. In cases where archaeological sites were located within a proposed Site Use area, the historical or research significance of the site(s) was weighted against the potential impact of the Site Use activity on the site(s) to formulate a recommendation (i.e., approval, conditional approval, disapproval). In cases where information about the content, extent, and/or integrity of a recorded archaeological site was lacking, a field inspection of the site was initiated to collect such information. In cases where the proposed Site Use area was not previously surveyed, a field reconnaissance was usually initiated. The decision to undertake additional fieldwork was based upon a combination of the potential of a particular Site Use activity to adversely affect archaeological resources and the potential of a particular Site Use area to contain significant archaeological resources. Until now, the criteria for making these decisions have not been made explicit nor have they been incorporated into a systematic and replicable decision-making process.

Archaeological policy on SRFS notification of timber compartment prescription planning has until now been largely an avoidance strategy. Timber compartment maps were used to plot the location of recorded archaeological sites. Recommendations for site avoidance were attached to sites with known or presumed historic or research significance. These sites were then usually flagged by SRARP staff for avoidance. Fieldwork was not routinely done to collect additional information about the significance of flagged sites nor to survey compartments for additional archaeological sites.

Based upon the compilation of archaeological and management information in two recent documents by the SRARP (*Prehistoric Synthesis* [Sassaman et al. 1989] and *Archaeological Resource Management Plan [SRARP 1989]*), we developed a formalized decision-making process for determining archaeological response to SR-88 Site Use applications and to USFS prescription planning. The process outlined below improves the efficiency and effectiveness of archaeological input to the planning process of the SRS Site Use system, while also making the criteria of archaeological decisions explicit and replicable.

SRARP Archaeological Response Process

SR-88 Site Use Applications

SR-88 Site Use Applications are issued by DOE to SRARP, among other involved parties, for review of proposed land-use activities on the SRS. Such activities range from the spraying of an area for insect control to large-scale construction projects. Reviewers are given a maximum of 15 calendar days to reply. This period of time is usually sufficient when small Site Use areas are involved; in the case of larger areas, the SRARP will usually respond with a "Conditional Approval" which makes a preliminary assessment of the potential for archaeological resources and provides a plan for implementing fieldwork to locate and evaluate resources.

The decision-making process for archaeological responses to Site Use proposals is organized as a chain of sequential decisions (D1...Dn), with alternative solutions (A1...An) and contingency factors (C1...Cn). A flowchart of the decision-making process accompanies the descriptions below (Figure 1).

D1. Assess potential effect of proposed Site Use activity on archaeological resources.

A1. No potential for adverse effect on archaeological resources, regardless of type of resource (Go to D7).

A2. Potential for adverse effect on archaeological resources:

C1. Depending on type of archaeological resource (Go to D7).

C2. Regardless of type of archaeological resource (Go to D2).

D2. Consult map of archaeological sites for existence of recorded sites.

A1. No recorded archaeological site(s) are located in proposed Site Use area (Go to D3).

A2. Recorded archaeological site(s) are located in proposed Site Use area:

C1. Information on content, extent and integrity complete (Go to D5).

C2. Information on content, extent and integrity incomplete (Go to D4).

D3. Consult 1951 aerial photographs for existence of standing historic structure(s) not previously recorded as archaeological site(s).

A1. Standing historic structure(s) observed (Go to D4).

A2. No evidence for standing historic structure(s) (Go to D5).

D4. Implement field work at existing site(s) to collect information on content, extent and/or integrity.

C1. If surface visibility is greater than 25 percent (Sassaman et al. 1989:220), a combination of surface collection and controlled tests excavation is adequate (Go to D5).

C2. If surface visibility is less than 26 percent (Sassaman et al. 1989:220), a combination of shovel testing and controlled test excavation is required (Go to D5).

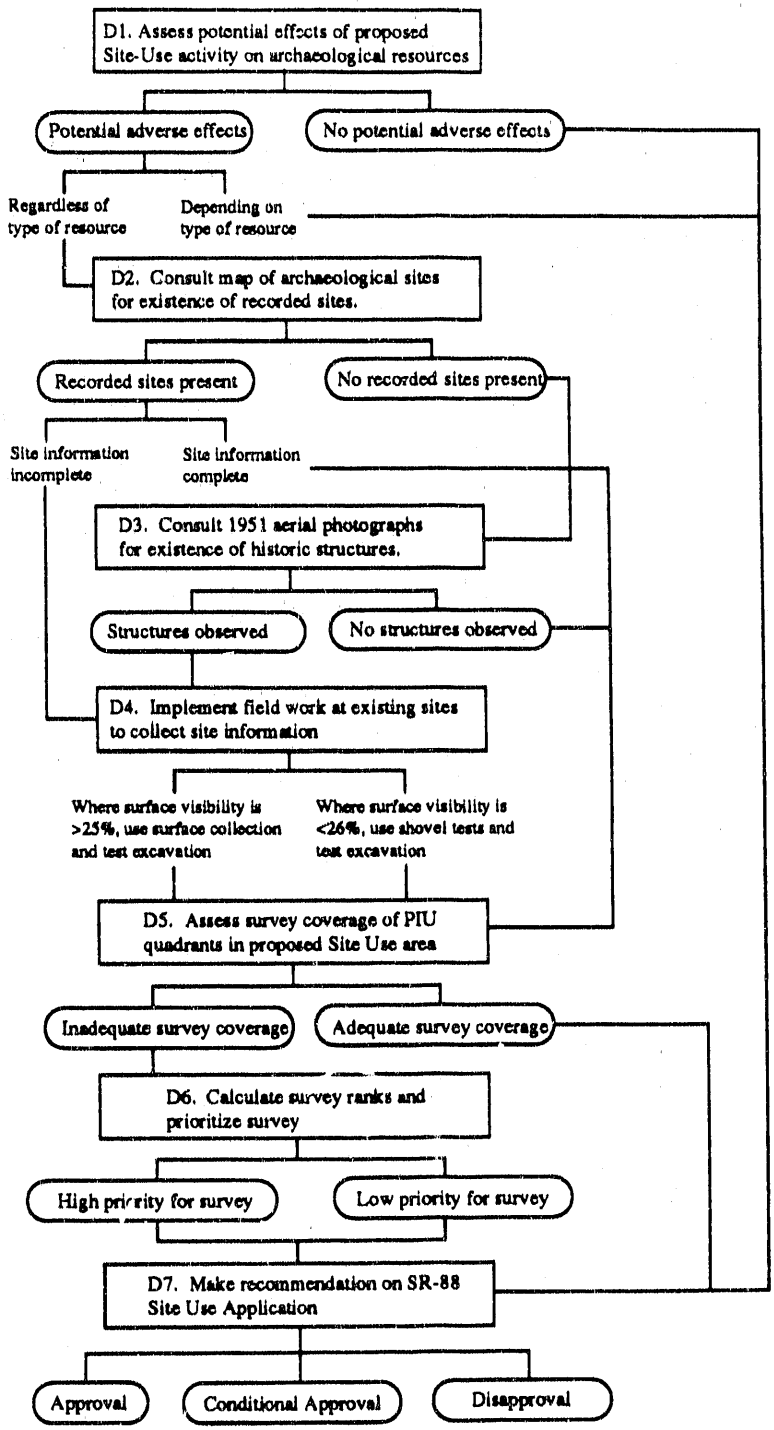

Figure 1. Flowchart of the decision-making process for archaeological response.

D5. Assess survey coverage of PIU quadrants[1] within proposed Site Use area.

A1. Adequate survey coverage of all PIU quadrants (i.e., *Clear Cut, Special Survey*) (Go to D7).

A2. Inadequate survey coverage of all or some of the PIU quadrants (i.e., *Random, Purposive, Transect, Not Surveyed*) (Go to D6).

D6. Calculate survey priority ranking based on Sensitivity Zones[2], areal ratios of PIU quadrants and type of previous survey.

A1. High priority survey ranks requiring additional survey (Go to D7).

A2. Low priority survey ranks not requiring additional survey (Go to D7).

D7. Make recommendation on SR-88 Site Use Application.

A1. Approve Site Use Application.

C1. Because there is no potential for adverse affect to archaeological resources, regardless of type of resource present, if any, or...

C2. Because PIU quadrants in proposed Site Use area have received adequate archaeological survey and no archaeological resources are known to exist in the area, or...

C3. Because PIU quadrants in proposed Site Use area have received adequate archaeological survey and archaeological resources in the area lack the historic or research potential to warrant preservation.

A2. Conditionally approve Site Use Application.

C1. Because archaeological site(s) in the proposed Site Use area have not been adequately tested to determine the content, extent and integrity of the resource(s), (SRARP has implemented Step D4), or...

C2. Because PIU quadrants of the proposed Site Use area have not been adequately surveyed and include areas characterized by great potential for archaeological resources (Sensitivity Zones I and II [SRARP 1989]), (SRARP has implemented Steps D5-D6), or...

C3. Because archaeological resources with historic or research significance are within the proposed Site Use area and will require means to mitigate the adverse effects of Site Use activity on the resources, or...

C4. Because archaeological resources with historic or research significance are located in the vicinity of the proposed Site Use area and may be subjected to indirect adverse effects and therefore require mitigative measures, or....

C5. Because knowledge of the potential impacts of the proposed Site Use activity is inadequate to make a final recommendation.

---

[1] Patrol Index Units (PIUs) are 4000x4000 ft squares within a SRS-wide grid that is used for a variety of purposes by DOE and its contractors. The 40 percent stratified random survey of the SRS employed quadrants of PIUs (2000x2000 ft units) as baseline sampling strata (Sassaman et al. 198[illegible]9-76). Because the vast majority of survey on the SRS was organized and documented by PIU quadrants, the SRARP will maintain the use of PIU quadrants until a GIS system is developed and implemented for archaeological purposes

[2] Sensitivity Zones are predictive boundaries for prehistoric archaeological sites based on statistical patterns in the location of sites recorded through 1988. The site locational data are summarized in Sassaman et al. (1989:195-280), while the rationale and methods for producing Sensitivity Zones can be found in the Archaeological Resource Management Plan of the SRS (SRARP 1989).

A3. Disapprove Site Use Application.

C1. Because archaeological resources with historic and/or research significance are within the proposed Site Use area and none of the contingencies of a Conditional Approval will assure preservation of the resources.

SRFS Timber Compartment Prescription Planning

The SRARP enters into Timber Compartment Prescription Planning when staff of the SRFS request information on the location and significance of archaeological resources in specific timber compartments of the SRS. The process for requesting information is informal, generally consisting of a simple request to mark timber compartment maps with known sites and specify which sites, if any, need to be avoided. This level of consultation is preliminary and is followed by an SR-88 Site Use application when implementation of the final timber compartment prescription is pending.

The process for commenting on timber compartment prescription plans is essentially the same as the SR-88 process and need not be repeated here. It should be noted, however, that the only SRFS activities considered to routinely have adverse effects on archaeological resources are clearcutting, site preparation, log loading, and logging road construction. Stands prescribed for clearcutting and replanting are thus the only tracts within compartments that are subjected to the full decision-making process as outlined above. Also note that most stands slated for clearcutting will be difficult to survey because of poor surface visibility. These stands need to be shovel tested and then resurveyed after clearcutting and/or site preparation to check for additional resources. The resurvey information will be used in future assessments of our survey techniques in wooded areas.

Collecting Data for Archaeological Response to SRS Site Use Applications

In this section, specific procedures are described for collecting data for archaeological responses to SRS Site Use Applications. Data collection entails two distinct levels of investigation. At the planning stage, information from SRS site files, survey files and predictive models (SRARP 1989) are combined to determine if fieldwork needs to be done, and if so, how that work is prioritized. Data collection secondly involves the actual survey and testing of Site Use areas, as well as revisits to recorded sites to better define site boundaries, content and integrity.

SRARP Databases

Five databases are currently involved in the curation of archaeological information on the SRS. The chief database consists of site files. Hard copies of SCIAA site files are curated at the SRARP by county and site number. SRARP does not maintain a computerized version of these files, *per se*, but there are a number of computer databases that duplicate portions of the SCIAA site files, and also contain additional information about sites. The oldest computer database is a Filemaker Plus document called *Survey Database fm*. The file is organized by site and contains information on location, UTMs, environmental context, components present, site size, and visitation. Much of the information in this file is obsolete, and because it has been superseded by other databases, it is no longer useful. In the course of preparing the prehistoric synthesis of the SRS (Sassaman et al. 1989), a number of Excel databases were created to store information on site testing, location, and component content. Two of these files, *SYN-Site Testing* and

SYN-Component Location, contain all the updated information that is needed to formulate responses to SRS Site Use applications.

The second relevant database is the PIU quadrant record. This database is in the process of growth and refinement and will ultimately be the database upon which a *space-oriented* file (GIS) will be based. Currently the information is in an Excel document called *PIU-Q Survey Values*. The file is organized by PIU quadrant and contains codes for survey strata, type of survey, and sites present.

The third database is an Excel file entitled *Site Use Response*. This file is organized by responses to SR-88 Applications and timber prescription planning, and is subdivided by PIU quadrants. In conjunction with this file, a hard copy map of site locations and Zones of Archaeological Sensitivity is used to assess the resource content and archaeological potential of Site Use areas.

The fourth database has recently been added to the SRARP files to accommodate information about survey loci, as opposed to sites. This Excel file, entitled, *Survey Loci Record*, is organized by project and contains data on the types of activities that take place at each survey locus (surface collection, shovel testing, etc.), the number and depths of any subsurface tests, and, if applicable, site numbers. The value of this file is that it provides a compete record of all survey activities, including those which do not locate archaeological remains.

The final database is the Automated Site Use System. Essentially, this database is an electronic version of SR-88 Applications. It is organized by Site Use Application number and contains information on location, schedule dates, type of activity, parties involved, type of approval, and conditions. SRARP's version of the database (the Savannah River Operations Office maintains their own version) is a Filemaker Plus document entitled *ASUS fm 7/8/88*. Hard copies of each Site Use Application are also curated by the SRARP.

With reference to these databases, the steps outlined below are used to obtain empirical and hypothetical information about a particular Site Use area. The process of inputting new information into these databases is the subject of a later section.

Procedural Steps

(1) The process of archaeological response begins with receipt of SR-88 Site Use Applications or Timber Compartment Prescription Planning Maps. Managers of the SRARP screen all applications to determine whether or not land alteration is proposed. Applications not involving land alteration are approved (sometimes conditionally), and all others are subjected to detailed archaeological review. With regard to prescription planning maps, all stands earmarked for clearcutting and reforestation are treated as Site Use areas involving land alteration.

(2) As a first step in the review of Site Use Applications involving land alteration, the maps depicting Site Use locations are xeroxed onto transparencies. The Site Use Grid Maps (SUGM) included with each Site Use Application can be xeroxed at full scale, but timber compartment maps usually need to be reduced to the scale of SUGMs[3] (1:36,000).

[3]Site Use Grid Maps (SUGMs) are relatively large-scale maps used to locate Site Use activities in SR-88 applications. Each SUGM is a square consisting of 25 Patrol Index Units.

(3) The transparency is next placed over the master copy of the Sensitivity Zone/Site map to locate any recorded sites in the Site Use (or timber compartment) area. A list of the sites by PIU quadrant is drawn-up. The Site Definition code (solid triangle=adequate site definition; open triangle=inadequate site definition) is recorded for each site. Note that the Site Definition codes are based on the representativeness of prehistoric assemblage samples with regard to assemblage density, diversity and components present. Checks of the *SYN-Site Testing* file and perhaps the hard copy site files are made to determine whether or not each recorded site has been adequately defined in terms of site boundaries and integrity, and to review information on historic components. All sites lacking *bona fide* site boundary maps and assessments of integrity (preservation condition) are considered "inadequately defined" and therefore require additional fieldwork (see below).

(4) The Site Use area in question is superimposed over the 1951 aerial photos of the SRS to check for standing historic structures.

(5) The areal proportions are calculated for each of the PIU quadrants in the Site Use area in question. This is done with a dot planimeter gridded by PIU quadrants. First, the planimeter is placed over the Site Use transparency on the master map, aligning the planimeter grid with the SUGM boundaries. A list of all PIU quadrants within the Site Use area is drawn up and the percentage of each PIU quadrant contained therein is calculated by counting the number of dots in the bounded area (1-25) and multiplying this number by 4 (e.g., 12 out of 25 dots in a PIU quadrant are contained in the Site Use area; 12x4=48, so 48% of the PIU quadrant is in the Site Use area). These values are used to weight the Sensitivity Zone values for PIU quadrants.

(6) The Sensitivity Zone Values for each PIU quadrant are calculated next. Again using the dot planimeter, the number of dots is counted in each of the Sensitivity Zone areas of PIU quadrants of the bounded Site Use area. From these counts the proportions of Sensitivity Zones present are determined(e.g., out of 12 dots, 4 are in Sensitivity Zone I and 8 are in Sensitivity Zone II; thus, 33% of the area consists of Zone I and 67% consists of Zone II). (Areas labeled Sensitivity Zone Ø are bottomland swamps that generally have not and can not be surveyed with routine survey methods).

(7) For each of the PIU quadrants we record the survey code listed in the *PIU-Q Survey Values* Excel file. The possible values are *Not Surveyed (NS), Clear Cut (CC), Special Project (SP), Purposive (PU), Transect (TR), Random (RA), and Excluded Area (EA).* Excluded Area consists of PIU quadrants that contain reactors, waste disposal facility and other buildings, and other areas that either cannot be surveyed, or have been largely modified by recent construction.

(8) Finally, the matrix of data values for PIU quadrants is used to calculate survey rank values. These values are indices which combine information about level of survey intensity, weighted Sensitivity Zone values, and proportions of PIU quadrants, to rank PIU quadrants for survey purposes. A hypothetical data matrix is provided below.

The weighted Sensitivity Zone values for each PIU quadrant is calculated by multiplying the ratio of each zonal area by the zonal rank value, and then summing the products. The rank values used are equivalent to the Roman numeral values: Sensitivity Zone I=1, Zone II=2, and Zone III=3. As an example, Sensitivity Zones in PIU quadrant H11SW consists of 0.90 (90%) Zone I and 0.10 (10%) Zone II. Multiplying these ratios by the zonal values, we get .90 (0.90*1) and .20 (0.10*2), and summing the products we arrive at a weighted zonal value of 1.10.

PIU Quad	Ratio of PIU Q area in Site Use	Ratio of area ranked SZ I	Ratio of area ranked SZ II	Ratio of area ranked SZ III	Survey Code
G11NE	0.48	1.00	0.00	0.00	NS
G11SE	0.88	0.90	0.10	0.00	RA
H11NW	1.00	0.80	0.20	0.00	RA
H11SW	0.95	0.90	0.10	0.00	NS
H11NE	1.00	0.05	0.63	0.32	CC
H11SE	0.90	0.24	0.53	0.33	NS
I12SW	0.75	0.00	0.32	0.68	TR

Next, the weighted areal value is calculated by dividing the ratio of PIU quadrant area into the weighted zonal value. Continuing with the example of H11SW, the ratio of PIU quadrant area is 0.95 (95%) and the weighted zonal value is 1.10; dividing 1.10 by 0.95 we arrive at a weighted areal value of 1.15.

The Survey Rank is then computed by multiplying the weighted areal value by the survey value using the following survey values:

Not Surveyed = 0.25
Transect = 0.50
Purposive=0.75
Random=0.75
Special Project=1.00
Clear Cut=1.00
Excluded Area=1.00

The complete formula for calculating Survey Rank is given below:

$$\text{Survey Rank} = (\sum(Z^{a}_{(1..n)} * Z^{v}_{(1..n)})/Q^{a}) * S^{v}$$

where: Z^{a} equals the zonal area ratio of Sensitivity Zone 1...n.
Z^{v} equals the zonal values of Sensitivity Zone 1...n.
Q^{a} equals the PIU quadrant area ratio
S^{v} equals the survey value

Solving for this equation, the survey ranks of the hypothetical data matrix are given below along with values for each of the components of the equation:

PIU Quad	$\sum(Z^{a}(1..n)*Z^{v}(1..n))$	Q^{a}	S^{v}	Survey Rank
G11NE	1.00	0.48	0.25	0.52
G11SE	1.10	0.88	0.75	0.94
H11NW	1.20	1.00	0.75	0.90
H11SW	1.10	0.95	0.25	0.29
H11NE	2.27	1.00	1.00	2.27
H11SE	2.29	0.90	0.25	0.66
I12SW	2.68	0.75	0.50	1.79

Ordering the survey rank values from small to large, the priority of PIU quadrant survey would be H11SW, G11NE, H11SE, H11NW, G11SE, I12SW, H11NE. Survey rank values below 1.00 account for all quadrants not surveyed before, and random survey quadrants which include large portions of Zone I. Within the unsurveyed quadrants, the

ranking is attributed to differences in quadrant area and weighted sensitivity values, with the highest priority going to the largest and most sensitive quadrant (H11SW), followed by a smaller, yet highly sensitive quadrant (G11NE), and finally a large but less sensitive quadrant (H11SE).

Collecting Data in the Field

Fieldwork often requires both survey for new sites and the testing of previously recorded sites. Top priority for fieldwork goes to testing at previously recorded sites to obtain information on extent, content and integrity.

Testing Previously Recorded Sites. Many of the recorded sites on file have never been tested to determine site boundaries. Adequate definition of boundaries requires complete or representative surface collection in cases where exposure is greater than 25 percent. With the exception of deeply buried sites lacking a shallow subsurface component, surface collection in well-exposed areas is an effective method of defining site boundaries.

Usually a site map will be found in the site file, but in many cases these are crude, poorly detailed and in need of revision. In these cases a new map is drawn that incorporates existing information along with new information. Old maps are retained as part of the site file record.

In cases where surface exposure is limited (<26 percent), site boundaries are defined through shovel testing. Shovel tests are 30x30 cm in size, at least 80 cm deep (depending on local soil conditions), and all fill is passed through 1/4 inch mesh. A cruciform test pattern with a maximum 10 m test interval is usually employed, although local conditions at a site sometimes require modified · ersions of a cruciform pattern. Each of the four test lines of the cruciform is terminated with the excavation of two negative shovel tests or at the natural boundaries of the landform (e.g., stream, terrace edge). The SRARP Shovel Test Form is used to record the location, content and depth of each test.

Once boundaries are established, the content and integrity of a site is assessed. Most information on site content (i.e., components present, artifact density, and assemblage diversity) can be obtained from surface collections of surface exposures greater than 25 percent, but a controlled excavation unit is required to determine the depth of archaeological deposits and assess the site's integrity or preservation. Controlled test excavation is both time-consuming and labor-intensive, but a site's significance cannot usually be assessed without it. Several tests are required at large sites to define intrasite variation in depth and integrity. At a minimum, however, a 1x2 m test unit is required at every site that needs to be evaluated for significance. Controlled level excavation, 1/4 inch mesh screening of all fill, and profile drawings and photos are routine. SRARP level forms are used to make observations about level provenience, content and context, and to record plan drawings on the back. Detailed profile drawings of at least one wall of each unit is made on metric graph paper and includes depths, Munsell colors, sediment descriptions, soil horizons, disturbances and other pertinent archaeostratigraphic data.

Surveying for New Sites. When the results of a file check indicate that one or more PIU quadrants in a Site Use area have not been previously surveyed or were not adequately surveyed, a reconnaissance survey is initiated.

The selection of PIU quadrants for survey and the order in which they are surveyed are determined by the mathematical process for coding survey ranks described earlier.

Normally, Site Use areas are small enough to permit reconnaissance of all PIU quadrants that were inadequately surveyed or not previously surveyed. However, when a Site Use area entails several PIU quadrants, or when several Site Use Applications have to be reviewed simultaneously, reconnaissance survey of all PIU quadrants in question should be prioritized by Survey Rank (quadrants with low values being surveyed first).

Survey begins with a walk-over of all surface exposures: rights-of way, clear cuts, borrow pits, fire breaks, and other disturbances. Beyond this, shovel testing in areas with poor surface visibility (<26 percent) is required to locate archaeological resources. The placement and density of shovel tests are factors that cannot be standardized. In general, wooded areas within PIU quads that are relatively level are targeted for judgmental shovel testing. This basically means that locations thought to be adequate for human habitation are tested. Variables important to long-term human habitation, namely, access to water and appreciable bottomland, have already been factored into the Sensitivity Zone criteria and are reflected in the priority of Survey Ranks. Shovel testing at 30 m intervals along transects is employed in Site Use areas containing large, linear expanses of sensitive area (e.g., terrace edges). Similar methods are occasionally used in low sensitivity areas as a check against the generalized locational data upon which Sensitivity Zones were based.

Once archaeological materials are located, a new site number is obtained, and the process of site testing is initiated.

Testing New Sites. Testing to define the boundaries, content and integrity of new sites is similar to the methods described above for previously recorded sites, except that, of course, the entire process must be done. All new sites are thoroughly collected and/or tested for boundaries, depth, a representative assemblage sample, and an assessment of site condition or integrity. A SCIAA site form which includes a detailed site map is completed and filed.

The Disposition of Collected Information

New information is collected in the process of reviewing site file and predictive data, and especially when site testing and survey are conducted. The final disposition of this information is the subject of this section.

Site Files Input

SCIAA Site Files. Any revisit to and additional fieldwork at a recorded site requires an update of the SCIAA site form. The present policy is to add information to the existing form when space permits. New forms are added to the file, however, when a revision of a site map or other types of obtrusive information threatens to obfuscate the original form. The existing forms, maps and other information are retained and curated as part of the permanent site file record.

Computerized Site Files. The computerized versions of site data (*SYN-Site Testing* and *SYN-Component Location*) are updated as new site data and changes in old site data are generated.

Survey Response Input

Site Use Response File. The Excel file entitled *Site Use Response* is designed as an interactive file that processes inputted data on Sensitivity Zones, quadrant areas and

survey status to generate Survey Ranks. Accordingly, the field archaeologist is provided an analysis template for each project to record the pertinent information. This is inputted into the computer and returned to the field archaeologist with Survey Ranks. This output is then used to record information about the type of response that was enacted.

In addition, information on field survey of any kind is inputted into the Excel file entitled *Survey Loci Record*. This file includes data on size and location of specific survey loci (e.g., clearcut, road, firebreak) and the results of work in those loci. The location of each locus for a given project or site is recorded on project or site maps and filed with the appropriate Site Use or Timber Compartment folder.

The Sensitivity Zones and Site Map. As sites are revisited and tested to obtain data on extent, content and/or integrity, the site definition codes on the master Sensitivity Zone/Site Map are changed from open triangles to solid triangles. Also, all new sites are added to the map and coded for site definition.

ASUS Input

ASUS updates are completed on a regular basis as Site Use Applications and final DOE notifications arrive.

Other Recording and Reporting Procedures

Finally, policies and procedures for laboratory analysis of archaeological materials have remained generally constant over the course of the last decade, and there is little reason to change them now. Until such time that a GIS system is designed for SRARP use, an artifact assemblage database is extraneous to the needs of the archaeological response process outlined here. Laboratory analyses for routine Site Use responses involving surface collections and the recovery of limited subsurface tests need only provide basic assemblage information (i.e., itemized diagnostics and counts/weights of other items by general artifact type). In these cases, catalog sheets listing provenience information, artifact counts and basic descriptions are completed and filed with the SRARP (hard copy) site files.

Larger projects requiring more extensive site testing entail a detailed report of field and laboratory methods and results. These reports include detailed specialized analyses (e.g., debitage size) and data appendices that supersede the types of information contained in site files. While the raw data sheets employed in special analyses may be included in the site files, the report itself serves as the most complete and accessible record of the investigation because said data are included.

Results of FY 1990 Site Use, Timber Compartment and Clearcut Surveys

The procedures and databases described above were designed in February 1990 and implemented in March 1990. Thus, Site Use and Timber Compartment responses prior to March 1990 were completed under old procedures that lacked the objectivity and replicability of the new procedures. Nevertheless, SRARP staff computerized survey activities prior to March 1990 for the purposes of this report.

Clearcut surveys were initiated in January 1990 to improve survey recovery from timber compartment stands. Previously, clearcuts were not systematically surveyed, although they were sometimes included as part of the 40 percent stratified sampling of the SRS (Sassaman et al. 1989). To catch up with the backlog of unsurveyed clearcuts,

all stands slated for cutting from the last five years of timber compartment prescriptions were earmarked for survey in 1990. Clearcutting and/or site preparation for 105 of the 143 stands had not been completed as of March 1990. The remaining 38 stands were completely walked-over. The results of this effort are reported below in conjunction with Timber Compartment and Site-Use surveys.

Survey Coverage

A total of 190 tracts of land comprising 12,486 acres was brought into archaeological review during FY90 (Table 1). Among these are 13 of the 73 SR-88 Site-Use Applications issued in FY90. SRARP staff screened each of the 73 applications for proposed land-alteration, and found that 13 required detailed review of existing archaeological documentation. Based on these reviews, field survey was conducted to evaluate existing sites and to search for new sites at eight of the 13 locations. The surveyed tracts comprised 87 percent (397 acres) of land threatened by proposed Site-Use activities.

Thirty-four stands in 6 timber compartments were subjected to archaeological review in FY90. Fourteen of these stands, or 713 acres, were actually surveyed during this period. The surveyed stands comprise 32 percent of the total acreage reviewed archaeologically.

One-hundred forty-three stands comprising 9,802 acres were reviewed for clearcut survey. As indicated earlier, 143 of these stands had not yet been cut as of March 1990. Accordingly, these stands are scheduled for archaeological survey over the next few years as cutting and site preparation are completed. No further consideration is given to these stands in this report. A total of 38 stands comprising 2.172 acres was cut over the course of the last two years, enabling survey in each of these by SRARP staff.
The selection of tracts/stands for survey was made on the basis of previous survey and archaeological sensitivity. As depicted in Figure 2, surveyed parcels have smaller mean weighted survey value than non-surveyed parcels. Survey values range from 0.25 (not previously surveyed) to 1.00 (intensively surveyed) and are weighted by the proportions of PIU Quads comprising each tract/stand. The difference in mean values between surveyed and non-surveyed stands among timber compartments is not appreciable, while the difference among Site-Use tracts is marked.

With regard to archaeological sensitivity, surveyed timber compartment stands have lower mean weighted value than non-surveyed stands (Figure 3). The value for surveyed Site-Use tracts is actually higher than the value for non-surveyed tracts, although in either case the values are high and thus indicative of limited archaeological sensitivity.

Table 1. Number of Tracts/Stands and Acres Reviewed and Surveyed in FY90 by Type of Project.

	RECORDS REVIEW		FIELD SURVEY	
	Tracts/Stands	Acres	Tracts/Stands	Acres
Site-Use	13	458	8	397
Timber Compartments	34	2,226	14	713
Clearcut	143	9,802	38	2,172
TOTAL	190	12,486	60	3,282

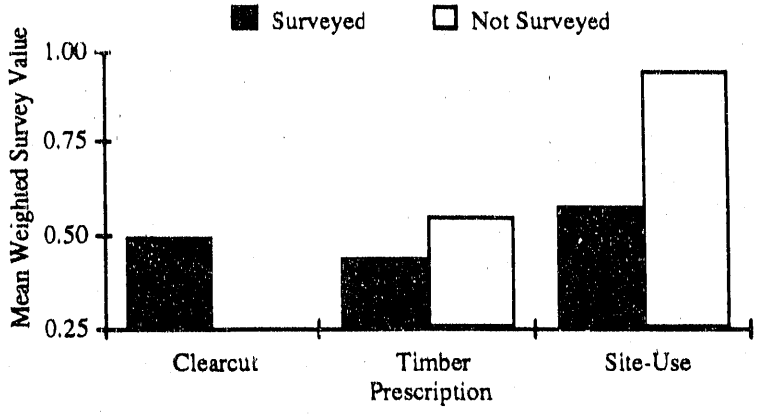

Figure 2. Mean weighted survey values by survey type for surveyed and non-surveyed parcels.

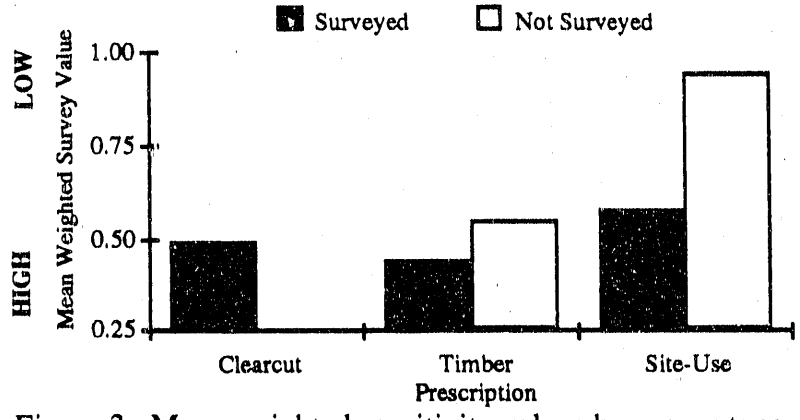

Figure 3. Mean weighted sensitivity values by survey type for surveyed and non-surveyed parcels.

In sum, all stands that were clearcut over the last five years were surveyed in FY90; stands not yet clearcut will be surveyed over the next few years. Timber compartment prescription surveys were limited in FY90, so our efforts focused on the most sensitive stands and stands lacking previous survey. Site-Use surveys were relatively comprehensive; a few parcels that were previously surveyed and/or had limited archaeological potential were not surveyed. Overall, Site-Use parcels had limited potential for prehistoric sites. Most of our Site-Use survey efforts were therefore aimed at locating and defining historic period sites that were observed on 1951 aerial photographs of the SRS area.

Survey Results

Twenty-five new archaeological sites were located and recorded in FY90 survey projects. In addition, 15 existing sites within survey tract boundaries were revisited to update site file records. A tabulation of existing and new sites by project type is provided in Table 2. Summary data on new sites are provided in Table 3. Testing at sites 38BR650 and 38BR651 was not completed at the time of this writing, so data on these sites are not included in Table 3, nor are they considered in the discussions which follow.

Table 2. Tabulation of Existing Sites and New Sites by Survey Project Type, FY90.

	EXISTING SITES		NEW SITES	
	Prehistoric	Historic	Prehistoric	Historic
Site-Use	38AK157	38AK73		38AK650
				38AK651
Timber Compartments	38AK158	38AK273	38BR640	38BR647
	38AK159	*38AK280	38BR641	38BR652
	38AK281	*38AK339	38BR643	
	38BR32	38BR416	38BR644	
	38BR349		38BR648	
	38BR415		38BR649	
	38BR479			
Clearcut	38AK69	*38AK293	38AK441	38AK332
	38AK220	*38BR202	38AK443	38AK336
	38AK221		38BR636	38AK437
	38BR69		38BR638	38AK438
	38BR70		38BR639	38AK439
	38BR99			38AK440
	38BR408			38AK444
	38BR530			38BR634
	38BR580			38BR635
	38BR611			38BR637
TOTAL	18	7	11	14

*Historic site with prehistoric component.
Underscored site numbers denote site revisits.
Existing sites not underscored had adequate documentation and were therefore not revisited.

The occurrence of sites, existing and new, varies to some extent with the size of survey tracts and archaeological sensitivity. Survey methods and land-use also affected the return on survey efforts.

With regard to survey parcel size, mean acreage increases mildly with number of existing sites (Figure 4). Except for the single occurrence of three sites in a parcel, the relationship between acreage and return is more apparent among new sites found in FY90. The reason for this difference seems to be the recording of 20th century home sites. These were not systematically recorded as archaeological sites prior to 1989. Our efforts at reviewing aerial photographs to locate late historic sites have been successful, and we are now recording many more sites in areas that otherwise have little archaeological potential. Because late historic home sites are distributed widely (perhaps evenly) across the SRS, a strong positive relationship between parcel size and site counts is expected. This is particularly true of interriverine, upland parcels that lack other types of archaeological resources.

The relationship between site counts and mean weighted sensitivity values (Figure 5) is inverse for new prehistoric sites. This corroborates the SRS-wide patterns used to construct sensitivity zones (SRARP 1989). The relationship for all new sites is less predictable, largely due to the inclusion of late historic sites. Twentieth century home sites are scattered across upland areas having low prehistoric site potential (i.e., Zone 3), and the relatively high mean values for parcels yielding two sites each reflect this tendency for upland historic occupancy (Figure 5).

Table 3. Data on the Extent, Depth, and Content of Sites Located in FY90 Surveys.

Site	Type	Max. Size(m)	Max. Depth (cm BS)	Survey Methods	Surface Visibility	Components
38AK332	Historic	150x350	Unk.	Surface Recon.	76-100%	20th century
38AK336	Historic	25x25	Unk.	Surface Recon.	51-75%	20th century
38AK437	Historic	50x50	Unk.	Surface Recon.	76-100%	19th-20th centuries
38AK438	Historic	25x50	Unk.	Surface Recon.	51-75%	19th-20th centuries
38AK439	Historic	25x75	Unk.	Surface Recon.	26-50%	20th century
38AK440	Historic	25x50	Unk.	Surface Recon.	76-100%	19th-20th centuries
38AK441	Prehistoric	75x100	Unk.	Surface Recon.	76-100%	LA, MW, LW
38AK443	Prehistoric	100x100	Unk.	Surface Recon.	1-25%	EA, MA, Unk. Hist.
38AK444	Historic	50x100	Unk.	Surface Recon.	76-100%	20th century
38BR634	Historic	30x50	Unk.	Surface Recon.	51-75%	20th century
38BR635	Historic	50x75	Unk.	Surface Recon.	51-75%	20th century
38BR636	Prehistoric	50x75	Unk.	Surface Recon.	51-75%	MW, Unk. Preh.
38BR637	Historic	25x25	Unk.	Surface Recon.	51-75%	20th century
38BR638	Prehistoric	50x100	Unk.	Surface Recon.	76-100%	MW, Unk. Preh.
38BR639	Prehistoric	100x150	Unk.	Surface Recon.	76-100%	MW, Unk. Preh.
38BR640	Prehistoric	20x20	55	STP, Test Unit	0%	MW, Unk. Preh.
38BR641	Prehistoric	20x30	60	STP	0%	Unk. Prehistoric
38BR643	Prehistoric	Unk.	40	STP	0%	Unk. Prehistoric
38BR644	Prehistoric	80x220	50	Surf., STP, TU	1-25%	EA, Unk. Preh.
38BR647	Historic	120x160	20	Surf., STP, TU	1-25%	20th century
38BR648	Prehistoric	40x80	65	STP, Test Unit	0%	MW, LW, Unk. Preh.
38BR649	Prehistoric	50x60	50	STP, Test Unit	0%	EA, MA, EW
38BR652	Historic	80x100	Unk.	Surface Recon.	1-25%	20th century

Surface Recon. - Surface Reconnaissance
STP - Shovel Test Pits
TU - Test Unit (1x2 m)
Unk. - Unknown
EA - Early Archaic
MA - Middle Archaic
LA - Late Archaic
EW - Early Woodland
MW - Middle Woodland
LW - Late Woodland

With regard to land-use, we should expect a greater success rate in clearcut surveys than in surveys of wooded parcels. Surface visibility in most of the clearcuts was excellent, while good visibility in wooded stands was limited to roads, hog rooting holes and firebreaks. Nevertheless, subsurface techniques of testing wooded stands were often successful at locating buried prehistoric sites that probably would not have been visible on the surface of clearcuts. In fact, the return rate of prehistoric sites in wooded stands was greater than in clearcuts. Wooded stands yielded a prehistoric site density of 1/118 acres, while clearcuts had a density of 1/434 acres. Adding in existing prehistoric sites, the differences diminish somewhat (wooded=1/54 acres; clearcut 1/144 acres). Even if we factor in the differences in archaeological sensitivity (i.e., divide the density figures by the respective mean sensitivity values), wooded areas still yield a prehistoric site density that is nearly twice as large as clearcut site density (wooded=1/36 acres; clearcut=1/68 acres). What these results suggest is that surface survey does not provide a complete sample, even in clearcuts with good surface visibility. Prehistoric deposits buried by as little as 40 cm ofsediment may not be visible on the surface and therefore require subsurface techniques to determine site extent and content.

Figure 4. Mean acreage per survey parcel by number of sites found in previous survey and in new survey.

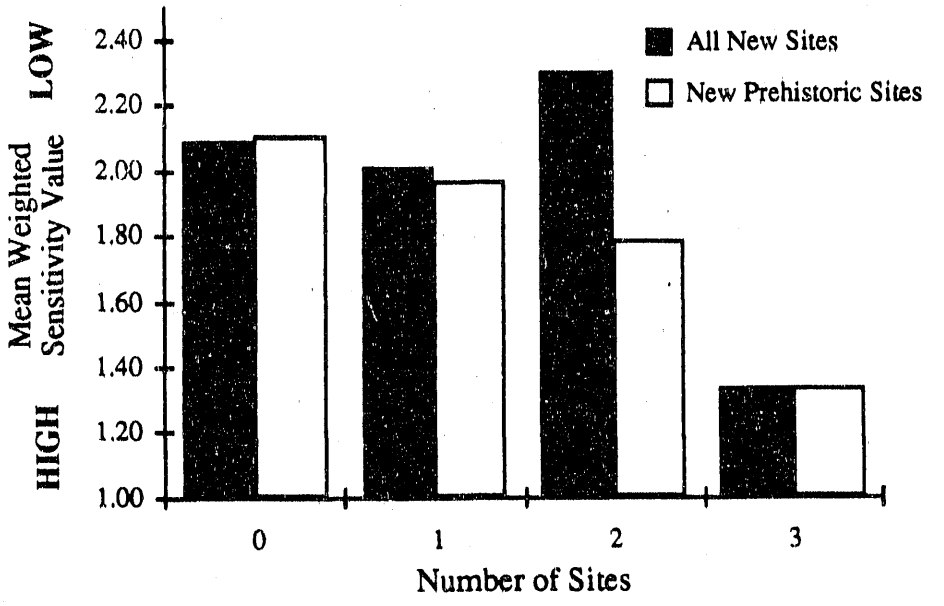

Figure 5. Mean weighted sensitivity values by total number of new sites and number of new prehistoric sites.

Fortunately, the fact that buried deposits are not always detected in clearcuts bodes well for the preservation of these sites. Clearcut practices and properly executed site preparation for replanting pose little danger to buried deposits (SRARP 1989). Surface survey techniques in clearcuts therefore remain the best possible strategy for locating deposits that are threatened by forestry practices, that is, deposits situated within the upper 40 cm below surface. We must continue to survey wooded stands with subsurface techniques not because deeply buried sites are endangered in these stands, but because it remains the only feasible way to locate any archaeological resource, shallow or deep.

Surface reconnaissance was usually an effective means of locating late historic sites observed on 1951 aerial photographs. Other historic sites were also located by surface reconnaissance in clearcuts, and in hardwood inclusions of wooded stands. However, subsurface testing was necessary to define the subsurface distribution of historic artifacts in wooded areas.

Site Testing

In March 1990 the SRARP implemented a policy to test all new sites with a minimum of one 1x2 m test unit. This standard was deemed necessary to ensure that adequate information was collected on the depth, stratigraphy and integrity of new sites. Existing sites that lacked previous testing were also earmarked for further work. In essence, the SRARP decided that limited site testing was to be part of the basic survey procedure.

As the volume of survey and site revisits increased, the time available to test each site diminished. Rather than forego survey for new sites, it was decided that site testing would be limited to only those sites under threat of destruction. Thus, sites found in timber compartment and clearcut surveys were not routinely tested with controlled excavation units.

A total of six sites were tested with 1x2 m units in FY90. One of the sites, 38AK157, was a revisit undertaken in response to a Site-Use request to construct a waste disposal facility. Because of the potential for destruction and the possible need to take mitigative measures to preserve it, SRARP staff conducted a full-scale testing program at the site. A short description of the testing strategy and results follows.

38AK157. In response to the SR-88 site-use application for the construction of the Hazardous Waste-Mixed Waste Disposal Facility north of F Area (SU-90-04-0), staff of the SRARP conducted archaeological testing at 38AK157 in December 1989 (Sassaman 1990). This prehistoric site was first recorded in 1974 during the preliminary archaeological inventory of the SRS (Hanson et al. 1978:56). The information collected at that time about the site's extent, content and integrity was inadequate to make well-informed recommendations. The testing efforts were thus aimed at collecting these data.

Archaeological investigations consisted of a three-stage strategy involving surface collection, systematic shovel test pit sampling, and the excavation of three secondary test units. A moderately large sample of lithic and ceramic artifacts was recovered from the surface and in subsurface contexts as deep as 80 cm below surface (BS). Stratigraphic data showed that the only significant, undisturbed portion of the site was a stratum extending from the base of the plowzone to a depth no greater than 45 cm BS. This zone contained relatively dense Early and Middle Woodland (3000-1500 B.P.) deposits. An earlier Late Archaic (5000-3000 B.P) component was detected in the lower half of this stratum, but it was ephemeral compared to the Woodland components. The plowzone

itself yielded artifacts dating to the Late Woodland (1500-1000 B.P.) and Mississippian (1000-500 B.P.) periods, as well as a mid- to late-19th century assemblage.

Because it was found to contain relatively dense and diverse prehistoric assemblages in a preserved stratum below the plowzone, and, accordingly, had the potential to expand our knowledge on Aiken Plateau settlement, particularly in the areas of community organization, technology, and upland patterns of economic intensification, 38AK157 was deemed eligible for nomination to the National Register of Historic Places. The SRARP recommended that DOE request a determination of no effect through mitigation of adverse effects to 38AK157 from the construction of the proposed waste facilities. A summary of the mitigation efforts is provided in another section of this report.

Survey Summary

A total of 3,282 acres was surveyed by the SRARP in FY90 for eight Site-Use applications, 14 Timber Compartment Prescriptions, and 38 clearcuts. Surface reconnaissance was conducted at 68 survey loci, 286 shovel tests were made at 35 survey loci, and eight 1x2 m test units were excavated at six sites. Twenty-five new archaeological sites were located, and another 15 sites were revisited to collect additional information. Determinations of eligibility to the National Register of Historic Places are only made for sites that are threatened by adverse impacts. Only one site, 38AK157, was threatened as such in FY90. SRARP staff found this site to be eligible for nomination to the National Register and recommended that the adverse effect be mitigated through avoidance or excavation.

EXCAVATIONS AT 38AK157

To mitigate adverse impacts from the construction of the Hazardous Waste-Mixed Waste Disposal Facility, SRARP staff spent the months of June-August 1990 excavating 38AK157, a Woodland Period habitation site in the Aiken Plateau. The upland site lies on a relatively small ridge nose formed by the dissection of two spring-fed streams. Subsurface testing across the landform revealed widespread prehistoric remains dating from the Late Archaic to Mississippian periods and a 19th century component. Block excavation in two portions of the site were implemented to retrieve Early and Middle Woodland materials situated below the plowzone to a depth of 40 cm below surface.

A 229 m^2 block placed in the center in the impact area yielded relatively low density assemblages dating to the Thom's Creek (4000-3000 B.P.) and Deptford (2600-1500 B.P.) phases. Concentrated at the south end of the block, the Thom's Creek component was marked by a variety of pottery surface treatments, including combinations of punctation and incising, as well as a high proportion of cordmarked lips. The associated lithic assemblage was meager, and no features could be attributed to the Thom's Creek occupation. The Deptford phase assemblage at the opposite end of the block included a greater diversity of remains, including Yadkin points, flake tools, and two hearth-like cobble clusters. The first serious use of nearby orthoquartzite sources is evident in the flaked stone assemblage. Semi-circular patterns in the distribution of point-plotted artifacts provide indirect evidence for at least one Deptford phase structure. As is typical of sandhills sites, organic preservation was nil.

A 144 m^2 block excavated on the perimeter of the impact zone produced a dense and diverse Refuge (3000-2600 B.P.) phase assemblage 25-35 cm below surface. The ceramic assemblage was dominated by simple stamped sherds, while punctate and linear

check stamped sherds comprised minority types. Over 125 small stemmed Early Woodland bifaces were retrieved, along with two major concentrations of chert debitage and a rich assemblage of flaked stone tools and gorget fragments. At least two structures are inferred from the patterned distribution of artifacts and associated cobble clusters (probable hearths). Organic remains and feature staining were again nonexistent.

Analysis of the 38AK157 materials is in progress. The anticipated report by Sassaman, Keith Stephenson and William Green will focus on (1) the decorative variation of Thom's Creek and Deptford Pottery, (2) technofunctional variation in Thom's Creek, Refuge and Deptford pottery, (3) Early Woodland hafted biface technology, (4) cobble cluster variation and function, (5) artifact patterns associated with structures and features, (6) form and function of gorgets, and (7) changing patterns of upland site use. A preliminary review of the data supports the existing SRS model for upland land-use, namely, that the Early Woodland period marked the earliest intensive, probably year-round, occupation of the Aiken Plateau. The unique contributions of this project, however, are the apparent recognition of habitation structures on the basis of artifact spatial patterning alone, and the recognition that the artifact inventory of small upland occupations includes elaborate material culture.

CURATION COMPLIANCE ACTIVITIES

General Background

The SRARP curates archaeological and archival materials under a cooperative agreement between the U.S. Department of Energy and the University of South Carolina. All collections housed in the Central Curation Facility (CCF) are the result of Federal cultural resource management action and are the property of the U.S. government. At SRARP curated collections are vital to ongoing *compliance* efforts because they furnish data which can be used to formulate survey and excavation procedures undertaken in response to the SR-88 process. Curated collections are also vital to *scientific* research as they furnish a database which can be used to formulate and test hypotheses related to past lifeways.

36 CFR 79 recognizes that particular collections require particular documentation and storage systems; thus, it sets forth a series of guidelines and requirements, but in most cases leaves up to the Federal Agency and/or the Repository Official the mechanisms needed to meet the requirements. Section 79.9 ("Standards to determine when a repository possesses the capability to provide adequate long-term curatorial services") is the most crucial section of 36 CFR 79 from the viewpoint of SRARP because it sets forth the minimum collections management standards for a repository. SRARP is attempting to comply with this section by: 1) instituting new guidelines for the processing of incoming archaeological collections; and 2) gradually upgrading old collections to meet the new standards.

Background of 36 CFR 79

Federal legal involvement in cultural resource management dates to 1906, when the Antiquities Act was passed by the U.S. Congress (U.S. Code 1906). The Historic Sites Act (U.S. Code 1935) mandated the HABS Survey, and the Reservoir Salvage Act of 1960 (U.S. Code 1960) furthered enlarged the role of the federal government in salvage excavations of impounded rivers and streams. More recently, the National Historic Preservation Act of 1966 (U.S. Code 1966a) made it much easier for sites to be nominated to the National Register of Historic Places. The Department of Transportation

Act of 1966 (U.S. Code 1966b), the National Environmental Policy Act of 1969 (U.S. Code 1969), and Executive Order 11593 (U.S. Code 1971) extended federal control of cultural resource management and hence, added substantially to the flow of excavated artifacts from fieldwork to repositories. Finally, the Archaeological and Historic Preservation Act (U.S. Code 1974) extended federal protection of cultural resources to all construction involving federal funds, and the Archaeological Resources and Protection Act of 1979 (U.S. Code 1984) established higher penalties for the looting and destruction of archaeological sites on public lands.

These laws substantially added to the conservation and excavation of cultural resources. The Army Corps of Engineers, for example, spent approximately $200 million on cultural resource management in the years from 1975 to 1989 (Tahar 1990:11). Unfortunately, a concomitant increase in the volume of artifacts to be curated followed this increased protection. This in turn led to a wide range of curation problems ranging from insufficient storage space at universities (where most of the artifacts are curated) to collections which simply could not be located by the supposed repository (Edward Jelks, personal communication 1989; Meyers 1988:15). Both the Archaeological and Historic Preservation Act of 1974 and the Archaeological Resources and Protection Act of 1979 mandated that the Secretary of the Interior issue regulations for curation of federally-owned artifacts, and as early as 1974, the Society for American Archaeology recognized the need for, and advocated the institution of, such regulations (Meyer 1988:9-11). In 1985 the Department of the Interior published an intent to propose rulemaking regarding curation of Federal collections, and draft regulations were distributed in 1986 (U.S. Department of the Interior 1985, 1986, 1987). The final rulemaking was published in the September 12, 1990 Federal Register (U.S. Department of the Interior 1990). 36 CFR 79 addresses a series of seven broad curation concerns, including management and preservation of collections (79.5), methods to secure curatorial services (79.6), methods to fund curatorial services (79.7), terms and conditions to include in contracts and agreements (79.8), standards to determine when a repository possesses the capability to provide adequate long-term curatorial services (79.9), use of collections (79.10), and the conduct of inspections and inventories (79.11). Of these concerns, Section 79.9 is arguably the most important, since it directly impacts the overall conditions and day-to-day operations of a repository.

Status of SRARP Collections and Corrective Steps

SRARP currently houses nearly 1,200 cubic feet of artifacts and associated documentation derived from survey and excavations on the SRS. The collections are organized primarily by site number and stored in standard-sized boxes inside a cage in a secure area of the SRARP offices. Based on the Curator's evaluation of the collections, it was determined that a series of steps were required in order to put SRARP in compliance with 36 CFR 79, as follows:

1) inventory and evaluate all collections in light of 36 CFR 79 standards (status: completed);

2) write a curation guide that sets forth procedures for the processing of collections following the procedures outlined in 36 CFR 79 (status: completed);

3) act to regulate air temp and humidity so that they are maintained within recommended parameters (45-60% relative humidity., 60-70 degrees F., cf. Lewis 1976:83; status: completed);

4) institute regular inspections for pests, collection deterioration, and general cleanliness of CCF (status: ongoing);

5) upgrade old collections to meet new guidelines in manual and 36 CFR 79 (status: ongoing); and

6) oversee lab operations and curation of collections following curation manual (status: ongoing);

The core of the new SRARP curation procedures is the curation manual (*Savannah River Archaeological Research Program Guide to Curation Procedures*). This document sets forth detailed instructions for the processing of artifact collections from initial laboratory sorting to final curation. In addition, it describes the database structure in the Master Curation Database, which is the primary collections-management tool, as well as secondary databases maintained by the Curator, and includes examples of completed database records from the SRARP curation files.

In addition to the steps taken above, SRARP has gone beyond the minimum requirements of 36 CFR 79 by instituting a procedure whereby specific archival records (site forms, photo logs, collapsed artifact inventories and final reports) are stored on archival-quality acid-free paper at SCIAA (normal paper disintegrates due to acids used in the paper manufacturing process). This ensures that particularly important records regarding collections will be permanently preserved and that, even in the event that records here were lost due to a fire or other mishap, crucial site documentation would be preserved.

PART II. RESEARCH

SAVANNAH RIVER SITE ARCHAEOLOGICAL RESEARCH

Technical Synthesis of Prehistoric Archaeological Investigations of the Savannah River Site, Aiken and Barnwell Counties, South Carolina.

Fourteen years of archaeological investigation into the prehistory of the SRS is summarized in the *Technical Synthesis* completed in December 1989 (Sassaman et al.). The synthesis represents not only the past accomplishments of the SRARP, but also the directions and goals for its future research agenda.

A major portion of the synthesis consists of environmental models for landform evolution, including changes within fluvial and colluvial depositional regimes. Combined with data on the past and present nature of soils, climate, geology and geomorphology in the area, the models provide predictive tools for site locational patterns and site formation processes.

Methods of survey, excavation and assemblage analysis on the SRS are summarized in the syntheses. Of particular interest is the design and implementation of the 40 percent stratified, random sample of the SRS. Also highlighted are summaries of major testing and excavation projects at over two dozen sites.

Typology and chronology of artifacts found on SRS sites are integral subjects of the synthesis. Data on the formal variability, technology, and chronology of hafted bifaces and pottery are described in detail for all periods of prehistory.. Stratigraphic data from SRS sites are introduced to construct local relative chronologies.

The environmental, methodological and typological reviews provided in the synthesis are directed toward a locational analysis of prehistoric sites on the SRS. The problem of site definition is addressed through an analysis of sample bias. The results are used to isolate a statistical subsample of sites (n=470) for locational analyses. Patterns in the distribution of sites across macrozones, microzones and places in the environment are defined. Both functional and chronological variation in site location is examined.

Finally, analytical results and comparative data are drawn together into interpretive models of settlement, subsistence, and sociopolitical organization. The models highlight a series unresolved issues in method and theory, and thus point to the research goals that are guiding SRARP activities in the 1990s. The final version of the synthesis is now being prepared for publication and will be issued as SRARP Occasional Paper Number 1.

Research in History and Historical Archaeology

Historic Occupation of the Savannah River Site

Richard Brooks and David Crass are currently completing final revisions on the Historic Period Archaeological Overview for the SRS. This document will be published as SRARP Occasional Paper Number 2. The report will accomplish two goals. First, it will establish a basic cultural chronology for historic occupation of the Middle Savannah River Valley. This goal is important because it is a first necessary step in anthropological hypothesis-testing. The second goal of the Historic Overview is to develop a settlement

systems model for the SRS. This model places historic period settlement in the study area in a context of social and cultural constraints. These constraints, which may have impinged on the broader settlement pattern trends, include such factors as transportation availability and technology, market demands, environmental considerations, kin relationships, and labor organization (cf. Adams 1976; Crass 1990; DeAtley 1984:5; Hirth 1978; Hughes 1987; Lewis 1976:151-201; Paynter 1982; Willems 1977). These constraints are probed through the archaeological and archival data gathered over the past 15 years of research on the SRS. The constraint model will serve as the over-arching design for all future research on historic-period sites in the study area.

Oral History Project

Crass and Brooks are also developing the SRARP Oral History Project [see the National Historic Preservation Act Section 110 (a and b) as annotated in the Environmental Guidance Program Reference Book (ORNL/M-1178)]. Because of the unique history of SRS development, many people who lived on the property or who had ancestors who lived here reside in the immediate area. Their memories of life here and family historical research which many have carried out on their own are an important, but rapidly disappearing, cultural resource. In order to preserve this dwindling portion of our cultural heritage, we have begun to compile a list of informants who are available for tape-recorded interviews. In addition, we have begun to host visits of local informants and tape-record interviews with them.

The data gathered through the Oral History Project will be correlated with specific archaeological sites as part of our compliance activities. The data gathered will materially aid our inventory efforts by improving our sampling strategy during survey and reconnaissance. This will enhance the cultural resources database of the SRS.

GEOARCHAEOLOGICAL RESEARCH

Geoarchaeological Research in the Coastal Plain Portion of the Savannah River Valley

Archaeological, stratigraphic, sedimentological and ^{14}C data suggest considerable potential for the existence of buried and preserved archaeological sites within South Carolina's modern estuaries, which began to develop at ca. 6000 B.P. when the rate of Holocene sea level rise slowed and sea level was within a few meters of its present position (e.g., Colquhoun and Brooks 1986). The discovery and investigation of buried estuarine sites may provide "missing data" that will help explain a number of the apparent anomalies in regional, archaeological patterning (Brooks et al. 1989a; Sassaman 1989; Sassaman et al. 1989).

The earliest dates for estuarine shell middens on the South Carolina Coast are ca. 4200 B.P. (Sutherland 1974). Many of the early (ca. 3100-4200 B.P) shell midden/ring sites were cut off from the mainland margins during estuarine expansion accompanying sea level rise. Such sites currently exist as island hammocks surrounded by marsh and their bases are commonly buried by 80-120 cm of marsh sediments (Colquhoun et al. 1980, 1981; Colquhoun and Brooks 1986; Brooks et al. 1986, 1989b). The tendency for early estuarine shell middens to cluster in time during the higher stands of sea level (transgressions) suggests that many sites established during the intervening lower stands (regressions) were probably completely buried by subsequent transgressions accompanying the general trend of Holocene sea level rise. If preserved, estuarine-associated sites that were established during even lower stands of sea level (4200-6000

B.P.) would be located in the seaward-most portions of estuaries and would be completely buried as well.

In that sea level is the ultimate, hydrologic base-level which controls estuarine and fluvial sedimentation and, hence, development, it is suggested that the mid-Holocene slowing in the rate of sea level rise provided the hydrologic stability (transition from high to low energy flow conditions) that was a prerequisite for the evolution of low energy, estuarine and floodplain depositional environments. Although modern estuarine and river floodplain development began at about 6000 B.P., there was a time-transgressive trend in an up-river direction, such that floodplain development in the Upper Coastal Plain in the vicinity of the Savannah River Site was initiated as late as 4000 B.P., followed shortly thereafter in the tributary streams (Brooks et al. 1986, 1989a). The details of these time-transgressive trends, which have important implications for environmental change and prehistoric human adaptations, are being investigated on the Savannah River Site with the assistance of Donald J. Colquhoun (Department of Geology, University of South Carolina) and Vergil Rogers (formerly with the USDA, Soil Conservation Service and now with the Westinghouse Savannah River Company). Comparatively, near-modern estuarine and river floodplain stability has existed in these dynamic, depositional environments for the last ca. 2000 years (Brooks et al. 1986, 1989a).

Geoarchaeological Research at 38BM85

On Saturday, February 24, 1990, a group of volunteers from the SRARP and SCIAA excavated a 3 x 3 m unit at 38BM85, a point bar site located on the South Edisto River in the Upper Coastal Plain of South Carolina. Point bars are high energy (flood-stage) depositional features that form on the inside of stream meander bends through vertical and lateral accretion accompanying channel migration. With channel migration, any given location on the point bar surface becomes increasingly stable, such that deposition is more infrequent and of successively lesser magnitude. Consequently, depositional units become thinner up the point bar stratigraphic sequence.

Aside from their distinctive geomorphology, point bars are characterized by a series of discrete, sediment fining-upward, depositional events; the tops of which have been found to coincide with prehistoric land/occupation surfaces. From the temporally diagnostic artifacts present on these surfaces, the: 1) times and rates of net sedimentation can be calculated, 2) times and duration of land/occupation surface stability can be determined, and 3) trends in channel migration and switching patterns, which may be linked ultimately to sea level changes and/or regional climatic patterns, can be ascertained (Anderson and Schuldenrein 1985; Brooks et al. 1986, 1989a; Brooks and Sassaman 1990).

One research objective was to compare the geoarchaeological data obtained from 38BM85 with that from 38BR383; also a point bar site located in the Upper Coastal Plain, but along the Savannah River on the Savannah River Site (Brooks and Sassaman 1990). Based on previous research in the Savannah River Valley (e.g., Brooks et al. 1986, 1989a; Brooks and Sassaman 1990), it was expected that differences in the depositional, and possibly occupational, histories between the two sites would relate to drainage-specific variation in such cross-cutting attributes as geologic structure, geomorphology, hydrology-stream gradient, available sediments, and drainage basin size, configuration and origin (i.e., Piedmont/Mountain-draining [38BR383] vs. Upper Coastal Plain-draining [38BM85]). In contrast, similarities among the two sites/drainages should relate to broader climatic patterns and/or eustatic sea level change, with sea level position establishing the ultimate, hydrologic base-level control that strongly conditions

sedimentological responses in fluvial systems (e.g. floodplain and alluvial terrace development), even far inland from the coast (e.g., Saucier 1974; Brooks et al. 1986, 1989a; Brooks and Sassaman 1990).

Regarding similarities between 38BR383 and 38BM85, both: 1) are located in the Upper Coastal Plain; 2) are point bars situated on the first terrace above, and immediately adjacent to, the modern/active floodplain; 3) contain four discrete, point bar sediment fining-upward sequences, each with an associated surface at the top; 4) appear to have formed, or were at least largely stabilized, primarily during the early to mid-Holocene; and 5) are capped with overbank deposits signifying a change in the environment of deposition associated with the development of the modern floodplain. These observations from two different drainage systems suggest that broad-based, environmental controls (i.e., climate and/or sea level) are probably operative to some as yet unknown degree.

The major differences between the two sites are that the depositional sequences at 38BM85 are slightly thinner, shallower, and, at least for the upper, mid- to late Holocene portion of the sequence, seemingly younger than their counterparts at 38BR383. The other difference is that the point bar sediments at 38BR383 are dominated by medium-coarse sand (Brooks and Sassaman 1990:188, Figure 5), whereas those at 38BM85 are dominated by fine-medium sand. The variation between the two sites in the thickness and depth of their respective depositional sequences, as well as in dominant grain size, can be directly related to drainage-specific variation in hydrology and available sediments associated with differences in drainage basin size, configuration and origin. The Savannah River basin is much larger and has greater run-off potential than the South Edisto. This accounts for the thicker and deeper depositional sequences at 38BR383. Similarly, the coarser sediments at 38BR383 relate to the Piedmont/Mountain origin of the Savannah River, while the sediments at 38BM85 are directly attributable to their origin in the Upper Coastal Plain, characterized by surficial, comparatively fine-grained marine sands.

While the similarities between the two sites argue for broad-based environmental controls, the apparent difference in the times of deposition and duration of exposure of the occupation surfaces must be resolved before drawing any definitive conclusions. In view of the low artifact densities and comparatively few temporally diagnostic artifacts from the 38BM85 excavation, it is quite possible that the times of deposition and the duration of exposure of the occupation surfaces have been drastically underestimated. Additional investigations upslope on the older and more stable portion of the landform may produce results more in line with 38BR383. If this is the case, then the argument for broad-based environmental controls is supported.

THESIS AND DISSERTATION RESEARCH

Political Change in Chiefdom Societies: Cycling in the Late Prehistoric Southeastern United States

This dissertation, by Oak Ridge Associated University Fellow David G. Anderson (Ph.D., Michigan 1990), explores political change in chiefdoms, specifically the formation and fragmentation of complex chiefdoms, or cycling behavior, and how this process may be examined with ethnohistorical, archaeological, bioanthropological, and paleoclimatic data. Cycling occurs at a regional level, amid a landscape of simple chiefdoms and, through comparative ethnographic examination, is shown to be caused by a range of factors, including rules of succession, marriage and post-marital residence:

intensity of warfare and factional competition; and the effect of ecological parameters such as regional physiographic structure, biotic resource occurrence, and climate perturbations on alliance network formation and tribute mobilization.

These and other propositions about the causes of cycling are evaluated using Mississippian archaeological and ethnohistoric data from across the Southeast. How organizational change in these societies has been examined by Southeastern archaeologists is reviewed in detail, specifically the effects of warfare, factional competition, succession to leadership, tribute mobilization, and territorial boundary and buffer zone formation and maintenance. Patterns and explanations for political change within the Cahokia, Moundville, and Coosa chiefdoms are examined. At a more general level, how the distribution of Mississippian societies throughout the region illustrates the cycling process is also explored.

Political change in the Savannah River Valley is addressed following a detailed synthesis of archaeological investigations in the basin, encompassing survey and excavation results, and the cultural sequence. Changes in architecture, mortuary behavior, and subsistence were observed at many sites. Fortifications were constructed during both the emergence and collapse of chiefdoms locally, and at several centers a decline in elite grave goods preceded site abandonment. Using locally-derived baldcypress dendochronological data relationships between climate, simulated crop yields and stored food reserves, and political change were inferred. The spacing and expansionist tendencies of complex chiefdoms over the region were also found to significantly affect the stability of local chiefdoms.

Economic and Social Contexts of Early Ceramic Vessel Technology in the American Southeast

The recently completed dissertation by SRARP staff archaeologist Kenneth E. Sassaman (Ph.D., Massachusetts 1991) explores sociopolitical factors that facilitated and inhibited the development of pottery in the Southeast. Ceramic vessel technology was first developed or adopted in three separate areas of the region between 4500 and 3000 years ago. Temporal lags in the adoption of pottery in these areas are evident, while pottery was not widely used in the intervening areas of the Southeast for nearly 2000 years. Variables related to the production and exchange of alternative cooking technologies are examined to interpret the variegated spatial and temporal patterns of early pottery use.

The case study for this problem is the development and adoption of fiber-tempered pottery in the Savannah River Valley region. The antiquity of pottery in the region is unparalleled, but the rate of local acceptance was extremely slow. Prior to and during the time early pottery was available, an indirect-heat cooking technology involving soapstone was utilized in the central portion of the valley. Evidence is presented to support the argument that the social relations surrounding the production and distribution of soapstone had an inhibiting effect on the rates and pathways of pottery adoption in the region.

Empirical support for this argument is drawn from technofunctional analyses of pottery and its nonceramic cooking alternatives, and from distributional analyses of soapstone and pottery. Evidence for the mechanical performance and use-wear of pottery is employed to identify functional attributes of pot design and use on over 1200 vessels from 30 assemblages. These data are compared todistributional patterns of soapstone to show that (1) pots were rapidly developed for use over fire in areas outside the sphere of

soapstone exchange, (2) pottery was not readily adopted by individuals directly involved in the production and exchange of soapstone, and (3) when finally adopted by individuals using soapstone, pots were used simply as containers for indirect-heat cooking.

Results of the case study are applied to the greater Southeast, where the Poverty Point commerce in soapstone vessels is viewed as a primary deterrent to the widespread adoption of pottery. An alternative model is offered for the westward spread of pottery which emphasizes the role of social integration on the periphery of Poverty Point exchange.

Yamasee Archaeological Project

William Green (SRARP and USC), in collaboration with Chester B. DePratter (SCIAA) and David McKivergan (USC), is continuing his M.A. thesis research on the archaeology and ethnohistory of the Yamasee. The Yamasee are a multi-ethnic group that began arriving in the Port royal area of South Carolina in 1684. Their roots can be traced back to the sixteenth century central Georgia chiefdoms of Altamaha, Ocute and Ichisi, and to remnants of the Coastal Georgia Guale. The interior Georgia Yamasee remained in central Georgia until the early 1670s when the Westo arrived on the Savannah River. Due to superior firepower (i.e. guns given to them by the Virginia traders), the Westo successfully forced the Yamasee out of their traditional homeland. The Yamasee split into two or more groups, some going to Apalachee, and some going to Cumberland and Amelia Islands north of St. Augustine. During the 1680s, some of the coastal Georgia Guale also moved to Cumberland and Amelia Islands, and from there both the interior Yamasee, and the coastal Guale moved to South Carolina. They were subsequently joined in the beginning of the eighteenth century by their kinsmen who had originally gone to Apalachee.

During their stay in Carolina, the Yamasee played an important role in both the deerskin and Indian slave trades. They also served as a buffer for the English, guarding against a possible Spanish attack from St. Augustine. Eventually relations between the Yamasee and English deteriorated due to abuses by the Carolina traders, and encroachment on their lands. In 1715, the Yamasee, allied with many other Native American groups, attacked the English and began what was known as the Yamasee War. The Yamasee ended their tenure in South Carolina and moved to St. Augustine where they rejoined the Spanish. For over a decade, the Yamasee continued their forays into Carolina, but by the middle of the eighteenth century they almost completely disappear from the documentary records.

A thorough search of the South Carolina Archives has revealed a number of maps and plats that pinpoint the location of many Yamasee towns. During the fall and winter of 1989, excavations were conducted at site 38BU1206, the Yamasee town of Altamaha. The presence of the Yamasee at this site was confirmed, and a possible structure was located. Unfortunately, time constraints prohibited further investigations of this structure, but a return to the site is planned for the near future. Additionally, other possible Yamasee sites will be tested and the materials compared to those found at the Altamaha site to determine if the Yamasee's multi-ethnicity can be seen in the archaeological record. Future research concerning the Yamasee will not only shed light on this little studied group, but will have widespread implications for other Southeastern Native American groups of the sixteenth, seventeenth and eighteenth centuries.

OTHER RESEARCH

Savannah Period Mound in Georgia

Archaeological investigations by D. Keith Stephenson (SRARP), John E. Worth (University of Florida) and Frankie Snow (South Georgia College) at the Sandy Hammock site (9PU10) in Pulaski County, Georgia, focused on a small, Mississippian platform mound. A contour map of the mound was produced, and a test unit that was excavated on the summit exposed mound stratigraphy. Mound strata revealed a construction sequence beginning with a premound structure over which two superimposed platform mound stages were constructed. Evidence indicates a burned summit structure on Mound Stage I. Ceramic artifact data show that the mound was constructed during the Savannah period, or approximately A.D. 1200 to 1300. A corrected radiocarbon determination of A.D. 1281±47 (UGA 6019) for the mound substantiates this chronological placement. The significance of 9PU10 is that the site seems to be the southernmost major occurrence of Etowah and Savannah Complicated Stamped pottery along the Ocmulgee River. The presence of an earthen mound suggests that 9PU10 was the center for a simple chiefdom. A report of this work was recently completed and submitted for publication to *Early Georgia*.

Middle Woodland Research in South Georgia

Stephenson and Snow have also conducted excavations at a Swift Creek period mound and village in south Georgia. Their efforts exposed cultural features beneath the sub-mound midden that represent a premound oval shaped structure and a large central refuse pit. Archaeological evidence indicates that the structure served ceremonial as well as nonceremonial functions. The midden and central refuse pit contained a diverse, well preserved assemblage of subsistence remains. Exotic artifacts recovered indicate long-distance exchange and analysis of Swift Creek complicated stamped designs reveals interaction between Hartford and contemporaneous regional sites. On-going laboratory analyses by Stephenson at the SRARP is providing important comparative information on Middle Woodland societies in the region and their local manifestations on the SRS.

International Historic Archaeological Cooperation

Dr. David Crass is serving as an historical archaeology consultant for a study being carried out by Dr. C. Garth Sampson of Southern Methodist University in Dallas, Texas. Dr. Sampson and a team of 15 international specialists are examining the impact of European colonization on hunter-gatherer bands. Analysis concentrates on changing land tenure and band boundary maintenance strategies through time (cf. Sampson 1988).

PART III. PUBLIC EDUCATION

Volunteer Program FY90

The volunteer program, part of the ongoing public outreach/education facet of the SRARP, continued on a regular basis during FY90. During the months of October and November 1989, volunteers from the Augusta Archaeological Society provided 60 person-hours of effort testing site 39BR631. This site had produced one complete Dalton type hafted biface during routine shovel-testing by SRARP staff. The Dalton biface is representative of cultures from the Savannah River Valley present about 10,000 years ago. Supplementing one 1x2-meter test pit excavated by SRARP staff, the volunteers excavated two 1x2-meter pits, going down to 85 centimeters and 80 centimeters below surface, respectively, in controlled increments. In addition to the archaeological excavation, soil sediment columns were extracted from the site for geoarchaeological study.

During November 1989, a decision was made by SRARP staff to continue a research project that had been started and also set aside during 1978 by the former program manager. The reopening of the site (38AK224) was proposed as an all-volunteer effort, under SRARP staff supervision, to increase knowledge of use of the uplands of the Aiken Plateau by prehistoric peoples during the Late Archaic on through the Middle-Late Woodland periods. A Site Use permit (SU-90-35-R) was approved by DOE for a five year period to conduct this research.

The research is done primarily on one Saturday each month, using volunteers from the Augusta Archaeological Society, the Archaeological Society of South Carolina, and occasional visiting professionals. SRARP program and staff investments are minimal, except for supervision, oversight and use of hand tools, laboratory for artifact processing, and curation facilities.

During the December session, volunteers were familiarized with the project, based on oral description of the previous work, and by sorting through the artifacts recovered from the 1978 excavation. Starting in January 1990, fieldwork commenced with cleaning up the site, re-staking provenience limits and related activities. The initial restart encompassed excavating of existing, partially excavated 2x2-meter squares, and completing what had been unexcavated in the center of a "U-shaped" block to square the site off and finish the block in an orderly fashion. The work was then extended out to the west and south of the 1978 block. The current work is being conducted in 1x1-meter squares which are excavated in 5 centimeter levels to provide better control over data recovery than previously used. The volunteer labor input at Tinker Creek totals 91 person-days, or 546 person-hours since January 1990.

Additional Involvement with Avocational Archaeology Groups

SRARP staff continue to maintain close ties with the Archaeological Society of South Carolina (ASSC), as well as the Augusta Archaeological Society (AAS). During FY90, George S. Lewis continued in his role of treasurer for the AAS, and edited the monthly newsletter of the AAS, *Debitage*. Kenneth E. Sassaman continued in his role of journal editor for ASSC, issuing two volumes of *South Carolina Antiquities* in FY90. Sassaman also served as the archaeologist for the Allendale Chapter of the ASSC, and worked with Chapter President Barbara Hiott and Paula Rahn to design and construct a display for the

Colleton County Historical Museum. SRARP staff also volunteered their own time to organize and run the ASSC's Fall Field Day, an annual event that raises the public's awareness of archaeology in the state while also generating funds for archaeological publications and preservation.

Public Presentations and Workshops

In FY90, SRARP staff made over two dozen presentations at schools, churches, and at environmental and historical awareness day celebrations. In particular, SRARP's involvement with school programs grew considerably over the last year. Realizing that public attitudes about archaeology and history are shaped at a very young age, SRARP staff are participating in outreach programs that include not only talks to local schools, but also workshops that educate teachers about the need for historic preservation and for a sound anthropological perspective on history and prehistory.

Public relations through DOE and Westinghouse, both locally and nationally, also expanded for the SRARP in FY90. Three presentations were made to Westinghouse employees concerning work conducted for the Hazardous Waste/Mixed Waste Facility. The staff also helped Westinghouse Public Relations with guided tours of old homesites to former inhabitants of the area and with the filming of October's *Update* about SRARP. At the national level, SRARP Co-Program Manager Mark J. Brooks participated in two workshops with DOE archaeologists and administrators. The outcome of these workshops was a broader awareness on the goals and operations of the SRARP, particularly its research emphasis and the need for positive, long-term public education programs.

REFERENCES CITED

Adams, W.
1976 Trade Networks and Interaction Spheres-A View from Silcott. *Historical Archaeology* 10: 99-113.

Anderson, D. G. and J. Schuldenrein (editors)
1985 *Prehistoric Human Ecology Along the Upper Savannah River: Excavations at the Rucker's Bottom, Abbeville and Bullard Site Groups*. Commonwealth Associates, Inc., Jackson, Michigan. Submitted to the National Park Service, Archaeological Services Branch, Atlanta.

Brooks, M. J., D. J. Colquhoun, J. G. Brown and P. A. Stone
1989b Sea Level Change, Estuarine Development and Temporal Variability in Woodland Period Subsistence-settlement Patterning on the Lower Coastal Plain of South Carolina. In *Studies in South Carolina Archaeology in Honor of Robert L. Stephenson*, edited by A.C Goodyear and G.T. Hanson, pp. 91-100. Anthropological Studies 9, South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Brooks, M. J. and K. E. Sassaman
1990 Point Bar Geoarchaeology in the Upper Coastal Plain of the Savannah River Valley, South Carolina: A Case Study. In *Archaeological Geology of North America*, edited by N.P. Lasca and J. Donahue, pp. 183-197. Centennial Special Volume 4, Geological Society of America, Boulder, Colorado.

Brooks, M. J., K. E. Sassaman and G. T. Hanson
1989a Environmental Background and Models. In *Technical Synthesis of Prehistoric Archaeological Investigations on the Savannah River Site, Aiken and Barnwell Counties, South Carolina*, by K. E. Sassaman, M. J. Brooks, G.T. Hanson and D.G. Anderson, pp.19-66. Report submitted to the Savannah River Operations Office, U.S. Department of Energy.

Brooks, M. J., P. A. Stone, D. J. Colquhoun. J. G. Brown and K. B. Steele
1986 Geoarchaeological Research in the Coastal Plain Portion of the Savannah River Valley. *Geoarchaeology* 1:293-307.

Colquhoun, D. J. and M. J. Brooks
1986 New Evidence from the Southeastern U.S. for Eustatic Components in the Late Holocene Sea Levels. *Geoarchaeology* 1:275-291.

Colquhoun, D. J., M. J. Brooks, W. H. Abbott, F. W. Stapor, W. S. Newman and R. R. Pardi
1980 Principles and Problems in Establishing a Holocene Sea Level Curve for South Carolina. In *Excursions in Southeastern Geology, Geological Society of America, Guidebook*, edited by J.D. Howard, C.B. DePratter, and R.W. Frey, 20:143-159.

Colquhoun, D. J., M. J. Brooks, J. L. Michie, W. H. Abbott, F. W. Stapor, W. S. Newman and R. R. Pardi
1981 Location of Archaeological Sites with Respect to Sea Level in the Southeastern United States. In *Florilegium Florinis Dedicatum*, edited by L.K. Konigsson and K. Paabo, *Striae* 14:144-150. Uppsala.

Crass, D. C.
1990 *Economic Interaction on the New Mexican Military Frontier* University Microfilms, Ann Arbor.

DeAtley, S. and F. Findlow
1984 Exploring the Limits: Frontiers and Boundaries in Prehistory. Edited by S. DeAtley and F. Findlow. *BAR International Series 223*: Oxford.

Hirth, K.
1978 Interregional Trade and the Formation of Prehistoric Gateway Communities. *American Antiquity* 43 (1): 35-45.

Lewis, K.
1976 *Camden: a Frontier Town in Eighteenth Century South Carolina.* Anthropological Studies 2, South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Lewis, R.
1976 *Manual for Museums.* National Park Service, Washington.

Meyers, T.
1988 Management of Federal Archaeological Resources: A Case Analysis. *Journal of the Steward Anthropological Society* 18 (1, 2): 7-21.

Paynter, R.
1982 *Models of Spatial Inequality: Settlement Patterns in Historical Archaeology.* Academic Press: New York.

Sampson, C. Garth
1988 *Stylistic Boundaries among Mobile Hunter-Gatherers.* Smithsonian Institution Press, Washington, D.C.

Sassaman, K. E.
1990 *Archaeological Testing at 38AK157, Savannah River Site, Aiken County, South Carolina.* Report submitted to the Savannah River Operations Office, U.S. Department of Energy.

Sassaman, K. E.
1991 *Economic and Social Contexts of Early Ceramic Vessel Technology in the American Southeast.* Unpublished Ph.D. Dissertation, Department of Anthropology, University of Massachusetts.

Sassaman, K. E., M. J. Brooks, G. T. Hanson and D. G. Anderson
1989 *Technical Synthesis of Prehistoric Archaeological Investigations on the Savannah River Site, Aiken and Barnwell Counties, South Carolina.* Report submitted to the Savannah River Operations Office, U.S. Department of Energy.

Savannah River Archaeological Research Program
1989 *Archaeological Resource Management Plan of the Savannah River Archaeological Research Program.* Report submitted to the Savannah River Operations Office, U.S. Department of Energy. Manuscript on file with the Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina.

Saucier, R.
1974 *Quaternary Geology of the Lower Mississippi Valley*. Arkansas Archaeological Survey Research Series 6.

Sutherland, D. R.
1974 Excavations at the Spanish Mount Shell Midden, Edisto Island, South Carolina. *South Carolina Antiquities* 6(1).

Tahar, J., E..
1990 Recent Developments in Curation and Collection Management. In *Federal Archaeology Report* 3 (3): 11. National Park Service Archeological Assistance Division, Washington.

U.S. Code
1906 *An Act for the Preservation of American Antiquities*. (16 U.S.C. 431-433).

1935 *Historic Sites Act* (16 U.S.C. 461-467).

1960 *Reservoir Salvage Act* (16 U.S.C. 469-469c).

1966a *Department of Transportation Act* (16 U.S.C. 1653).

1966b *National Historic Preservation Act* (16 U.S.C. 470 et seq.)

1969 *National Environmental Policy Act* (16 (U.S.C. 4321-4327).

1971 *Executive Order 11593 of May 13, 1971*. Protection and Enhancement of the Cultural Environment. (36 FR 8921, 16 U.S.C. 470).

1974 *Archeological and Historic Preservation Act* (U.S.C. 469-469c).

1979 *Archaeological Resources Protection Act* (U.S.C.470aa-11).

U.S. Department of the Interior
1985 36 CFR Part 79. Curation of Federally Owned Archeological Collections; Notice of Intent to Propose Rulemaking and Request for Comments. *Federal Register*, Vol. 50: 41527-41528, October 11.

1986 36 CFR Part 79, *Review Draft*, September 12.

1987 36 CFR Part 79. Curation of Federally-Owned and Administered Archeological Collections; Proposed Rule. *Federal Register*, Vol. 52: 32740-32751, August 28.

1990 36 CFR Part 79. Curation of Federally-Owned and Administered Archeological Collections; Proposed Rule. *Federal Register*, Vol. 55: 37670-37639.

APPENDIX

PUBLISHED PAPERS

Brooks, M. J. and K. E. Sassaman
1990 Point Bar Geoarchaeology in the Upper Coastal Plain of the Savannah River Valley, South Carolina: A Case Study. In *Archaeological Geology of North America*, edited by N.P. Lasca and J.E. Donahue, pp. 183-197. Centennial Special Volume 4, Geological Society of America, Boulder, Colorado.

Brooks, M. J., P. A. Stone, D. J. Colquhoun and J. G. Brown
1989 Sea Level Change, Estuarine Development and Temporal Variability in Woodland Period Subsistence-settlement Patterning on the Lower Coastal Plain of South Carolina. In *Studies in South Carolina Archaeology in Honor of Robert L. Stephenson,* edited by A.C. Goodyear and G.T. Hanson, pp. 91-100. Anthropological Studies 9, South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Brooks, R. D.
1989 An Examination of Historic Ceramic Seriation: A Case Study from the Savannah River Region of South Carolina. In *Studies in South Carolina Archaeology in Honor of Robert L. Stephenson,* edited by A.C. Goodyear and G.T. Hanson. Anthropological Studies 9. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Brooks, R. D.
1990 Isandlwana and the Custer Battlefield. In *Umkhonto, Newsletter of the Zulu War Study Group*, No. 5. Victorian Military Society.

Sassaman, K. E.
1989a Pattern and Process in the Middle Archaic of South Carolina. (co-author with D. B. Blanton). In, *Studies in South Carolina Archaeology: Essays in Honor of Robert L. Stephenson*, edited by A. C. Goodyear and G. T. Hanson, pp. 53-72. Anthropological Studies 9, South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

1989b Prehistoric Settlement in the Aiken Plateau: Summary of Archaeological Investigations at 38AK158 and 38AK159, Aiken County, South Carolina. *South Carolina Antiquities* 21 (in press).

Snow, F. and D. K. Stephenson
1990 DeSoto at Swanton's Ocute: Another House of Cards? *Lamar Briefs*, Number 15, June 1990.

Stephenson, D. K.
1990 An AMS Date for Cord Marked Pottery in South-Central Georgia. *Lamar Briefs*, Number 15, June 1990.

TECHNICAL REPORTS

Sassaman, K. E.
1990 *Archaeological Testing at 38AK157, Savannah River Site, Aiken County, South Carolina.* Report submitted to the Savannah River Operations Office, U.S. Department of Energy.

Sassaman, K. E., M. J. Brooks, G. T. Hanson and D. G. Anderson
1989 *Technical Synthesis of Prehistoric Archaeological Investigations on the Savannah River Site, Aiken and Barnwell Counties, South Carolina.* Report submitted to the Savannah River Operations Office, U.S. Department of Energy. Manuscript on file with the Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina.

Savannah River Archaeological Research Program
1989a *Annual Report of the Savannah River Archaeological Research Program: Fiscal Years 1988-1989.* Report submitted to the Savannah River Operations Office, U.S. Department of Energy. Manuscript on file with the Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina.

1989b *Close Out Report for Archaeological Investigations on the Savannah River Site, South Carolina (Contract DE-AC09-81SR10749).* Report submitted to the Savannah River Operations Office, U.S. Department of Energy. Manuscript on file with the Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina.

1989c *Archaeological Resource Management Plan of the Savannah River Archaeological Research Program.* Report submitted to the Savannah River Operations Office, U.S. Department of Energy. Manuscript on file with the Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina.

PROFESSIONAL PAPERS PRESENTED

Lewis, G. S., and K. E. Sassaman
1990 The Heard Robertson Collection. Paper presented at the Spring 1990 Meeting and Conference, Society for Georgia Archaeology, DeKalb Community College, Atlanta, GA, and also at the 16th Annual Conference on South Carolina Archaeology, Columbia, SC.

Sassaman, K. E.
1989 Economic and Social Contexts of Early Ceramic Vessel Technology in the American Southeast. Paper presented at the Southeastern Archaeological Conference, Tampa, FL.

Stephenson, D. K.
1990 Excavations at Hartford: A Fourth Century Swift Creek Site on the Ocmulgee River. Paper presented at the 16th Annual Conference on South Carolina Archaeology, Columbia, SC.

JOURNAL CONTRIBUTIONS OF CURRENT RESEARCH

Brooks, M. J.

1989 Fluvial Landform Evolution and Stability as Determined by the Archaeological Record. *American Antiquity* 54 (3): 654.

1990 Buried Sites in South Carolina's Estuaries: Possibilities and Implications. *COSCAPA Newsletter* 11 (1): 5.

EDITORSHIPS

Lewis, G. S.

Debitage (Bi-monthly newsletter of the Augusta Archaeological Society).

Sassaman, K. E.

COSCAPA Newsletter (quarterly newsletter of the Council of South Carolina Professional Archaeologists).

South Carolina Antiquities (annual journal of the Archaeological Society of South Carolina).

SEMINARS/WORKSHOPS

April 1990

Brooks, M. J. and K. E. Sassaman

Participated in a workshop for DOE-contracting archaeologists at the Annual Meeting of the Society for American Archaeology, Las Vegas, Nevada.

July 1990

Brooks, M. J.

Participated in a Cultural Resource Management workshop sponsored by the DOE in Santa Fe, New Mexico. Presented, with Ronald D. Jernigan, DOE SRS, a 45 minute presentation on the missions and accomplishments of the Savannah River Archaeological Research Program.

Crass, D. C. and K. E. Sassaman

Participated in South Carolina Heritage Trust workshop on the acquisition of archaeological sites in South Carolina.

PUBLIC SERVICE ACTIVITIES

December 1989

Lewis, G. S. and K. E. Sassaman

Laboratory analysis of materials from the Tinker Creek site (38AK224)

Augusta Archaeological Society.

January 1990

Lewis, G. S. and K. E. Sassaman
Volunteer excavations at the Tinker Creek Site (38AK224)
Augusta Archaeological Society.

Sassaman, K. E.
"Screwdrivers, Nailclippers, and Archaic Stone Tool Technology"
Presentation to 7th Grade, Camden Middle School.

February 1990

Lewis, G. S. and K. E. Sassaman
Volunteer excavations at the Tinker Creek Site (38AK224)
Augusta Archaeological Society.

Sassaman, K. E.
"Screwdrivers, Nailclippers, and Archaic Stone Tool Technology"
Presentation to Anderson Chapter of the Archaeological Society of South Carolina.

March 1990

Lewis, G. S., K. E. Sassaman and M. J. Brooks
Volunteer excavations at the Tinker Creek Site (38AK224)
Augusta Archaeological Society.

April 1990

Lewis, G. S., K. E. Sassaman and M. J. Brooks
Volunteer excavations at the Tinker Creek Site (38AK224)
Augusta Archaeological Society.

Sassaman, K. E.
Program Chair of the Annual Conference of South Carolina Archaeology
Archaeological Society of South Carolina.

Sassaman, K. E. and G. S. Lewis
"Savannah River Archaeological Research Program"
Display for Environmental Awareness Day, SRS

May 1990

Brooks, M. J. and G. S. Lewis
"Savannah River Archaeological Research Program"
Display for Beech Island Historical Society's Annual Heritage Day Celebration.

Brooks, M. J.
"Savannah River Archaeological Research Program"
Display for "Barnwell Fishing Rodeo: Get Hooked on Fishing, Not Drugs," sponsored by the South Carolina Wildlife and Marine Resources Department, Barnwell, S.C.

Lewis, G. S.
"Indians and Archaeology"
Presentation to Kindergarten, Stepping Stones, South, Aiken.

Lewis, G. S. and K. E. Sassaman
Laboratory analysis of materials from the Tinker Creek site (38AK224)
Augusta Archaeological Society.

Sassaman, K. E.
Volunteer excavations at Penny Creek Site
Anderson Chapter of the Archaeological Society of South Carolina.

"Screwdrivers, Nailclippers, and Archaic Stone Tool Technology"
Presentation to Athens Chapter of the George Society for Archaeology.

"Screwdrivers, Nailclippers, and Archaic Stone Tool Technology"
Presentation to C. Murphy Anthropology Class, Augusta College.

June 1990

Lewis, G. S. and K. E. Sassaman
Volunteer excavations at the Tinker Creek Site (38AK224)
Augusta Archaeological Society.

Sassaman, K. E.
Tour of the SRARP and excavations at 38AK157
C. Murphy Anthropology Class, Augusta College.

"Screwdrivers, Nailclippers, and Archaic Stone Tool Technology"
Presentation to Teacher's Summer Workshop, South Carolina Institute of Archaeology and Anthropology

"Material Culture of Coastal Plain Prehistory"
Exhibit for Colleton County Historical Society Museum.

July 1990

Lewis, G. S. and K. E. Sassaman
Volunteer excavations at the Tinker Creek Site (38AK224)
Augusta Archaeological Society.

Sassaman, K. E.
Tour of the excavations at 38AK157
Bechtel Engineers.

August 1990

Lewis, G. S. and K. E. Sassaman
Laboratory analysis of materials from the Tinker Creek site (38AK224)
Augusta Archaeological Society.

Sassaman, K. E.
Artifact Identification Day

Colleton County Historical Society Museum.

"Prehistoric Peoples of South Carolina"
Presentation to 11th Grade, Walterboro High School.

Sassaman, K. E., M. J. Brooks and D. C. Crass
Filming of SRARP operations
Update, Westinghouse Public Relations.

September 1990

Brooks, R. D. and D. C. Crass
Guided Tour for members of the Treadaway Family to 18th and 19th century family holdings on SRS.

Lewis G. S., K. E. Sassaman and D. C. Crass
Volunteer excavations at the Tinker Creek Site (38AK224)
Augusta Archaeological Society.

Sassaman, K. E.
"Prehistoric Peoples of South Carolina"
Presentation to 7th Grade, Langley-Bath-Clearwater Middle School.

Presentation on 38AK157 Excavations and Lab Analysis
Westinghouse Engineers.

"Archaic Period Prehistory in the Middle Savannah River Valley"
Presentation to First Presbyterian Church, Aiken.

Co-Organizer, Fall Field Day
Archaeological Society of South Carolina.

END

DATE FILMED

7/7/92