AN EVALUATION OF EXCAVATION STRATEGIES EMPLOYED AT THE ZEBREE SITE (3MS20): 1968-1976 FIELD SEASONS

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by

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David G. Anderson
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Chapter 1

INTRODUCTION

The purpose of this thesis is to critically evaluate field excavation procedures employed at the Zebree site (3MS20) between 1968 and 1976. The site, which contains extensive and significant prehistoric and historic archeological remains, is located along the Right Hand Chute of the Little River in northeastern Arkansas, immediately below the Missouri bootheel (Figure 1). Excavations were conducted at Zebree over four separate field seasons, in 1968, 1969, 1975, and 1976. Different field procedures were employed each season, which were implicitly or explicitly linked to specific research goals or hypotheses. Many of these procedures are common to American archeology; some are new and experimental in nature.

It is argued that a need exists within the discipline of archeology for the constant and critical evaluation of field procedures. Expanding contract programs that require accurate budgeting and resource allocation, and the need to tie research designs with practical, relevant excavation procedures are two major reasons for such an emphasis. Archeologists must recognize which field procedures are useful in a given set of circumstances, and which are likely to be inefficient or even detrimental. With proper evaluation and foreknowledge, field strategies can be effectively coordinated with project goals and hypotheses.

The field procedures used during the Zebree project are examined for their effectiveness relative to project goals and resources,

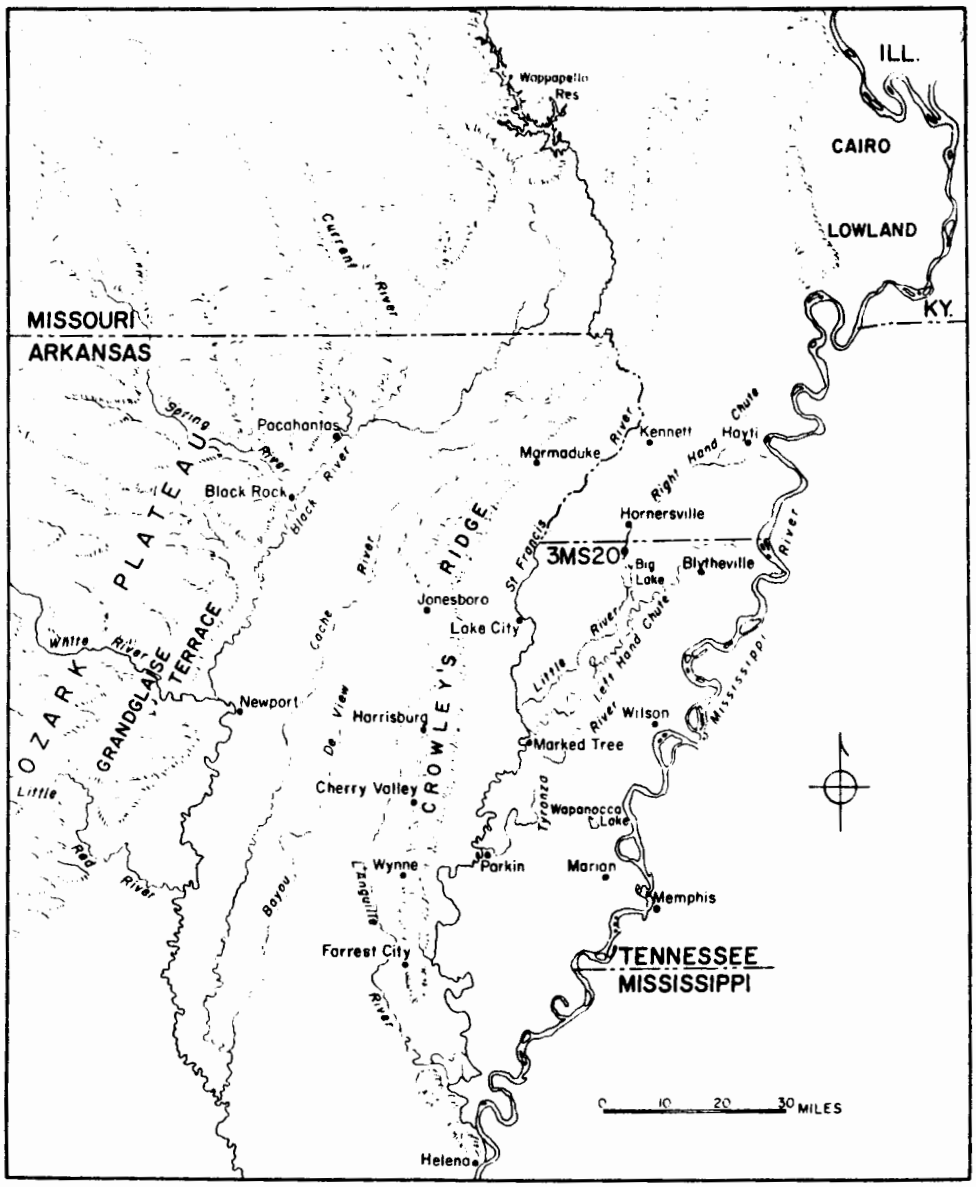

Figure 1. The location of the Zebree site (3MS20) in relation to primary topographic features, northeast Arkansas (from Morse 1975a:209).

and for their usefulness to archeological research in general. Advantages and disadvantages are equally stressed, and suggestions for improvement or refinement proposed, where necessary. This examination emphasizes such considerations as data gathering potential, time, practicality, and coordination with subsequent analyses.

The format of this thesis is tripartite, with major sections that are theoretical, historical/descriptive, and evaluative in nature. Chapter 2 is largely theoretical, and examines why a need exists for the evaluation of field strategies. The relationship between research design and research implementation is examined, based on the major premise that field procedures are the methods of data collection by which project hypotheses are tested.

Chapters 3 and 4 are purely historical in nature, and provide a detailed summary of the events leading to, and following, each field season at Zebree. Goals, preparations, general field conditions, as well as subsequent analyses and writing are reviewed. These chapters are also designed to place the project in perspective, in relation to ongoing archeological research in northeast Arkansas.

Chapters 5 and 6 focus on specific field procedures used each season, and provide a descriptive summary of excavation methods. These procedures form the basis for the analyses that follow.

The final section of the thesis (Chapters 7-11) focuses on a chronological evaluation of field procedures. Specific procedures

in use during any one season are however, evaluated in light of the total site information base available as of late 1977. The effectiveness of the 1969 auger testing program to reveal midden deposit depth, for example, is evaluated both independently and in conjunction with later, more detailed information about these same deposits recovered in 1975 and 1976.

Chapter 7 deals with the 1968 testing and the 1969 block unit operations. The use of auger tests and pothole scars to delimit stratigraphy is examined, as well as the efficacy of specific field recording procedures. The effectiveness of screening, as opposed to troweling and hand-picking excavation fill, is also investigated. Finally, some general comments on "intuitive" as opposed to "random" sampling procedures are presented.

Chapter 8 focuses on the 1975 field season, specifically on the random sampling strategy that formed a major portion of the field effort that year. The usefulness of small, randomly dispersed test units for the recovery of information about site content is examined, particularly in relation to specific goals of the Zebree project concerning component location, midden content, and post-depositional modification of site deposits. Problems in the statistical analysis of test unit, as opposed to single artifact, data (cluster vs. element sampling), and simple random vs. stratified sampling schemes are also examined.

Chapter 9 deals with the remaining field procedures used during the 1975 field season: the block unit excavations; the trenching

procedures; the various methods for on-site record keeping; and the washing, screening, and storage of artifacts. The use of a backhoe in field operations is examined, as are methods of dealing with site flooding. Field concomitants of fine screening are investigated, together with their subsequent demands during laboratory analysis. Finally, the effects of using differing screen mesh size are examined for several classes of site artifacts.

Chapter 10 concerns field procedures used during the final, salvage operations in 1976. The usefulness of various forms of heavy equipment are examined, including bulldozers, tractor log skidders, and draglines. The effectiveness of wide-area stripping operations for revealing features are discussed, together with concomitant logistical requirements, particularly feature delimitation, mapping, and removal. The uses of aerial photography in mapping and recording site destruction are also examined. Finally, quickly digging and then hand-picking feature fill as a field method is compared with procedures used during previous seasons.

The final chapter summarizes the preceding analyses, and includes a brief comparison of the results of each season. Broad suggestions by which excavation strategies might be improved or modified are proposed, should similar conditions be met in future investigations.

This evaluation attempts to go beyond specific methods for moving dirt, to encompass a wide range of field activities. The focus,

however, is on techniques of data recovery. Every effort has been made to achieve objectivity, although the close involvement of the author with the project made this difficult on occasion. Final judgment is in the hands of the reader.

Chapter 2

WHY EVALUATE FIELD PROCEDURES?

Introduction

As a discipline, archeology is constantly undergoing self-examination by its practitioners. Goals, subjects, methods, and writing format continually change, sometimes slowly, and at other times in an almost revolutionary manner. The middle to late 1960's, during the rise of the "new archeology", for example, was regarded by many as a time of rapid change in goals and theoretical orientation (Martin 1971, Willey & Sabloff 1973, Binford 1968). The winds carrying these changes have, however, for the most part died. The new formulations are either quietly accepted or ignored, with little of the previous fanfare, proselytizing enthusiasm, or acrimonious debate.

The last few years, it is argued, have seen the rise of yet another internal revolution profoundly affecting the profession of archeology. Unlike the previous revolution, which was theoretical in scope, the current activity focuses along organizational and methodological lines and is directly related to the tremendous upsurge in funding for archeological research. Theoretical foundations, for better or for worse, are relatively stable--archeologists generally know where they are going, or at least what they would like to do in their research. Their current problem is to determine how to get there; that is, how to best organize and direct resources to achieve desired research goals. The need for evaluation of field procedures (or any method of resource allocation) is particularly pressing in this regard.

Theoretical and Practical Reasons for Evaluation

Theoretically, field procedures are methods for the recovery of data relevant to project research goals. To recover information effectively, the investigator must be aware of the concept of research design (Hill 1972, Binford 1964); that is, what are the questions under investigation and how does one go about answering them? Choosing the proper field strategies is an important part of the design process.

Related to research design is the concept of archeological significance. Archeological remains are coming to be viewed as significant only in relation to their ability to inform on "specific research questions in substantive, technical, methodological, and theoretical contexts" (House and Schiffer 1975:163; see also Raab and Klinger 1977). Field procedures, as the primary methods of data observation, collection and recording, must be integrated into the total project. Through proper research design they can be directed towards questions of archeological significance.

A second reason why field procedures should be carefully evaluated is practical in nature: to increase their efficiency and cost-effectiveness. Proper evaluation prevents the repetition of mistakes and ensures maximum return on resources invested. This is increasingly important in light of the sharp upsurge in public funding, and scrutiny of that funding, for archeological research.

It has been suggested that the archeologist is a technician who acquires skill through long experience (Taylor 1948). This implies

that an archeologist must go through a long apprenticeship before becoming a grizzled, field-hardened veteran who can intuitively discern and apply proper procedures in a given set of circumstances. While some acquired motor habits may be involved in successful excavation, credit should be given to directed inspiration in addition to forced perspiration.

Linking Field Strategies with Research Design

Archeological fieldwork cannot be conducted in a vacuum. Field investigations invariably reflect the interaction of an investigator with a particular problem, or series of problems, the answers to which, hopefully, are to be found in the ground. In recent years there has been call for the development of sound, integrated research designs to guide archeological investigations (Binford 1964, Hill 1972, House and Schiffer 1975, Raab and Klinger 1977). Ideally, a project research design should make explicit the goals of the project and the methods used to reach these goals.

In the development of research designs the integration of theoretical models with recovery procedures must be considered. Models, by themselves, are of little value if the data necessary for the testing of hypotheses derived from them cannot be collected. When developed in conjunction with a project research design, field strategies should be explicitly stated both in terms of their employment and in their relationship to research problems and hypotheses (Redman 1973:66, 1975: 147, Asch 1975:170).

Field procedures should ensure maximum data recovery under the conditions imposed by time and money, and should strive toward productive results; data which are representative, reliable, and relevant to project goals (Binford 1964:139, Redman 1973:62-63). The explicit statement of strategy should not, however, preclude flexibility or even innovation once in the field. Diverse procedures that can shed light on a series of hypotheses or research questions should be implemented wherever possible (Asch 1975:172-173, Redman 1973, South 1974). Thus, if the resolution of one or more hypotheses proves infeasible, the entire design and field procedure need not be scrapped and reformulated in midstream. Ideally, field procedures should be opportunistic and provide for the effective exploitation of unforeseen yet significant discoveries (Brown 1975:156).

Beyond the testing of behavioral hypotheses, field strategies must also inform on natural formation processes or n-transforms (Schiffer and Rathje 1973, Reid, Schiffer and Neff 1975). These consist of post-depositional natural processes that affect the archeological deposits. In other words, the effect of the natural environment on the archeological remains must be considered. Ideally, the methods for determining this effect should be incorporated into the project research design and operationalized as a part of specific field strategies.

A final point to consider is that the development of specific excavation procedures, and indeed all aspects of research design, should benefit from previous investigations on the site or in the area. The triumphs and tribulations of past work can be equally instructive, and

should always be considered (Reid, Schiffer & Neff 1975:216, Redman 1973, 1975:150-151).

Practical Considerations in the Evaluation of Field Strategies

While the selection and employment of field procedures must be intimately related to project goals, the linkage between theory and practice seems to be only infrequently realized. Most archeological reports tend to emphasize the results, and not the methods, of the excavations they describe. Discussion of field procedures rarely goes beyond strict description into the realm of evaluation, except perhaps to provide a melodramatic backdrop for enumerating harrowing experiences involved in the collection of archeological data. Even where research hypotheses are solidly linked to specific field procedures, the final report may be organized in such a manner as to obfuscate or overlook problems that developed in their implementation.

This preoccupation with research results is, to a large extent, forgivable, since they are the objective. What is suggested, however, is that more attention be devoted to the methods by which results were achieved, particularly successes and pitfalls met along the way. In any field work, technical difficulties arise which must be overcome, and occasionally outright mistakes occur. While it may be rooted in human nature (or perhaps in Euro-American culture) to accentuate accomplishment and ignore methods or mistakes (especially if tedious or embarrassing), the latter, too are important. The field should be the last place to solve problems from scratch.

Another practical reason for evaluation concerns the nature of collected data. Many field procedures which are easy to adopt may produce data incompatible with project goals. A specific field procedure useful in one situation may not be successful in another. Judicious planning during research design should reduce this possibility, however. A more significant problem is the relationship of field recovery procedures to available resources. Are selected procedures realistic in terms of budgeted crew and/or laboratory analysis facilities? It may be possible, for example, to collect large quantities of data that are in effect worthless because analysis resources are not available.

The days of excavation for the sake of excavation, and to provide unborn generations of graduate students with term projects are fading. Modern archeological research emphasizes all aspects of the endeavor, from research design through report publication (Stephenson 1963; McGimsey and Davis, eds. 1977). This attitude has, to some extent, been forced upon the profession: contracting agencies are understandably intolerant of uncompleted reports or poorly directed funds. Archeologists must now plan all aspects of a project, in order to win proposals, conduct field work, and meet report deadlines. This necessitates efficient allocation of resources: obtainable research goals must be set, and field and laboratory procedures adopted accordingly. Field work is no longer regarded as the culmination of archeology, but part of a larger research process that begins with design and ends with publication.

The Efficacy of Evaluation: Some Examples

A number of texts delimit methods of field excavation and activity (Hole & Heizer 1969, Hester, Heizer & Graham 1975), and descriptions of specific field procedures may be found in good survey or excavation reports. Other volumes give individual accounts of past field work, particularly those by Wooley (1954), and recently Willey (1974). The former category are largely "how-to-do-it" books, while the latter tend to fall into the category of personal reminiscences.

Field manuals tend to assume that the reader will take a measure of intelligence and common sense into the field, and consequently de-emphasize problems. In most cases these texts also assume that the investigator knows the kind of and how much data can be produced by a given technique, an assumption that may be unjustified. Personal reminiscences, in contrast, tend to be more valuable in that problems are usually brought to light, although often in an unorganized manner. These accounts however, while engrossing and amusing, are often too far removed from the realm of critical evaluation to be more than of passing or historical interest. In particular, they often emphasize the spectacular at the expense of the mundane.

Field Survey Evaluations

In recent years, an important body of literature evaluating field surveying procedures has appeared, that has important implications for excavation evaluation. First, the occurrence of an "evaluation syndrome" is important. Critical evaluation of field surveying procedures is not new to archeology (e.g. Phillips, Ford & Griffin 1951:39-45), but until recently it has been relatively uncommon. The last decade,

however, has seen a veritable explosion in studies concerned with survey methodology, from sampling procedures to specific methods for discovering, recording, and collecting artifacts (Schiffer & House 1975, Mueller 1975, Klinger 1977, Ferguson & Widmer 1976).

There has been a tremendous increase in archeological survey activity recently, notably due to the requirements of the National Environmental Policy Act (NEPA) of 1969 (McGimsey 1972, Lipe & Lindsey eds. 1974, McGimsey & Davis, eds., 1977). Much of the modern evaluative literature, therefore, is natural fallout from increased survey demands. With the passage of the Moss-Bennett Act in 1974 (releasing major funds for excavation), and as more NEPA-generated surveys lead to a major excavation, a corresponding increase in excavation evaluations will probably occur.

A second important implication of survey evaluation is an increased awareness of the nature of archeological data, and data analysis Many sampling techniques currently used in archeological field work derive from survey activity. Survey research has led to papers describing the effects of collector behavior and other post-depositional modification agencies (Morse 1973a, Schiffer & House 1975). These, in turn, are bringing about a better understanding of what collected artifacts represent in relation to original site deposits. House & Schiffer's (1975:175-1975) concept of the "size effect"--that larger artifacts are overly represented on site surfaces and hence more likely to be curated or collected--derives from surveying activity yet it is crucial to the interpretation of excavation assemblages. Surface collections have also been employed to

delimit surface-subsurface relationships, to guide excavations (Redman & Watson 1970, Binford et al 1970).

Many survey procedures incorporate methods for quickly examining and evaluating subsurface deposits; hence, the "survey" portion of a multistage project may actually be the first stage in excavation. Power augering, posthole digging, shovel testing, and raking away vegetation are techniques that have received considerable attention in recent years (Percy 1975, Ackerly 1976, South & Widmer 1976). Electronic sensing devices (Steponaitis & Brain 1976) are also an initial survey activity linked to subsurface investigation.

Evaluations of field survey methodology also provide forceful examples of the need for practicality. Controlled surface collections have recently become popular (Redman & Watson 1970, Binford et al 1970), but to date most of the reports have tended to underemphasize their occasionally spectacular field and analytical requirements. As Johnson (1973:24-27) has indicated, the collection of even small sample fractions from large, artifact-rich sites may result in the accumulation of literally tons of material, assemblages nearly impossible to analyze.

Survey evaluations have yielded unexpected yet important results, and it is probable that the same will occur when excavation procedures are closely examined. South and Widner (1976:19), for example, found that hand-operated posthole diggers were more efficient than power augers for initial subsurface testing. Similarly, Morse (personal communication) has noted that the period immediately after plowing (with no rainfall) is probably the worst time to detect surface artifacts.

Field Equipment Evaluations

Field procedures have not been the only focus of attention. More and more reports concern the design and operation of field equipment. In particular, several descriptions of mechanical sifters have appeared, together with some discussion of their efficiency and effects on artifacts (Michie 1970, Guerreschi 1973). At the 1976 meeting of the Southeastern Archeological Conference a symposium was conducted on artifact recovery from shell midden sites, focusing primarily on field equipment (Ryan 1976). Aten (1971) has discussed the effects of both water and fine screening on shell midden artifacts. A number of papers have examined the efficiency of flotation equipment (Streuver 1968a, Watson 1974, 1976, Dye & Moore 1977), and a growing literature attests to the effects of varying screen mesh size on recovered artifacts (Thomas 1968, Flenniken 1975, Roth 1976). Other papers have outlined potential damaging effects of specific equipment on archeological remains (Sense 1973, Powell 1977). Most lithic specialists, for example, are painfully aware of the effects of improper field packing on stone tools: bag damage is an unfortunate form of retouch that must be controlled.

Field Excavation Evaluations

Numerous articles have described and, in many cases, evaluated specific excavation procedures. The Hester, Heizer, and Graham (1975) volume on Field Methods in Archaeology provides the best single review of this literature. In addition, papers have appeared that outline theoretical considerations behind large-scale excavation (Streuver 1968b, Redman 1973, South 1974, Brown 1975). As noted, much of this literature is either implicit or incidental. Few studies have actually made use of

quantified or even descriptive field data to support their claims. This thesis, hopefully, marks a step beyond this level.

Perhaps the major consideration in the selection of field procedures may be that alluded to by Braidwood (1973:39). Throughout the history of archeology, the most significant results have occurred where the data can be processed, analyzed, and reported. The classic site reports are those that employed carefully collected data toward the resolution of specific problems, and that maximized the information potential of the material at hand. Field procedures that are not conducive to efficient data collection, analysis, and reporting, probably do more harm than good.

Chapter 3

A HISTORY OF THE ZEBREE ARCHEOLOGICAL PROJECT: 1967-1974

The Discovery of the Site

In late August 1968 two test pits were excavated at the Zebree site. The results of this test led to more extensive operations on the site in 1969 and in subsequent years. The history of excavations at the site begins, therefore, with this test, and the reasons why it was undertaken. In a very real sense the excavations at Zebree also parallel the modern development of archeology in Arkansas.

The Arkansas Archeological Survey was created in 1967 with the passage of Act 39 by the state legislature (McGimsey 1972:66). The enabling legislation provided for the establishment of Survey archeologists and research stations at state universities and colleges. Three stations were established during the first year of the Survey's operations, and Dr. Dan F. Morse was hired to fill the position at Arkansas State University in Jonesboro.

Early in September of 1967 Morse arrived in Jonesboro to assume his duties as Survey Archeologist for northeast Arkansas. He soon became involved in a wide range of salvage operations, necessitated by the tremendous amount of site destruction occurring in the area (e.g. Medford 1972). In October of 1967 a local collector, Rufus W. Lyerly of Jonesboro, informed Morse about several sites endangered by planned ditching operations near the Big Lake National Wildlife Refuge in Mississippi County (Figure 2).

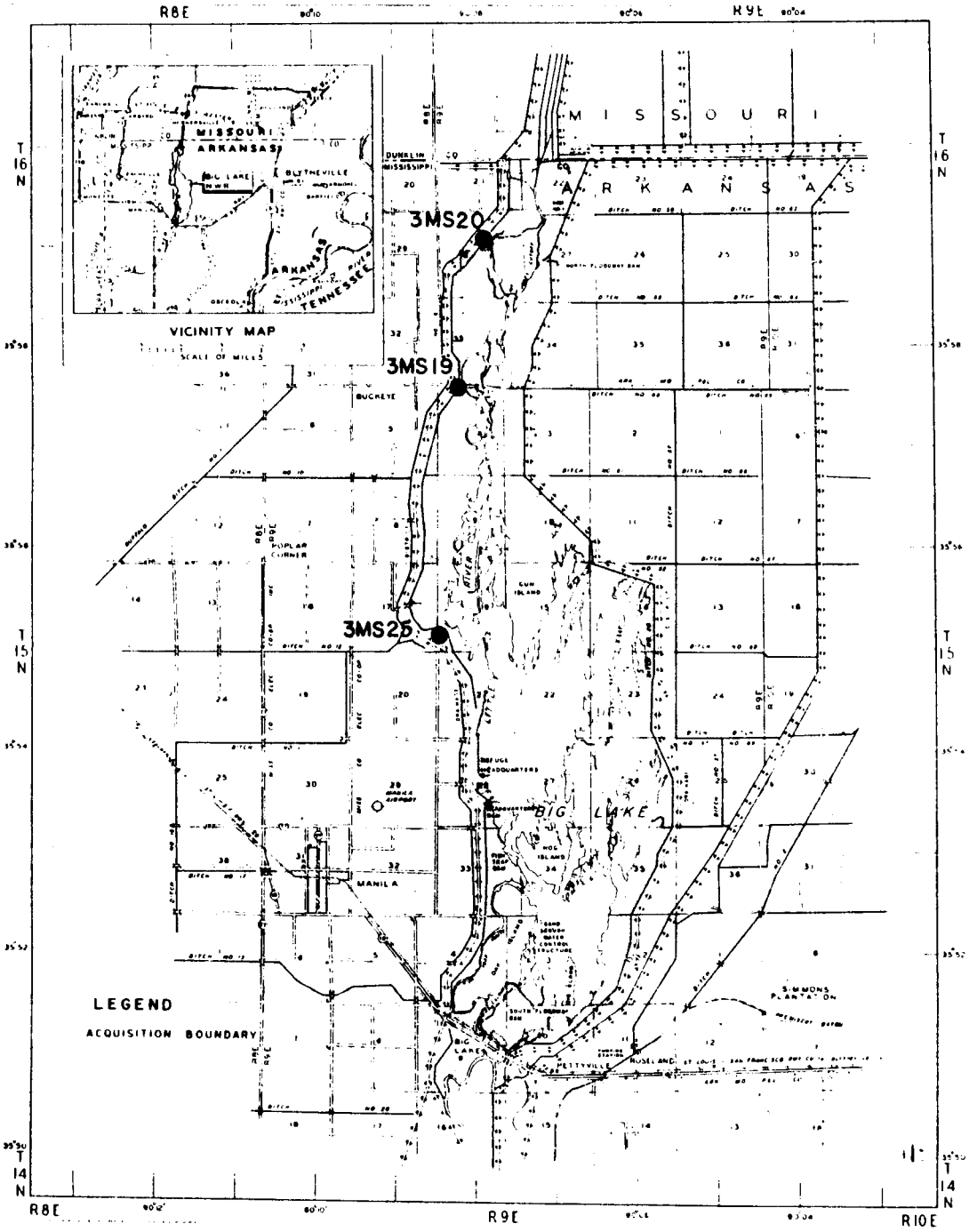

Figure 2. Archeological sites in the Big Lake National Wildlife Refuge, Mississippi County, Arkansas (Base map courtesy U.S. Department of the Interior Fish and Wildlife Service).

On October 21, 1967 Morse and Lyerly visited the Big Lake area; one of three sites that they examined was Zebree. Although the site was densely overgrown, a number of potholes were apparent, and a collection of artifacts (mostly sherds) was obtained from the backdirt piles. Several of the potholes were at the north end of the site, and there was a large pothole to the south on a low rise that Morse felt may have been a prehistoric house mound. At this time, Zebree and a neighboring site at Buckeye Landing were recorded in the Survey site files as 3MS20 and 3MS19.

Artifacts recovered from the sites included sand-tempered Barnes cordmarked (Williams 1954:204) and shell-tempered plain and red-filmed sherds, and formed an assemblage previously unreported for northeast Arkansas. By a rather unusual coincidence Morse was at the 24th Southeastern Archeological Conference in Macon three weeks after visiting Zebree, and at the meeting Richard A. Marshall described some of the artifacts associated with sites he had been excavating near Hayti, Missouri, some forty miles to the northeast (Marshall 1965, 1967). The ceramics reported were virtually identical to those found at Zebree and Buckeye Landing. Near Hayti the assemblage was considered to be early Mississippian in age. The Big Lake assemblages, if related, represented the earliest probable Mississippian materials known for northeast Arkansas.

On November 18 Morse and Lyerly revisited Buckeye Landing (3MS19) and the third site, previously unreported, that was located on land owned by the Manila School District. Several potholes were evident, and apparent Hayti phase artifacts were noted in the spoil dirt. In a quick spot test Morse profiled one of the larger potholes, revealing the remains of an

extended burial, and recovering a small slate celt. This site, reported as 3MS25, was named Cottonwood Point.

All three sites (3MS19, 3MS20, and 3MS25) appeared to contain early Mississippian Hayti phase artifacts, and all were threatened with complete or partial destruction if ditching was undertaken. In late November Morse wrote the Manila School District asking permission to test 3MS25 if necessary. At that time he wrote the Warden of the Big Lake National Wildlife Refuge, to ask about the proposed ditching operations, and to obtain permission to map the two sites (3MS19, 3MS20) that were on federal (Refuge) property.

Through the cooperation of Mr. Bobby Brown, the manager of the Refuge, formal permission was obtained in December to map the Zebree and Buckeye Landing sites. Mr. Brown also ensured that these sites were posted, to help deter future pothunting activities. Permission to test 3MS25 was also obtained from the Manila School Superintendent's office. On January 18, 1968 Morse and Lyerly revisited Zebree, accompanied by Mr. John Ellis, the Refuge Game Warden. The site was extremely overgrown in spite of the cold weather, and it was possible to produce only a rough sketch map at that time.

Preparation for the 1968 Test

Although ditching was planned, the nature of the project or when it would be carried out were uncertain. In January, 1968 the State Archeologist, Hester Davis, contacted the Little Rock District Office of the Army Corps of Engineers, asking for details of the project, and

appraising them of the existence of three archeological sites in the probable impact zone. The project came under the jurisdiction of the Memphis District Office, and plans delimiting the area of construction were sent to the State Archeologist's office in early February. Although it was not known when ditching would actually begin, a completion deadline of "no later than calendar year 1972" was indicated (Michaels: letter to Hester Davis dated 2 February 1968).

Since site destruction seemed inevitable, the Survey decided to initiate salvage operations. A testing program was considered essential to assess the archeological significance of each site, and for planning subsequent full-scale salvage operations. A formal proposal describing the purpose, methods, and requirements of a testing program was prepared, and was submitted to the Department of the Interior on April 24, 1968 (Morse and McGimsey 1968). Under the terms of this proposal, the Arkansas Archeological Survey agreed to fund the entire cost of the operation. The proposal was accepted, and on June 14 an Antiquities permit sanctioning the testing was issued, under the provisions of the Antiquities Act of 1906. Actual field operations occurred from August 5 through 30, under the direction of Morse.

Test excavations were not conducted in a theoretical vacuum, undertaken merely because large sites were endangered. The early Misssissippian character of the sites was recognized, and both the cultural-historical and processual research potential of the situation was identified. In particular, it was noted:

> These sites are important for understanding the history of this immediate area, for interpreting the chain of events and forces involved in the Mississippi Valley at this time and their effects on the remainder of the Eastern United States in the next few centuries, and for gathering information on the process of acculturation from one culture to another (Morse and McGimsey 1968:1-2)

In 1968, the sites represented the only distinct early Mississippian occupation in Arkansas, and were regarded as reflecting the initial spread of the complex into the region from the north.

The 1968 Testing Operations at Big Lake

A total of 18½ days were spent in the field during the 1968 testing at Big Lake, with six days spent at 3MS25, 4½ days at 3MS19, and eight days at Zebree, the last site examined. Specific field procedures employed during this and subsequent seasons at the site are summarized in Chapters 5 and 6. At Cottonwood Point (3MS25) five test pits were opened, only two of which produced subplowzone features in the form of deep pits. Several sand and shell-tempered sherds were recovered, together with animal bone, sherd abraders, a single point and a few flakes of local chert, a bone gouge, two bottle stoppers, a polishing pebble, and miscellaneous items. A single charred hickory nut fragment and a mud dauber's nest suggested a possible fall occupation, while the large amounts of fish and bird remains indicated spring through fall activity. Site deposits were extensively disturbed by recent historic activity, including the construction and later removal of a levee, the placement of several buildings known as Rice Landing in the area earlier in the century, and the depredations of a number of recent pothunters. Where prehistoric artifacts were found, they resembled those found at Zebree and on the Hayti phase sites to the northeast.

The second week of testing was spent at 3MS19, the Buckeye Landing site. Two test pits were opened, and subplowzone features were found in each, although few artifactual remains were encountered. Both sand and shell-tempered ceramics were recovered, including fragments of at least two hooded bottles. A close similarity with the Hayti phase materials was again evident. At both the Cottonwood Point and Buckeye Landing sites, Barnes cordmarked, Varney red-filmed, and Neeley's Ferry Plain were the predominent ceramics recovered, with only incidental occurrences of other wares. Buckeye Landing, like Cottonwood Point, had been under cultivation for a number of years. It had also had historic buildings on it dating from earlier in the century. The deposits were relatively shallow at both sites and devoid of artifacts, or they had been largely removed by past historic activity.

A total of eight days were spent at Zebree. Field work consisted of the excavation of two test pits intuitively placed on high areas within the site. At the time of testing the site was covered with dense vegetation. The only access was by boat, over the ditch. Two low rises were located on the southern and western portions of the site; the former was marred by a single pothole and the latter by nineteen (Figure 3). These rises were referred to as Areas A and B during the 1969 and subsequent excavations. The first test, on the southern rise in Area B, consisted of squaring up and then expanding the solitary pothole. The second test, located on the northwestern rise, was a 2½ by 2 meter pit placed in the middle of the large cluster of potholes.

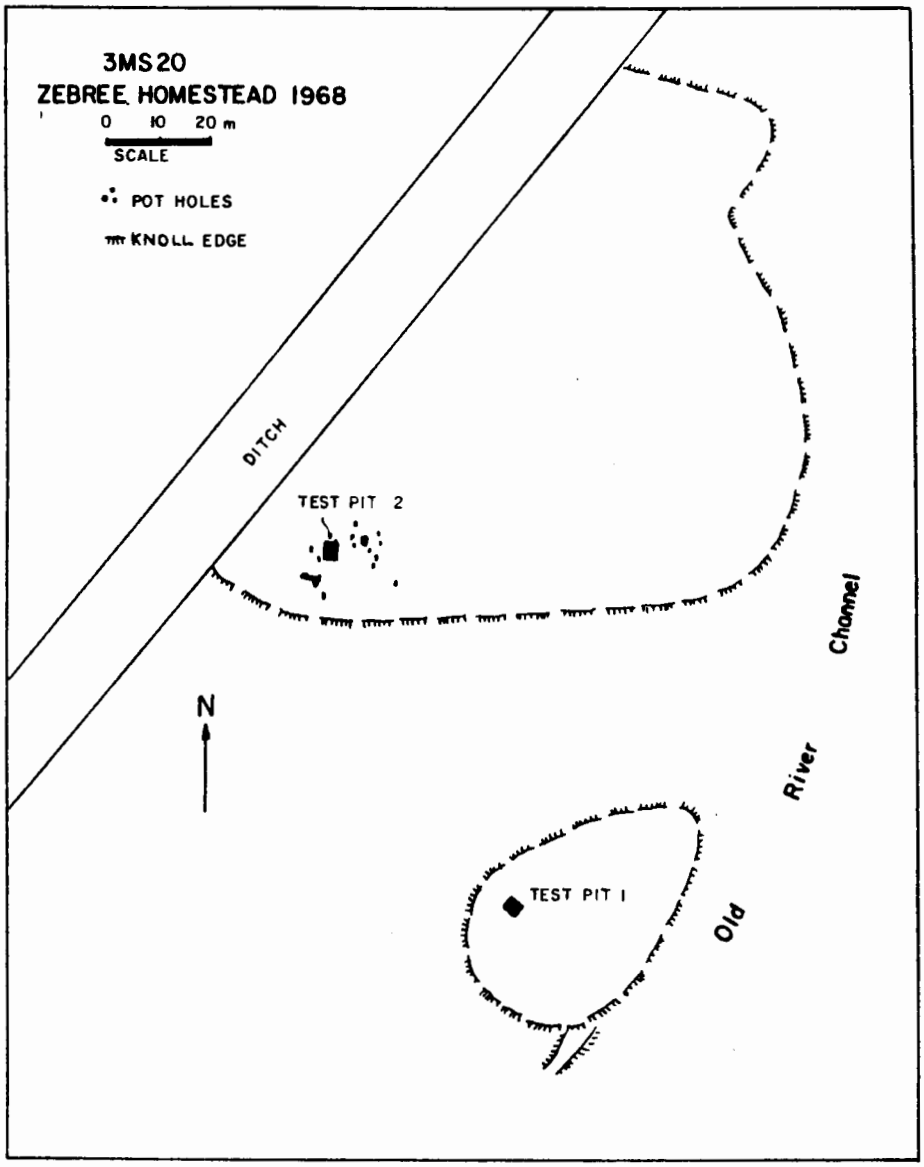

Figure 3. The Zebree site as envisioned in 1968, showing the locations of visible pothole scars and Test Pits 1 and 2 (from Morse 1968:13).

A rich artifact assemblage was recovered from the testpits, and distinctive late Woodland, early Mississippian, middle Mississippian, and historic components were recognized. Except for the early historic occupation detected only during the final salvage in 1976, all major site components were recognized by this test. Late Woodland and early Mississippian artifacts were noted in both sites, and evidence for a slightly later, middle Mississippian occupation was noted in the test on the northern rise (Area A). Test Pit 1 produced a meter of stratified deposits, with pure late Woodland (Barnes) materials separated from early Mississippi midden by a distinctive and relatively artifact-free layer. Evidence of a comparatively recent historic occupation was noted in the upper 20 cm of the deposits, which was interpreted as reflecting the late 19th to early 20th century Sebree homestead. Later investigations demonstrated this to be the location of the Sebree house. Both pits exposed complex patterns of features, in addition to producing large quantities of bone, shell, ceramic, and lithic artifacts. In the base of one of the features in the Area A test, several microlithic tools and cores were found, associated with several fragments of both worked and unworked conch and mussel shell. Two reconstructable Barnes vessels were found in the other unit. A total of 15 features, in addition to 14 postmolds, were found in both units.

Initial Reaction to the Testing Results

The results of the 1968 testing operations near Big Lake were summarized in a report submitted to the Department of the Interior in November of that year (Morse 1968). Included in that report were general descriptions of excavation procedures, site artifact and feature contents, evaluations of significance, and recommendations for future salvage

operations. Detailed analysis and description were deferred in the anticipation that more extensive work would be undertaken on each site. The similarity of the early Mississippian material at the Big Lake sites to Marshall's (1965, 1967) Hayti phase materials to the north in Missouri was recognized. A separate Big Lake phase was proposed, however, encompassing the early Mississippian occupations at the three sites tested (Morse 1968:20).

In the initial report, additional work was recommended at all three of the sites tested. In particular:

> Three weeks work each at 3MS25 and 3MS19 should be sufficient to provide an adequate sample of the material which remains at these two sites. The importance and potential of the Zebree site (3MS20) is such that intensive, prolonged excavation there is highly recommended. In order to recover the data which remains, two 3-month field seasons might well be necessary, with a crew of at least 10, plus others for processing the large quantity of material which will be recovered. The importance of salvaging the information contained in this site cannot be stressed too greatly (Morse 1968:21).

The emphasis on Zebree reflected the site's rich and stratigraphically distinct late Woodland and early Mississippian components. Further excavations at the site could:

> provide valuable if not unique information on (1) the end of the Woodland occupation in the area, (2) an initial acculturation to Mississippian, and (3) a stronger and possibly more direct relationship to a major center of Mississippian development, the Cahokia site near St. Louis (Morse 1968:16).

Specific field procedures and research problems were suggested for consideration in the event of additional excavation funding. The use of flotation and the collection of pollen samples was recommended to help probe the relationship of agriculture to the spread of Mississippian. Uses to which particular features or artifact classes were put by site occupants were also suggested as problem areas to consider in future investigations.

The Big Lake Sites in Perspective: Early Models on Emerging Mississippian in Northeast Arkansas

The investigations near Big Lake in 1967 and 1968 were only a small part of the research, survey, and testing activity taking place in northeast Arkansas at that time. One of Morse's primary research plans was to record as many sites and obtain collections from as wide a spatial and temporal span as possible. The purpose of this activity was to provide some control in subsequent interpretations of prehistoric occupation in the general area (Morse 1973a). Previous research tended to focus on the later Mississippian occupations, with their prominent mound groups, and a need existed to determine the nature of both earlier and more prosaic assemblages. Accordingly, whenever possible field work, largely of a salvage nature, was undertaken during this period. Concurrent with the initial reconnaissance near Big Lake, during the late fall and winter of 1967-1968 Morse was also involved in an extended salvage operation of another early Mississippi complex near Weona, where a series of knolls on the Hyneman property were being leveled. Hurried salvage operations occurred continually at this time. The testing of 3MS19 at Big Lake was even interrupted for one day to permit the salvage of some information from the leveling of the large pyramidal mound at the Hazel site (Morse 1973b).

The purpose for the 1968 testing was primarily to help plan later excavation. At the same time, however, the information recovered from the Big Lake sites was incorporated, in conjunction with information from other sites in the vicinity of northeast Arkansas, into tentative models about the emergence of Mississippian in the area (Morse 1969a).

In late 1968 Morse (1969a) completed a summary of northeast Arkansas prehistory, as it was viewed on the basis of information collected to that date. Late Woodland sites were noted as common in the region, in contrast to an extreme dearth of early and middle Woodland sites. The occurrence of sand-tempered (Barnes) and grog-tempered (Baytown) ceramics on large numbers of sites was noted. Their distributions were considered to be generally mutually exclusive, with Barnes restricted to the Upper St. Francis River and the Right Hand Chute of the Little River (Morse 1969a:20). Although sand-tempered (and rarely the grog-tempered) wares were assumed to continue in use into the initial Mississippian, the late Woodland nature of some of the Zebree deposits was noted.

At least three phases of initial Mississippian were recognized in northeast Arkansas at this time, all the result of work during the previous two years (Morse 1969a:20-22). One site near Newport along the White River (3JA16) was put into the Adams phase, two sites near Weona along a remnant of a former Mississippi River channel were put into the Hyneman phase, and five sites along the Little River (including the three tested in 1968) were placed in the Big Lake phase. All three early Mississippian phases were tentatively dated to between AD 900 and 1100, and a close cultural relationship was inferred with the late Woodland complexes in the same areas. Rapid changes in ceramics and possibly cooking and subsistence patterns were indicated, although burial and hunting patterns appeared to be relatively stable, continuing the Woodland tradition. The Hyneman phase sites were recognized as similar to those near Big Lake, and both phases were recognized as similar to the Hayti phase in southeastern Missouri (Marshall 1965). The Adams phase materials were

considerably different, resembling more a developed Baytown, with little shell tempering evident, and a mostly plain or cord marked grog-tempered assemblage.

The Big Lake phase sites in late 1968 were viewed as part of a larger pattern of emerging Mississippian in the central Mississippi Valley. A primary research concern was that of tying down local (northeast Arkansas/southeast Missouri) manifestations of this emergence. Rapid acculturation, rather than direct colonization, was suggested as a probable mechanism, although a definite change in settlement pattern and subsistence economy was indicated (Morse 1969a:22). A clear sense of problem-orientation regarding the origins of Mississippian in the area had developed in the area by late 1968, and suggestions for further examination and investigation were being proposed. It was suggested that effort focus not only on the known initial Mississippian sites, but also on some of the larger, later sites for evidence of earlier occupations, and for change over time (Morse 1969a:21).

Preparation for the 1969 Excavations at Zebree

In April 1969 a formal proposal was submitted to the National Park Service for extensive salvage operations at the Zebree site (Morse and McGimsey 1969). Although all three of the Big Lake phase sites tested the year before were regarded as containing significant information, attention focused on Zebree because of the unusual nature of the deposits and artifacts found there. This focus was partly due to uncertainty concerning the planned ditching. If it was to quickly come about, the unusual nature of the Zebree deposits needed to be maximally exploited. Funding was

requested for eight weeks of field work by an archeologist and a crew of seven, and for a similar period of laboratory processing by a crew of three. The level of the operations was considerably below that originally suggested by Morse, which was in part due to a need to better understand the site situation. Morse's call for at least two three-month field seasons at Zebree after the 1968 testing (Morse 1968:21) appears to have been an accurate, if not somewhat conservative, appraisal of the situation. In planning for the 1969 excavations, however, proposing and implementing such an effort on the basis of only two test pits was more or less untenable. At the time it was also assumed that if important discoveries were made during the field operations, additional excavations at the site might be possible.

The basic goal of the 1969 excavation was to recover as much information about the site and its contents as possible. Under the terms of the Antiquities Act, the proposal also included provisions for the processing, analysis, and storage of artifacts and other remains encountered. Two conditions of the proposal were that a preliminary report of the excavation's findings was to be submitted within six weeks of leaving the field, with a final report due one year after the completion of field work.

Planning for the excavation proceeded during the spring of 1969, both prior to and after submission of the proposal at the end of April. Equipment was assembled, a crew hired, and provisions made for camping on the site. The proposal was quickly reviewed, and the budget, for $8,900.00, accepted. Toward the end of May 1969 Mr. Bobby Brown, the Manager of the Big Lake, National Wildlife Refuge, had a crew open up a field road through the woods on the eastern site of the ditch. This road, connecting with a

logging bridge across the ditch a mile and a half below the site, permitted the transportation of heavy equipment and supplies directly to the site. On June 11 an Antiquities Permit sanctioning the excavations was issued, and actual field work began on June 16.

The 1969 Zebree Excavations

A total of nine weeks were spent in excavation, from June 16 to August 16. The crew consisted of Morse, a field assistant, and from four to eight laborers, usually averaging five. The general strategy was the removal of two large block units placed on high areas within the site, near the locations of the 1968 pits (Figure 4). Scattered test pits and auger holes were also employed, in an effort to delimit the site boundaries. The excavations proceeded by the removal and screening of contiguous 2 meter squares, and tremendously rich deposits were soon encountered. Morse's Annual Report for fiscal year 1969, written at the end of June of that year, highlighted the importance of the site; which at this time Morse considered Zebree the probable center of the Big Lake phase.

Working conditions, usually ignored or glossed over in formal elaborations of field procedures, are worth recounting to provide a perspective on how the data were recovered or, more accurately, what the crew underwent to get it. The immediate area of the site had been homesteaded and farmed earlier in the century, but by 1969 had been overgrown for more than 20 years. The main channel of the Little River was some 100 yards to the east, and the intervening area was flat and subject to periodic flooding. With the ditch to the west, only a slight rise in the water level was necessary to turn the site area into an island. A boat was kept on the

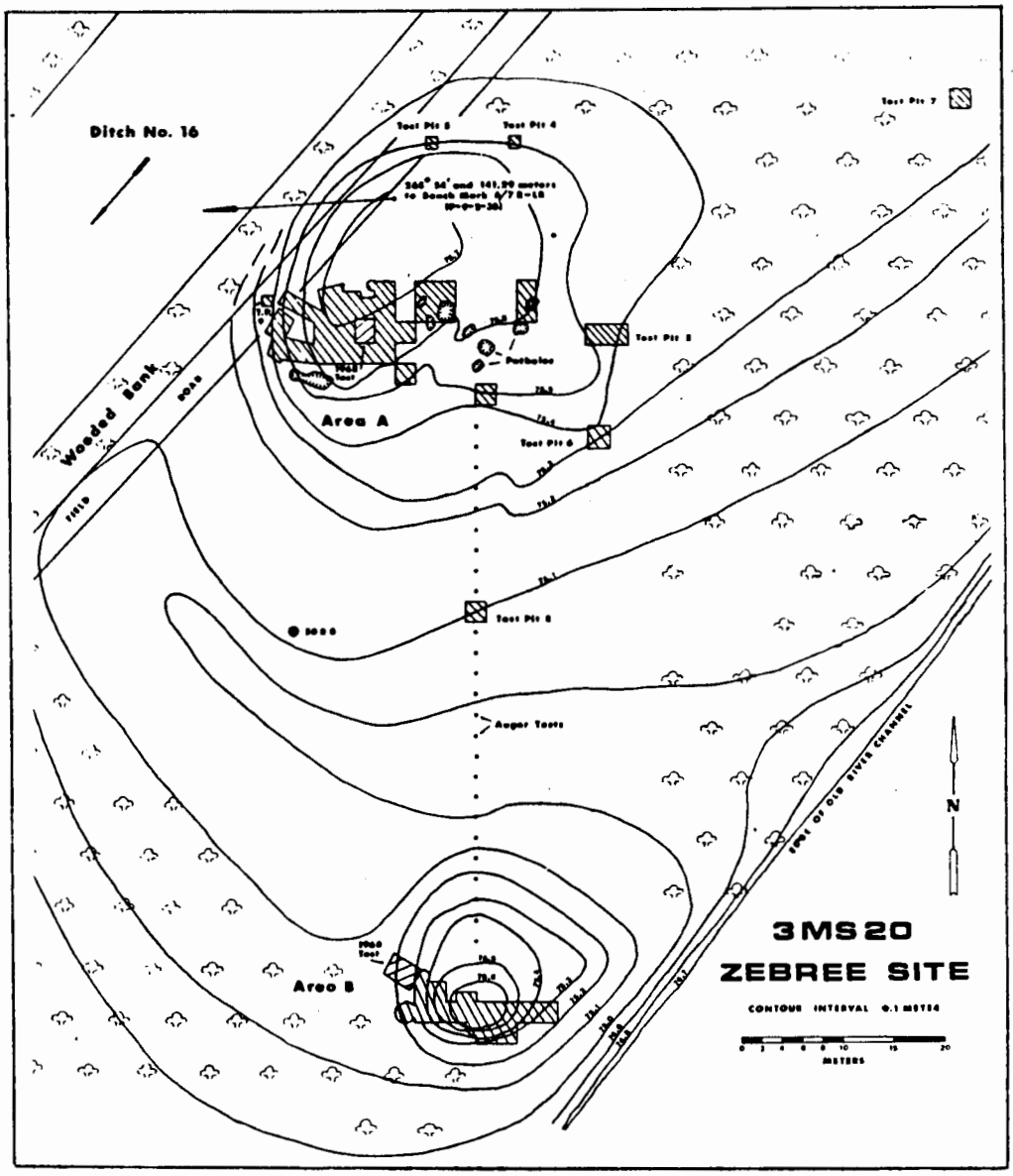

Figure 4. The Zebree site as it was viewed in 1969, with the locations of all 1968 and 1969 excavation units. The full extent of the deposits had not yet been realized, with Test Pit 7 assumed to lie at the extreme periphery (from Morse 1975a:8).

site, both for daily access and escape from flooding. One vehicle that had been driven onto the site was stranded for over a week when rain and high water closed off the access road.

Regular access to the site was by boat. Farm roads across the ditch to the west (on the other side of the levee) provided a relatively secure transportation route to the point of embarkation, although these too became clogged with mud during and after rainstorms. During the first week, three full days were spent clearing underbrush and small trees from the two highest areas of the site, where the block units were later removed, and a campsite established between them. Dense vegetation and the proximity of shallow standing water provided an ideal environment for mosquitos, and extensive and periodic sprayings with insecticide were necessary. The combination clearing and spraying activities reduced the numbers of mosquitos in the site area, at least during the day, but it was still often necessary to wear long sleeved shirts. The action against the mosquitos had unexpected side effects. By clearing areas of the site, an environment apparently favorable to gnats was produced. While they did not sting or bite, the gnats did manage to get into just about everything: food, hair, eyelids, and even under clothes. They appeared to thrive on insecticide. While never a serious problem, insects were a continual minor annoyance. Once clearing was completed, poison ivy cases began to decrease. Fortunately, snakes or ticks, the usually oft-told perils of southeastern excavations were never a serious problem.

As in most archeological excavations, trees and backdirt piles were at least occasionally located over areas which needed to be examined. In the second week of the excavation, there was a bad rain and hail storm, and it frequently rained at night. Little time was actually lost due to rain (since the work was made up on weekends), but the damp weather made screening operations difficult. When the river and ditch water levels rose, the water table was reached in a number of units while still in artifact-rich deposits. These fill from these units had to dry or be pressed through the screen. Temperatures were generally over 90° during the day, and for one nine-day stretch were over 100°. Humidity was near 90 percent, the stadia rod warped, cloth bags rotted, and mildew was universal. In the last three weeks, the weather was pleasant, but the excavations were halted in mid-August when Hurricane Camile came up river and the resulting rain flooded the site.

In spite of these problems, crew morale was high and much was accomplished. A total of 180 square meters were opened, 92 from a block in Area A, 54 from a block in Area B, and the remainder from a series of test pits of varying sizes scattered to the north, east, and south of Area A. A tremendous quantity of artifacts was recovered (over 40,000 sherds alone), which were regularly carried back to the Survey Station lab in Jonesboro for processing. The laboratory crew was so efficient that by the close of the excavations, all but the last two weeks of materials had been washed, cataloged, and temporarily stored. In all, 153 features were recorded, including over 100 pits, 8 human and 2 dog burials, all or parts of 8 structures, several natural disturbances, and a number of concentrations of lithic, ceramic, and shell artifacts.

Other Field Activity in Northeast Arkansas During 1969

The summer 1969 Zebree excavations were not the only field activity conducted in northeast Arkansas that year. Two weeks prior to the Zebree dig, in late May and early June, Morse (1970) had spent several days recovering fragments of a mastodon and tapir that had been exposed by drainage ditch construction near Weona. Less than three days after the Zebree dig, Morse became involved in a nine-day emergency salvage at the Floodway site (3PO46) near Marked Tree, a multiacre site with six mounds, all of which were leveled. The University of Arkansas field school was conducted that summer at the Hazel site (3PO6), a major Mississippian mound group bisected by the construction of Arkansas Route 308 later that year. The six-week field school and subsequent six-week, Survey-sponsored salvage overlapped the Zebree/Floodway excavations; nevertheless, Morse remained in close contact with the Hazel excavations, which were being directed by Michael Hoffman. In addition, the Arkansas Archeological Society's annual training program was held at Hazel, in an effort to maximize information from the areas soon to be destroyed (Davis 1973). When the actual highway construction at Hazel began in late October of 1969, Morse spent 11 days at the site mapping and removing features as they were exposed by the heavy machinery (Morse & Smith 1973).

The Preliminary Report on the 1969 Excavations

In spite of the various distractions created by the ongoing destruction of archeological sites in the general region, and the feeling that at least some information should be recovered from each, work continued on the Zebree assemblage. Once out of the field processing continued, and by the end of 1969 all washing, cataloging, and permanent storage had

been completed. A 26-page preliminary report outlining the 1969 excavations was completed by late September, and submitted to the Park Service in accordance with the terms of the research proposal (Morse 1969b). In this report a number of preliminary conclusions about the site and its importance were presented, indicating an elaboration of, and in some cases, a shift in former views. In particular, the similarities with Cahokia were emphasized, notably the microlithic tool industry and the presence of bone harpoons, several of which were found. The absence of Ramey Incised pottery was taken to imply a pre-1100 time-depth, and similarities with the AD 900-1100 materials at Cahokia were noted (Morse 1969b:21-24).

Perhaps the most significant result of the excavations was the light they shed on the relationship of the late Woodland to the early Mississippian occupations. In Area B a deep ditch or borrow pit had been excavated by the initial Mississippian occupants, and the fill thrown over a rich late Woodland (Barnes) midden. No early Mississippian artifacts (other than in obvious disturbances) were recovered in the capped deposits, and Mississippian artifacts were found immediately above and on the cap in large quantities. In Morse's (1969b:22) words:

> Rather than a gradual shift in artifacts, the stratigraphy clearly revealed a sudden change from Woodland to Mississippi. We are able to infer two different peoples rather than one people changing their culture. In addition, we can construct two cultural stages which are temporally close.

The implications of this stratigraphic/temporal relationship are of considerable importance, for they run counter to the idea that a gradual change occurred between Late Woodland and Early Mississippian in the immediate area. Previous interpretations of the Barnes/Big Lake or Barnes/Hayti

interactions, as proposed by Morse (1968), Marshall (1965, 1967), and others for the Woodland/Mississippi transition in the region in general, had viewed the process as gradual, involving acculturation rather than colonization or direct replacement of groups. At the least, the Zebree evidence suggested that interpretations of gradual cultural change based on sherd frequencies in mixed deposits needed to be reexamined.

Goals of the laboratory analysis were also included in this preliminary report. The discovery of large numbers of Varney pan fragments in the deposits suggested the possibility of on-site salt manufacture as something to test for, as well as salt trade (Keslin 1964). The relationship of the microliths and shell beads was suggested as another potentially fruitful area (Morse 1969b:24). Descriptions of the artifact and feature assemblages were planned, and soil samples were prepared for flotation. Additionally, shell and animal bone was separated and planned analyses included species identification and butchering techniques, towards environmental and subsistence reconstruction. Examination of the shellfish was to be specifically oriented toward determining the nature of the Little River environment at the time of prehistoric occupation (Morse 1969b:7). Finally, sources of lithic raw materials were tentatively proposed, as well as possible mechanisms by which they could have been brought onto the site. In particular, cherts from Illinois and Cahokia (Mill Creek and Dupo or Crescent Quarry) were recognized at Zebree, and long distance trade in salt, shell beads, and lithic raw materials was suggested as a possible avenue for future research (Morse 1969b:23).

Laboratory Analysis and Report Preparation: 1969 through 1973

The amount of material recovered during the 1969 Zebree excavations was far greater and more complex than had been anticipated, and preparation of the final report took four years. Processing, various analyses, and extensive writing and rewriting occurred; in addition, the ordinary demands of maintaining the Survey Station continued. Almost all of the faunal remains recovered in the excavation were sent to John Guilday and Paul Parmalee, of the Carnegie Museum and the Illinois State Museum, respectively, for identification(Guilday and Parmalee 1975). Their analysis, the results of which were in hand by September of 1970, indicated a strong aquatic orientation to site subsistence patterns. Additionally, remains of prairie chicken and the 13-lined ground squirrel were identified, indicating the existence and exploitation of an open, prairie environment somewhere near the site (Guilday and Parmalee 1971).

Processing and artifact analyses continued unabated during 1970, and early in the year, a probable additional house was "discovered" in the 1969 block units when individual artifacts were plotted by depth. While a tentative draft of the site artifact assemblage was largely completed by mid-summer, this early formulation was held back and, in light of subsequent analyses, extensively revised. Once initial inspection gave way to extended examination, the site assemblage was found to be far more complex than suspected. The microlithic tool industry was complex and diversified, and attention focused on both replication of manufacturing technology and the uses to which the finished tools were put (Morse 1975a: 124-145). Morse and Mr. Bobby Brown, the Refuge Manager, collected samples of American lotus (Nelumbo lutea) from the waters of Big Lake during the summer.

Chester North, Morse's lab assistant, ran atomic absorbtion tests on the ashes, after burning, to test positively for the presence of salt (North 1971, 1975). Results of the test supported the possibility of prehistoric salt manufacture at Zebree by means of the burning and leaching of lake plants, and additionally prompted investigation of the pan and funnel vessel forms on the site, for their possible role in such a process.

One of the more significant events influencing the ongoing analysis of the Zebree assemblage was the reevaluation of the origin of the Big Lake and St. Francis sunk lands. Partially influenced by the strong aquatic orientation indicated at Zebree, Saucier (1970) advanced the hypothesis that the formation of these low areas may have occurred a thousand or more years ago and not, as generally assumed by Fuller (1911), during the New Madrid earthquake of 1811-1812. The presence of a lake environment along sections of the Little River during Early Mississippian or earlier Woodland times may have provided incentive to settlement, over and above those offered by the more prosaic riverine/backswamp resources common along streams in the area. Attempts to directly test this "Big Lake formation hypothesis," as it came to be called, through the examination of site shellfish, were frustrated. Finding a specialist on freshwater shellfish of the general Arkansas region proved difficult, although the effort was initiated in 1970.

Analysis and writing continued through 1971 and 1972, and by spring of 1973, the manuscript was completed and sent to Fayetteville (Survey Headquarters) for editing and publication preparation. The intervening years between the 1969 excavations and the completion of the manu-

script were busy, with several projects other than Zebree ongoing. For a while after the 1969 dig, the possibility of a later season at the site was discussed and Morse developed plans for the use of heavy equipment (a backhoe or bulldozer) to delimit the pallisade ditch and locate features. These plans were abandoned when it became apparent that additional funding would not be immediately forthcoming. Morse continued to maintain close contact with Mr. Brown, however, keeping him posted about the analysis, and in turn Brown relayed what information he knew about the planned ditching, as well as detailed environmental data concerning the wildlife refuge itself. In addition, Brown began to enlist local support to help preserve the site.

Field Activity in Northern Arkansas 1970-1974

During the summer of 1970, extensive excavations were conducted at the Brand site, a relatively pristine early Archaic Dalton hunting/butchering station (Goodyear 1974), and research on local Dalton assemblages proceeded over the next several years (Morse 1971a, 1971b, 1973c, Morse and Goodyear 1973). Attention also focused on the complete range of Mississippian settlement in the area, and two field seasons were devoted to excavation and testing of Middle and Late Mississippian sites. This research focused on the Nodena phase (Williams 1954, Phillips 1970:933-934), delimited by a series of mound groups near and along the Mississippi River to the east and southeast of Blytheville. During 1970 and 1971, Morse assembled a detailed history of previous investigations at Nodena phase sites, particularly at Upper Nodena (3MS4) (Morse, ed. 1973). In the same volume, he summarized available information on the phase, and proposed hypothetical models for settlement patterning, subsistence orientation, and social organization (Morse 1973d). These models were used to structure

subsequent field and laboratory analyses during later field investigations. During the period from 1969 to 1973, Morse also completed manuscripts detailing the 1968 and 1969 salvage operations at the Hazel site (Morse 1973a, Morse and Smith 1973), as well as several smaller, descriptively oriented papers on local Mississippian remains (Morse 1971c, 1972a, 1972b).

Excavations were conducted at the Upper Nodena site from late June through mid-August 1973, as part of a combined U. of A./A.S.U. field school. During the same period, the mound at Armorel (3MS23) was tested and a brief reconnaissance of the local area initiated to locate other probable Nodena phase sites (Morse 1973e). The excavations at Upper Nodena were directed towards the testing of the site map Morse had re-created based on Dr. Hampson's field notes from the 1930's (Morse 1973d:66), and towards recovering information related to house size and orientation, tool use, and subsistence. The test at Armorel was directed towards determining site stratigraphy, and in particular to see if intact pre-Mississippian Woodland deposits existed below the mound. A lab was established near the site, and methods of artifact processing and analysis under field conditions were developed. A zooarcheologist was employed, and both flotation and water-screening experiments (with a variety of mesh sizes) were undertaken, and then routinely employed.

The following year, extensive excavations were conducted at the Armorel site, again as part of a combined U. of A./A.S.U. field school. Excavations were conducted on the site during June and July of 1974, with a four week program of site survey and testing in July (P. Morse 1974). Excavations were conducted at Armorel to test, among other things, whether

or not the site was Nodena phase (verified), to investigate subsistence preferences, possible craft specialization as reflected in lithic materials, to examine kitchen pottery and the manufacturing technology behind it, and to determine whether pre-Mississippian Tchula deposits were intact within the midden (unconfirmed) (Morse 1974a). A field survey was undertaken to examine Nodena phase settlement pattern, and testing at the Nodena phase Knappenberger mound was undertaken to discover undisturbed middle Mississippian remains (Klinger 1974a, 1974b).

As during the previous season, a lab was established near the site, and processing and analysis of ceramics, lithics, zooarcheological and other remains continued throughout the excavations. Variable screen-mesh size experiments, fine water-screening, and flotation procedures were routinely carried out. A zooarcheologist was again employed, and accomplished much of the task of specimen identification, at least for the ¼" screened remains, while in the field (Bogan 1974). Under the direction of Michael Million, ceramic artifacts were processed, and experimental replication of site kitchen pottery initiated (Million 1974).

In addition to generating a tremendous amount of new information on the nature of Middle and Late Mississippian in northeast Arkansas, the two field seasons of Nodena phase investigation provided the necessary experimental and practical background experience used to set up and run the 1975 Zebree excavation. Many of the field and laboratory procedures quickly initiated at Zebree in 1975 were all previously developed during the Nodena research: concomitant lab and field operations, varied recovery procedures, and specialists handling specific areas of the investigation.

Zebree analysis was always a consideration during these years, and a considerable amount of both time and energy was devoted to the interpretation of the 1968 and 1969 assemblage. In late July of 1971, the Mid-South Archeological Conference was hosted in Jonesboro; over 70 people attended, including most of the archeologists working on Mississippian in the central valley at the time. The station collections were examined, particularly the materials from Zebree, and comments on the materials and Morse's interpretations exchanged. Early in January of 1972, Morse tested the Hinklin site in Missouri, where a large Varney jar had been found the year before by a collector. The tests indicated a Mississippian occupation, although probably somewhat later in date than Zebree or the other Big Lake sites known at that time. Site surveying, recording, and emergency salvage operations continued apace during this time, prompted by the tremendous rate of destruction by land-leveling and other agricultural practices, construction projects, and commercial grave robbers (e.g. Medford 1972, Morse 1973a). An average of two to three hundred new sites were recorded in northeast Arkansas each year during the late sixties and early seventies, with surface collections or minor testing operations made at a sizable fraction of this total.

Early in 1973, Michael Million became Morse's laboratory assistant, and almost immediately began a program of ceramic replication experimentation. Early research along these lines included investigation of the Armorel site kitchen assemblages (Million 1974), and preliminary examination of the Zebree ceramics. Part of the latter research helped to shape Morse's (1975a) descriptive formulation of the Zebree wares. The Zebree manuscript itself remained in Fayetteville for over a year

before it was returned late in 1974 for final commentary prior to release. In the meantime, Morse continued with a detailed examination of the microlith industry found at the site, and specialized papers on the subject were subsequently released (Morse 1974b; Morse and Tesar 1974). In addition to the Armorel excavation, the Cache River Archeological Project (Schiffer and House 1975) was underway at this time, with extensive field survey and testing in the spring of 1974 and write-up throughout the remainder of the year. During March and April of 1974, Morse spent 32 straight days excavating at the Sloan site, a probable Dalton cemetery discovered during the Cache survey (Morse 1975b). Preliminary reports on both the Sloan site and on Million's ceramic research with Nodena phase materials were presented at the Southeastern Archeological Conference in October (Million 1976), and papers on these and other areas of ongoing research in northeast Arkansas were released in the Cache volume, which was written by late 1974 and published a year later (Schiffer and House 1975).

The Release of the Final Report on the 1969 Excavations

Late in 1974, the manuscript report on the 1969 excavations at Zebree was returned to Morse for final commentary prior to release. A number of editorial changes had been made in both content and format, and some rewriting and reshooting of artifacts was needed. The final document was printed in March of 1975 (Morse 1975a), minus a major interpretive section that had been edited out to make the report descriptive in orientation. This section, dealing with possible mechanisms behind the emergence and spread of Mississippian as viewed from northeast Arkansas, was subsequently released elsewhere (Morse 1977). By this time planning for additional excavations at Zebree was already well underway.

Chapter 4

A HISTORY OF THE ZEBREE ARCHEOLOGICAL PROJECT: 1975-1977

Introduction

The excavations ultimately undertaken at Zebree in 1975 and 1976 were made possible largely through the efforts of Mr. Bobby Brown, the Refuge Manager, to preserve the site. Late in 1973, Brown began steps necessary to place the Zebree site on the National Register of Historic Places, following the provisions of the National Historic Preservation Act of 1966 (McGimsey 1972:112-117) and in compliance with Executive Order 11593 (e.g. Lipe & Lindsey, eds. 1974:206-209). By mid-1974, it became apparent that the long-delayed ditching operations at Big Lake, while still in the planning stage, would soon begin. Accordingly, thoughts turned to the possibility of additional salvage operations, and their requirements. In late 1974, the Corps of Engineers notified the Arkansas Archeological Survey that the proposed ditching had been funded, and that the contract for the final ditching would be let in January of 1975. Were it not for Brown's nomination (of which the Corps was unaware), little could have been done to delay or mitigate the destruction. Without the National Register nomination, the ditching would have likely occurred with little or no funding for archeological salvage. In addition archeologists may not even have been notified of the probable final schedule. (The other two Big Lake phase sites in the direct impact zone, 3MS19 and 3MS25, were ditched away without any final notice to the Survey, in spite of verbal promises to the contrary.) Fortunately, through Brown's foresight, an additional two seasons of work at Zebree were achieved.

Preparation for the 1975 Excavation: The One Percent Question

Nomination of Zebree to the National Register (which was approved early in 1975) necessitated a reevaluation by the Army Corps of Engineers of their ditching operations. Under the provisions of the Historic Preservation Act (PL89-663), particularly Section 106, the Corps were required to:

> take into account the effect of the undertaking on any district, site, building structure, or object that is included in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under title II of this Act a reasonable opportunity to comment with regard to such an undertaking (PL 89-665, Sec. 106; in McGimsey 1972:244).

Furthermore, under the provisions of the Archeological and Historic Conservation Act of 1974 (PL 93-291) the Corps was authorized to transfer project funds to meet the cost of mitigating the destruction. Accordingly, the Corps suspended planned ditching operations near the Zebree site to provide time for planning and conducting salvage measures. This action occurred in January 1975. One year was tentatively set for completion of the mitigation, prior to resuming ditching operations near the site.

Virtually all of the planning and preparation for the 1975 excavations occurred from January through June of that year. During this period, Dan F. Morse was on an official leave-of-absence from the Survey. He intended to devote full time to completion of the report on excavations at the Sloan site conducted the previous year. Phyllis A. Morse (ABD Michigan) assumed responsibility for the Jonesboro station. Actually Morse was in his office every day, and much of his leave-of-absence was spent preparing for work at Zebree. The magnitude of this effort, and the ensuing fieldwork, laboratory analysis, and write-up, have combined

to delay completion of Sloan until after the Zebree project.

Much of January and February of 1975 was spent estimating the effort needed to effectively mitigate destruction of the site in the time allotted. A proposal and budget for $243,794 was prepared, an amount considered adequate for both field and laboratory operations in the time remaining prior to site destruction. This was then submitted to the Corps (with whom close contact had been maintained), for use in meeting the requirements of the Advisory Council on Historic Preservation, and for actual construction funding and timing. During this period, the research and logistical planning was conducted in Jonesboro, while contact with the Corps of Engineers was maintained through Survey headquarters in Fayetteville. Final preparation of Morse's proposal and budgetary estimates, and negotiations with Corps personnel, were undertaken by Hester A. Davis, Arkansas State Archeologist, and Charles R. McGimsey, Survey Director. The latter task required numerous phone calls, letters, and meetings during the first half of 1975.

Submission of the quarter-million dollar budget was followed by a period of considerable uncertainty. The Corps seriously considered by-passing the site (and thus avoiding both destruction and the need for excavation). The size of the budget was also challenged as being beyond the 1 percent total project cost limit authorized by the provisions of the Archeological and Historic Conservation Act of 1974. Specifically, under Section 7 of the Act:

> To carry out the purpose of this Act, any Federal agency responsible for a construction project may assist the Secretary and/or it may transfer to him such funds as may be agreed upon, but not more than one per centum of the total amount authorized to be appropriated for such project... (in Lipe & Lindsey, eds. 1974:206).

One percent of the proposed ditching operations along Big Lake was roughly $102,000. The Corps indicated in April that they were willing to commit this amount. Under the conditions of the Historic Preservation Act and the tenor of Executive Order 11593, effective mitigation should have been sought. Through the letter (but hardly the spirit) of the Archeological and Historic Conservation Act, however, the Corps found justification for less-than-adequate mitigation funding. Faced with the choice of a protracted legal review process before the Advisory Council and possibly elsewhere, or accepting the Corps figure, the Survey felt it had little choice but to accept. Any delays would mean missing the summer excavation period, when both student/crew and specialist help would be readily available. Although a final decision on whether the site would be ditched had yet to be made, replanning and budgeting began in late April for operations that would be within the new (lower) dollar figure.

Submission of the Final Contract and Last Minute Preparations

By late May 1975, a revised budget was completed, conforming to the $102,000 funding limit. On May 27, at a meeting with Corps personnel in Memphis, the decision to ditch rather than by-pass the site was announced, and a formal request for a suitable mitigation budget was issued. The cost of by-passing the site would have been far more than that of mitigating it, and even shifting the ditch channel

would not preclude eventual lateral erosion into the deposits. Under the direction of Hester A. Davis, the Arkansas Archeological Survey submitted a revised proposal and budget (for $101,945.00) and applied for an Antiquities Permit during the first week in June. In a cover letter accompanying the proposal, Davis indicated that should the Corps interpretation of the 1 percent funding limitation be overturned, the Survey would reopen negotiations toward achieving more adequate mitigation measures.

The $101,945 revised budget included two months funding for the following: a field crew of 12, a lab crew of eight, the field director, two field assistants, the lab director, and three lab specialists (ceramic, zooarcheological and enthnobotanical). Per diem, laboratory headquarters and equipment rental, mileage, and miscellaneous supplies were covered, as well as funding for subsequent analyses, report preparation, and publication. Since overhead accounted for about one third of the total budget, the Survey contributed the salaries of the project director and a graduate assistant, as well as a number of other material benefits.

The revised budget was considerably below the level felt necessary to effectively mitigate the site, and a number of compromises had to be made. The field period was shortened from three to two months, and the number of personnel was cut almost in half. Funding for analyses by the three laboratory specialists was reduced to encompass only the field period. Plans for a fourth specialist (lithics) were dropped, and a site survey team was abandoned. Finally, post-excava-

tion analyses were reduced from levels conceived in the original budget, although every effort was made to ensure completion of all phases of project research.

Until the end of May it was not known if excavations would be conducted at Zebree in 1975 (Morse 1976a). Under the terms of the revised proposal, field work was slated to begin July 1 and continue for two months, leaving one month for preparation. While a considerable amount of planning had been accomplished previously, little substantial could be done until the go-ahead had been issued. Morse had been contacting people all spring about work on the Zebree project that summer, but formal offers could not be made until funding was assured. An even worse situation logistically was that funding for supplies and equipment was unavailable until after the proposal had been formally approved, which did not occur until early July. Essential materials had to be obtained prior to this date, however, and the Survey (or in many cases, Morse himself) had to provide funding or obtain credit.

Once the revised proposal was submitted in early June, the pace of activity quickly accelerated. Job offers were made to a number of people, purchases of equipment and supplies began, and a search for housing in the Big Lake area began. The site was visited and conditions assessed. Contact was made with the construction company responsible for the ditching operations, which were already in progress on the reaches below the site. Morse and Million visited Zebree in mid-February and in May, and on the former occasion noted extensive recent potting. The site was posted after the Refuge authorities were contacted and,

fortunately, little additional damage occurred prior to the summer excavations.

By late June, the project rapidly acquired shape and organization as the research team and field crew began to arrive in northeast Arkansas. Mark Raab, the new Survey archeologist for northwest Arkansas, arrived at this time to serve as the field director and, by the end of the month, all of the project specialists were aboard. Besides Dan F. Morse (project director), Phyllis A. Morse (lab director) and Mark Raab (field director), specialists included Suzanne Harris (ethnobotanical analysis), Michael Million (ceramic technology), Eric Roth (zooarcheological analysis), David G. Anderson and Jeffery Newsom (field assistants).

Finding adequate housing for the project specialists and crew --some 30 people-- was difficult. Virtually no housing was available in any of the small towns near the site, and structures that were offered by local enterpreneurs combined astronomical rents with substandard or nonexistent plumbing, electricity, or even safe construction. The Morses' three-bedroom house in Jonesboro became something of a Zebree crash pad throughout late June, with up to nine people sleeping in the living room, den, and anywhere else floor space was available. This permitted extended (and often spirited) discussion in the evenings about project research goals, field procedures, equipment purchases, plans for the ensuing days' work, and so on. Many of the field and laboratory procedures used during the 1975 excavation were developed during these evening sessions, with specific details hammered out among the project

supervisory/analytical staff. Housing was finally located on the last day in June, although people were scattered over a large area, some in Paragould, others in Monette, Manila, or Blytheville, and a few of the specialists at the lab headquarters. In addition, about one quarter of the field crew camped at the site each day.

The 1975 Field Excavations at Zebree

The Zebree site seemed to be a howling mosquito-infested wilderness in June of 1975. All traces of Morse's 1969 clearing activity had disappeared, and dense underbrush covered the entire area under the hardwood canopy. Clearing operations began on June 23, and continued every day for two weeks under the direction of Michael Million. Most of this work was accomplished by Million, Raab, Anderson, Doug Hurdlebrink, and Barry Elrod, all of whom came down with poison ivy in varying degrees of severity. Underbrush was hacked away with sickles, bush knives, and axes. Gasoline chain saws were used to remove larger growths. Phyllis Morse consulted with an entomologist about mosquito control, and a half-gallon container of malathion was acquired (the first of several purchased over the summer). This insecticide, which was approved by the Refuge authorities, is non-toxic to birds and other warm blooded animals (and, it was sometimes cynically suspected, to mosquitos). Every morning a mosquito squad would liberally spray ten to twenty gallons of the dilluted (roughly 1:250) insecticide over and around the site area and, except for a few resurgences, the effort was largely successful. Crew members arriving on the site after the first week in July could have little appreciation of the site's original conditions.

Under the direction of Mark Raab, a steel cable swinging bridge was suspended over the drainage ditch to the site. (This effort, it should be noted, received as much attention and praise from visitors over the course of the field season as did the excavations themselves!) The bridge provided direct and convenient access for most supplies and equipment, and for the crew each day. The logging bridge south of the site was still intact, and the road to the site blazed in 1969 was re-opened, permitting access to heavy equipment and vehicles during periods of low water or dry weather. Two well points were established near where the bridge adjoined the site, and washing and wet-screening racks were placed in the same area, draining into the ditch. The Corps of Engineers gave approval to use the ditch for water screening. A storage shed was built for equipment right on the site, and an outhouse was placed across the ditch (and downwind).

All of the preparations described above were undertaken before excavations began. In addition, the site terrain had been effectively mapped to 10cm contour intervals (Figure 5). A historic metal detector survey of the same area had been conducted by Jim and Cindy Price, and a fully-functional laboratory and headquarters station had been set up in a building at the Big Lake National Wildlife Refuge Headquarters. While successful completion of project preparations was in part due to the efficiency of project organization, it was also due to a frustrating series of delays in obtaining government approval to initiate excavations. The proposal and budget for the project submitted in early June had to be approved by the Corps, the Advisory Council on Historic Preservation, and the State Historic Preservation Officer before excavations could

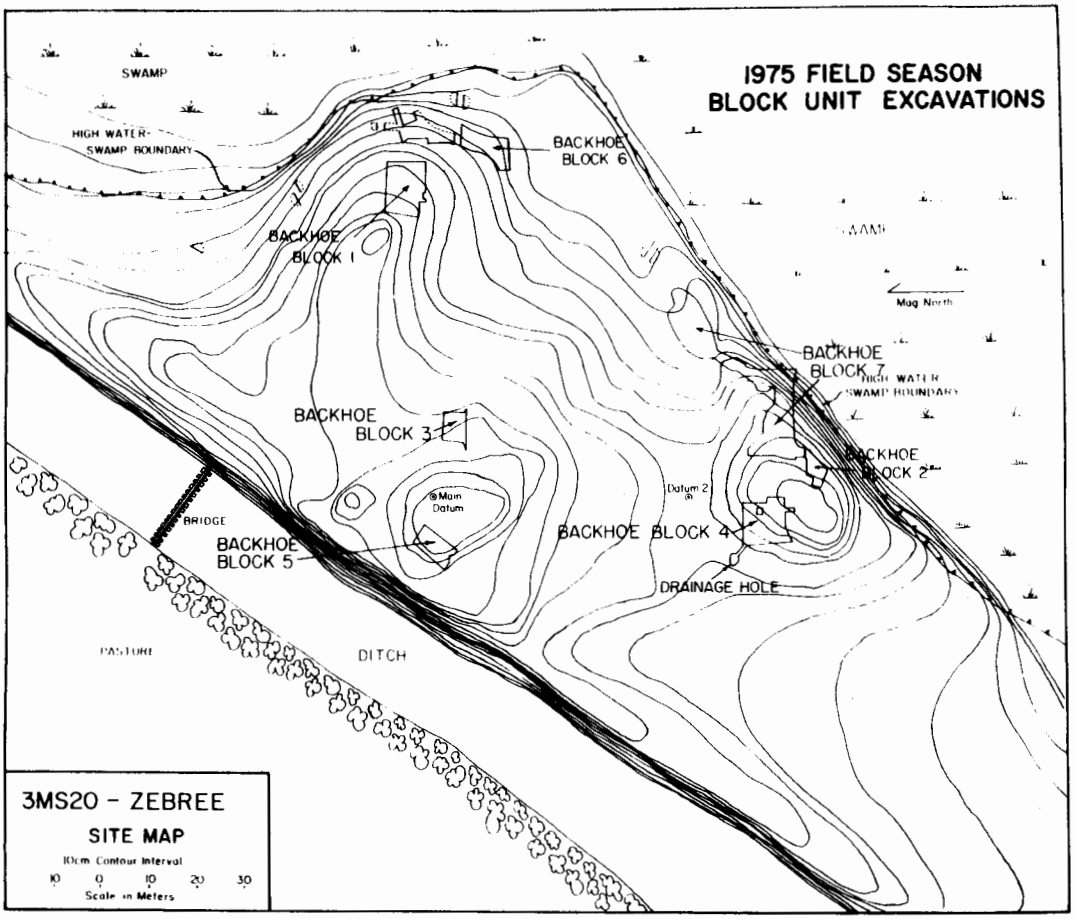

Figure 5. Ten centimeter contour interval map of the Zebree site, including 1975 block excavation units. The base map was prepared during the 1975 excavation season (Negative 774215).

begin. This meant that the proposal and budget had to be converted into a formal memorandum of agreement, which then had to be mailed back and forth between all concerned parties for approval and signatures. A normally slow procedure, the agreement was quickly passed from hand to hand in a spirit of cooperation (and largely due to the sheparding of Davis and McGimsey). Unfortunately, it was lost in the mail for eight days during the final step-- the return of the completed agreement to the Advisory Council for approval. The actual excavations began on July 8, when verbal confirmation of the agreement reached the Refuge Headquarters. While some of the eight days lost were well spent in final clearing, settling-in, and last minute preparations, at least several days of valuable field time were lost.

During the first week of excavation, everyone worked in the field until enough of an artifact backlog had developed to justify full-time laboratory operations. Three major excavation strategies were used (see Chapter 6 for details): (1) the removal of a randomly selected 1 percent sample of certain areas in the site using 1 meter test pits, (2) the use of arbitrarily and randomly placed backhoe transects and slots across the site, and (3) wide-area block unit excavations at locations previous excavations or the results of methods 1 and 2 had demonstrated to be of significane to the project's goals. For several days, field work concentrated on opening and completing as many random squares as possible, primarily in previously unexamined site areas (Figure 6). Field procedures diversified after this time, with roughly one third of the crew working random squares, one third in block unit excavations, and one third in specialized activities such as mapping,

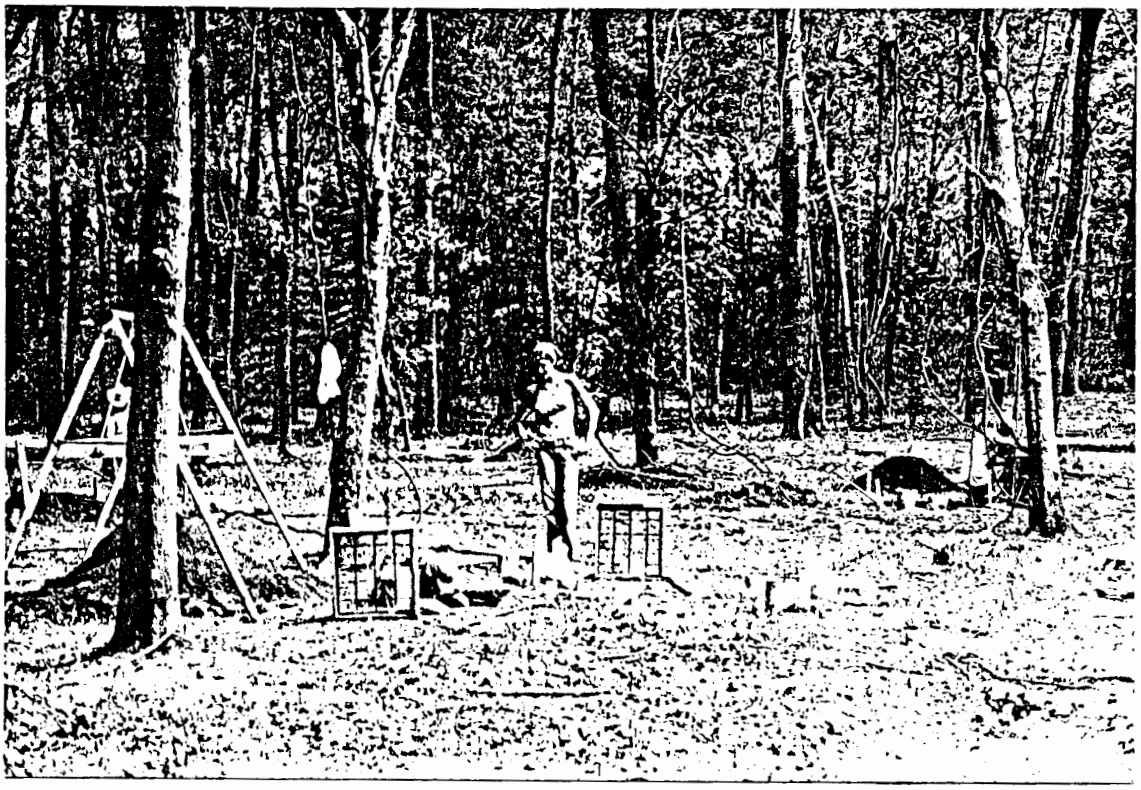

Figure 6. Random one-meter square excavations east of the main site datum, 1975 Zebree excavations. (Negative 752611)

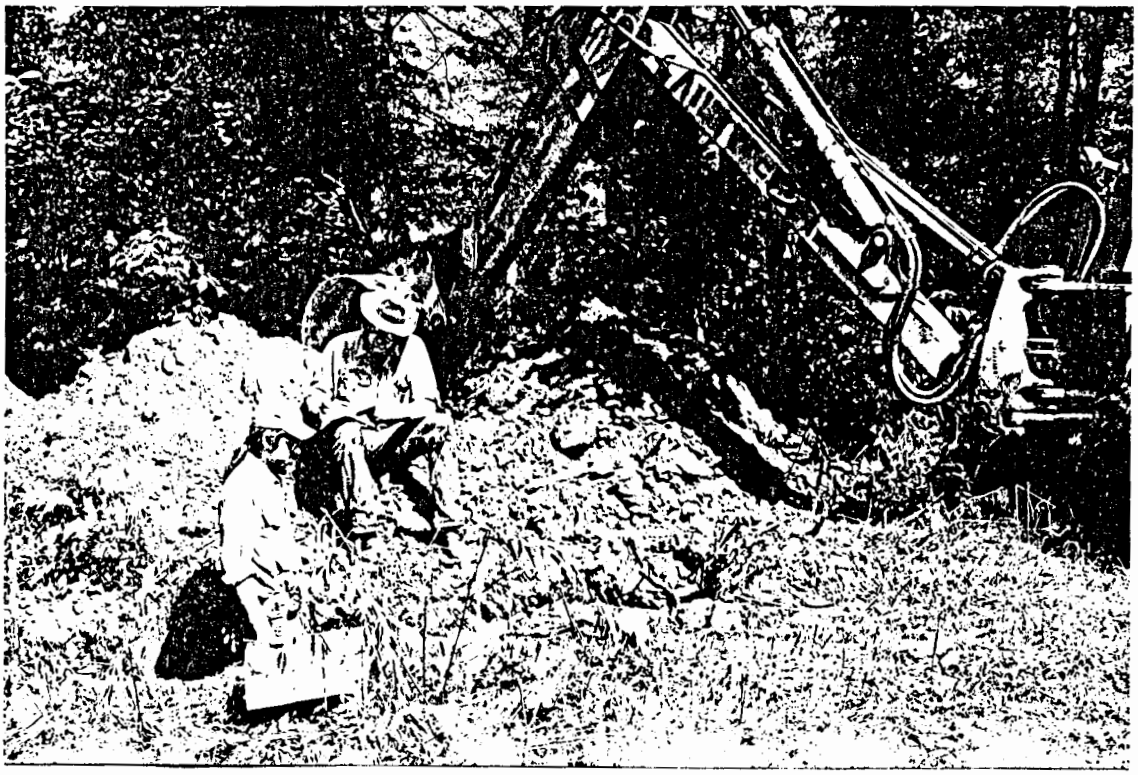

Figure 7. Examination of Backhoe Trench 1 fill near the western margin of the site, 1975 excavation season. (Negative 752593)

photography, profiling, burial removal, water screening and artifact washing operations, or record keeping. After the first week, about 10 people remained in the lab each day while roughly 15 worked at the site. The actual numbers varied somewhat from week to week, as crew members arrived from, or left for, school, or when rain precluded operations at the site.

Processing and analyses of materials proceeded throughout the excavations at the field laboratory, under the direction of Phyllis Morse. In addition to cleaning, sorting, and cataloging artifacts from the field, analysis of ceramics, ethnobotanical remains, and zooarcheological data proceeded on full-time under the direction of Million, Harris, and Roth, respectively, each assisted by one or two students. Each of these specialists also spent a considerable amount of time at the site, pursuing specific data-recovery strategies. In addition to the normal daytime activities, many of the field personnel worked in the evenings completing records, assisting in specialized analyses, discussing the project to date, and so on. Informal meetings of all personnel generally were held once a week, and problems, modifications in field or lab procedures, records checks, and general briefings on the state of individual analysis or activity were discussed. These meetings, and the regular flow of people from the lab to the field, provided for relatively rapid information flow and feedback, and procedures in either area could be modified to meet new circumstances in the other.

Under the direction of Gayland Wilson, of Paragould, a backhoe was available each day to place test trenches or transects in various

parts of the site (Figure 7). It was found that one or two hours a day with the backhoe created enough work to keep several people busy for one or more days. Over the course of the excavation, the backhoe was used to open a large number of transects across the site, speed up the random square operations through slot/profile trenches, open block units, or remove overburden. In addition, the backhoe was used to uproot trees, dig drainage ditches when the site flooded, clear underbrush, pound in well points (with the bucket as a hammer head) and move backdirt piles which frequently were located over areas where further excavation was desired. Toward the end of the dig, the backhoe was also used to backfill units (including all of the random square holes). The half-ton bucket cracked and had to be hauled off in a pickup for welding, and obtaining fuel oil during the summer shortage proved a great challenge. Generally, however, the machine ran quite well.

For the first month, field work continued six out of seven days, with Sundays off; after this time a 5½ day week was followed, with Saturday afternoon off as well. Operations normally ran from 7 a.m. to 3:30 p.m., although hours were rarely limited to these bounds. In the first two weeks in July, the water level in the swamp to the east of the site rose alarmingly, and a number of the random sample square locations were flooded. The extent and detail of the site contour map made at this time was limited by this flooding, although fortunately the major areas of the site were never completely inundated. Some two weeks of field time were lost to rain, however, and many excavation units were at least temporarily flooded. This proved disastrous along profiles, which quickly undercut and collapsed (Figure 8). Block units, although flooded (Figure 9),

Figure 8. Flooding and undercutting of backhoe cut profile brought about by heavy rainfall and rising swamp waters. (Negative 752834)

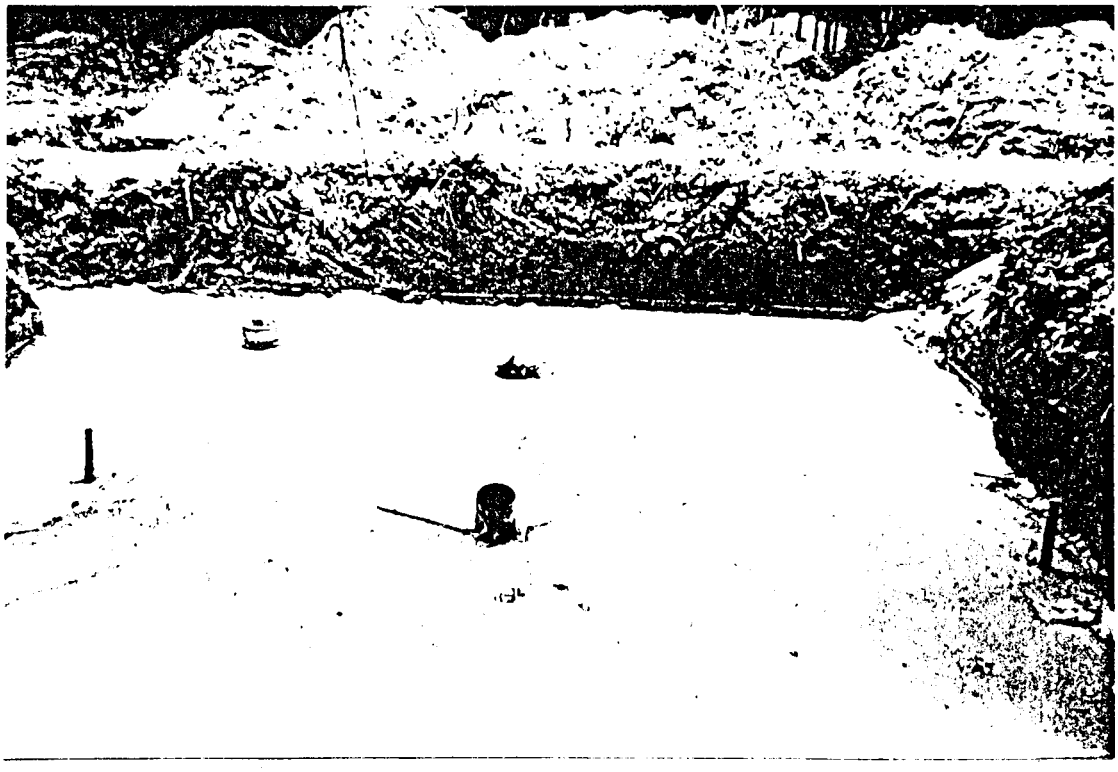

Figure 9. Flooding in Backhoe Block 3, 1975 Zebree excavations. (Negative 772265)

were little affected and required only the removal of slumpage or mud prior to resuming excavation. Smaller units were bailed by hand when they became water filled, while larger units were drained, where possible, via backhoe trenches.

On-Site Evaluation: CLASS, Peer Review, and Specialist Assistance

During the field season, a number of archeologists with research interests in the region or in problems related to late Woodland or Mississippian visited the site and provided useful commentary and criticism. An informal research organization known as CLASS (Central Lowland Archeological Symposium and Seminar), exists within the Central Mississippi Valley. Its members are attempting to pool their knowledge, research designs, and information about ongoing research in a natural area encompassing portions of seven states. The 1975 CLASS meeting was held at the lab headquarters on August 2, with several hours spent at the site. This enabled many of the primary investigators in the central Mississippi area to view the field and laboratory operations firsthand, and provided a forum for commentary and suggestions about both the procedures and interpretations being developed at the time. As part of a formal peer-review, two scholars with extensive research experience and commitments in southeastern U.S. archeology— Dr. Christopher Peebles of the University Museum at the University of Michigan, and Dr. Bruce Smith, then at the University of Georgia— visited the site to evaluate the project (Peebles 1976, Smith 1976). Both provided useful input into the ongoing effort.

The excavations and analyses continued at Big Lake throughout July and August and into early September. A full crew was maintained

until the last week in August, when most of the students had to return to their various campuses. During the summer a number of specialists in various disciplines visited the site and participated in the project. As has been noted, a metal detector survey of the site area was made immediately prior to the start of the excavation under the direction of Jim and Cindy Price of the University of Missouri's Southeast Missouri Archeological Research Facility. Sensitive locations were flagged and opened once permission to excavate had been received. The pattern of metallic debris indicated a single dump area on, and adjacent to, the site of the Sebree homestead in Area B.

Dr. Jim King of the Illinois State Museum's Quaternary Studies Center visited the area in late August, and collected several cores from Big Lake for palynological investigation and to aid in the reconstruction of the prehistoric aquatic and surrounding terrestrial environment. This effort necessitated the construction of a pontoon-based raft, on which two days were spent paddling about the upper reaches of the lake and then in coring. Dr. Dan Wolfman, Arkansas Archeological Survey regional archeologist at Russellville, also visited the site in August and collected several fired clay samples for possible archeomagnetic dating. Lynne Bowers, from Shelby State College, collected increment cores and chain saw sections of bald cypress from the immediate site area, as part of an ongoing program of dendrochronological investigation in the general northeast Arkansas region (Bowers 1973, 1976).

Shutting Down the Excavations and the Transfer to Jonesboro

The last week in August the crew total dropped from near 30

to under 10. Although excavations were continued at the site until the 8th of September, they were conducted in the end largely by Dan, Phyllis, and Danny Morse, and Michael Million. The final activity consisted primarily of the rapid excavation of promising pit-features still unexcavated in exposed profiles, and in the use of the backhoe around the site's eastern perimeter to locate several sections of the ditch system. Equipment from the site had to be removed at this time, and the lab headquarters had to be cleaned out, with all equipment and artifacts transferred to the Survey station in Jonesboro. Dan Morse assumed charge of the final excavation, backfilling, and equipment removal from the site area, while the transfer of the lab equipment and artifacts to Jonesboro proceeded under Phyllis's direction. Much of the dismantling was accomplished by these two, assisted by Michael and DD Million, Suzanne Harris, and several ASU students who were available on a part-time basis. Only one Survey vehicle was operational at this time (the other had broken down during the excavation and was undergoing repairs), and a large number of trips were necessary to transport all the material from the Big Lake area to Jonesboro.

All of September was spent transferring material and setting up the laboratory in Jonesboro to handle the mass of artifacts that flowed in. Under Phyllis's direction, artifact sorting and processing continued, much as in the field laboratory. By late fall all but the fine-screened materials (artifacts recovered through flotation or in screens under ¼" mesh size) had been processed and cataloged. Suzanne Harris was hired for an additional three weeks to continue her analysis of site ethnobotanical remains, and actually stayed well beyond that.

Anderson and Newsom, graduate assistants responsible for major artifactual and environmental analyses, respectively, were by this time in Fayetteville in graduate school, and it was necessary to relay project notes, maps, artifacts, and other information to them for their research. Additionally, a general policy of the Survey was to maintain duplicate records of all field notes and maps in Fayetteville, to prevent accidental loss. In late September, Dan Morse organized all of the Zebree records and took them to Fayetteville, where they were copied. The routine of sorting the tremendous quantities of fine screened and floated material was established in Jonesboro (continuing the effort begun in the field lab). This activity continued unabated over the next year and a half.

Preliminary Analysis and Preparation of the 1975 Excavation Results

The focus of project activity during the fall and early winter of 1975 was the preparation of a preliminary report indicating the history, methods, and preliminary findings of the 1975 excavations, as well as future research and analytical goals. A symposium on "The Zebree Project: New Approaches to Contract Archeology" was presented at the 32nd Annual Southeastern Archaeological Conference in Gainesville, Florida on November 8, with papers by Morse, Anderson, Harris, Newsom, Roth, and Raab, with commentary by Dr. Bruce Smith (University of Georgia) and Dr. Stephen Williams (Harvard). Under the direction of Dan and Phyllis Morse, these papers were assembled and edited, together with several additional documents by Bowers, Million, and Peebles, and sent to Fayetteville for release through the Survey. Although the manuscript was submitted in mid-November, it was not released until late March, 1976 (Morse and Morse eds. 1976). This was primarily because of delays in

the final typing generated by a large backlog of impending reports in the Survey headquarters office.

Much of the activity during the fall of 1975 focused on either laboratory organization and processing or preparation of the preliminary report. Morse revisited the Zebree site several times in the months following the dig, to check on conditions. By early October, only one month after field work, the bridge had been badly vandalized and the site potted in several areas. During one visit, Morse scared off a car-load of pothunters approaching the site from the old logging road, which was still passable. Other than notifying the Refuge authorities, little, short of continual on-site inspection, could be done to stop the looting. Fortunately, this form of activity rarely lasted more than a day or two, at least for any one party, since the site deposits were relatively devoid of marketable antiquities (i.e. whole pots). Usually an afternoon of two of digging with little more than the recovery of large sherds hit by the probe was enough to discourage most of the visitors.

Early in October, Morse returned a well pump, cots, and other equipment to Jim Price, who had loaned them to the project earlier in the year. This form of cooperation is common among investigators in the area, who frequently assist other projects when possible, both materially through the loan of equipment, and in the research effort itself. The Prices, in particular, provided advice and commentary during the project, and helped in the field work with their metal-detector survey. Papers on the 1975 activities at Zebree were presented by Morse to the membership of the Mississippi Archaeological Society in October, and to

the Arkansas Society later that winter. By early December all of the equipment used in the operations was cleaned and stored away, and all of the artifacts were at least preliminarily sorted.

1976 Lab and Field Activity: An Overview

Destruction of the Zebree site, tentatively slated by the Corps for January, did not actually occur until August of 1976. Unfortunately, this scheduling was not known at the time of the original budgeting. Otherwise, another season of field work at the site might have been considered. In spite of this, an emergency three-week salvage was conducted at the site immediately prior to, and during, the destruction. Other major activities during 1976 included an extensive survey in the Big Lake Highlands area, the continuation of the 1975 analyses (after August with the 1976 material included), and the continued sorting of the fine-screened material. In addition, planning for the preparation of the final report began in earnest.

The processing and sorting of Zebree artifacts continued throughout the spring, employing both paid and volunteer labor. Iris Weaver of Paragould spent over 500 hours sorting fine-screened materials during 1975 and 1976, and at least three times this number of hours were put in over the same period at the Jonesboro lab. The work was extremely hard on the eyes, and could only be done for a few hours each day. Students in Morse's two anthropology classes at Arkansas State University were required to put in ten hours over the course of the semester on a special project, and artifact processing was one of the alternatives offered. Under Phyllis's direction, the sorting continued

throughout the winter and spring, and the bulk of it was completed by early summer 1976, at least from the features and random square levels. Only about half of the bucket and flotation samples remained unsorted at this time, with the bulk of the effort, the sorting of the contents from the 1975 fine-screened features, over.

Zebree in Areal Perspective: The Big Lake Transect Survey

Prior to 1976 there had been no formal survey of the Big Lake area. The route of the ditch had never been surveyed (due to lack of funding), and the only knowledge of site locations in the area was intuitively derived, largely the result of leads provided by local informants. The three sites in the path of the Corps ditch were brought to the attention of the Survey only through the actions of an informant, and otherwise might have remained unexamined. A survey of the Zebree area and the immediate region had been incorporated into the original budgetary proposal early in 1975, but had to be abandoned when funding fell through. The need for a comparative data base from the area, against which to place Zebree in perspective, was therefore pressing. Accordingly, Morse began to develop plans for a survey of the Big Lake area, to be accomplished largely through volunteer help.

A variety of surveying and sampling schemes were considered, and the method selected involved the complete field survey of a ¼ mile wide transect that extended for 15 miles across the Big Lake Region, from Big Lake to the St. Francis River. The transect, originating at Big Lake near the town of Manila, was selected since it was on line with the transect Schiffer and House (1975) had surveyed across the northern

portion of the Cache, and that Klinger (1977) was continuing across Village Creek at this time. The transect was also situated so as to cut across most of the major environmental zones in the Big Lake Highlands, the focus of the ongoing environmental reconstruction. All prehistoric and historic sites within the transect were recorded, including single finds. Over 100 sites and a large number of isolated artifacts were plotted. The field work was accomplished during the last two weeks in March, over a period of six days, with two additional days spent in the lab checking records and in initial processing of artifacts. The project, although directed by Morse, was conducted by over 20 volunteers, including students at ASU and members of Morse's immediate family.

Other Field Activity in Northeast Arkansas During 1976

In addition to the ongoing artifact processing and the planning and implementation of the Big Lake Transect survey, a number of other projects and activities were underway in northeast Arkansas during the winter and spring of 1976. Under the direction of Timothy C. Klinger, an extensive field survey of portions of the Village Creek basin was undertaken from late 1975 to mid-1976, a project comparable in scope and direction to the Cache survey of two years before. Some 525 archeological sites were located during this survey in the Village Creek basin, and the final document (Klinger 1977) included a number of detailed analyses of the information collected. Also at this time, Tom Padgett (1977) was conducting a series of survey and testing operations along Crowley's Ridge, as part of an extended contract with the Soil Conservation Service. Morse continued to visit newly reported or endangered archeological sites in the region, and in early March spent a day at the Floodway site (3MS2),

where a Big Lake phase component was discovered in the eroding midden. A ditch running by the site and pothunters had slowly and continuously eroded the deposits, and the Big Lake phase materials were discovered in this cut, below those of the more extensive Nodena phase surface occupation. The Alabama Museum of Natural History had excavated here in 1933. Based on a photograph in the files of Moundville, Alabama of a large jar in place deep in the deposit, Morse suspected the existence of Big Lake phase remains below the later Mississippian midden as early as 1971.

In early April, Morse visited the Manila area and discovered that the Buckeye Landing and Rice (Cottonwood Point) Landing sites had been ditched through. The Rice Landing site was destroyed, while much of the prehistoric component at Buckeye Landing was covered by the levee. The historic components, including an early 19th century house site indicated on GLO maps for the area, were apparently destroyed. The ditching had stopped about a quarter of a mile below Zebree, and it was learned that the final contract, for the last section of the ditch, would be let in May, with construction to begin by mid-June. Accordingly, Morse began to make plans for a possible salvage effort that summer, and also contacted local people to help keep track of the ditching.

Ongoing Analysis: Spring-Summer 1976

By the end of April, site forms and artifact processing from the Big Lake Transect had been completed except for one section, and work was continuing on sorting the fine-screened material from the Zebree features. Early in May, Michael Sierzchula, a graduate student at

Fayetteville interested in lithic technology and flintknapping, visited Jonesboro and examined the microlithic assemblage recovered from Zebree. Sierzchula attended the Crabtree/Flenniken flintknapping school in Washington that summer, and one of the subjects he pursued was the replication of the Zebree microliths. Shortly after returning from the flintknapping school, he decided to pursue the replication as the topic for his master's thesis at Fayetteville. About the same time-- late summer 1976-- another University of Arkansas graduate student, Mary Lucas Powell, decided to incorporate an examination of the Zebree human skeletal remains into her master's thesis, which examined bioarcheological excavations sampling requirements, utilizing the Zebree project as a case in point (Powell 1977). Powell's effort was largely voluntary, while the Survey contributed nine months of Sierzchula's time (as a half-time Survey Assistant) for work on Zebree. Both were unexpected, yet welcome additions to the ongoing analysis.

In the meantime, Newsom and Anderson, the two Survey Assistants working on the Zebree project, were occupied with other duties in Fayetteville. Over the nine months following the close of the 1975 excavations, both were in graduate classes at the University of Arkansas, with Survey duties accounting for 20 hours a week. Aside from the preparation of papers for the Southeastern Archaeological Conference symposium (Anderson 1976, Newsom 1976) no work on Zebree was sanctioned, and both were assigned other projects. Anderson worked with materials from the Toltec site (3LN42) and Newsom with the 1969 field school collections from Hazel (3PO6). The demands of these projects precluded much work on Zebree; Newsom left the Survey late in the spring. Anderson's

work on the Toltec analysis, first in reporting the results of the 1966 Arkansas Archeological Society dig at Mound C, and then in the analysis of a major lithic assemblage from the site, led to valuable results (Anderson nda, ndb), but diverted a great deal of his efforts away from Zebree.

With Newsom removed from the project, it was essential to find someone to assume responsibility for the paleo-environmental reconstruction. Suzanne Harris, the project ethnobotanist, who was Newsom's major advisor, had prepared similar environmental analyses during surveys conducted in Missouri (e.g. Price et al 1975, Price, Price & Harris 1976). Accordingly, she was hired with the funds remaining from Newsom's assistantship. Harris was in Jonesboro from June through early September 1976, working on both the ethnobotanical analysis and the environmental reconstruction. During this time, she provided a great deal of input on all aspects of the ongoing research. Anderson was also in Jonesboro during July and August working on the organization and initial analysis of portions of the 1975 artifact assemblage. In addition, Anderson, who directed computer operations on the project, spent a great deal of time in analysis of Harris's Government Land Office tree species data for the paleo-environmental reconstruction.

The 1976 (Terminal) Excavation at Zebree

On May 13, 1976, bids were opened for the final section of the ditch. The contract was awarded to the S. J. Cohen Construction Company of Blytheville, Arkansas. The ditching was scheduled to begin at the end of June or early July. In all probability, Zebree would be

destroyed during the second or third week of operations. Morse contacted Mr. Jerry Cohen, the head of the construction company, about the possibility of conducting salvage operations at the site during the ditching, and a pledge of full cooperation was received. On July 6th, Morse and Anderson visited the Zebree area, where they met Cohen and his field supervisors. At that meeting, Mr. Cohen again pledged his full support, and told his supervisors to provide all possible assistance to the archeologists during the salvage operations. During excavations at the site later in the summer, a bulldozer and operator were made available each day, the construction crew helped in the digging when possible, and a small plane was even provided to overfly the site. The degree of cooperation was unprecedented in Morse's experience, and the construction company was later awarded one of the two environmental honorable mentions given to private contractors in the Corps of Engineers first annual Environmental Awards for 1976.

Because of heavy rains upstream in Missouri, the ditch was too flooded to work effectively, and construction did not begin until the end of July. Lab work continued in Jonesboro, and on July 23rd Morse revisited the Floodway site (3MS2) and found Varney salt pan fragments in the eroding midden, yet another piece of evidence linking this site with Zebree. The last week in July the ditching began, and for the next three weeks all activity focused on the salvage at the site. The 1976 field operations were conducted under the direction of Dan Morse, assisted by David Anderson. Twenty days were spent at the site. On a number of days the work force was expanded with volunteers from the Arkansas Archeological Society, students from Arkansas State University,

members of the construction crew, and interested people from the area. Arleen Olson, Survey photographer, spent almost two weeks at the site documenting the destruction, photographing features, and doing a great deal of digging. Other Survey personnel who visited the site for one or a few days and helped out included Mark Raab, Michael Sierzchula, David Stahle, and Dan Wolfman.

The 1976 season was an emergency salvage, and was conducted in the best tradition of such operations. A bulldozer was available for use for some three to five hours each day and with it a series of 3 meter wide cuts were made across the site to subsoil depth. A total of 2500 square meters were exposed in this fashion, primarily in those portions of the site slated to be ditched away. Once dark overburden had been removed, stains of features extending into the subsoil were recognized, marked, and opened. Pit contents were removed using trowels and small shovels, and the fill hand picked. Screening proved far too time-consuming, and was only used to process fill from a few of the features that were removed to the Jonesboro lab. All field records were kept by Anderson, who also ran the transit and plotted in newly dug or exposed features each evening. This mapping was essential to avoid the possibility of reexcavating backfilled testpits and features from earlier seasons.

Field conditions during the 1976 season were considerably different than in previous seasons (Figure 10). Prior to the actual ditching, the site had to be cleared. Instead of a lush green jungle, the area was a desolate tree and branch strewn swath of brownish gray.

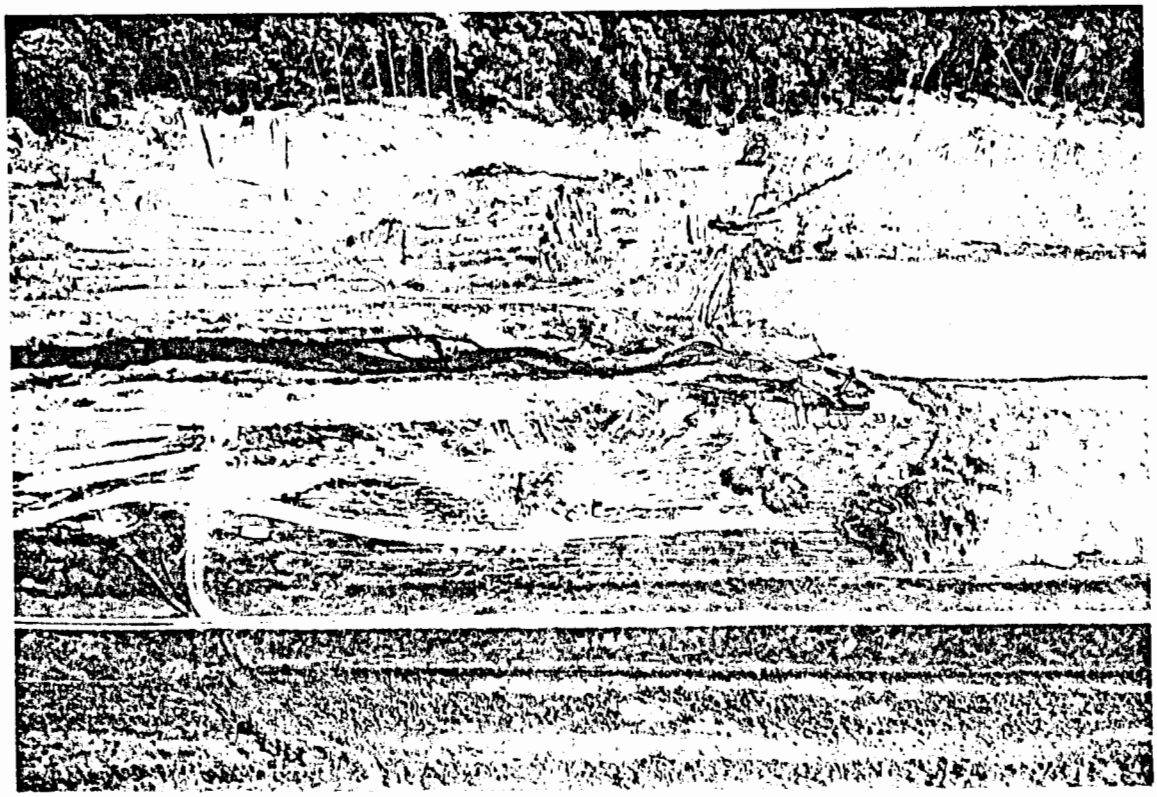

Figure 10. Draglines advancing on Zebree, August 1976. The site (with exposed bulldozer trenches) is in the upper left corner, with truck as a north arrow. (Negative 763788)

Figure 11. Crude wet-screening and flotation operations in the ditch bed east of the site, with bulldozer trenching proceeding on the site itself. (Negative 763720)

Bulldozers and log skidders were constantly at work in the zone ahead of the draglines, pushing downed vegetation into brush piles or hauling it away for lumber sales. The brush piles were ignited with fuel oil and were usually burning or smoking all around the site throughout the dig. The fires, in combination with the equipment-churned earth, created a scenerio not unlike that envisioned by Dante. The constant rumble of the dragline as it advanced on the site, coupled with the screams of tortured metal cables controlling the dragline buckets, compounded this effect. During the last few days of the salvage, when the draglines were within a couple hundred feet of the site, it was possible to feel the impact of the 12,000 pound bucket each time it hit-- a most disturbing sensation if one was in the bottom of a pit at the time.

Access to the site during the 1976 salvage was obtained by a variety of methods. The construction contractor, Jerry Cohen, saw to it that earthen dams were periodically thrown across the ditch, above where the draglines were working, to permit trucks and other heavy equipment access to the eastern side. These temporary structures rarely lasted an entire day, and frequently had to be repaired or replaced. The water level in the ditch rose and fell rapidly, depending on whether the dam was holding or had just broken. A boat was used during periods of high water, especially when the dam was on the verge of or actually washing out. Once these temporary dams were broken, the water level in the ditch quickly dropped five to eight feet, and it was possible to wade the remaining 1 to 2 foot stream.

As the water level rose and fell, it exposed most of the long-

submerged bed of the ditch west of the site. Unfortunately, no aboriginal remains were detected, although these may have been deeply buried. One elaborate (and illegal) catfish wicker trap was found, as well as several whiskey bottles. A large number of mussels were collected for use in comparative examination and identification of site shellfish remains. Even a cache of 1930's soft drink bottles were found, buried during a break in the original ditch construction. When the water level was low, it was also possible to set up wet-screening operations in the ditch bed, which was done to help process the fill of a historic well that was detected (Figure 11). Morse and Anderson were forced to wade the ditch about 1000 feet below the site one day and, in the process, found an extensive Big Lake and Barnes sherd scatter in an eroded gully off the ditch. When they returned with collection equipment the next day, the gully had been bulldozed to permit the dragline to advance over it, and only a few sherds were recovered.

The discovery of a previously undetected Big Lake site nearby was disconcerting, although there had been no time to conduct a survey in the area. As noted, the ditch route was never surveyed, which was unfortunate. The dragline operators recounted stories of extensive artifact scatters along the course of the ditch, including what appears to have been a major site near the old Wildlife Refuge Headquarters that "everyone" knew about (except the archeologists). The knowledge would have undoubtedly brought additional frustration, though, for little probably could have been done to recover information from these unknown sites; all available effort was needed just to begin to recover part of the Zebree record.

The area opened during the 1976 salvage, approximately 2500 square meters, was roughly three times the total area examined in all of the previous seasons. A total of 136 features were investigated, including ten fragmentary human burials, a large number of pits, several earthquake disturbances, and a historic well. Additional segments of the Early Mississippian pallisade ditch were uncovered at the north end of the site, although as during previous seasons, the feature proved disjointed and difficult to follow. Of the ten fragmentary human burials, one skull exhibited marked cranial deformation, and was encased in surgical plaster prior to removal, to prevent crumbling. All of the burials were single and scattered about the site area; no evidence of a cemetery was detected. Through inspection of the bulldozer cut floors and profiles, it was possible to obtain rough ideas about the depth of artifact-bearing deposits and the extent of earthquake disturbances in several areas of the site.

In terms of increasing the artifact inventory associated with each prehistoric component, a primary goal of the salvage, the excavations were quite successful. Several new artifact categories were recovered, including pottery ladles and bowls in the Big Lake component. One Big Lake pit produced a sphere of hematite, and reconstructable vessels were found in over a dozen pits. A Middle Mississippian infant burial was recovered with a buffalo fish effigy bowl in association. Typically, this burial was at the base of one of the balks between two grader cuts, and was detected only through Morse's enthusiasm to leave no potentially productive area unchecked. As is also typical of operations of this nature, the last few dsya seemed to yield the richest

returns. In the last day and a half 21 features were opened, including one with four and another with two reconstructable vessels, plus several single vessel finds. Considering only one intact Big Lake vessel was found during the 1975 excavations, the salvage was an exciting period, one that the investigators wished could have been extended.

One major accomplishment of the 1976 season was the testing of the western side of the ditch, an area previously unexamined. Some 200 meters of bulldozer cuts were opened to subsoil, but no intact, nor disturbed deposits were found. Except for a few Barnes sherds and one possible pit at the extreme north end of one cut opposite the site, only recent historic remains were detected. The remaining area appeared to have been extensively disturbed, to a depth of several feet, by previous construction activity. The tests did indicate that the Big Lake phase village probably did not extend across the ditch.

A second high point of the 1976 excavations was the discovery and removal of a mid-19th century cypress-lined well in Area A. The feature had been detected by Morse in 1969 (who assumed it was an outhouse pit). It had remained unexcavated, though, due to both a lack of time and its assumed recent date. The last few days of the excavation Morse decided to check this feature, partly because 19th century ceramics were turning up in the grader cuts around Area A, where such an occupation was previously unsuspected. A second reason for the test was the increased appreciation for historic archeological remains, by both Morse and much of the archeological community, since the 1969 excavations. The testing was also practical in nature. If the feature was contemporaneous with the early ceramics that were turning up, it could yield

information useful to the reconstruction of the early settlement of the area, about which virtually nothing was known even as late as 1976.

With the use of bulldozers and, when the hole became too deep, the dragline bucket, the fill surrounding the well was removed to permit safe excavation. A log skidder was used to pull up boards and shoring beams, and eventually the feature was completely removed, to a depth of roughly 4 meters. Fill from inside the well was scooped into 5 gallon oil buckets provided by the contractor. About 80 gallons were removed to the Jonesboro lab for fine-screening. Dan's son, Danny, set up a waterscreening operation in the ditch channel beside the site, through which much of the remaining fill was processed (Figure 11). The construction crew working the dragline cooperated fully, and were even able to spot rich features as they were exposed by the bucket. If these had not been completely carried away, ditching was momentarily directed elsewhere to enable the archeologists to check the deposits. Several of the last features found on the site were detected in this unsubtle fashion.

The dragline reached the site on August 13, 1976, and had completely gone through it four days later, effectively terminating the excavations. While much of the site was ditched away, or buried under the new levee placed near the swamp edge, traces still remain. The levee fill by the site is rich in artifactual debris, and along the ditch midden is continually undercut and eroded by rising and falling waters. As expected, the site is also subject to occasional pothunting.

The Final Year of the Project: Analysis and Report Preparation

With the close of the field excavations, attention shifted back to the laboratory in Jonesboro, which by this time was practically buried in artifacts. Some 10,000 sherds had been recovered, in addition to a large number of other artifacts. Until the field work ended, all available lab helpers were working at the site on a part-time basis. The station typist-technician, Brenda Keech, who was running the office while everyone else was in the field, managed to keep things in order and conduct a good deal of the initial processing. By the end of September, all of the material had been washed and boxed up, although cataloging and analysis had yet to begin.

At the end of August, 1976, Anderson returned to Fayetteville for a final semester of graduate classes and, shortly after this, Harris returned to Missouri. The Morses left for Europe in late September, where Dan gave a paper on Dalton culture in the central Mississippi Valley at the IX Congrés de Union Internationale des Sciences Préhistoriques et Protohistoriques in Nice (Morse 1976b), as part of a symposium on the Holocene in North America. Zebree continued to dominate events, however. In late August, the Morses visited Little Rock to (unsuccessfully) look for records about historic occupations at the site. About all they were able to discover was that the further removed a settlement was from a court or any kind of government seat, the less likely the occupants were to pay taxes!

In early September, a large quantity of the cypress timbers from the early historic well were given to Lynne Bowers, for use in

dendrochronological studies. At the same time, pollen samples taken from behind and between the well shoring timbers were sent to James King, who sent word back that no grains had been preserved. Also in late September, an article with accompanying cover picture recounting the 1976 salvage appeared in Construction News, a national trade journal. The article described both the excavations and Jerry Cohen's cooperation that had made them possible, and included an extensive photo-spread on the work at the site. The cover shot featured Morse and Anderson grinning expansively while holding one of the intact cypress timbers freshly raised from the historic well (Figure 12).

Early in November, Morse and Anderson (1976) gave a brief presentation on the state of the Zebree project at the SEAC in Tuscaloosa, Alabama, as part of a symposium on "Approaches to Anthropological Archaeology Under Contract." At the same meeting Morse gave a paper on Paleo-Indian research in the Southeast. During the fall, Morse assembled the Zebree material from all four field seasons, and set aside a large classroom/laboratory for storage and analysis space. One of the more fortunate circumstances of the year occurred in late October, when Michael and DD Million returned (a year early) from a planned two-year stay in Europe, on which they had left almost immediately after the close of the 1975 field season. The archeological assistant's position, which Million had held formerly, was open at this time, and it was immediately offered to him. Early in November, Million began work at the Jonesboro station, assuming a major responsibility for Zebree analysis and reporting. If Million had stayed in Europe for another year, as originally planned, he would have had little or no input into the

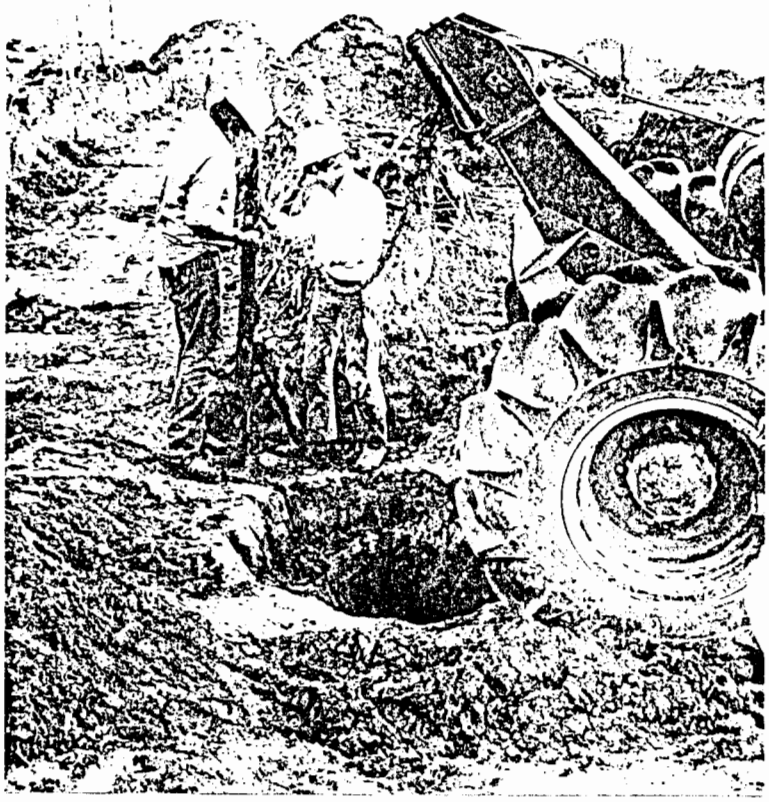

Figure 12. Morse and Anderson examining cypress support beam raised from the early historic well in Area A with the help of a log skidder, August 9th, 1976. This photograph later appeared on the cover of Construction News. (Negative 763707).

final report; as it turned out, his work was one of the more significant contributions.

Under Million's direction, final sorting and cataloging of the 1976 excavation sample was completed by early January 1977. At the same time, Million began to check the results of the Big Lake Transect survey. Over the next six months, he spot checked all questionable site locations and completed the surveying in areas missed (due to crop conditions) during the original field work. The final work on the transect was completed, with all sections examined, by late spring of 1977. In the analysis of the 1976 assemblage, all reconstructable vessels, lithics, and unusual artifacts were separated from the mass of material, and all sherds were identified as to component, to permit feature identification. Million also began working on technological/replication studies of the Big Lake and Barnes ceramic assemblages. These tasks were performed in addition to his normal station duties, which included running the lab, checking site leads, and maintaining the site files in good order.

In mid-February of 1977, Anderson moved to Jonesboro from Fayetteville and, with M.A. exams and classwork finished, was able to devote his full attention to Zebree. With the help of student "volunteers" from Morse's Indians of Arkansas class (each of whom was required to put in 24 hours time on some kind of lab or field project), the final sorting of both the remaining bucket and flotation samples was accomplished over the next two months. In addition, over the course of the spring, the laborious task of transferring the results of half a dozen specialists' investigations from data sheets onto computer

cards was accomplished, primarily by Anderson and David White and Lisa Lamar, two laboratory assistants. Once coded, the printouts had to be checked against the data sheets (to minimize error), which proved time consuming, but essential. Over the same period, Million completed all analyses of the 1975 and 1976 ceramics, and it became possible to identify site features and levels by specific component. By going over the field records, descriptions of features for both field seasons (1975 and 1976) were generated. These descriptions, coupled with computer listings of contents, provided the basis for more detailed studies of pit form and function.

Throughout the spring and into the summer, the pace of the investigations quickened as the deadline for completion of the draft (early October) approached. Early in February, a dozen radiocarbon samples were selected from the over 200 available, and were submitted to Dr. Herbert Haas, Director of the Radiocarbon Laboratory at Southern Methodist University. On February 22 and 23, a meeting of Zebree project investigators was held in Jonesboro, with Anderson, Harris, DD and Michael Million, Dan and Phyllis Morse, Mary Lucas Powell, and Michael Sierzchula present. A tentative outline for the final report was prepared, with reporting responsibilities allocated and various deadlines set for analysis completion and chapter drafts. The status of various lines of research was discussed, and individual investigator requirements (i.e. drafting, specific computer work, etc.) made known. The results of the meeting were then disseminated to all other project participants, and to interested researchers in the general region, as an issue of the CLASS newsletter.

Early in March, Morse spent a week in Illinois and Missouri tracking down possible sources for extralocal cherts found on the Zebree site. With Leonard Blake of the Missouri Botanical Gardens, he visited the Crescent Quarries near St. Louis (Ives 1975) and collected a number of chert samples for Sierzchula's replication experiments. One of the artifacts collected included a microlith core, supporting the possible exploitation of this quarry source by microlith-using groups (i.e. Cahokia, Zebree). Based on this visit, Morse realized that what he had been previously calling "Dupo" chert was actually Crescent Quarry. Together with John Kelley, an archeologist in charge of highway salvage operations near Cahokia, Blake and Morse surveyed near the town of Dupo, Illinois, where only a very poor grade of chert was found.

By late spring, various aspects of the analysis were rapidly shaping up. Powell completed research for her M.A. thesis on the Zebree human skeletal assemblage, while Sierzchula was well along in his replication experiments. Anderson's thesis, involving the evaluation of field procedures over each season, progressed as data came in from the last two seasons. Richard Rockwell identified shellfish remains from a number of Big Lake and Barnes features, employing a comparative collection-- the only one for the state-- that he had assembled with the help of Paul Parmalee (Rockwell 1977). Suzanne Harris arrived from Missouri and spent a month in Jonesboro, from early April to mid-May, working on the environmental reconstruction and identifying flotation sample remains. DD Million was hired as artist and began to draw final figures. Project specialists further removed contributed data and progress reports, including Eric Roth (zooarcheological), James King

(palynological/Big Lake coring results), and Dan Wolfman (archeomagnetic dating).

In late April, a second Zebree project symposium was held in Jonesboro, with all of the original participants attending (except Mary Powell, who was racing a thesis deadline), as well as Hester Davis, Pattie Patterson, and Mark Raab, who had come from Fayetteville. Unlike the previous meeting, which was primarily organizational, this meeting focused more on the state of the various analyses underway, and consisted largely of progress reports and discussion of specific research avenues to follow in the final report. Logistical problems such as the amounts of drafting, photography, computer analyses, typing, and editing that were to be necessary were also discussed. Tentative plans and schedules were made to handle this burden.

By July, all of the artifact sorting, processing, and analyses were completed, with all pertinent information transferred to computer cards. Extensive analysis of this data base was underway, including the preparation of numerous artifact distribution maps based on the random square analysis data. These were later prepared in Fayetteville (due to a lack of computer-graphic facilities at Arkansas State), using a program adapted by Thomas Scheitlin that was superior to the STAMPEDE program used to prepare distribution maps in the initial investigations of the 1975 materials (Anderson 1976). A wide range of other data presentation and manipulation options were at last possible, and ideas were tested against the data set within one to a few days after they were conceived. Most of the final computer analyses were conducted at

the Arkansas State University's Data Processing Lab, run under the directions of Drs. Adams and Babb of the School of Business, who provided their complete cooperation and much advice.

The months between June and October 1977 saw the project operating at its most feverish pitch, with periods of near round-the-clock writing and analysis. Much of the final report, which will be released in 1978, was completed and written during these five months, as two years' and more of thought achieved fruition. Early in June, the first radiocarbon dates came in and suggested a very early date for the Big Lake phase. As the summer wore on and more early dates continued to roll in, the excitement increased. While the final, published analysis can hardly lay claim to being definitive or exhaustive, during these summer and fall months, it appeared that more and more pieces of the site picture were falling into place.

The final draft report on the Zebree project was submitted to Survey Headquarters in December of 1977 for final editing and review prior to publication. The report, which is a summary of all four field seasons, consisted of 28 chapters and ran to over 600 pages. A separate Appendices volume, prepared by Anderson, consisted of almost 400 pages of information on artifact measures and provenience. The final report should be released some time in late 1979.

Chapter 5

FIELD STRATEGIES: 1968 AND 1969 SEASONS

1968 Testing Operations

In August 1968, archeological testing operations were conducted at Zebree (3MS20) and at two other sites within the Big Lake National Wildlife Refuge, Buckeye Landing (3MS19) and Cottonwood Point (3MS25). All three sites were endangered by a planned drainage project, and testing was undertaken to both help assess the significance of each site and to aid in the planning of full-scale salvage operations, if necessary. Prior to actual excavation, each site had been visited and at least cursorily mapped, and a formal proposal delimiting the purpose, methods, and requirements of a testing program had been submitted to the Department of the Interior (Morse & McGimsey 1968). Although the excavations were conducted under proposal to, and with the approval of, the National Park Service, the entire operation was funded by the Arkansas Archeological Survey.

A total of 18½ days were spent in the field during the 1968 testing at Big Lake, with 2½ days lost to rain. Testing occupied six days at 3MS25, 4½ days at 3MS19, and eight days at Zebree, the last site examined. Five test pits were opened at 3MS25 and two at 3MS19. The work at Zebree consisted of the excavation of two pits intuitively placed on high areas within the site (Figure 13). Field work was conducted by Morse and a crew of two, assisted on occasion by one or a few local volunteers. Living quarters were obtained in Manila, a nearby town.

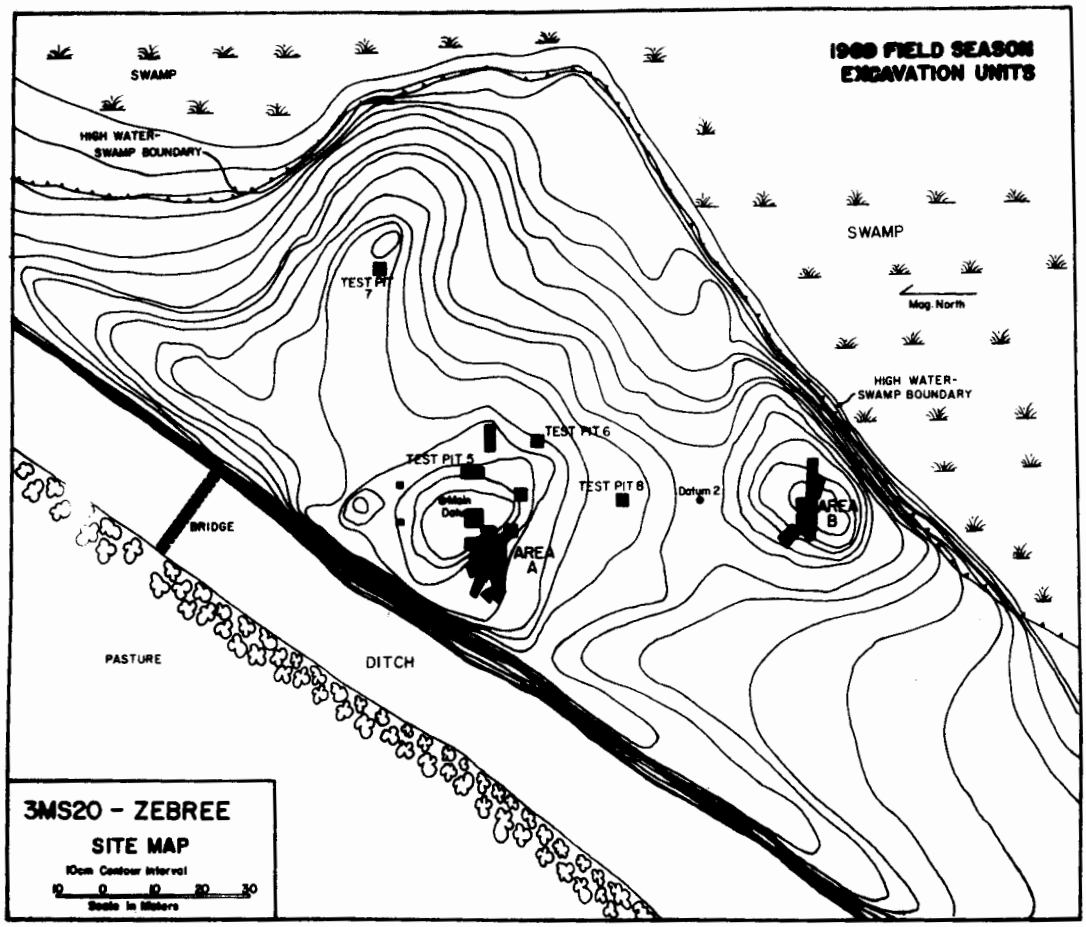

Figure 13. Excavation units at Zebree, 1968 and 1969 field seasons, superimposed over 10 cm contour interval base map (Negative 774224).

Although the other two sites could be driven upon, Zebree was accessible only by boat, necessitating the daily ferrying of equipment and personnel across the old drainage ditch bordering the site. When the testing took place, Zebree was densely overgrown, and preparation of a detailed site map was impossible. Some 20 potholes were evident, concentrated primarily on two low rises that characterized the western and southern periphery of the site. During, and subsequent to, the 1969 excavations these areas were referred to as Areas A and B. Temporary datums were established near each of these rises, and these were tied into a Wildlife Refuge boundary marker on the northwest corner of the site, near the ditch.

The first test, at the southern end of the site, consisted of squaring up and then expanding a large pothole. Test 2, located on the northwestern rise, was a 2½ by 2 meter pit placed among a large cluster of potholes. All fill from both units was shoveled or troweled out and artifacts were hand-picked from the loose dirt. Arbitrary levels were used where natural stratigraphy was not apparent, and the fill of all features or disturbances was kept separate. Because additional work on the site was anticipated, portions of features extending beyond each unit were left unexcavated. Charcoal and other samples were taken as warranted, and unusual or delicate artifacts were separated and safeguarded.

Arkansas Archeological Survey excavation unit level sheets were used to record basic information. Graph paper was used to draw all final profiles, floor plans, and maps of the immediate test localities. Black and white and color slide record photographs were taken, with

identifying notes accompanying each shot. A separate field record book was also kept, complementing the level sheets and generally detailing the excavation activity. All artifacts and samples were assigned temporary catalog numbers in the field; these numbers were then checked and finalized in the laboratory after the excavation. Both pits were backfilled at the close of the excavations, and temporary (wooden) datum stakes were left in place by each. Routine artifact processing operations (washing, numbering, and storage) were conducted at the Jonesboro Survey lab, both during and after the completion of field work.

Test pit 1, excavated around an old pothole, was roughly rectangular in shape, and measured 3.2 by 2.3 meters. Some time prior to the 1968 excavations, and probably during the summer of the previous year, a large oval shaped pothole had been opened at the south end of the site. Oriented NE-SW and measuring 140 by 190 cm, this pothole was relatively isolated from the cluster of 19 potholes on the northern rise. A myriad of probe holes and a tunneling excavation procedure (caving in the walls from the base upwards) indicated an experienced digger. The scar was advantageously placed on one of the rises, and the backdirt was rich in artifacts. For these reasons, Morse decided to excavate around it rather than completely remove a unit nearby.

From the field notes it is apparent that the pothole was squared off to "(1) see the extent of damage, (2) get some control of the sherds thrown out, and (3) get a quick profile of this part of the site." The pothole was first cleaned up, and all artifacts found within the loose spoil were assigned to a general provenience. Upon encountering undis-

turbed deposits, features and artifact clusters were exposed and then removed separately. As the testing proceeded stratification in the deposits became increasingly suspected (Figure 14). Two 2 by 0.5 meter extensions were then removed to subsoil, one to the northwest and the other to the southeast, to examine the stratigraphy in more detail. Each extension was taken out in 10 or 15 cm arbitrary levels, or following natural strata where this was observed. Features encountered were removed separately.

A total of 7 pits were noted in test pit 1, as well as 8 postmolds of undefined pattern. A crushed Late Woodland (Barnes) vessel and a miniature Barnes pottery jar were also found in the deposits, the former ignored and the latter missed by the pothunter. No plowzone was recognized, although the upper levels were obviously churned by recent digging activity. Below this churned layer were two artifact-rich strata separated by a lighter, relatively sterile zone. Except where intruded from above, the lower level contained pure Late Woodland remains.

The second test was initially a 2 by 2 meter pit opened among a large number of potholes on the western rise (Figure 15). As with test pit 1, a half meter extension was later opened to the south to clarify stratigraphy. The first 30 cm was recognized as plowzone and was removed as a unit. Below this, two arbitrary levels were removed before subsoil was encountered. No recognizable cultural stratification was detected. Upon reaching subsoil, the outlines of a number of features were recognized; these were removed separately. The completed unit measured 2.5 by 2 meters. Eight pit-features were encountered and were

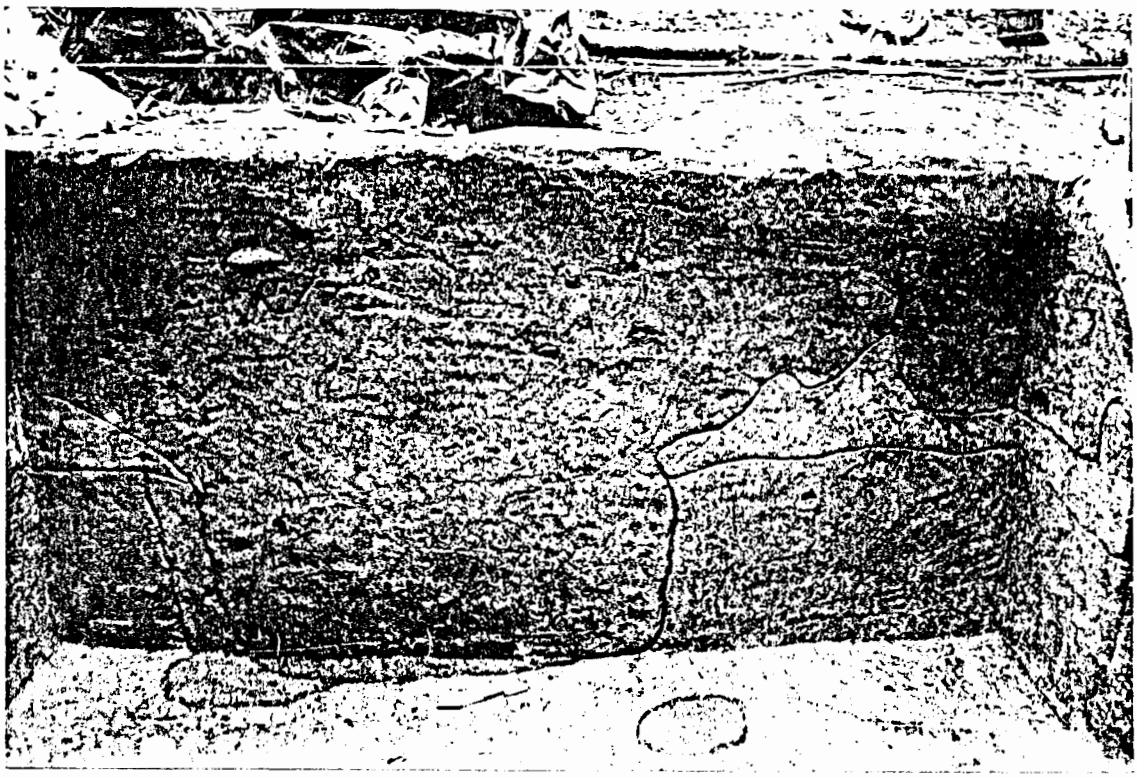

Figure 14. Northeast wall profile, 1968 Test Pit 1. The lighter soil band (Zone C) effectively separates the Late Woodland and Early Mississippian deposits. A large Big Lake pit intrudes the lower Late Woodland level. (Negative 682952)

Figure 15. Test Pit 2, 1968, after removal of features. (Negative 682955)

partially or completely removed. Six postmolds were also noted, again forming no recognizable pattern. In the base of one of the features, several microliths and cores were recovered, along with worked and unworked conch and mussel shell fragments, suggesting a manufacturing area. A human skull was also found in one of the walls, but was left in place since the burial apparently extended well beyond the unit.

Excavation at Buckeye Landing (3MS19) and Cottonwood Point (3MS25) indicated that large portions of these sites had been damaged by cultivation activity. Undisturbed midden and features were detected, but were apparently of restricted extent. Of five test pits opened at 3MS25, only two yielded subplowzone deposits consisting of pit features and shallow midden leases. At 3MS19, both test pits revealed subplowzone pit features. Surviving midden deposits at this site, however, were shallow and relatively devoid of artifacts.

Rich, complex, and potentially highly significant deposits were found at Zebree. In Morse's words, the site:

> proved, on the basis of two test pits, to be an archeologist's dream, especially as it holds tremendous promise for answering many questions concerning Early Mississippian and Late Woodland (1968:11).

Late Woodland and Early Mississippian artifacts were noted in both units, and evidence for a slightly later, Middle Mississippian occupation was noted in Test Pit 2. Test Pit 1 produced a meter of stratified deposits, with pure Late Woodland materials separated from Early Mississippian midden by a distinctive and relatively artifact-free layer. Evidence for a comparatively recent historic occupation was noted in the upper 20 cm of the deposits in this pit, which was interpreted as the late

19th-early 20th century Sebree homestead. Both pits exposed complex patterns of features, in addition to large quantities of bone, shell, ceramic, and lithic artifacts.

1969 Intuitive Block Units

The year 1969 saw extensive excavations at the Zebree site. The results of the 1968 testing operations (Morse 1968) were used to plan salvage operations at the endangered Big Lake sites, and in April 1968 a formal proposal was submitted to the National Park Service (Morse and McGimsey 1969). All three sites were recognized as containing significant information, but because of the unusual nature of its artifacts and deposits, Zebree was selected as the focus for subsequent work. Funding was provided for eight weeks of field work by an archeologist and a crew of seven, and for a similar period of laboratory processing by a crew of three.

The major goals of the 1969 excavations have been variously recounted (Morse & McGimsey 1969:1-2; Morse 1969b, 1975a:4, 1976a:8) and essentially consisted of the recovery of as much and as diverse information about the site and its contents as possible prior to destruction. Morse (1976a:8) has summarized some of the more specific goals as:

> to confirm the 1968 tests, to collect sufficiently large assemblages of artifacts in good cultural context to provice an adequate and representative sample of all occupations, to relate the two areas of the site to each other, to expose house patterns and at least hints of community plans for each occupation and to obtain sufficient samples to investigate more fully the nature of the Zebree Microlith industry.

The early Mississippian occupation received the focus of attention. Excavations were undertaken to delimit it in relation to earlier and

later occupations on the site and, if possible, to recover information relating it to other centers of initial Mississippian development, notably to the north in the Hayti/Cairo Lowlands area and with Cahokia.

The 1969 field activity at Zebree was conducted over a period of nine weeks, from June 16 through August 16. A total of 45 days were spent in actual field operations, with time lost to rain during the week made up on weekends. The crew consisted of Morse, a field assistant, and a crew of from four to eight, usually averaging five. In all, about 350 man-days were spent on the site. The excavations consisted of the removal of two large block units intuitively placed on high areas within the site, and the use of scattered test pits and auger holes in an effort to define deposit boundaries (Figure 13).

Much of the first week was spent settling in. A road was opened to the site from where a logging bridge crossed the ditch 1½ miles to the south, and vehicular access was possible in times of low water or dry weather. Trees and underbrush were cleared away from the low rises defining areas A and B, the scene of the 1968 tests, and a camp-site was established between them close to Area B, at the south end of the site. Accumulated underbrush was burned, and both cleared and surrounding areas were periodically sprayed with insecticide to reduce the number of gnats and mosquitos. A boat was kept on the site, and provided the only sure access for much of the dig, when the road was flooded or choked with mud. A well was established and a gas generator was set up to provide for fans, lights, and other amenities.

Once Areas A and B had been cleared, the immediate vicinity of the 1968 test units was gridded into 2 m squares with a transit, stadia, and tape. A finite grid was established, with a point southwest of Area B selected as the origin and the Y axis, or site meridian, oriented along magnetic north-south. Locations within the site were determined first in distance along the meridian and then to the left or right of it. The center of 1968 Test Pit 1 in Area B, for example, was 17.5R11, while that of Test Pit 2 was 80R7. The grid was set up so that the site would be within a single quadrant. Permanent datums were established along a line within areas A and B and at a point roughly between them, at 88R18, 8R18, and 34R18.2, respectively. The point in Area A (88R18) was selected as site Main Datum and a 5 foot length of zinc-based pipe was driven; the other two datums were marked with 3 foot lengths of wrought iron. Wooden stakes were used to mark temporary points, and the entire grid was tied into a bench mark on the far side of the levee to the west.

Initial excavation activity consisted of quickly cleaning out and squaring up seven old pothole scars near 1968 Test Pit 2 in Area A to determine why they were dug and to investigate local stratigraphy. Most of the potholes apparently were dug as the result of a probe hitting one or more large sherds. With the pothole strata serving as a guide, excavations proceeded with the removal of contiguous 2 meter squares in Area A, around the 1968 test unit. After two weeks, a second block was begun, in Area B immediately to the east of the 1968 test pit. A total of 180 square meters were opened during 1968, 92 from a block in Area A (Figure 16), 54 from the block in Area B (Figure 17), and 34 from a series of test pits of varying size placed near, and east of, Area A (Figure 13).

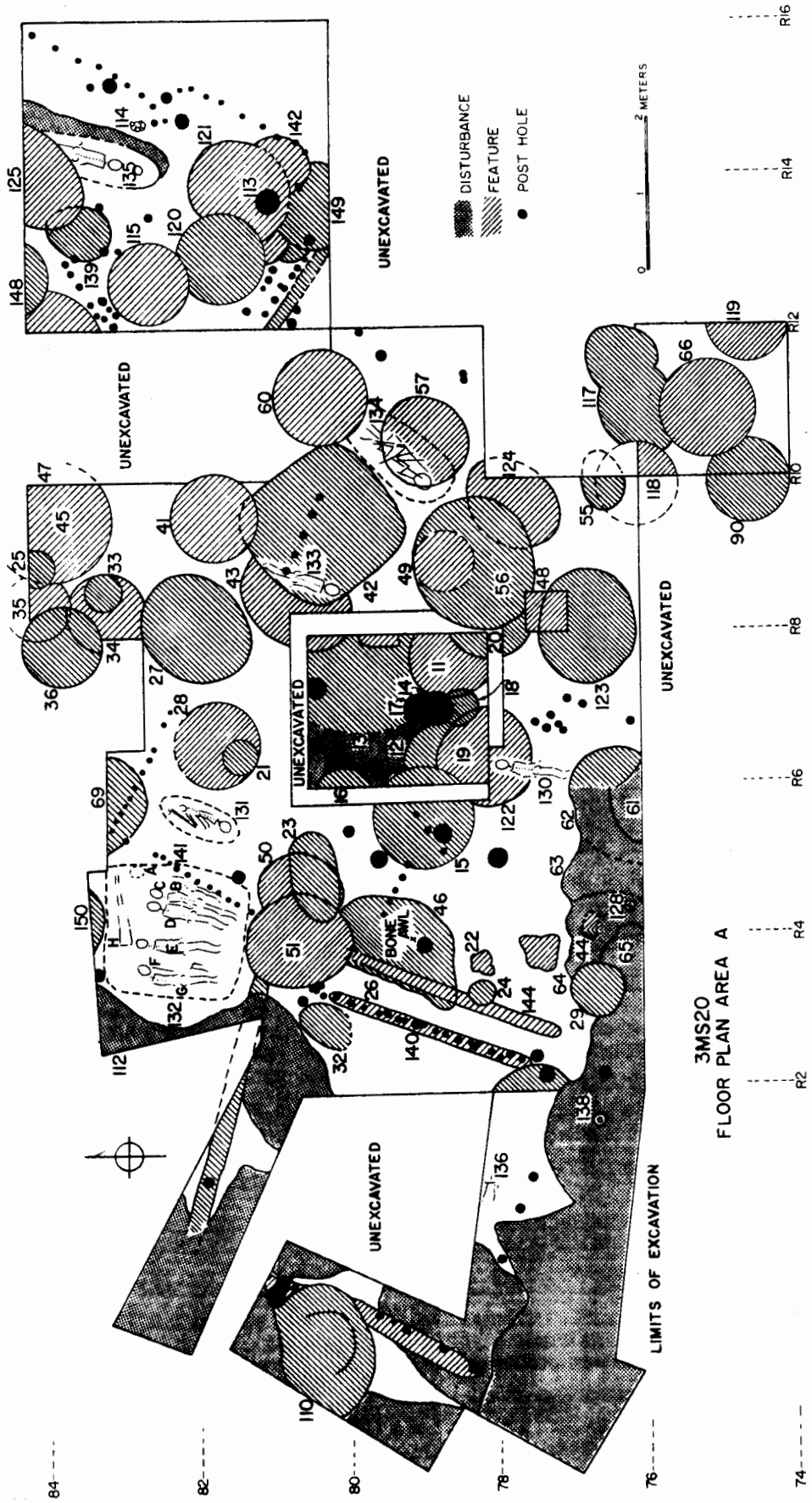

Figure 16. Area A block excavation units and features, 1969 field season, Zebree (from Morse 1975a:34).

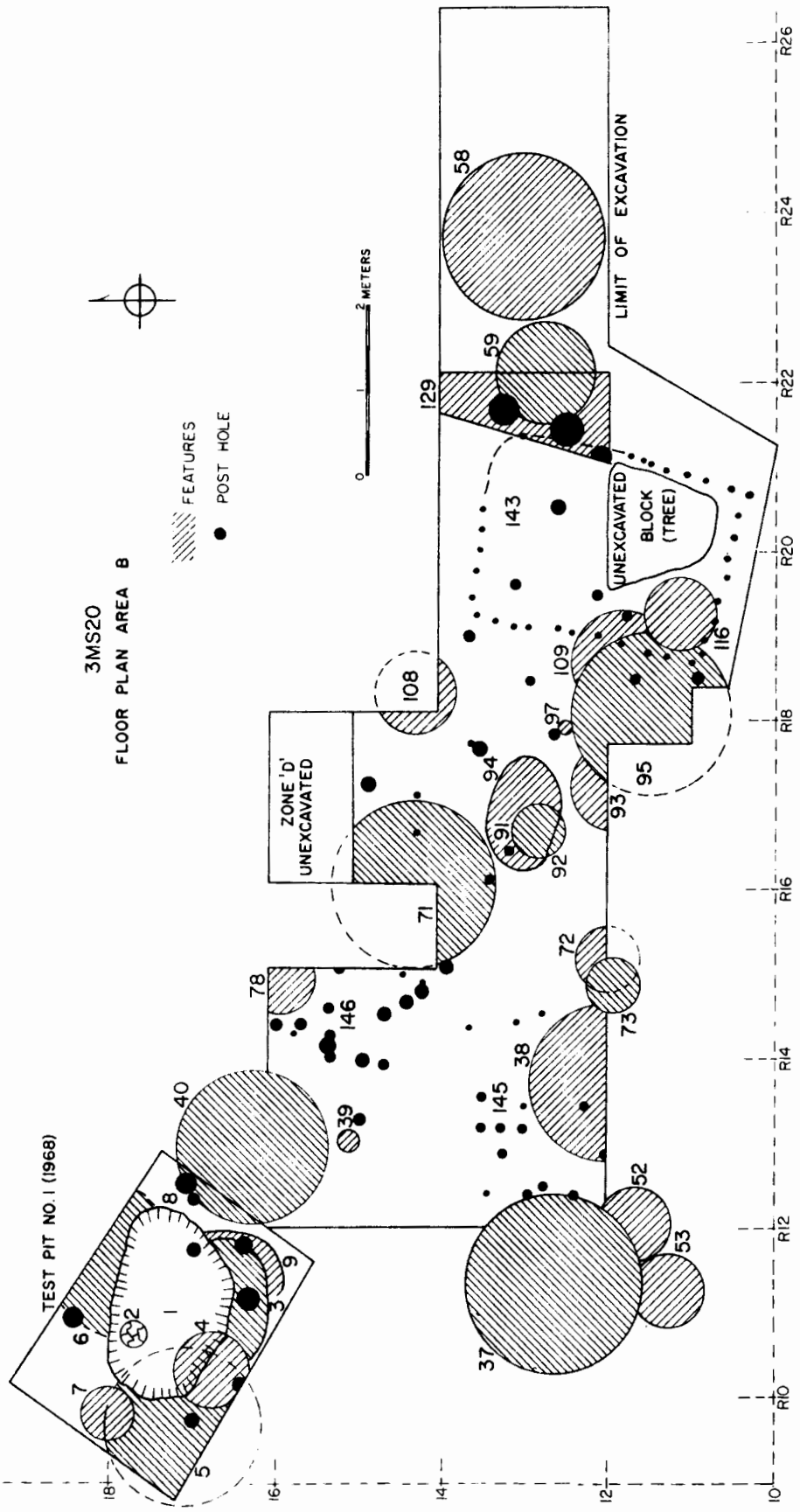

Figure 17. Area B block excavation units and features, 1969 field season, Zebree (from Morse 1975a:26).

Squares were excavated in arbitrary 20 cm levels unless natural strata existed, in which case these were followed and removed in total. A thin plowzone 20-30 cm deep extended over all of the areas tested. In Area A this was screened while in Area B it was discarded to speed excavation. Arbitrary levels were shoveled out, unless features appeared, with the fill sifted through ¼ inch mesh in shaker screens. Features and the stratagraphic zones in Area B were troweled out and the fill hand picked. Attempts to fine screen feature and natural strata fill were frustrated by the damp soil; it rained at least briefly on most days, and when the adjacent ditch filled, the water table on the site was only a foot or two below the surface in most areas.

Every effort was made to completely excavate features when these were encountered (Figure 18). Adjacent (unexcavated) squares were frequently intruded or undercut to remove fill. Tunneling procedures were employed on one occasion, to delimit a house floor in Area B that had been intruded by a large tree. The presence of numerous pothunters in the area meant that features or units could not be left partially exposed on days when the site was unoccupied. During the first weekend of the dig, the site was vandalized and some equipment stolen.

As in 1968, Survey unit level sheets were used, with supplementary sheets used to record features and additional information where necessary. Floor plans were drawn at the base of each level, and concentrations of artifacts and single distinctive artifacts at any depth were first exposed and then drawn in and piece plotted on the record sheets (Figure 19). All final profiles as well as many floor plans were drawn on graph paper. Pencils were used, for all field notes, and a

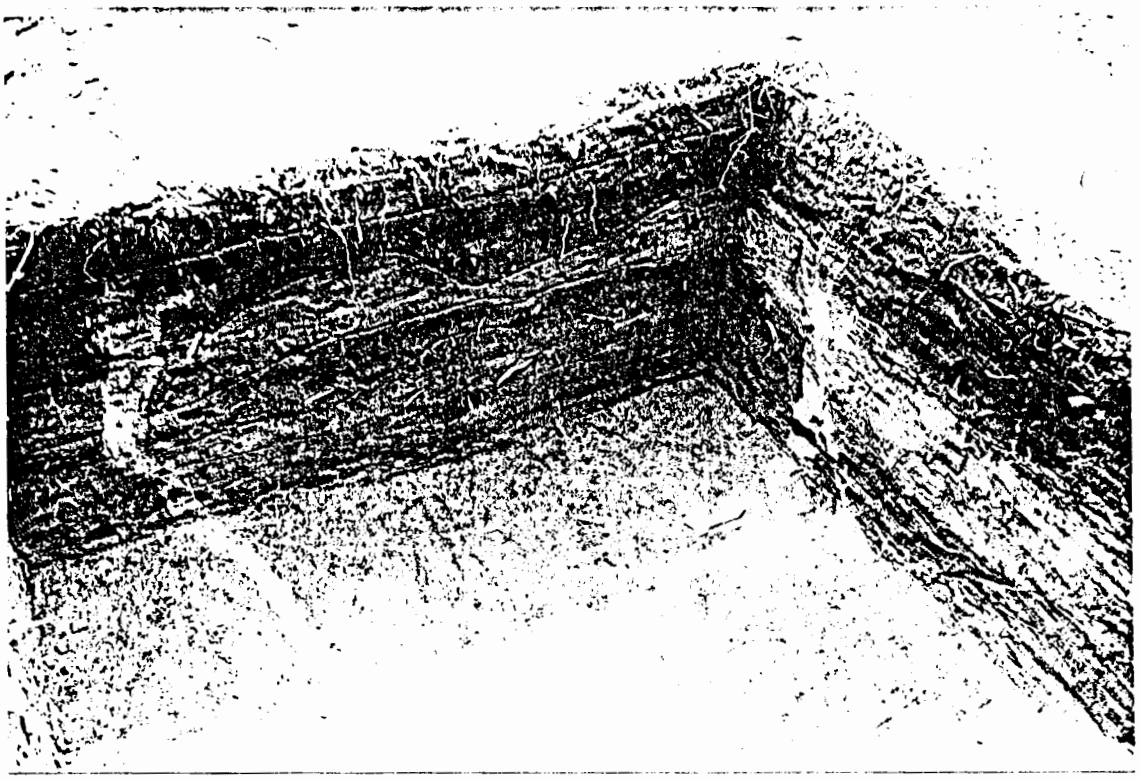

Figure 18. Feature encountered in floor of Test Pit 5, 1969 excavations. A narrow earthquake crack appears in the floor and north and west wall profiles. (Negative 692742)

Figure 19. Mass burial, House #1, and Features 50 and 51 exposed in Area A, 1969 excavations. (Negative 692570)

Munsell chart was employed to maintain soil color control. Over 100 black and white photographs and color slides were taken, one backing up to the other, and notes were kept recording each shot.

Soil, carbon, and flotation samples were taken from a number of features and strata, and fragile artifacts were wrapped separately. A zone of burned clay encountered in Area A was covered over, to preserve the deposit for possible archeomagnetic dating. A 3-inch (o.d.) hand auger was used to help determine both the nature of the soil matrix and the midden depth. A series of 28 auger tests, one every two meters, were placed along the north-south line beginning at the Main Datum and running towards Area B. Several other locations were augered up to two meters or more in depth to determine natural stratigraphy.

Nine test pits of varying size were opened in an attempt to delimit the nature and extent of the deposits, and to locate features. Most were located close to Area A (Figure 13), although one two-meter unit (Test Pit 8) was placed roughly midway between Areas A and B and another (Test Pit 7) was placed over 50 meters northeast of Area A, near what seemed to be the site periphery. Two one-meter pits, four two-meter pits, and two 2 by 4 meter units were opened. The final unit, a 0.5 by 0.4 meter test slot, was opened west of Area A near the ditch edge, to determine the effects of construction on the deposits.

During the excavations level contents and field specimens were assigned temporary catalog numbers based on unit or grid coordinates. All materials were removed to the Jonesboro station for processing, where

final numbers were assigned. The laboratory staff was able to process all but the last two weeks' materials by the end of the dig. While the excavations were in progress a transit and stadia were used to shoot 140 points, most near Areas A and B, for incorporation into a site contour map. Upon completion of the excavations, all open units were backfilled using a bulldozer, and all materials except for the three primary datum stakes were removed.

A total of 153 features were recorded, including over 100 pits, 8 human and 2 dog burials, all or parts of 8 structures, several natural disturbances, and a number of concentrations of lithic, ceramic, and shell artifacts. Some 75,000 separate artifacts were recovered, mostly ceramic, lithic, bone, or shell. The resulting data was summarized by Morse (1975), and served as a guide to both prepare for and help interpret succeeding work on the site, in 1975 and 1976.

Chapter 6

FIELD STRATEGIES: 1975 AND 1976 SEASONS

1975 Multistage Operations

From late June through early September 1975, extensive field operations were again conducted at the Zebree site, under the overall direction of Dr. Dan F. Morse. Actual excavations did not begin until July 8, and field operations prior to this were oriented toward preparing the site and equipment for excavation. When excavations did begin, many separate strategies were utilized simultaneously due to limitations of both time and money, instead of in the recommended temporal succession which allows for maximum feedback and restratification (Figure 20).

Field operations began on June 23, and for the next two weeks, consisted primarily of clearing operations. The site had reverted back to dense underbrush, with all traces of Morse's 1969 clearing gone. Site clearing, under the direction of Michael Million, continued every day for two weeks. All underbrush over a roughly three-acre tract was cut and burned and many smaller trees were removed. As in 1969, the site area was extensively and periodically sprayed with insecticide approved by the National Wildlife Service. A storage shed for equipment was built, and two well points were set immediately north of Area A. A steel cable swinging bridge, designed by Mark Raab, was suspended over the ditch, and provided direct access for most supplies, equipment and personnel. The logging bridge south of the site was still intact, and the field road hand-blazed in 1969 was reopened with the help of a backhoe, permitting access to vehicles and heavy equipment during periods of low water or dry weather.

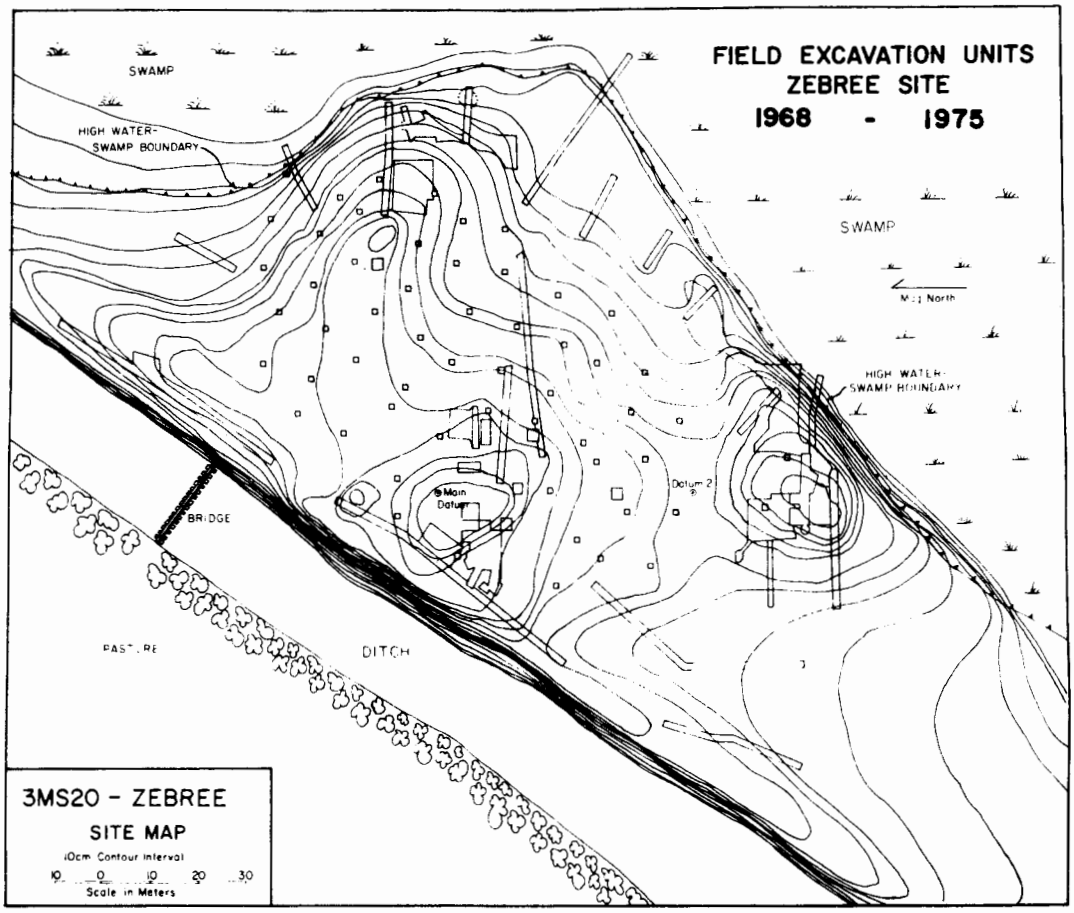

Figure 20. All excavation units, 1968 through 1975 field seasons, Zebree (Negative 774219).

A wooden water screening rack was set up at the edge of the ditch near the two well points, and plastic sheeting was used to direct water and sediment into the ditch, an action approved beforehand by the U. S. Army Corps of Engineers. Screen frames were interchangeable, and it was possible to employ 1/16th, 1/8, 1/4th, or 1/2 inch mesh as circumstances warranted. Two gasoline generators were established near the well points, which provided power to run water pumps, fans, lights, and other electrical equipment as needed. With both generators running, it was possible to have three hoses in use simultaneously at the wet screen rack. Large quantities of midden and feature fill were processed in this manner. Wheel barrows were employed to transport feature fill from excavation units to the wet screening area. All artifacts were washed in the field at this rack prior to removal to the lab, and the screen frames were placed on sheets of plastic in the sun, to dry.

A laboratory and headquarters were set up in a house at the headquarters of the Big Lake National Wildlife Refuge. Once excavations began processing and analysis was conducted here by a number of specialists and assistants under the overall direction of Phyllis Morse. Current and rapid information flow between the lab and field was maintained. Field personnel were aware of the nature and quantities of material they were recovering, and could modify their strategies to suit the needs of project specialists. The same specialists, in turn, had the capability to personally recover or supervise the recovery of data suitable to their research interests.

Almost two of the eight weeks of field operations with a full crew were lost to rain; a particularly heavy fall from August 1 through 4 completely flooded every unit on the site, and it was necessary to drain pits to work in them. A backhoe and operator were available each day, and it was possible to dig drainage holes for a few of the larger block units. Time lost to rain in the field was spent in processing and analysis in the lab.

Once the site had been cleared, some 250 points for a detailed 10 cm contour map of the site were shot in with a transit and stadia (Figure 5) by David Anderson, and Morse's 1969 grid system and excavations relocated. As new units were opened they were mapped, a necessity on a site this large and overgrown. To adequately map in units and shoot contour points, it was necessary to establish the transit over a number of carefully set datums about the site, including those placed in 1969. Even with the underbrush removed, there were so many trees that line-of-sight readings were difficult over more than 30 or 40 meters. One person (Anderson) was responsible for mapping activity during the 1975 field season.

The excavation strategy for the 1975 field season employed a three-fold plan of action: 1) the excavation of a randomly selected 1 percent sample of certain areas of the site using 1 meter test pits, 2) use of arbitrarily and randomly placed backhoe transects and slots across the site, and 3) wide-area block unit excavations at specific parts of the site. Additionally, under the direction of Dr. James R. Price, a metal detector survey was made of the site area, to help delimit

the historic components. Finally, a one-meter test slot (designed for other ends) was opened to a depth of two meters on the west site of the ditch, opposite the Main Datum.

Random Excavation Sample

A 1 percent excavation sample was obtained from a large area of the site through the use of a stratified systematic unaligned sampling strategy (Anderson 1976). Directions for the use of this strategy have been presented by Haggett (1966:196-198), and examples of its use on archeological sites have been presented by Redman and Watson (1970), and by Goodyear (1975). A particular goal of the sampling procedure was to secure information on the nature and rate of midden accumulation.

The 1 percent sample was obtained by selecting, using a table of random numbers, a 1-meter square from within a grid system employing units 10 meters on a side. Each 10 meter grid block contained 100 1-meter squares, one of which was chosen for excavation using a stratified systematic unaligned selection procedure. Once in the field, the locations of each square were determined using a transit and steel tape, shooting from fixed datum points. Sample squares were selected in a manner which assured maximum dispersion over the site. A total of 55 1-meter units were excavated using this strategy, from the central and northeastern portions of the site within a roughly "L" shaped area. These areas had been only briefly tested, or not tested at all, by Morse in 1969.

The sample units were excavated in natural levels and arbitrary 20 cm levels within natural levels. If no natural stratigraphy could be

determined, arbitrary 20 cm levels were utilized througnout. The first 27 pits were excavated in this fashion. In some of these squares, deep midden or features were encountered. A different strategy suggested by Goodyear and House (personal communication) was adopted for the remaining sample squares. A backhoe trench a meter and a half long and a meter or more deep was placed along the north face of each of the remaining units. From this backhoe trench, stratigraphy could be determined and features, such as pit outlines, could be noted and removed separately. A total of 28 units were removed using this trenching procedure.

In the excavation of each random square, a consistent collection procedure was employed. From each level a one-gallon flotation sample was collected, from the center of each unit. These samples were removed to the laboratory each day for processing and analysis by the ethnobotanist. In addition to the flotation sample a "bucket sample", consisting of two gallons of earth, was removed from each level for fine screening. This sample was then weighed and wet-screened through 1/8th or 1/16th inch mesh. The remainder of every level was passed through 1/4 inch screen, employing either the wet screening racks if the hoses were free, or dry screens suspended from frames made from swing sets or lashed poles. In addition to the flotation and bucket samples, pollen, soil, and carbon samples were taken, where appropriate.

Field notes were taken from each square, with records kept by level, and profiles were drawn upon completion of the unit. Features encountered were removed separately. As in previous seasons, Arkansas Archeological Survey level sheets were employed, with supplementary fea-

ture record and field catalog sheets used as needed. Graph paper was used for final profiles, and record photographs were taken as needed (Figure 21). Crews working a particular square routinely filled out temporary field catalog forms, took all notes, and labeled samples and artifacts. This led to some variation in the quality of notes, and spot checks were used to check for errors. Finally, each crew also washed the artifacts recovered from 1/4 inch screening upon completion of the unit.

Backhoe Transects

The second major field strategy utilized at Zebree in 1975 involved the use of a backhoe to place test trenches and transects across the site area in both randomly and arbitrarily determined locations. During field operations, a backhoe and operator were on the site each day. Early in the summer it was found that one or two hours' use of the backhoe each day provided enough work to keep several persons busy for one or more days.

Backhoe cuts were placed within the site area, on the site perimeter, and outside the site to recover information. Transects 1-meter wide, running north-south and east-west, were opened across the site to delimit the extent of midden. Short trenches were opened along the north face of a number of the probability sample units. Additional trenches were placed across the site, with variable orientation and extent, to delimit features, geological stratigraphy, or profiles for the gathering of soil and pollen samples. A total of 20 long transects and trenches and 28 short trenches were opened using this strategy. The combined length

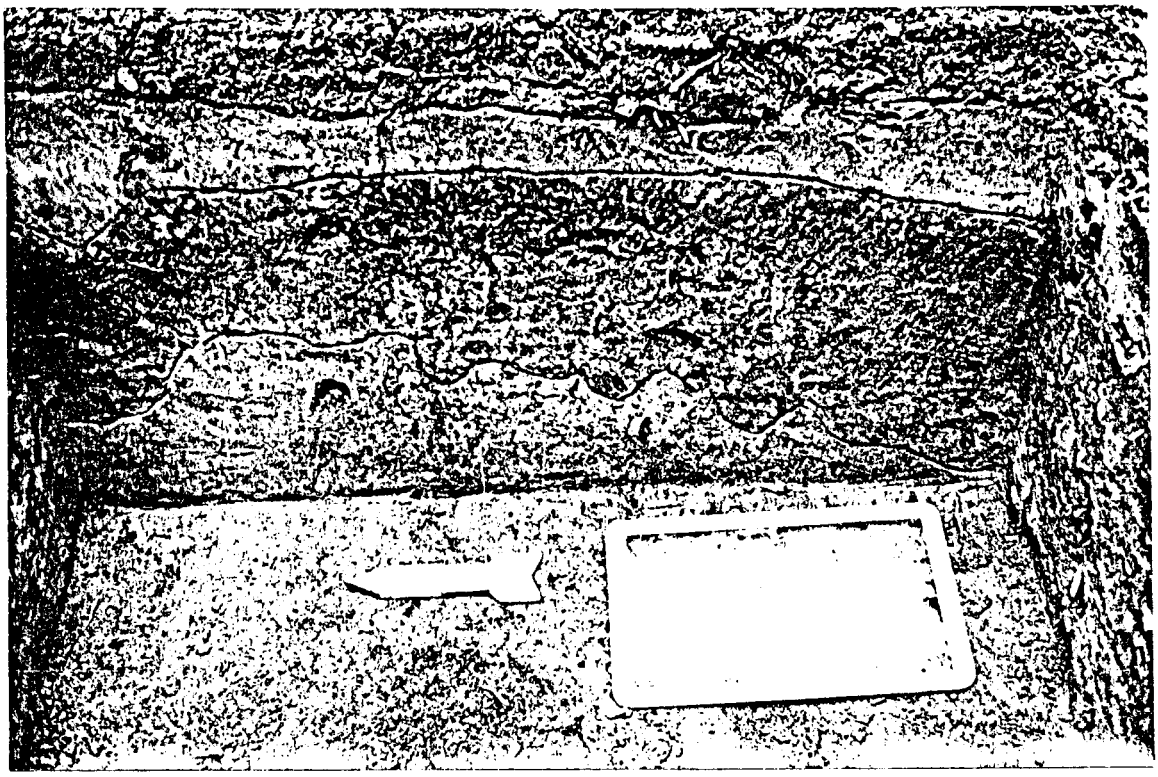

Figure 21. East wall profile, Random Square 44, 1975 excavations. Recent clay, plowzone, midden, and subsoil levels are delimited. (Negative 752659)

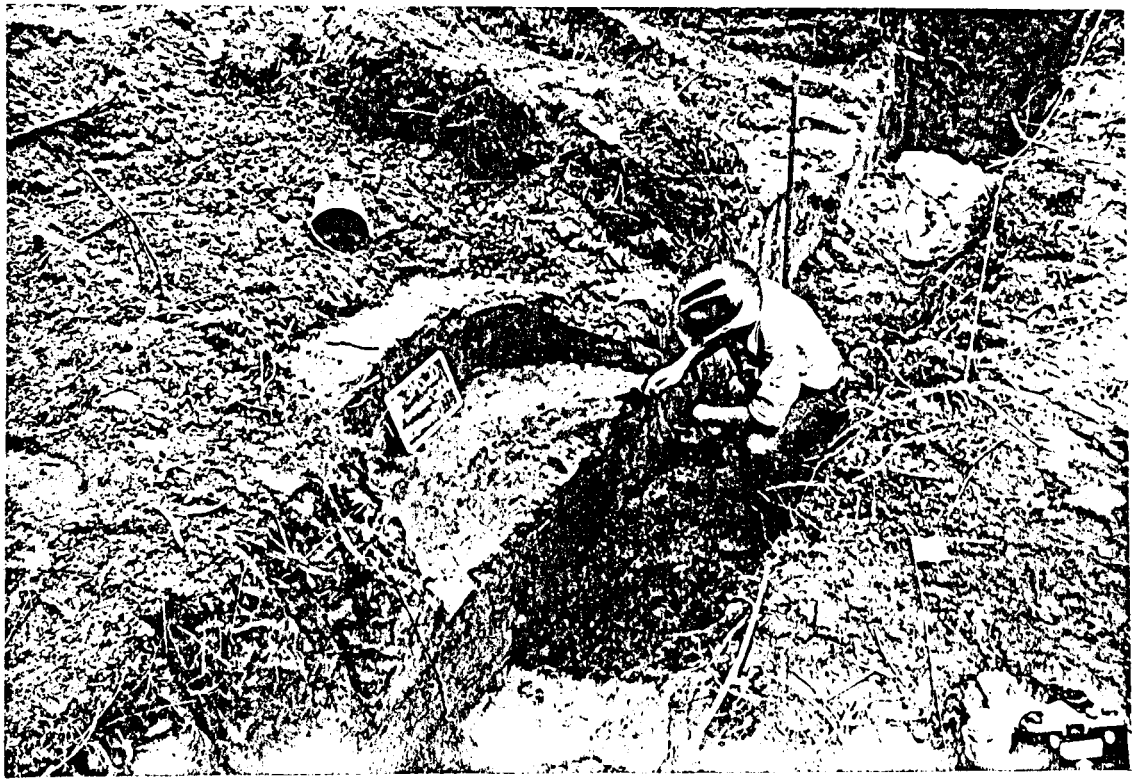

Figure 22. Dan F. Morse examining Feature 206/210 intersected by Backhoe Trench 3, 1975 excavation season. (Negative 752777)

of these trenches was approximately 490 meters.

Backhoe trenches were excavated in 10-15 cm cuts under the supervision of one of the field directors. Cuts were removed to subsoil or until unusual features or materials were observed. Walls and floors were cleaned and profiles mapped, with soil and pollen samples removed as appropriate. Features encountered were drawn on the profiles and removed separately, if time permitted (Figure 22). To some extent, the placement of backhoe cuts on the site was limited by conditions of topography, drainage, and vegetation. Care also had to be taken to leave gaps in the trenches, where necessary, to provide for the efficient movement of persons and vehicles across the site.

Block Unit Excavations

The third major excavation strategy consisted of the excavation of relatively large "block" units. Excavations conducted in this fashion consisted of units from 5 to 10 meters on a side, placed in areas of potential significance to project research goals (Figures 23, 24). Previous excavations on the site and the sampling and transect procedures of the 1975 field season formed the basis for decisions concerning block unit locations. Five block units were excavated on the Zebree Site during the 1975 field season, encompassing an area of approximately 240 square meters. In addition, two other large areas on the site's eastern perimeter were opened to subsoil during operations designed to locate and follow the pallisade. These somewhat irregularly shaped units extended over approximately another 240 square meters.

Figure 23. Anderson mapping fill of partially excavated Block Unit 3, 1975 Zebree excavations. (Negative 752897)

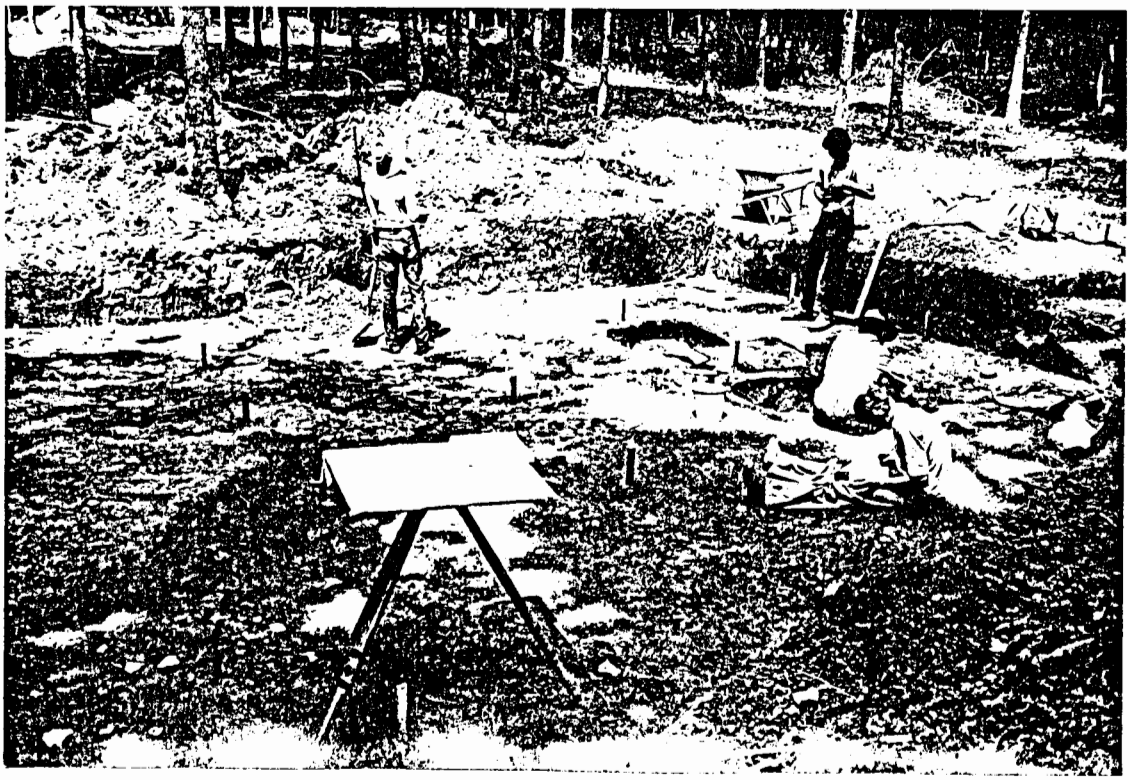

Figure 24. Block Unit 4 excavations near Area B, 1975. (Negative 752893)

Block units were excavated two ways. In the first procedure, the backhoe was used to remove overburden to immediately above the desired levels, where finer recovery techniques were used. Approximately 480 square meters were examined in this manner in 1975. In the second procedure, contiguous 1 by 2 or 2 by 2 meter squares were removed following natural stratigraphy, or in arbitrary 20 cm levels if no stratigraphy was apparent. This procedure had limited use; only 14 square meters, all in Area B, were opened in this fashion during the 1975 season. In both procedures units were removed to subsoil, with pollen, soil, and flotation samples collected as appropriate. Features encountered were mapped and removed separately.

Feature Removal

In each of the major excavation procedures outlined, a wide range of features were encountered. These included pits, burials, postmolds, and burned clay areas. When these were encountered, the procedures that led to the discovery were abandoned and ones more directly relevant to the recovery of feature data were adopted.

All features were mapped as encountered and, in all cases, material from defined feature areas was kept separate from other material. In unusual situations, relevant specialists were called in to remove the features. Separate feature records were maintained, containing appropriate notes, field catalog numbers, and profiles or plan drawings. Again, record photographs were taken as considered appropriate. Most features were water-screened through 1/8th inch mesh. Fill volume was recorded in gallons for a number of the units. Finer or coarser

screening procedures were occasionally used; screen size was routinely recorded along with the volume of material.

Flotation samples were removed from a majority of features, and pollen and soil samples from a number of them, particularly if unusual soil conditions were apparent. Carbon and archeomagnetic dating samples were secured where conditions warranted. Every effort was made to completely remove all features encountered in the block units. Features in trench profiles, or extending behond the boundaries of the random squares, were removed only if the shape or contents indicated a promising return on recovery time. In particular, attention focused on shell or clay lined or bell shaped pits, or on burials.

A total of 158 features were recovered, including eight human and two dog skeletons (complete), a number of artifact concentrations, several house, post, and hearth areas, 13 possible sections of the site ditch line, and almost 100 pits. Some 250 flotation and 200 bucket samples were taken, and over 50 samples each of soil, pollen, and carbon were also collected. Over 100,000 artifacts were ultimately collected and processed.

1976 (Terminal) Field Salvage

Due to various delays, the final ditching operations in the vicinity of Zebree did not begin until the end of July 1976. Field operations were conducted under the direction of Morse, assisted by Anderson. A total of about 100 work days were spent on the site during

the three-week period of the excavations.

Using the bulldozer, a series of 3-meter wide cuts were made across the site to subsoil depth (Figures 25, 26). Pits, postmolds, and other features extending into the subsoil were thus fairly easily delimited. Before the exposed cut bottom dried out to a uniform yellowish-gray color, feature outlines were emphasized with a trowel and a flag was placed in the center of each. Pit contents were then removed using trowels and shovels, and the locations mapped in with a transit (Figure 27). Backdirt was troweled but not screened, and pollen, soil, and C14 samples were taken as appropriate. Each night the features and cuts were plotted on a base map, to prevent the reexcavation of former units. Approximately 2500 square meters of the site area were opened to subsoil, with 200 meters opened on the west side of the drainage ditch bordering the site.

The discovery and excavation of a mid-19th century well also occurred during 1976. With the help of first bulldozers and, during the last few days of the dig, the 12,000 pound dragline bucket, it was possible to excavate the well fill in entirety, to a final depth of almost 4 meters below ground surface. The well had cypress board shoring with corner and cross pieces almost perfectly preserved below the modern water table at 220 cm. With the use of a tractor log skidder, provided by Jerry Cohen, it was possible to pull up the support beams and almost all of the shoring boards.

A total of 136 features were investigated, including ten fragmentary human burials, two dog "burials", a large number of pits, several

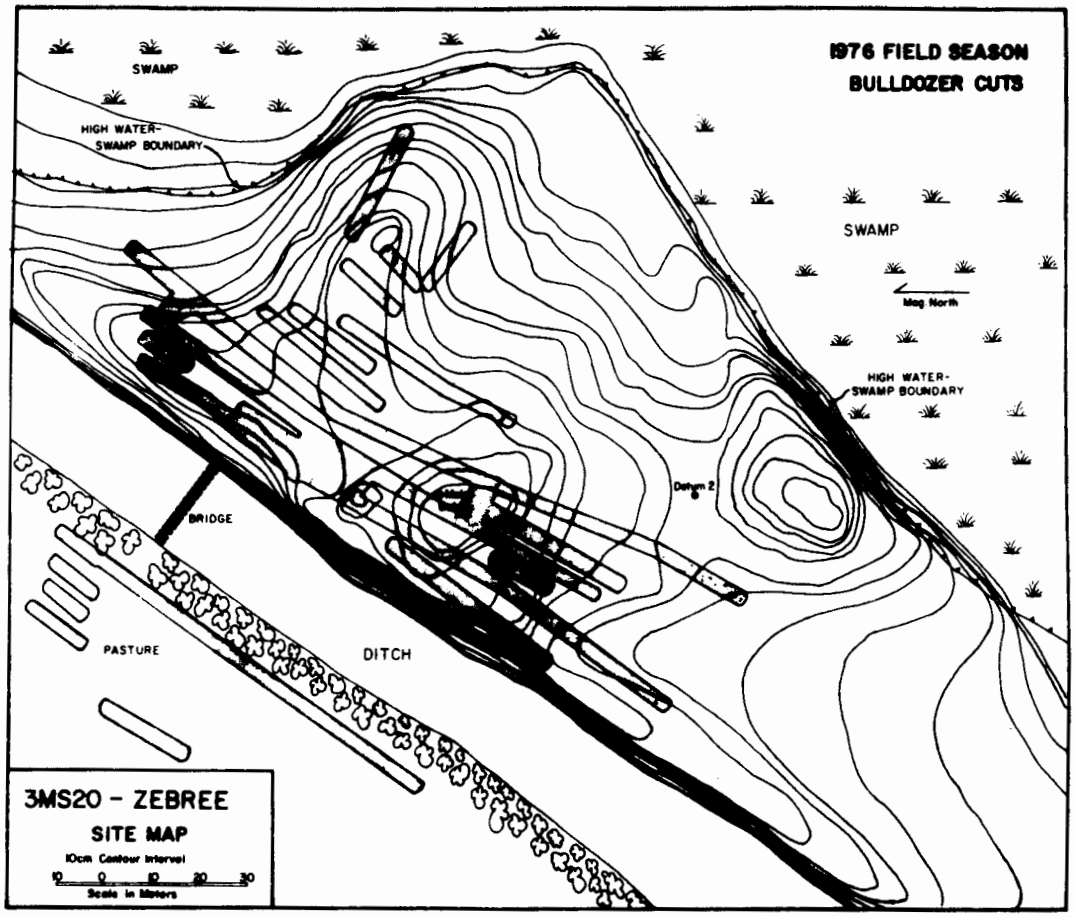

Figure 25. Excavation units at Zebree, 1976 field season, superimposed over 10 cm contour interval base map (Negative 774220).

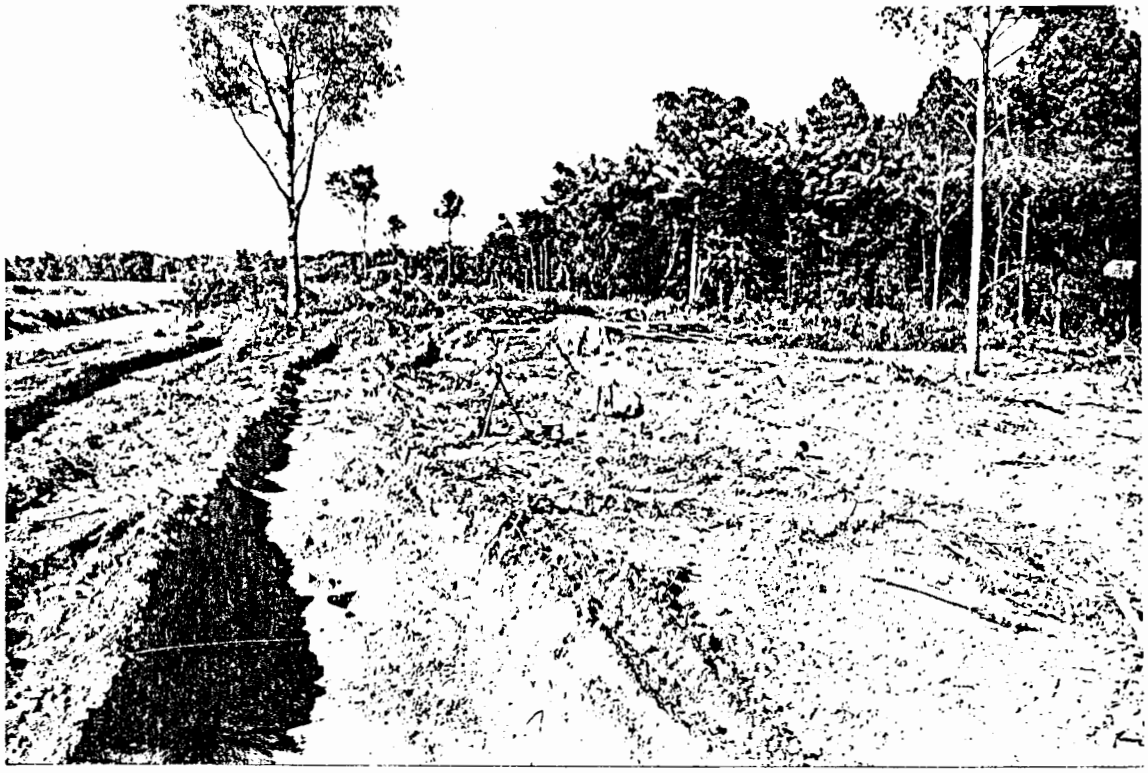

Figure 26. Bulldozer cuts across the Zebree site, looking north, 1976. Transit (in center of photograph) is established over the site main datum. (Negative 763659)

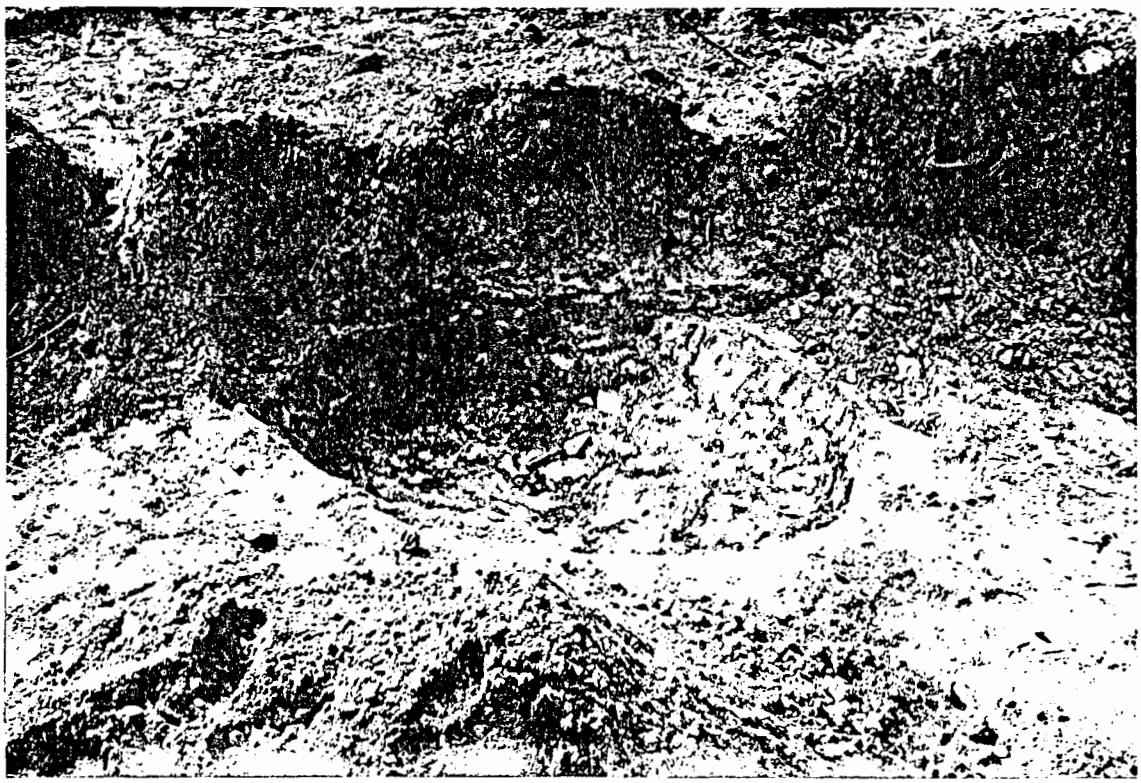

Figure 27. Feature 333, after excavation, August 1976. Surveyor's flags were used to mark features upon recognition. (Negative 763668)

earthquake disturbances, and the historic well. Two large segments of the ditch were uncovered at the north end of the site. Over 70 pits were completely excavated, and a tremendous amount of information was recovered. Soil, pollen, and carbon samples were taken as appropriate; in particular, attention focused on recovering carbon samples in secure context. Over a dozen restorable vessels, several awls, a sphere of hematite, and upwards of 10,000 sherds were recovered. All artifacts were transported to the Jonesboro lab each evening, where processing was initiated. Due to the large numbers of materials recovered, and the fact that virtually everyone available was drafted for one or a few days duty at the site, final processing was not completed until some time after the close of the excavations.

Chapter 7

EVALUATION: THE 1968 AND 1969 SEASONS

The 1968 Testing Operation

From the historical review it is apparent that a considerable amount of activity and planning had occurred before the 1968 testing operations took place. Prior to initiating field work, a formal proposal had been prepared, outlining the goals of the project and the methods by which they were to be achieved. This proposal, for the "Archeological Testing of Three Sites in the Big Lake National Wildlife Refuge" (McGimsey and Morse 1968) explicitly delimited the reason for the test: appraising the salvage requirements for each site. In other words, the testing was conducted to aid in the planning of extensive salvage operations, if necessary. It was designed to determine what was in each site, and what would be needed to recover an adequate sample of the remains, assuming eventual complete destruction.

Prior to the testing a detailed discussion of field procedures was never explicitly presented. The research proposal states only that the sites

> will be sampled utilizing scientific methodology and complete records will be kept of all phases of excavation (Morse and McGimsey 1968:2).

Intuitive placement of test pits was implied, but never expressly stated, either in the proposal or elsewhere. The proposal does, however, delimit subsequent analytical procedures, including provisions for the cleaning, cataloging, and storage of recovered artifacts.

The 1968 testing strategy is best described as intuitive, or judgmental in nature. Placement of excavation units on high areas within the site reflected the assumed desirability of these locations to prehistoric occupants during extensive rain or flooding. Artifact rich pothole spoil in these areas, noted prior to initiating excavation, supported this suspicion. Problems with judgmental sampling have been widely discussed (Binford 1964, Ragir 1967, Redman 1975), and reflect one main limitation. The strategy reinforces, and cannot help refute, preconceived notions of human behavior. In excavations or surveys conducted using judgmental methods, only certain kinds of loci are examined. Much of the appeal random sampling has acquired recently has been because it can lead to discovery in unexpected or unanticipated areas--locations that might otherwise have never been examined.

The use of two 2 meter pits to evaluate a site that was ultimately recognized as extending over 3 acres can also be criticized. The incontrovertable vantage of hindsight permits sure targets, and it is undeniable that the single test "telephone booth" approach is a sitting duck (Flannery 1976:4). Information on the site deposits was, however, also obtained from a much larger, if somewhat unfortunately derived, sample of units. Potholes scattered about the site indicated a rich, dispersed fill--more than might be construed if only the test pit data were known. One such "illicit intuitive" test was expanded, as test pit 1, to quickly and accurately probe a portion of the site deposits.

The opportunistic use of potholing activity, combined with fixed unit excavations to determine and control for site stratigraphy,

indicate a flexible field procedure. This contention is supported by the fact that neither unit nor level parameters were rigorously predetermined, but rather were adjusted as necessary in response to particularistic conditions. In retrospect it is apparent that some form of probability sampling would have been optimum. Smaller, more dispersed test units, coupled with auger or posthole digger spot tests, could have effectively delimited stratigraphy, component membership, and at the same time generated a representative artifact inventory. Such procedures have not become common (or efficient in terms of time constraints) until very recently (Percy 1975, South and Widner 1976, Ackerly 1976), however, although Morse did use an auger at 3MS25 in one pit to determine stratigraphy.

During the 1968 testing fill was not screened, but was shoveled or troweled out and hand picked. This procedure almost invariably results in the loss of many small artifacts (Flenniken 1975, Roth et al nd). The extent of loss varies, of course, with the care used in removing and examining the fill. The 1968 test data suggest that at least in this case troweling produced less lithic artifact loss than if 1/4 inch screen had been used. An appreciable quantity of microlithic tools and manufacturing debris were recovered. Subsequent analysis by Michael Sierzchula (Roth et al nd) has demonstrated that 1/4 inch or even 1/8 inch mesh is relatively ineffective for recovery of microlithic tools and debris. Ceramic artifact frequencies from the 1968 units also indicate that careful hand picking may be an effective substitute for screening. A number of squares with comparable volumes were excavated and screened through 1/4 inch mesh in 1969 and 1975, near the locations

of the 1968 tests. Little difference can be noted in the number of artifacts recovered, either in total or by specific typological categories.

While field notes and records were generally complete and intelligible, commentary on the primary provenience form--the level sheet (Figures 28, 29)--is called for. It is argued here that this form is unnecessarily restrictive for many field operations. Excavations conducted using other than a square/level framework are at an immediate disadvantage. The plan view grid, while useful for sketches, is no substitute for graph paper, which permits finer detail and more flexible scale. The regimented listing of procedures on the reverse side creates spacing problems and entails recording redundant information, both aspects that lead to omissions. Finally, the size and nature of the form, an 8½ by 11 inch sheet of ordinary 20 pound bond paper, make it notoriously difficult to use unless a clipboard is available. In addition to being highly susceptible to water damage or tearing, these forms are also particularly annoying to control in all but the weakest breezes.

Excavation-specific provenience forms should be developed and used wherever possible. These should be fairly small and on heavy duty stock. Index cards roughly 4 by 6 inches are one possibility; these could be preprinted with spaces for basic information, such as the site, unit, recorder, and date, without being unnecessarily restrictive. Graph paper would have to be handled separately, although cards could also be developed here. Use of unstructured provenience cards would require careful attention in the field, but it would save time and permit

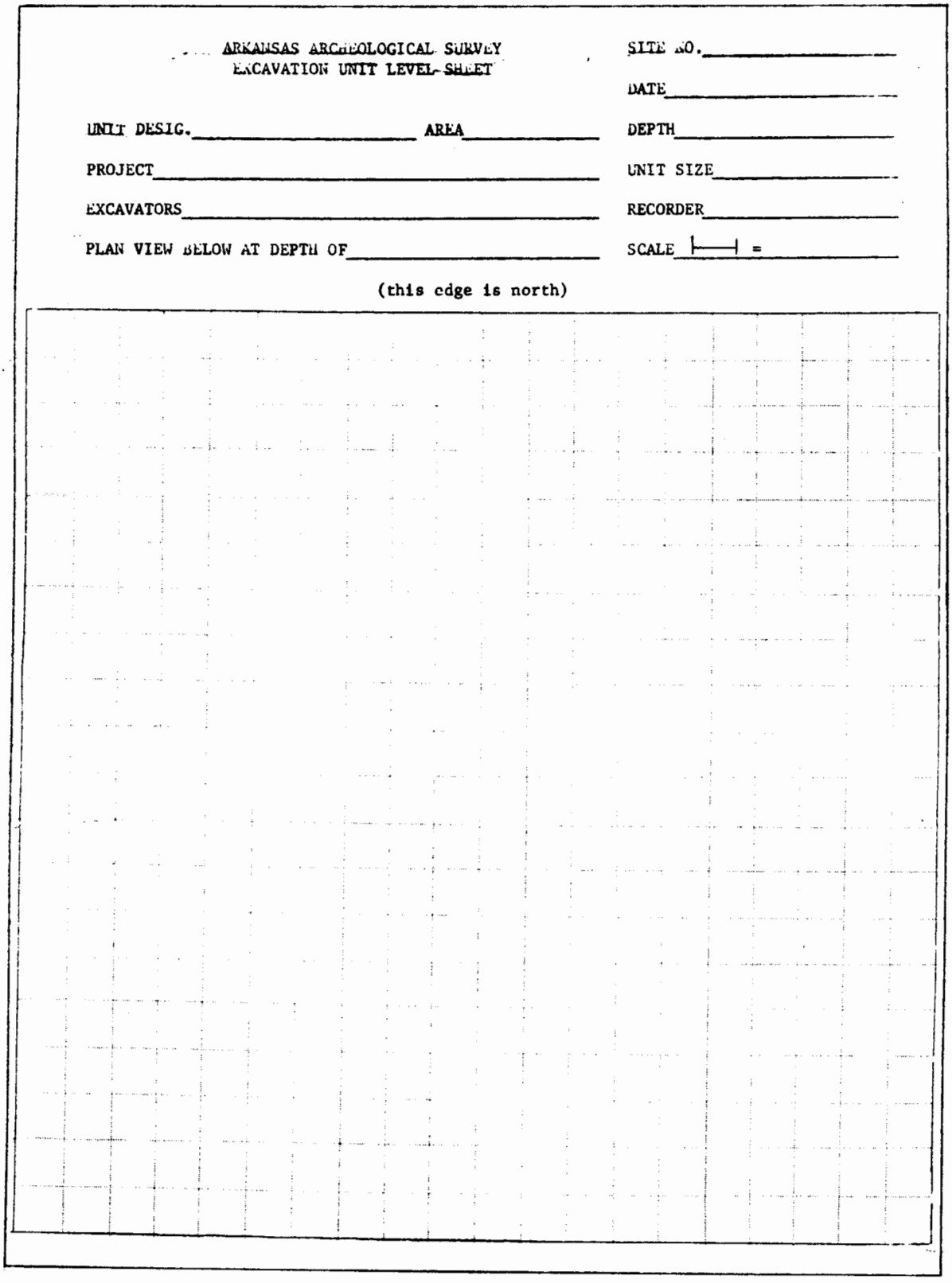

Figure 28. Arkansas Archeological Survey unit level sheet, side 1.

Material collected in excavating this level: Accession No.

Cat. # Contents Cat. # Contents

Cat. # Contents Cat. # Contents

Cat. # Contents Cat. # Contents

Excavation techniques used:

Remarks on features and artifact content:

Nature of soil matrix:

Explanation of C14, soil or pollen samples, if any:

Additional remarks:

Photographs, if any:

Recorder:

Figure 29. Arkansas Archeological Survey unit level sheet, side 2.

specific elaboration where necessary. Work on a singularly uninteresting test pit with 10 levels might be effectively described on one provenience card rather than on ten sheets.

An Overview of the 1968 Test

The purpose of the testing operations was to plan the salvage needs of each site. The initial recommendation of two three-month field seasons with a crew of ten appears conservative. At the time, however, it was perhaps overly optimistic, given the restricted nature of the test. Final planning for the (1969) salvage operations took place over a period of several months after the initial report was written. When plans and a budget for salvage excavations were submitted to the National Park Service in April of 1969, an eight-week field season with a crew of eight was proposed for Zebree.

The 1968 test appears to have been a well-planned operation. The sites were visited and mapped in advance and a clear, formal statement of excavation methods and purpose was developed. A preliminary report on the findings was quickly prepared after the completion of the field work. It would be appropriate to say that these should be standard procedures in all but the most impromptu of archeological investigations. Without downplaying the extensive preparations by Morse, it must be recognized that the specific requirements of the Antiquities Act of 1906 influenced much of the formal elaboration.

All three sites, including Zebree, were on or extended onto federal property, and an Antiquities Permit was required to test them.

The "Uniform Rules and Regulations" by which a permit is obtained (McGimsey 1972:236-238) delimits rigorous standards for excavations on federal lands. Written in 1906 these guidelines, if uniformly followed by modern archeologists, would greatly improve analysis, research, and reporting standards.

Any evaluation of the 1968 test must finally take into consideration the role played by chance coupled with developed intuition. The first test pit was placed directly within distinctive, stratified deposits. After four field seasons at the site it is apparent that these deposits occurred in only a very small area, extending no more than 10-15 meters around the spot where the unit was placed. An equally improbable occurrence characterized the second test pit. The only clear association of microliths with shell beads detected in any field season occurred in this unit. Additionally, the microliths were recovered by one of the few archeologists in the southeast who, at this time, could recognize their significance. The intuitive testing procedure, it would appear, can on occasion effectively delimit both unique and representative site data.

The 1969 "Final Salvage" at Zebree

The 1969 excavations at Zebree were predicated upon the results of the 1968 test and were designed to recover as much information as possible from the site before it was destroyed. In accordance with the requirements of the Antiquities Act of 1906, a proposal was prepared and submitted prior to field investigations (Morse and McGimsey 1969). Although relatively brief, this proposal delimited the planned excavation

strategy (block units around the areas of the 1968 tests), budgetary requirements, post-analysis storage facilities, and reporting deadlines. While excavation strategies were briefly described, it is apparent that all of the field analyses proposed in the 1968 test report (Morse 1968: 20-21) were to be implemented.

The 1969 field excavations may be characterized as both intuitive and opportunistic. They began with an inspection of pothole spoil and profiles, following the example of Test Pit 2 in 1968. Removal of a large block of contiguous 2 meter squares in Area A proceeded from this opportunistic appraisal of local stratigraphy. Block unit excavations were extended into rich areas and halted when less promising deposits were noted. Features extending beyond the units were removed in their entirety, in general disregard for the arbitrary boundaries imposed by the grid squares (Figure 30). The exact dimensions of the two major blocks only approximately follow a 2 meter grid. That is, while most of the excavation units were 2 meters on a side, this measurement was altered or abandoned if conditions warranted it. For some areas this means that assumptions about standardized unit size must be carefully checked before proceeding with comparative analyses between units.

The 1969 field strategy included extensive exposure and plotting of individual artifacts. Pedestalling and large area exposures were carefully accomplished (Figures 31, 19), with floors and profiles clean and even over the exposed strata. Artifact plotting was elaborately detailed in the field notes, although this effort produced mixed results.

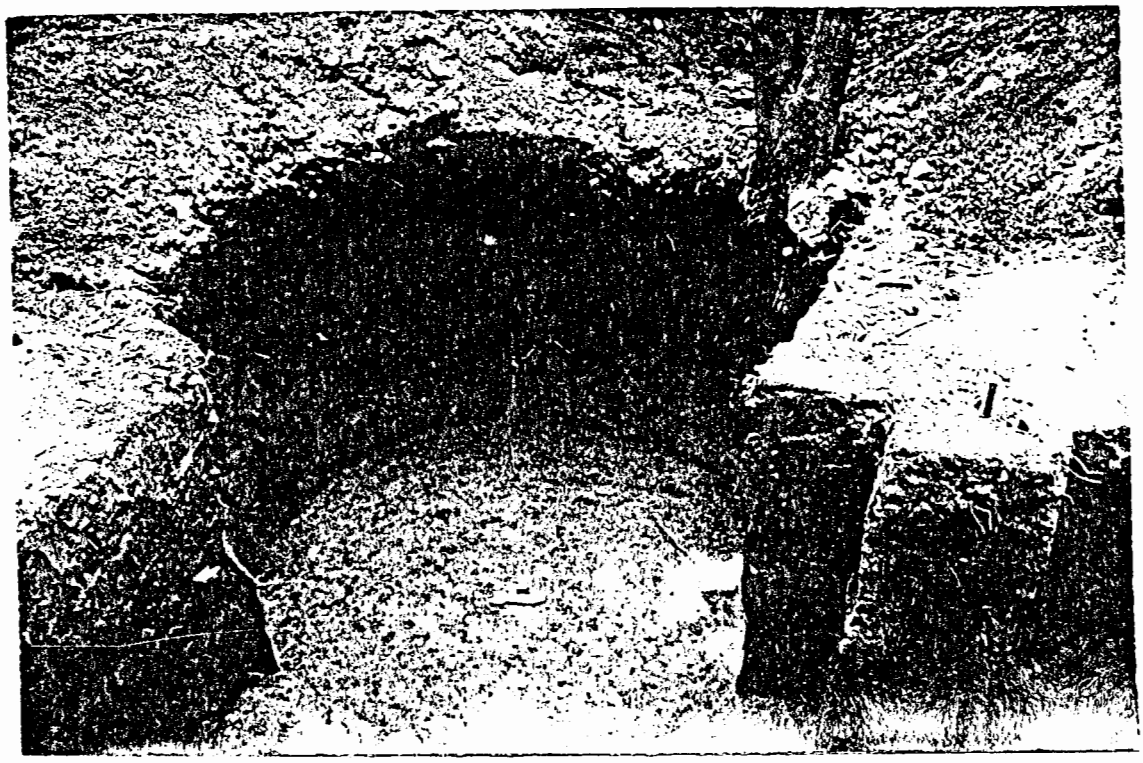

Figure 30. Feature 37, Area B, 1969 excavations. Big Lake phase cylindrical flat bottomed pit detected in corner of a unit and subsequently removed in entirety. (Negative 692735)

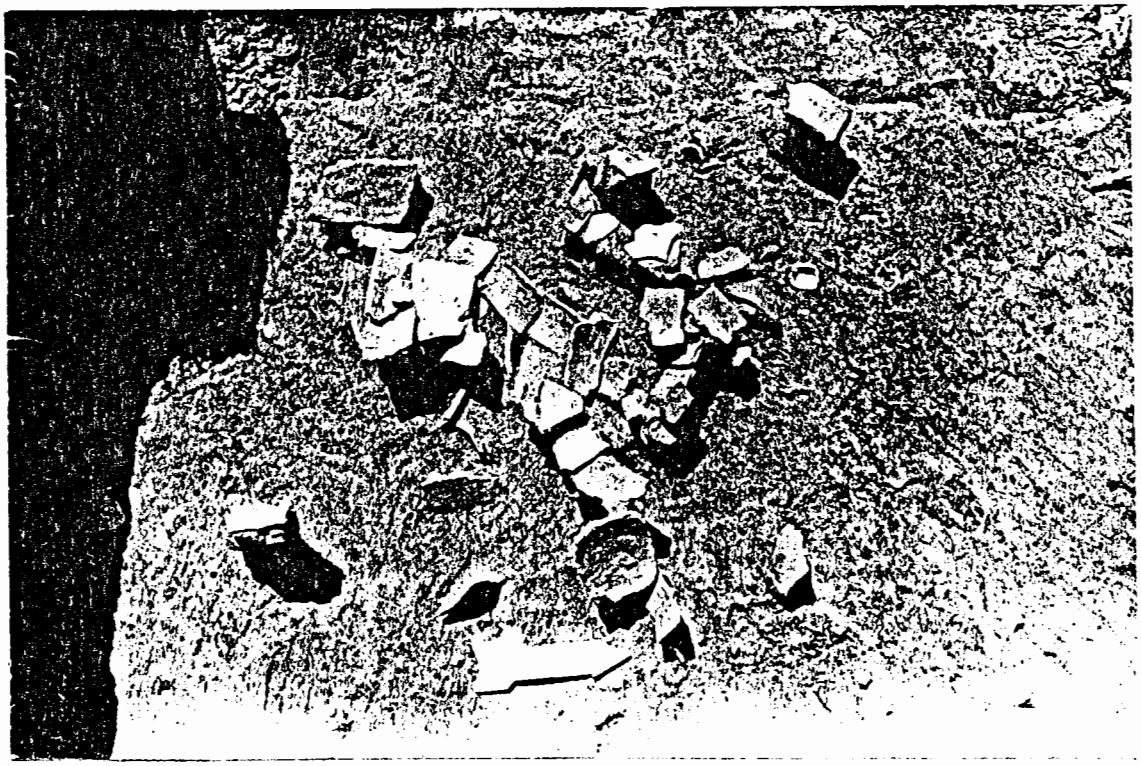

Figure 31. Feature 57, Area A, 1969 excavations. Big Lake phase sherd scatter in a vague pit outline, an example of the dramatic effects produced by artifact pedestalling. (Negative 692736)

It permitted the laboratory reconstruction of a house floor missed in the field, and the accurate delimitation of microlith floors, broken vessels, and other artifact clusters. In several instances, however, it appears that largely useless information was recorded. In particular, the locations of dozens of artifacts were plotted from what was later revealed as churned midden or feature fill in Area B. In any excavation this is a probable occurrence, however, and should be anticipated: only after an area has been exposed is interpretation possible.

The field notes taken during 1969 are the clearest and most detailed of the four field seasons. The small size of the crew, together with a high level of interest and enthusiasm (2 later received M.A.'s and a third a Ph.D. in anthropology), permitted effective control over the notes. In addition, excavations never proceeded in more than two areas, giving Morse ample opportunity to direct work in one and monitor the other. One problem with the field notes, however, was the use of a light (probably number 3 or 4) pencil, which had faded almost to illegibility by 1977. Softer lead, or waterproof, smear-proof pens would have been better. Fortunately, Morse recognized the problem, and had copies typed. Profiles and maps were highly detailed and carefully drawn: those in Area B were used in 1975 to guide excavations. Morse's 1969 contour map, while covering only Areas A and B and the ground between them in any detail, was accurate enough to permit detection of spreading patterns caused by the use of a grader in backfilling at the close of the 1969 dig.

Establishment and use of a finite grid system over the site proved to be somewhat unwieldy. The grid system employed, and the location selected for the origin, led to the placement of excavation units into different quadrants. It should be noted that this was not originally intended, but developed as the full extent of the site was discovered. While a minor problem, it did render difficult coordinate assignments in the field, and the preparation of distribution maps in the laboratory. A different origin and major axes had to be created to produce the computerized artifact distribution maps illustrated in the 1976 (Anderson 1976:40) and final reports, with each unit relocated and assigned appropriate X and Y values. Whenever possible, grid systems should be planned to accommodate all reference points within one quadrant. This would permit the rapid computer storage of information in a form directly amenable to locational or distributional studies.

Many of the features excavated in 1969, and apparently most of the unit levels in Area B, were troweled out rather than passed through screen. While the reasons for this were readily apparent--waterlogged deposits and time pressure--it was not possible in every case to determine whether screening or troweling and hand picking had been employed. The field notes, while detailed, are occasionally silent on this point. This created some laboratory problems, in that the direct comparison of figures from screened and unscreened levels, unless controlled for, could produce misleading results.

Two cautionary notes about the use of troweling and hand picking are in order. First, the process must be done carefully, which may

take more time than if screening were adopted. Second, it is probable that certain categories of artifacts are differentially recovered by this technique. For example, the white, highly visible color of the Crescent Quarry microliths may have contributed to their frequent recovery during troweling operations. Inspection of darker colored osteological remains from troweled units suggests that fewer remains were recovered than in screened levels of nearby units.

Use of the three-inch hand auger to determine deposit depth between Areas A and B appears to have yielded accurate results. In the final report on the 1969 excavations Morse (1975a:12-14) noted that the auger holes indicated a continuity of deposits between the two areas, with several possible features suggested by unusually deep, artifact-rich soundings. Morse also suggested that the Zone C cap might extend for some distance (14 meters) beyond the Area B block unit. A final use for the auger was the collection of soil samples; a test in Feature 50, Test Pit 8, was extended to below 2 meters.

Subsequent excavations have demonstrated that Morse's conclusions were generally correct. The major exception is in the estimated extent of the Zone C cap, which extended over somewhat less area than estimated. The specific deposit depth values, however, appear quite accurate when compared with midden depths obtained in 1975 random and 2 meter squares from the same area. The 1976 excavations also supported the 1969 figures, although detailed deposit depth measurements were not taken during the final salvage.

The excavation data indicated that closely spaced auger tests could be used to develop an accurate picture of site midden depth and extent. Some care must be taken in the use of this procedure, however. A series of auger tests conducted near Area A by a field assistant, for example, proved useless because accompanying provenience data had been incompletely recorded. If the augering procedure had been used extensively in 1969, a more accurate picture of the site extent might have been realized.

An Overview of the 1969 Excavations

Two major problems were encountered in the planning and execution of the 1969 field work at Zebree: (1) the field work did not adequately provide for the delimitation of the site's total extent and content, and (2) the time allotted for analysis and report preparation, based on anticipated data recovery, was severely underestimated. The first of these points has been touched on previously, in the discussion of the auger testing program. A series of test pits were scattered intuitively about the Area A block, in an effort to locate site boundaries. All of these test pits have since been demonstrated to lie well within the deposit perimeter. Since the excavation procedure was devoid of random sampling/statistical population parameter estimation procedures, an unrepresentative sample was obtained. Nonetheless, it appears that the "unrepresentative" sample collected has been, in some respects, more valuable than the statistically valid sample obtained in 1975. In particular, the 1969 intuitive sampling yielded far more unique or unusual artifacts, such as harpoons, microlithic cores and debris, and other lithic tools, than were collected in subsequent seasons.

This richness was partly due to the nature of the areas examined. By all subsequent analyses, Areas A and B have been demonstrated to be among the richest on the site, particularly for Big Lake phase materials. The undivided attention these areas received in 1969 almost guaranteed spectacular results. The recommended excavation procedure for complex sites, employing a multistage approach, has been stated as (1) to obtain an exploratory, representative sample, and then (2) to concentrate on exceptional areas (Brown 1975, Redman 1973, Streuver 1968b). At Zebree the reverse was followed!

The second major problem, the underestimation of laboratory and writing time, appears to have been unavoidable given the era in which the excavations were conducted. The budget provided for only a few months post-excavation analysis funding, all of which was contributed by the Survey. The traditional salvage ethic (recover the data now, worry about analysis later) appears to have been operating; only recently has analysis and writing time received careful attention by both archeologists and contractors. It is, however, probable that the one year report deadline could have been met if the investigator could have devoted full time to the task, and if a more prosaic assemblage had been recovered. Unfortunately, neither condition obtained; Morse's responsibilities and research interests went far beyond Zebree, and the quantity and unusual character of the artifacts went far beyond expectations.

Chapter 8

EVALUATION: THE 1975 RANDOM SAMPLING STRATEGY

Introduction

Excavations at Zebree during the 1975 field season employed three major field strategies: excavation of a randomly dispersed sample of the site, use of intuitively placed backhoe trenches, and excavation of large area block units. In addition, a considerable amount of field and laboratory time was spent fine screening and sorting excavation unit fill. The present chapter is concerned with the random sampling strategy--its advantages, disadvantages, and results--while the remaining 1975 strategies are discussed in the following chapter.

The random sampling procedure was used to provide information relevant to a number of project research questions. The primary purpose was to provide a representative sample of site artifacts, with additional goals the determination of component locations and associations, midden content, and midden formation processes (Morse 1976a, Raab 1976: 26-27). The locations of 1 meter test squares were determined using a stratified systematic unaligned sampling procedure, and 55 were opened to subsoil (Chapter 6, Figure 32). Bucket and flotation samples were routinely taken from each level and all remaining fill was passed through 1/4 inch mesh.

The Nature of the Sample: Advantages

The stratified systematic unaligned sampling procedure employed at Zebree has a number of advantages for archeological investigation.

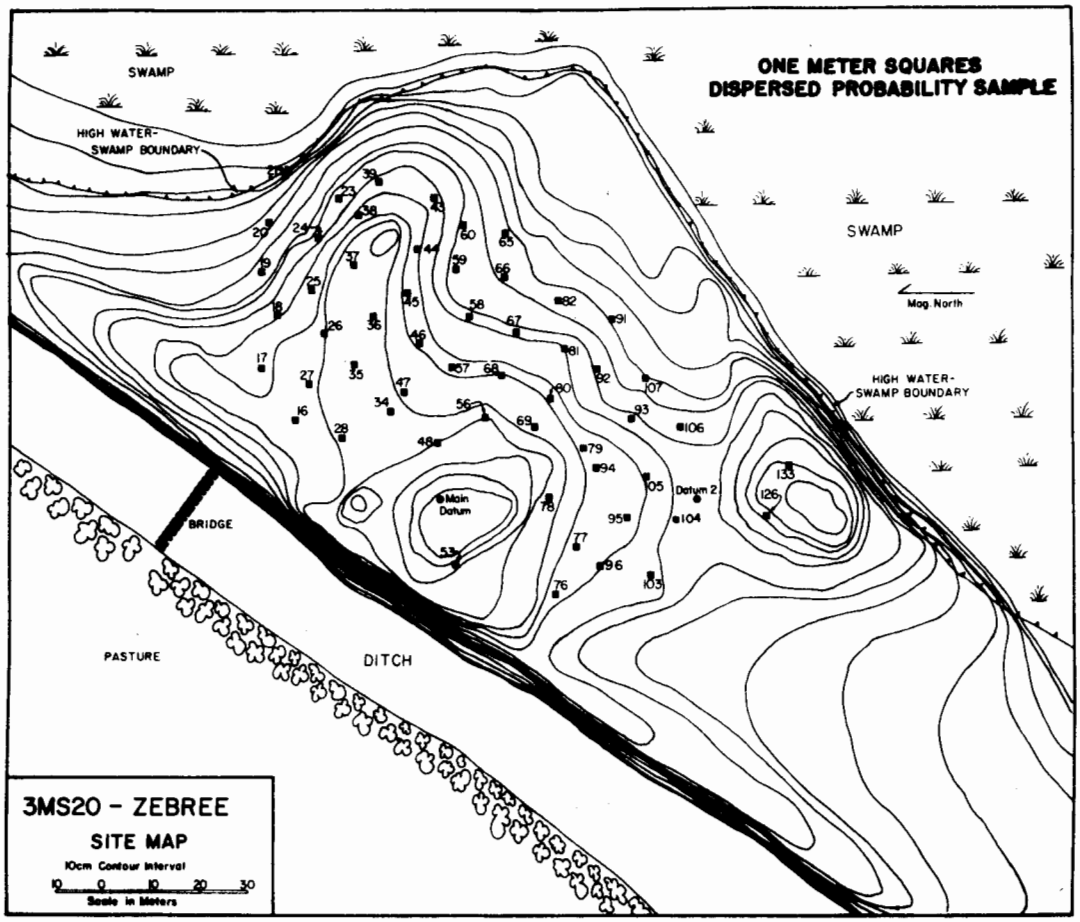

Figure 32. Dispersed probability excavation sample units at Zebree, 1975 field season. Fifty-five 1-meter test pits were opened using a stratified systematic unaligned sampling frame (Negative 774221).

Use of a probability sampling procedure minimizes the effects of human biases, permitting reliable estimates of population parameters (Redman 1975:149, Ragir 1967, Binford 1964:139). The procedure provides even sample coverage of site area while avoiding the gaps or clustering effects common to simple random sampling (SRS) and the problem of periodicity in a systematic random sample (Haggett 1966:196-198). The most significant aspect from an archeological point of view is that the boundaries of the area to be sampled do not have to be rigorously predetermined, nor does the entire sample of units have to be excavated. Any portion of the sample may be excavated and still represent a random sample from the areas (grid blocks) examined (Redman and Watson 1970, Haggett 1966).

The 1 meter units provide a random sample of both site area and site artifacts. The units represent a 1 percent random sample of the area from which they were drawn, and the artifacts recovered from the fill, taken together, form a cluster sample of the site contents. The sample data, by virtue of their manner of collection, are amenable to statistical manipulation, particularly the determination of artifact population parameters. The geographic (areal) sample is also the basis for a volumetric sample of the site contents--upon excavation each unit represents a sample of the midden from within its particular stratum--in this case each 10 meter on a side grid block.

Establishing locations of the sample points in the field was quickly and efficiently accomplished, although removal of the units at each point proved troublesome. Using graph paper, sample points were

delimited and angles and distances from various datums recorded. This was done in the lab for some 180 points--more than enough to cover the site area--in one man-day. Using a transit and tape, over 100 points were set out in the field, by two people, over two days. The field operations went smoothly, in spite of extensive underbrush and the need periodically to relocate the transit.

An added advantage of the point location procedure was that it provided information for the development of a site contour map. As each sample point was located (with the stadia and tape), the elevation at that point could be quickly recorded. This was done on the same sheet listing the angle and distance from the datum to the point. The procedure provided an unbiased, dispersed sample of contour elevational values. Other readings were later added in various site areas to provide greater detail.

The Nature of the Sample: Disadvantages

The principal disadvantage of the random sampling procedure employed at Zebree in 1975 was that it was too time-consuming. Although over 180 sample points were plotted and about 100 were actually located in the field, only 55 1-meter units were excavated. Detailed records on size of the field crew each day were not recorded, partially because there was a constant flow of personnel between the lab and the site. Inspection of the field notes, however, indicated that between a third and a half of the field time in 1975 was spent in excavating random squares, or in processing fill from them. Of an estimated 600 man-days spent in the field, at least 200 and probably closer to 300 were spent on this excavation procedure.

The average field time of four-plus man-days per random square can be better understood when it is remembered that all fill was screened--no small task in the often wet soils--and that two soil samples, detailed records, and (frequently) piece plotting were required from all levels. Many areas of the site also proved to be far richer than initially suspected.

The first 27 pits were opened straight down, a procedure that was extremely time-consuming and awkward in areas where deposits extended below half a meter. The final 28 units were removed employing a short backhoe trench to quickly expose the local stratigraphy and improve access to the lower levels. This proved to be a highly useful procedure. From the field notes, it is apparent that a marked drop in excavation time occurred. While the first 27 units required upwards of four man-days to open, the last 28 were almost all completely removed in two to three man-days.

A second major problem encountered in the field was that the 1 meter squares were frequently too small to accurately delimit features. Units were sometimes removed to great depths before it became apparent that they were within a feature. In several cases surrounding fill had to be removed to delimit the situation (Figure 33). Since all feature fill was screened through 1/8 inch mesh, this too markedly slowed the random square excavations. By adopting the short backhoe trenches, however, feature recognition and removal was facilitated. Unfortunately, this trenching method is highly destructive and is justifiable only where site destruction is probable.

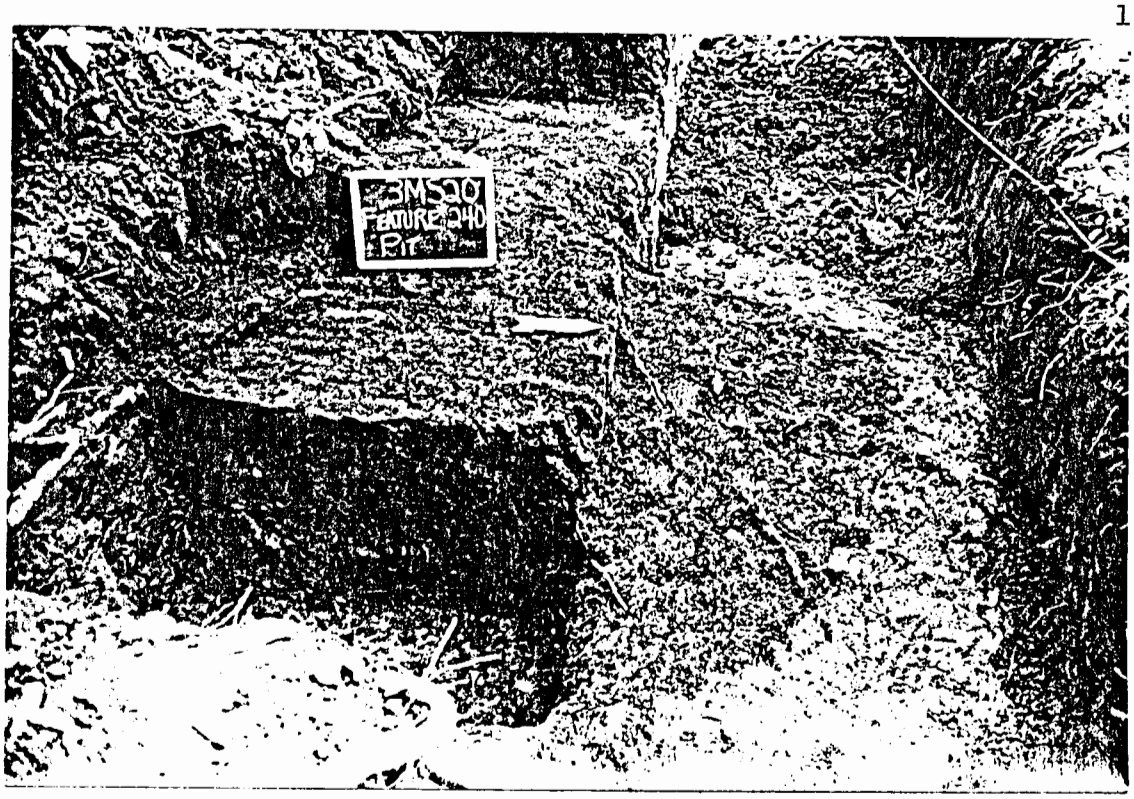

Figure 33. Feature 240, Random Square 80, 1975 excavations. The 1-meter test unit was placed in a large Big Lake phase pit, creating a confusing situation until the surrounding area was exposed. (Negative 762241)

Figure 34. Dog "burial" in Random Square 105, 1975 excavations. Occasionally the 1-meter units came down on unusual features, such as this dog in the bottom of a Big Lake phase pit. (Negative 752865)

The random squares encountered unusual features, such as the dog "burial" in Square 105 (Figure 34). It is apparent from the success Morse had in 1969, however, that block unit excavation in intuitively perceived "hot spots" is probably a better method for recovering extensive or exotic artifacts and features. While the sampling procedure may be useful for the recovery of data about site midden, it was of limited value in the exposure and investigation of features.

A final analytical problem brought about by the use of the 1 meter squares was that of equating stratigraphy between units, a problem noted by a number of investigators using small units (Brown 1975:157; Asch 1975:182,189). Where features occurred and were initially unrecognized, this proved especially troublesome. When enough samples had been collected from an area, however, general trends in midden depth could be determined. Use of other excavation procedures, such as the backhoe trenches, provided complementary data useful for resolving or reducing this problem.

Analytical Concomitants of the Sampling Procedure

The 1 percent random sample was the only excavation assemblage from the site that could be used to generate probabilistically-based artifact parameter estimates. It was also the only sample evenly dispersed over a large area employing standardized collection procedures. As a randomly selected, representative sample of the midden contents, the artifacts also formed the only bias-free data base for descriptive and comparative analyses. The sampling frame itself, however, was one of area (1 meter squares). Artifacts recovered from the sample locations

form a cluster sample. Since most statistical procedures assume simple random (as opposed to cluster) sampling (SRS), the demands of analyzing this kind of information must be examined.

In SRS the object is to select a collection of elements from a defined total population in such a manner that every element has known chance of being selected (Blalock 1970:510). In cluster sampling, groups of elements--"clusters"--are selected (Blalock 1970:523). In archeological analysis the total population to be sampled is only rarely known--as in cases where entire sites have been excavated, and there is reasonable assurance that all artifacts of a certain kind or kinds have been collected. Field procedures, furthermore, are oriented toward collection of cluster samples--test pits or grid squares produce clusters of artifacts rather than one artifact per unit (in most cases). As Thomas (1975:80), Mueller (1975:39), and others have indicated, it is virtually impossible to achieve simple random sampling conditions with archeological field data.

Computational methods developed to handle clustered data are extremely cumbersome and difficult to apply to particular situations. The computational procedures need to be tailored to the particular sampling design. Few standard computer programs exist to handle data of this kind, making analysis difficult. The reason for these problems is related to the nature of the data--in general, cluster samples yield greater standard errors than simple random samples (Blalock 1970:524). That is, the probable range of a cluster sample mean about the true population mean (assuming repeated sampling) is usually much greater than if SRS were used.

In spite of this problem, the Zebree statistical analyses employed simple random sample based formulas. Estimation of artifact parameters (for example, the number of Varney sherds that were probably in the sampled midden area) made use of SRS-based confidence intervals. Comparative statistical analyses involving artifact measurements were conducted using SRS-based formulas for t-tests, correlation, and regression. The use of these formulas was justified two ways: by accepting the probable errors of analysis, but attempting to minimize them through data cleaning operations, and by using the clusters themselves as sample units.

First, although artifact samples derived from clustering procedures tend to produce larger standard errors than obtain from SRS, this effect may be reduced by (1) drawing a larger sample, or (2) drawing a large number of clusters. That is, a cluster sample of 1000 elements may be equivalent to 500 elements selected by SRS in terms of its analytical efficiency (Blalock 1970:527). By the conservative interpretation of analytical results, the chances for error may be reduced considerably. If the number of clusters is large (greater than 30), and/or the sample coefficient of variation (V) fairly low (less than 0.20), then the possibility of marked error using SRS-based formulas may also be lowered (Cochran 1963:157, Kish 1965:187).

The second analytical procedure involved using the entire cluster as an observational unit, rather than the elements within it. Measurements in these analyses referred to sums or averages within units. The combined measurements are technically an element sample, and hence

amenable to analyses where SRS is assumed. The method of element selection, however (stratified systematic unaligned), also means that strict use of SRS formulas cannot be theoretically justified. In practice this is a minor source of error that may be reduced by cautious inspection of the data. Stratified samples tend to be more efficient than SRS (Blalock 1970:527), and hence require smaller sample sizes.

A final analytical concomitant of the Zebree sampling strategy was related to the production of artifact density/distribution maps. Some canned mapping programs, notably GIPSY4 and STAMPEDE (the only such programs readily available to the Zebree project team), take entered data points and relocate them within a uniform grid as part of their internal procedure (Scheitlin 1976, Gussow et al 1968). If the data points input into the program were not fairly regularly dispersed to begin with, considerable distortion in the output map might obtain. Fortunately, the Zebree sample, derived from regular 10 meter grids, can be used in these programs with only minor distortions. This could, however, have been a serious problem if other forms of sampling had been used, particularly SRS where gaps or clustering might have occurred.

The Random Sample in Post-Depositional Modification Analyses

The random excavation sample proved useful to a variety of analytical pursuits. Three examples are presented here, all related to the post-depositional modification of the archeological record on the site. The usefulness of the sample in determining and controlling for patterns of artifact spreading, artifact reduction, and the usefulness of small, fine screened samples are examined.

Patterns of Artifact Spreading

The random excavation sample included plowzone and subplowzone remains from across a substantial portion of the Zebree site. Through the use of computer mapping procedures, density/distribution maps were prepared for a wide range of artifact categories, for both plowzone and midden levels. Midden was defined as subplowzone artifact-bearing deposits not discernibly disturbed by either features (pits or pit bases) or other disturbances (i.e. earthquake cracks). Computer maps were prepared delimiting plowzone and midden distributions of the following artifact categories (recovered by 1/4 inch mesh): Barnes, Neeley's Ferry Plain, Varney, and Wickliffe ceramics, identifiable faunal remains by taxonomic class, charcoal and nut fragments, shell, fired red clay, other clay, ceramics under 1/2 inch, and lithics. Similar maps were prepared employing the bucket samples for both the plowzone and midden levels for all ceramics (unsorted by type), fired red clay, other clay, charcoal, fish scales, bone fragments (unsorted by taxonomic class), shell, and lithics. For many of the categories plots of both count and weight were obtained, creating an extensive data base from which to compare plowzone-midden distributions. These maps are incorporated into the appendices volume accompanying the final report.

The maps were used to compare artifact distributions in the plowzone and midden levels. From inspection of the various maps it was concluded that, generally, at Zebree the plowzone artifact distribution was at best only a fair predictor of the underlying midden artifact distribution. For most classes of artifacts, knowledge of plowzone distribution, even when coupled with a general awareness of disturbance patterns

within the site, did not permit effective resolution of midden distributions. While it varied considerably depending on the category of artifacts examined, this pattern was pronounced over enough categories to preclude combining plowzone and subplowzone levels in further distributional studies.

Patterns of Artifact Preservation and Reduction

The random excavation sample also provided a useful data base from which to examine patterns of artifact reduction in differing site environments. Table 1 presents the results of a comparison of average sherd weight, by type, in the plowzone, midden, and feature levels of the random squares. Barnes, Neeley's Ferry Plain, and Varney Red Filmed ceramics were examined, primarily because these were the only types represented in sufficient quantities from the excavation units. The results indicate that over all three categories, average sherd weight increases from plowzone to midden to features. The results of the t-tests, furthermore, suggest that significant differences in average sherd size obtain between different depositional environments.

This finding had immediate and important consequences for the site ceramic analyses, since it indicated that sherd counts from differing deposits were not directly comparable. Sherds in features, for example (regardless of type), tended to be two to three times the average weight of those in the plowzone, and from 1 1/2 to two times the average weight of sherds in the midden. Equating these counts in analyses (i.e. combining plowzone, midden, and feature sherd counts), as in an attempt to estimate pre-breakage vessel totals, would probably yield meaningless

Table 1. Comparison of Average Sherd Weight, by Type, in Differing Depositional Environments at the Zebree Site (3MS20). 1975 Random Square Excavation Sample: Student's t (Difference of Means) Test Results.

ARTIFACT CATEGORIES	PROVENIENCE PLOWZONE (N=48)	MIDDEN (N=106)	FEATURES (N=49)	T-TEST RESULTS* PLOWZONE/MIDDEN	MIDDEN/FEATURES	PLOWZONE/FEATURES
(1) Average Weight of Barnes Sherds	N= 47 $\bar{X}$= 3.158 SD= 0.663	N= 106 $\bar{X}$= 4.322 SD= 3.496	N= 48 $\bar{X}$= 6.182 SD= 7.241	t= -3.30** df= 120.92 p 0.001	t= -1.69** df= 57.16 p= 0.048	t= -2.88** df= 47.81 p= 0.003
(2) Average Weight of Neeley's Ferry	N= 46 $\bar{X}$= 2.178 SD= 0.481	N= 100 $\bar{X}$= 3.131 SD= 1.646	N= 40 $\bar{X}$= 5.024 SD= 4.474	t= -5.32** df= 129.36 p 0.001	t= -2.61** df= 43.29 p= 0.007	t= -4.00** df= 39.78 p 0.001
(3) Average Weight of Varney Red-Filmed Sherds	N= 39 $\bar{X}$= 3.621 SD= 2.280	N= 94 $\bar{X}$= 5.653 SD= 9.831	N= 39 $\bar{X}$= 9.830 SD= 9.683	t= -1.89** df= 113.99 p= 0.031	t= -2.24 df= 131 p= 0.014	t= -3.90** df= 42.20 p 0.001

* All probabilities are one-tailed. ** Separate variance estimate (Alpha for F= 0.05).

N= Number of excavation levels $\bar{X}$= Average SD= Standard deviation

results unless some measure of control was introduced.

Differences in average sherd weight noted between the plowzone, midden, and feature levels are of such magnitude as to make direct comparison relatively meaningless. Unfortunately, for the 1968, 1969, and 1976 excavation seasons, only sherd counts were recorded during the laboratory analyses. Using linear regression analysis, however, together with the count and weight data from the 1975 random excavation levels, it was possible to develop a series of prediction equations linking these two variables (Table 2). These equations, developed for both individual and combined proveniences, render the data from these other seasons comparable to those from 1975, with both a high degree of accuracy and efficiency. That is, through examination of the values for the variance explained (R^2), it is apparent that the equations will yield highly reliable results, without actually weighing the complete excavation assemblage.

Use of Fine Screened Units in Midden Distribution Analysis

Artifact density/distribution maps were prepared for plowzone and midden levels using both the bucket sample information and the 1/4 inch level data sets. For most classes of artifacts, the bucket sample distributions were in close agreement with the maps from the larger (more coarsely screened) sample. Discernible differences appear to be due primarily to factors of preservation and reduction. If these are controlled for, the smaller samples appear to be as useful as the larger for delimiting intra-site artifact distributional patterning.

Table 2. Comparison of Count and Weight Relationships of Prehistoric Ceramics, by Type, in Differing Depositional Environments at the Zebree Site (3MS20). 1975 Random Square Excavation Sample: Regression and Correlation Analysis Results.

CERAMIC CATEGORY	ALL UNITS (N=203)	PLOWZONE (N=48)	MIDDEN (N=106)	FEATURES (N=49)
(1) BARNES	N= 201 R^2= 0.816 p 0.001 wt= -47.5 + (ct)(5.28)	N= 47 R^2= 0.896 p 0.001 wt= -31.4 + (ct)(3.93)	N= 106 R^2= 0.914 p 0.001 wt= -58.7 + (ct)(5.14)	N= 48 R^2= 0.785 p 0.001 wt= 7.3 + (ct)(6.05)
(2) NEELEY'S FERRY PLAIN	N= 186 R^2= 0.828 p 0.001 wt= -10.7 + (ct)(3.46)	N= 46 R^2= 0.957 p 0.001 wt= -2.5 + (ct)(2.43)	N= 100 R^2= 0.836 p 0.001 wt= -22.8 + (ct)(3.73)	N= 40 R^2= 0.870 p 0.001 wt= 12.4 + (ct)(3.62)
(3) VARNEY RED-FILMED	N= 172 R^2= 0.643 p 0.001 wt= 4.97 + (ct)(5.30)	N= 39 R^2= 0.903 p 0.001 wt= -2.02 + (ct)(4.29)	N= 94 R^2= 0.724 p 0.001 wt= -0.88 + (ct)(4.74)	N= 39 R^2= 0.585 p 0.001 wt= 46.3 + (ct)(6.30)

N= Number of units examined R^2= Variance explained p= Significance

wt= Weight of sherds ct= Count of sherds

Figures 35 and 36 illustrate the distribution of shell within the random square midden levels as indicated by first the 1/4 inch screened levels and second by the bucket samples. There is little difference in the two distributions; if anything, the bucket sample map provides more detail. This may be due to the greater sensitivity of the 1/8th inch mesh to shell, which breaks down into small fragments; considerably more is likely to be recovered than if 1/4-inch mesh is used.

The various distribution maps indicate that small, fine screened artifact samples may be as effective as larger, more coarsely screened samples. Future analyses of site midden may, therefore, find it more profitable to employ smaller units than the 1 meter squares. In terms of field time this would be much more efficient, particularly if accurate column samples could be obtained using augers, post hole diggers, or small test blocks. Where difficulty would occur is in the laboratory. Fine screened samples require much time to accurately sort, and the trade-off must be recognized.

An Overview of the 1975 Sampling Strategy

The 1975 random sampling procedure accomplished what it was intended to do. The data collected proved useful in delimiting the prehistoric components, estimating artifact parameters, and resolving post-depositional effects on midden contents. The procedure entails a number of field and analytical constraints, however; its chief weakness is its time-consuming nature. Fortunately, use of the method led to the development of a faster, more efficient field procedure--the collection of small, fine screened column samples. When the sampling technique is viewed in

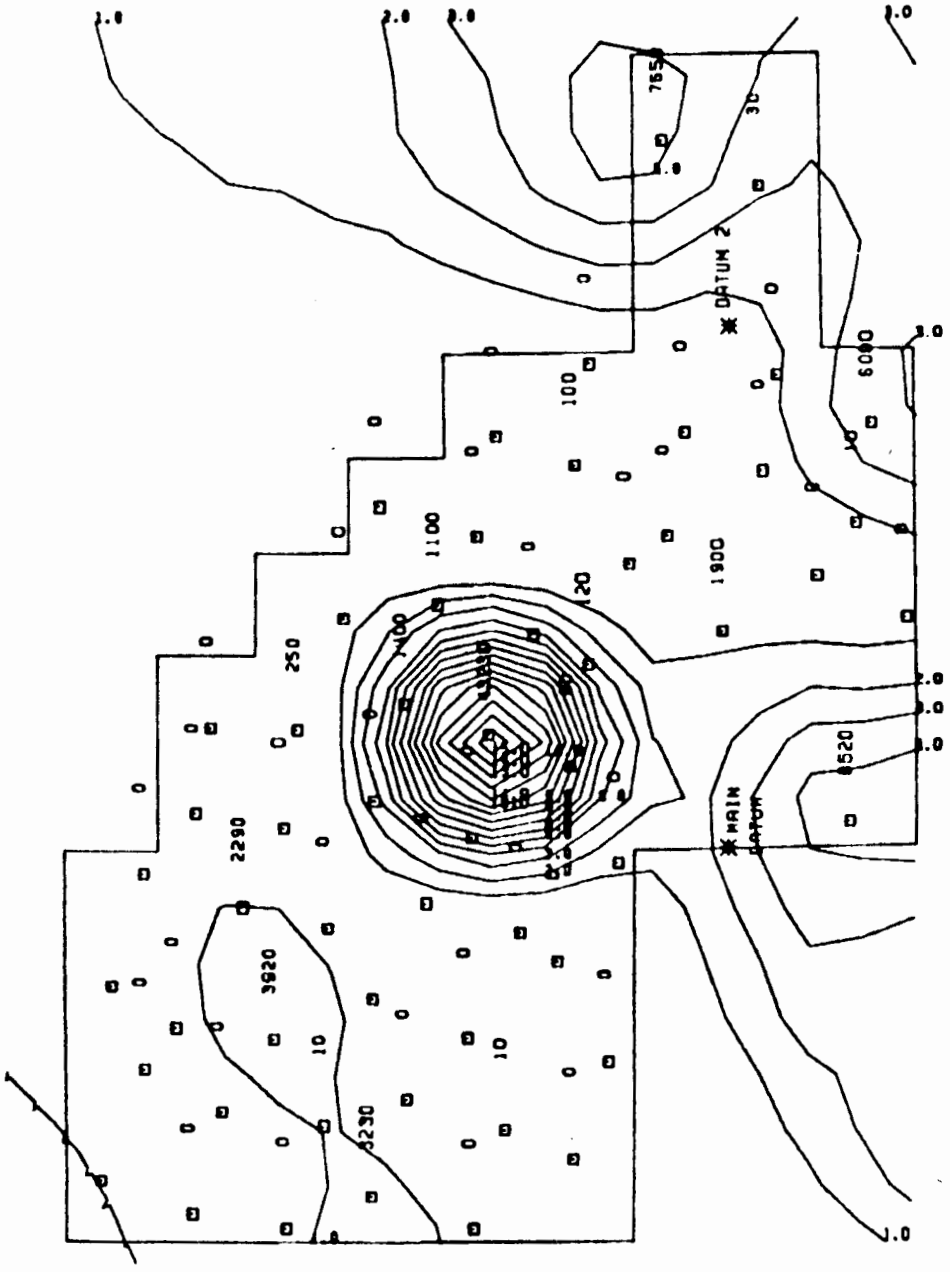

Figure 35. Computer-generated distribution map of shell occurrence in the midden levels at the Zebree site, in the 1-meter probability sample units. A ten gram contour interval was employed, using the GYPSY-IV mapping program.

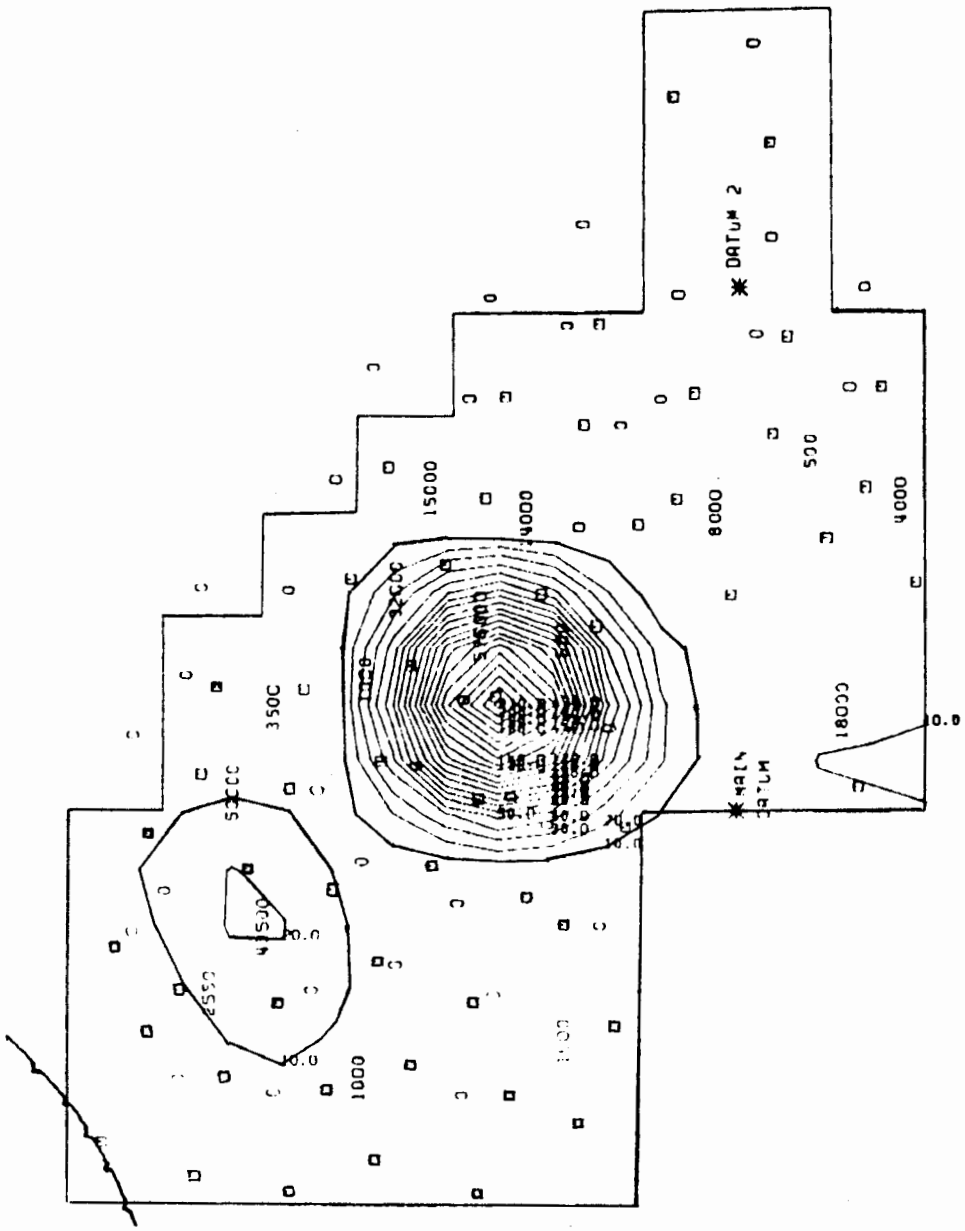

Figure 36. Computer-generated distribution map of shell occurrence in the midden levels at the Zebree site, using the bucket sample data. A one gram contour interval was employed, using the GYPSY-IV mapping program. The distribution is nearly identical to that shown in Figure 35, which is based on a much larger sample.

perspective, as one of a number of complementary procedures, its problems are less significant. If it had been the only method of excavation employed, these problems would have been critical. The 1 meter units were excavated, however, to provide kinds of information unavailable by other means.

Chapter 9

EVALUATION: OTHER 1975 FIELD PROCEDURES

Introduction

Field procedures used at Zebree in 1975, in addition to the sampling strategy discussed previously, included block and trench excavations, a metal detector survey, and the screening, washing, storage, and record-keeping necessary in any large operation. Heavy equipment in the form of trucks and a backhoe were used to bring equipment onto the site and to move earth. Mapping operations were performed, and a great deal of time was spent in washing and fine screening operations.

Block Unit Excavations

The 1975 excavation blocks were opened using three procedures: (1) regular block units 5-10 meters on a side, (2) irregularly shaped units, and (3) contiguous 1 by 2 or 2 by 2 meter squares (Chapter 6). Regardless of procedure, all of the blocks were intuitively placed, and thus form a judgment sample. As such, they are not useful in probabalistic investigations. Asch (1975:185) has commented on the difficulties of obtaining the large N's necessary for viable probabalistic analysis if block units form the unit of observation. At a minimum, about 30 blocks would be needed, collected through a statistically valid sampling procedure. Funding for excavations on this order of magnitude was simply not available.

The block units proved valuable in the exposure of pits and pit clusters (Figure 37). Use of a backhoe to remove overburden was an effec-

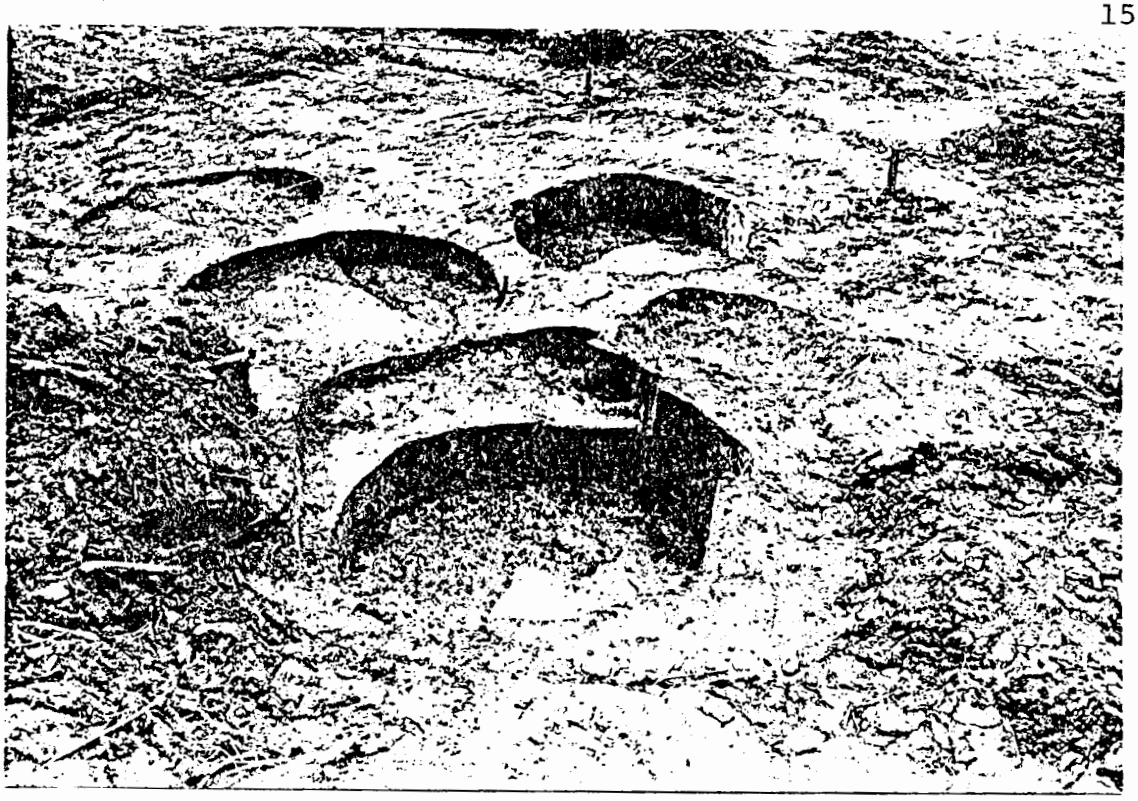

Figure 37. Big Lake phase pit cluster in Block 1, 1975 excavations. Large blocks revealed relationships among features not readily detectable in smaller units. (Negative 753056)

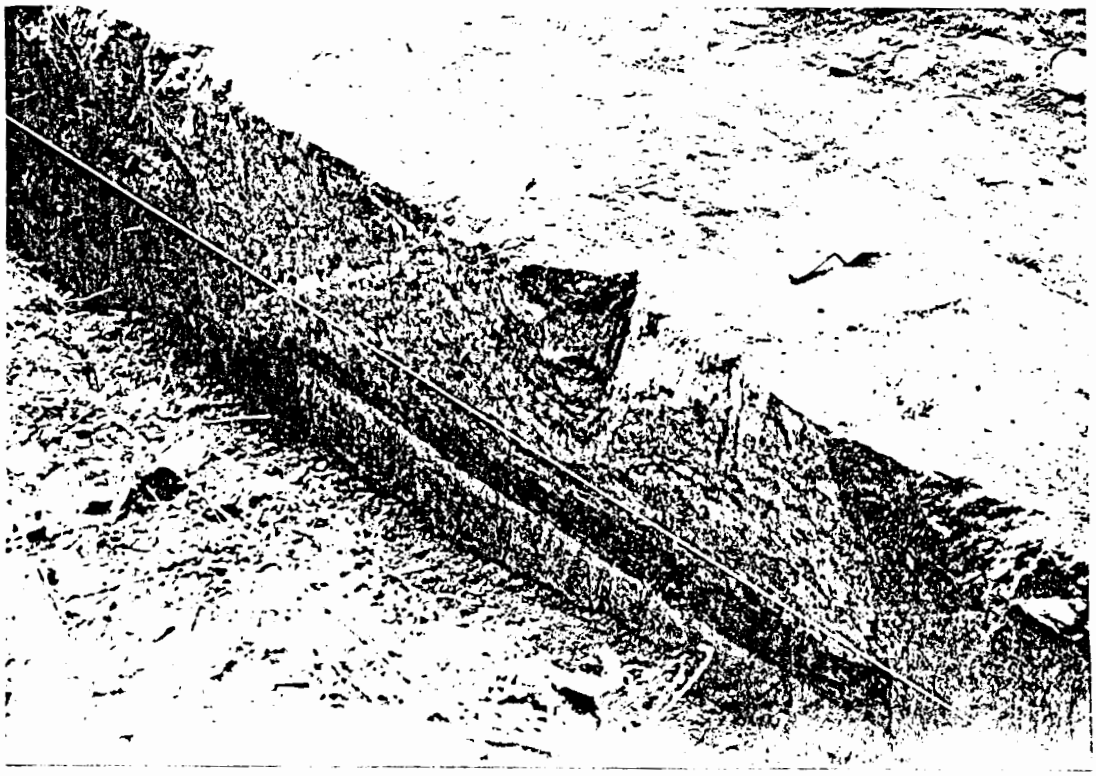

Figure 38. Morse's 1969 Test Pit 6 as revealed in the profile of Backhoe Trench 4, 1975 excavations. When first encountered this "feature" was interpretted as a flat bottomed storage pit. (Negative 752766)

tive method for exposing lower portions of features, which could then be individually removed. Unfortunately, the procedure resulted in destruction of artifact context in the upper levels, and damage or destruction of many fragile artifacts. Powell (1977) noted that many burials in the upper levels were either lost or damaged by backhoe operations in 1975; many artifacts were similarly affected. Some upper level features were recognized and removed during the backhoe work, but this was infrequent.

Use of contiguous testpits opened and screened by level is probably the most effective method of opening large blocks, if maximum information recovery is desired. This procedure was used to great advantage in 1969, but in 1975 only a small area (14 square meters) was opened in this fashion. Careful removal and screening of fill proved to be extremely time-consuming; in 1975 time and resources were limited. It should be noted that while overburden was removed and discarded from some site areas in 1975, the 1 meter random squares were designed to provide information about these levels.

Backhoe block excavations were most successful when small units were opened. If the units were 5 to 6 meters on a side, the machine could maneuver effectively and remove all fill with the bucket. Blocks 1, 3, and 4 were opened in this fashion, and produced large numbers of features that could be easily removed. With increasing block size, however, overburden removal became irregular and difficult to control. Block 5 was intended to be 10 meters on a side; only a small corner was ever examined in detail. The size proved too great for efficient use of

the bucket arm, and attempts to remove fill by scraping with the bucket edge and moving the machine closer proved disastrous. The backhoe became mired in the loose fill, and the spinning tires badly damaged the deposits.

Backhoe Transects

A total of 20 long and 28 short backhoe trenches were opened at Zebree in 1975. The long trenches, averaging 10 meters and more in length, were intuitively placed in various site areas to determine deposit depth, reveal features, and locate the pallisade system (Figure 38). While generally successful, the trenches form a judgment sample and cannot be considered representative of the site area or deposits. The 28 short trenches were placed on the north side of the 1 meter squares, and form a random sample. They were used only to aid in the excavation of the test units, however, and their value as a transect sample must be discounted. In most cases, their length was under 2 meters, and only extremely rich features encountered within them were removed.

Placement of backhoe transects was limited by existing vegetation. It was easier to go around, rather than through, stumps or heavily wooded areas. The backhoe could occasionally remove fairly substantial trees, stump and all, but the disturbance this produced negated possible advantages. Trenches and block units also had to be placed to permit efficient equipment and personnel movement about the site. Vehicular access was limited, and it would have been possible to temporarily strand equipment, unless some care was taken.

Backhoe transects were a highly effective method for exposing features, although only those in the walls could be removed; those in the trench cut itself were almost invariably destroyed. Trenches were taken to below the appearance of subsoil, which meant that most of the features within them were removed. Only the bases of the deepest of pits were preserved in the floors. Many pits and burials were completely destroyed by the trenching operations. Even if features were detected within the cut, careful salvage was largely precluded by the method of exposure. The average pass was six inches or more in depth, and the bucket claws extended two to three inches deeper. By the time features were recognizable, they were seriously disturbed.

The trenches exposed large numbers of features, however, and many important artifacts and associations were detected within them. In addition, profiling operations produced valuable information about deposit depth over extended sections of the site. While both trenching and block unit excavations damaged site deposits, the information recovered balanced that lost, given the inevitability of site destruction.

A major problem encountered in trenching operations at Zebree arose from overuse of the procedure. Because transects quickly provided information about deposit depth and feature variability, a large number were opened in a short period of time, without adequate thought to documentation. While a 20 meter trench could be removed to subsoil in two hours or less, effective documentation required 10 to 20 times this time. Once a cut was opened the walls had to be cleaned, and stratigraphy and features drawn using graph paper. Profile cleaning was essential, since

the backhoe bucket scraped the sides, marring even subsoil levels, and rendering interpretation difficult. Once profiles were drawn, features were removed if time permitted.

Although about 490 meters of trenches were opened during 1975, detailed profiles were completed for only about half of this total. Drawings were not obtained from many of the units, particularly at the eastern edge of the site along the pallisade, for two reasons. First, a major rainstorm occurred less than a week after a number of these units were opened; the resulting flood filled most of the trenches and caused them to collapse. Second, while most of the units had been profiled prior to this, the work had been done by an inexperienced student. His highly imaginative efforts were only in the process of being corrected when the flood occurred.

Flooding and profile collapse are not new field experiences. Ford (1951:23-24) reported similar calamities at the Greenhouse excavations, conducted over 30 years ago. The Greenhouse, and Zebree examples indicate, however, that if units are opened field personnel should be available to quickly and effectively document them. At Zebree it was possible to salvage crude sketches of the water damaged profiles, but detailed information was lost. The trenches were undercut one to two feet, and hand removal and cleaning would have been far too time-consuming. Use of the backhoe, to reopen the cut, was also difficult or impossible. The existence of the original trench prevented excavation of another nearby, until it could be filled in. The backhoe wheels had to either straddle the original trench, or stand on firm ground, condi-

tions no longer present due to the flooding. The extensive vegetation, furthermore, precluded quick opening of other trenches, since the first units were placed in the few favorable, cleared locations.

Field Artifact Storage and Record Keeping

Equipment, artifact, and record storage at Zebree was facilitated by construction of a small shed on the site. This was locked each night and, while hardly sufficient to deter vandals, provided protection from both casual visitors and the elements. The shed was set up in about four man-days using under $100 worth of plywood, tarpaper, and two by fours. Only a moderate knowledge of carpentry and a few tools were required. The effort was well worth the investment, since the alternative would have been the transport of materials onto and off the site each day.

The shed measured roughly 8 by 8 feet, and was about 7 feet high. It provided ample room for the screens, buckets, shovels, artifact bags, and smaller tools. Field records were placed in the shed each night from uncompleted units; completed records were brought back to the main laboratory. A series of nails and small shelves were used to mount tools and segregate smaller items. While the shed was waterproof, paper items became damp overnight, which was an inconvenience, since the wet paper (bags or record sheets) smeared and tore easily. Another minor problem in the use of the shed, traffic jams at the door, was resolved by having 2 to 3 people stow equipment and records rather than letting everyone try to do it. Use of a single equipment storage area permitted informal inventory once everything had been stored for

the night. It was possible to determine roughly what was present and what was missing, and so gather tools inadvertently left on the site. Unfortunately, many smaller items such as tapes or trowels were lost over the course of the summer, and the informal inventory often did little more than indicate that another such item was missing.

Maintaining field records such as unit level sheets, profiles, and bag identifications, required constant attention. Number 2 pencils were used for most of the records, although ball point pens were also used. Pens almost invariably produced messy records, since erasure was difficult. Permanent magic markers were useful for marking plastic sacks; if they were left in the sun very long, however, the label tended to fade. The markings were also subject to accidental removal by rubbing when fresh, until the ink dried. To reduce the loss of provenience data, bags were often marked and then tagged, using a heavy cardboard or paper stock with inscriptions in pencil.

A final problem in maintaining artifact provenience resulted from the breakage or spilling of one or more bags and the resulting mixture or loss of contents. Fortunately, this only happened two or three times. The breakage occurred in the shed, where artifacts and tools were stowed at the end of the day. While this loss was unfortunate, it was to some extent unavoidable. It was not possible to leave bags near units overnight, since many casual visitors entered the area, and there was some probability of appropriation occurring.

Heavy Equipment Operation: General Comments

Both trucks and a backhoe were brought onto the site during the 1975 field season. The trucks included campers and Dr. Morse's Survey pickup, and were used to haul equipment that could not be easily or safely carried across the bridge. Most heavy items were brought on the site this way, including fuel oil for the backhoe, the gasoline generators, and the screening frames and well points. Care had to be taken to avoid open excavation units or soft and wet ground, but otherwise vehicle use presented few problems. The equipment occasionally got in the way of line-of-site mapping, or made communication difficult because of their noise. These problems were resolved by keeping vehicles out of the excavation area except when in use.

The backhoe proved useful in moving dirt and opening units, although its movement was limited by vegetation and the extent of previously opened units. Additionally, it could not operate effectively in wet or loose soils, since the wheels would mire and churn the deposits. Use of the backhoe to remove overburden proved destructive, both to midden levels and occasionally to features intruding into subsoil. Effective depth control was difficult to maintain, and often the difference of one cut meant that something or nothing was recovered. Finally, heavy machinery had to be carefully maneuvered about the site, to avoid running over equipment, artifact bags, or field personnel. Since the operation of vehicles near the transit jarred this instrument, settings had to be periodically checked to avoid measurement and mapping errors.

Field Washing and Screening Operations

The 1975 water screening operations at Zebree were used to process fill and to prepare artifacts for laboratory analysis. Most artifacts were washed and dried in the field, and delivered to the lab for cataloging and analysis. Washing and screening kept one to two people busy continuously, with some of this activity continuing into the evening or on normal off days.

Use of removable rack sections facilitated processing operations. Once a sample had been washed, the screen could be removed and set in the sun to dry. This avoided delays, such as might have occurred if artifacts had to be hand picked from a fixed screen base after each load. Washing operations also included the artifact sacks themselves, to ensure that reasonably clean specimens reached the lab. Care had to be taken to ensure that provenience records were not lost or washed away; labels were checked and screens with drying artifacts tagged. Provenience records were tied to the screen; weighting labels under artifacts or the screen itself was felt to be too risky. One important datum that was occasionally overlooked was the mesh size used in screening or washing. Fortunately, in most cases where this omission occurred, simple inspection indicated which size had been used.

Although time records were not kept, water screening excavation fill proceeded much faster than dry screening. Site deposits were wet, and contained an appreciable proportion of recent organic material, silt, and clay. This clumped and had to be hand pressed through screens. Water screening quickly reduced clumped soils, and was almost universally

adopted after rains. Even with two hoses running continuously, however, backlogs developed at the screening rack. Wheelbarrows of fill awaiting processing were prevalent. If 1/4 inch mesh was used, water screening proceeded quickly, but smaller mesh sizes (such as used for the bucket samples and feature fill) took much more time. Wheelbarrows, buckets, plastic bags, and drop cloths were used to "store" fill during serious backlogs.

Minor logistical and documentary problems arose through the use of a variable screen mesh operation. In a few cases field personnel forgot to record the screen size employed during recovery or washing. This could usually be remedied by inspection. More seriously, in a number of cases fill was processed through inappropriate screen sizes. The bucket samples, for example, were to receive 1/16th inch screening, but most were actually passed through 1/8th inch mesh. These errors necessitated some revision in laboratory analytical procedures; most samples proved useful in spite of the (somewhat less than ideal) standardization achieved.

Other Field Procedures

Early in the 1976 season a metal detector survey was conducted over the site, effectively delimiting the historic Sebree house and dump area. All encountered objects were marked using surveyor's flags, and the locations were plotted on the site base map. Unfortunately, the field assistant responsible for tagging the metal fragments lost (or never took) his notes. While the historic metal artifact locations are known, exactly which artifact came from specific locations cannot be

determined. The example indicates the need for close supervision of field personnel, although it is difficult to guard against irresponsible behavior by alledgedly well-trained personnel during such a large project.

Mapping operations during 1975 (other than those associated with historic metal objects) generally proceeded satisfactorily. The only real problem was a slow turn-around time in the preparation of site and unit base maps from field data. Often, several days passed before field unit locations were plotted in; one of Morse's 1969 test pits was interpreted as an aboriginal feature for a time until the mapping got caught up (Figure 38). In the field, use of a three-person team (one on the instrument, one recording, and one on the stadia) greatly facilitated mapping, as opposed to having one person both sight and record measurements.

Photographic documentation during the 1975 field season was generally good, although considerably less complete than intended. Two rolls of film were lost near the end of the summer, emphasizing the need for care in handling field records of any kind. Personnel with cameras had many other time-consuming responsibilities; some important units and features were incompletely documented because the photographers were busy elsewhere. For large excavations one or more individuals should be charged solely with photography, mapping, or similar record keeping tasks. Their records should be periodically checked by all senior personnel for completeness. In 1975 this was attempted for both mapping and photography, but some problems arose when other personnel assumed these tasks (i.e. the historic artifact debacle), or due to time commitments (i.e. incomplete photo documentation).

A final problem encountered during the 1975 field season was flooding. Loss of trench profile information has been previously noted; it is suggested that in variable climates unit documentation should proceed quickly and with an awareness of the changeability of the weather. Plastic drop cloths were a useful means of protecting open floors; the tarps segregated slumping fill from the floor surface. Another effective procedure during periods of flooding was use of the backhoe to dig ditches and holes to drain off flooded units, although potentially important midden could be destroyed during the process.

The Effect of Differing Screen Sizes: The 1975 Bucket Samples

A total of 191 two-gallon bucket samples of fill were collected from the 1975 excavation units, primarily from the random squares. Each sample was obtained by periodically dumping a shovel of fill into a bucket during the excavation of a level or feature. Fill was tamped down and the volume collected (two gallons) represented approximately 4 percent of a 20 cm level from a one meter square. While a useful sample, several problems occurred during collection and analysis that reduce its analytical value. Weights were recorded for each sample, but these values are considered to be of little value due to differing moisture contents. Samples collected soon after a heavy rain invariably weighed more than those taken during relatively dry periods.

During field collection fill was often gathered by shovel skimming, reducing the probability that large objects would be included. Highly visible artifacts were sometimes hand picked and included with general level fill. In a number of cases bucket samples were either for-

gotton or were collected from near the bottom of the level. Finally, while the samples were to be screened through 1/16-inch mesh, due to field error, most (131 out of 191) were actually screened through 1/8-inch mesh. The other 60 were screened through 1/8-inch mesh later in the lab, when the error was discovered, to standardize the bucket sample. The heavy element of the flotation samples now constitutes the 1/6-inch sample.

In spite of these problems, the bucket samples were highly useful to the overall site analysis, particularly in indicating artifact loss due to differing screen size. Table 3 compares the average weights of artifacts caught in the bucket samples with those in the random square levels. Values for the random squares reflect the average weight or count of artifacts caught by 1/4-inch mesh from a 1m by 1m by 20cm level (excluding the volume of fill removed by the bucket and flotation samples). Two-gallon bucket samples, in contrast, equal only about 4 percent of this volume. If the effect of 1/8 as opposed to 1/4-inch screening is minimal, the average value of the artifacts recovered from the bucket samples should correspondingly be roughly 4 percent of that for the random square levels. It is apparent from Table 3 that this is only true in some cases. Lithics, charcoal, seeds, and other clay artifacts are considerably over represented within the bucket samples, with the quantities of shell and fired red clay slightly larger than expected. Only the various ceramic and bone artifact values are in approximate agreement.

The figures in Table 3 suggest that in most cases (excepting only ceramics and identifiable bone), considerable proportions of the

Table 3. Comparison of Artifacts Recovered in the Random Square Levels with those in the Bucket Samples: Average Count or Weight per Case. The volume of the bucket sample fill collected was approximately 4% of the random square level.

ARTIFACT CATEGORY	RANDOM SQUARE LEVELS (1/4")	BUCKET SAMPLES (1/8")	BUCKET SAMPLE $\bar{X}$/RANDOM SQUARE LEVEL X (%)
Ceramics**	$\bar{X}$ = 518.78 N = 207	$\bar{X}$ = 23.01 N = 173	4.4%
Fired Red Clay	$\bar{X}$ = 50.29 N = 139	$\bar{X}$ = 4.48 N = 159	8.9%
Other Clay	$\bar{X}$ = 52.09 N = 151	$\bar{X}$ = 15.45 N = 160	29.7%
Shell	$\bar{X}$ = 54.93 N = 49	$\bar{X}$ = 3.55 N = 58	6.5%
Bone*	$\bar{X}$ = 42.03 N = 101	$\bar{X}$ = 1.67 N = 144	4.0%
Charcoal	$\bar{X}$ = 1.51 N = 91	$\bar{X}$ = 0.753 N = 114	49.9%
Lithics (count)	$\bar{X}$ = 7.63 N = 135	$\bar{X}$ = 2.747 N = 91	36.0%
Barnes** Ceramics	$\bar{X}$ = 276.11 N = 205	$\bar{X}$ = 14.11 N = 74	5.1%
Neeley's Ferry** Plain Ceramics	$\bar{X}$ = 123.31 N = 189	$\bar{X}$ = 5.85 N = 64	4.7%
Varney Red Filmed Ceramics**	$\bar{X}$ = 152.68 N = 176	$\bar{X}$ = 5.08 N = 42	3.3%
Seeds	$\bar{X}$ = 0.11 N = 5	$\bar{X}$ = 0.13 N = 5	118.2%

* Bone from random square levels (1/4") includes only fragments identifiable by taxonomic class.

** Ceramics from random square levels (1/4") refers only to sherds caught by 1/2 inch mesh in laboratory pre-sorting.

N = Number of cases (All averages except lithics refer to average weight in grams)

original assemblages are lost when 1/4-inch mesh is used. Using 1/8-inch screen would (apparently) result in the collection of roughly 1 1/2 times as much shell, twice as much fired red clay, nine times as many lithic artifacts, 12 1/2 times as much charcoal, and so on.

The 60 bucket samples field-screened through 1/16-inch mesh offered the opportunity to check artifact loss through 1/8-inch mesh. To further examine ceramic information loss, all identifiable sherds were also passed through 1/2-and 1/4-inch mesh. Table 4 records the total count or weight of artifacts caught by each screen size over the 60 samples. The figures listed in the column under "1/16"-MESH" therefore, refer to the quantity of material passing through 1/8-inch mesh yet caught by 1/16, and so on. Only ceramics, however, were screened through all four mesh sizes. The values listed under "1/8"-MESH" for all other artifact categories refer to the quantity of remains caught by 1/8-inch mesh, under "1/16"-MESH" that passing through the 1/8-inch mesh and caught in the finer screen.

The information reported in Table 4 is in close agreement with the patterning suggested by Table 3. Relatively few identifiable ceramic artifacts, for example, passed through either 1/4-or 1/8-inch mesh, although the figures indicate that considerable quantities occur between 1/2 and 1/4 inches in size. For most other classes of artifacts it is evident that a substantial proportion of the total site assemblage not only passes through 1/4-inch mesh, but also through 1/8. For lithics, charcoal, and other clay, almost as much or more material passes through 1/8-inch mesh as is caught by it. The figures for shell, bone, and

Table 4. Comparison of Artifacts Caught by Differing Screen Sizes, Employing the 60 Bucket Samples Screened through 1/16" Mesh. Ceramics were additionally passed through 1/2 and 1/4" mesh.

ARTIFACT CATEGORY	1/2" MESH	1/4" MESH	1/8" MESH	1/16" MESH	TOTAL
Barnes Ceramics	243.47 N=21	69.78 N=20	5.28 N=11	0.11 N=1	318.64 N=23
Neeley's Ferry Plain Ceramics	38.60 N=10	30.26 N=17	4.13 N=14	0.17 N=1	73.16 N=18
Varney Red Filmed	72.98 N=7	16.39 N=10	1.73 N=8	0.46 N=2	91.56 N=13
All Ceramics	402.54 N=27	156.57 N=27	13.77 N=22	7.18 N=16	580.06 N=28
Red Clay	-	-	214.01 N=43	53.72 N=37	267.73 N=44
Other Clay	-	-	741.52 N=52	698.14 N=51	1439.66 N=52
Shell	-	-	61.76 N=12	21.62 N=13	83.38 N=13
Bone	-	-	92.64 N=30	55.39 N=29	148.03 N=30
Charcoal	-	-	4.37 N=6	18.49 N=6	22.86 N=6
Fish Scales	-	-	0.43 N=3	0.08 N=2	0.51 N=3
Lithics (count)	-	-	85 N=26	120 N=27	205 N=27

N = Number of cases (All totals except lithics refer to weight in grams)

fired red clay show a similar, although less pronounced pattern, with 26 percent, 20 percent, and 37 percent of the sample totals, respectively, passing through the 1/8-inch mesh.

The ceramic data recorded in Table 4 indicate that at least a moderate proportion of the site assemblage is under 1/4 inch in size, although little of this is smaller than 1/4 inch. The figures refer to identifiable sherds, few of which could be recognized below 1/4 inch. The ceramic totals recorded caught by 1/2-inch mesh are subject to some suspicion, due to the use of shovel skimming recovery procedures. Totals for screen sizes less than this, however, probably give a fairly accurate picture of relative sherd proportions in each size category. What these figures indicate is that roughly 20 to 40 percent of the ceramics in the site deposits are lost by using 1/2-inch screen. Roughly 24 percent of the Barnes, 47 percent of the Neeley's Ferry Plain, and 20 percent of the Varney ceramics are under 1/2 inches in size. This discovery alone has important implications in any behavioral analysis of site contents, and illustrates the value of the fine-screened samples.

An Overview of the 1975 Field Excavation Procedures

A major challenge during the 1975 excavation season was that of effectively using available equipment and personnel towards the resolution of project goals. Problems that arose were largely logistical, and only indirectly related to the planned strategy excavation and analysis, which generally ran smoothly. Supervision and coordination of the crew, for example, proved difficult at times due to the diverse, ongoing activity. While some information was lost due to incomplete supervision,

this must be balanced against the tremendous amounts of useful data recovered. The appendix volume for the final report, for example, has over 20,000 entries from 1975 just listing provenience artifact totals.

While use of extensive fine screening generated valuable analytical results, too much time may have been expended on this activity. In the field fine screening operations led to backlogs at the water screen, delaying other activity. In the lab inordinate amounts of time were spent sorting the fine screened samples. Each bucket sample, for example, required an average of two to three hours to sort. Collection of fine screened bucket and flotation samples from each unit appears redundant; the flotation analysis heavy fraction by itself provided a standardized fine screened sample. Furthermore, comparing the methods of collection and screening employed, it is evident that the flotation heavy fraction is a more standardized sample.

Given that the 1975 Zebree field operations were accomplished in approximately 5 1/2 weeks (excluding time lost to bureaucratic delays, rain, and flooding), the season must be regarded as highly successful. While more field work might have been accomplished, this could only have been done at the expense of laboratory analysis; in retrospect a balance in both areas was reached.

Chapter 10

EVALUATION: THE 1976 SEASON

Introduction

The field excavations conducted at Zebree during 1976 were a voluntary effort on the part of the Arkansas Archeological Survey, the Cohen Construction Company, and a number of individuals. In all, 100 man-days were spent in excavation activity at the site (Chapters 4,6). The 1976 operations were conducted without an explicit research design. At the close of the 1975 season it was assumed that the ditching project would be completed in a matter of months, precluding additional salvage operations. Only when the ditching operations, originally scheduled for January 1976, became repeatedly delayed, did serious consideration along these lines begin.

Operations were conducted according to a definite strategy, however, even though a formal statement of intent was absent. Field activity was directed toward the recovery of information unobtainable during earlier seasons through wide area stripping operations. The use of heavy equipment had been proposed in the original 1975 contract, which had been rejected by the Corps of Engineers as too expensive. The situation in 1976, thanks to the cooperation of the Survey and Cohen Construction Company, provided an opportunity to explore this option.

Feature Exposure and Removal: The Use of Wide Area Stripping Procedures

During the 1976 season bulldozers were used to open an extensive series of cuts across the northern and western margins of the site,

primarily in areas to be completely removed by the planned ditching. Features became readily apparent at about the same depth in the bulldozer cuts as in units opened by level during earlier seasons, usually when yellowish, contrasting subsoil was reached. Once subsoil was exposed features had to be quickly delimited before the deposits dried to a uniform yellowish-brown. Surveyor's flags and trowel points were used to mark and outline stained areas. These methods proved generally successful, although a few features were "lost" when their flags were uprooted by unsupervised equipment operation, or when the troweled outlines became scuffed up. Once an area dried, the soil had the consistency of concrete, and liberal application of water from the ditch was needed to loosen up the rock-like crust that formed. Because water transport was awkward and time-consuming, features were opened as soon as possible after exposure.

Feature recognition was easiest in the center of each cut, or where cuts were clean and level, and more difficult at the edges where the bulldozer treads had passed. Some shovel skimming was necessary in every case where a feature was suspected, to clearly delimit its boundary. Skimming operations were easiest at the center of the cuts, and more difficult at the edges, where some one to two inches of tread-disturbed soil had to be removed.

Careful judgment had to be exercised in the use of the bulldozer. If cutting operations were stopped before features were clearly delimited, extensive shovel skimming was necessary to render boundaries distinctive. Proceeding with a cut, however, also risked the complete

removal of pit bases, particularly if they were shallow. In all cases the contents of upper levels were displaced, and most pit fill above subsoil depth was usually lost. While larger artifacts tended to occur in the bottoms of pits, and hence were often recovered, many shallow pits and burials were either lost or recognized only after considerable destruction had occurred. In a few sections information was lost because the bulldozer cut too deeply; in other areas recovery was incomplete because cuts were not opened deeply enough to reveal more than highly distinctive stains.

At Zebree stripping operations were complicated by the presence of different equipment operators almost every day. The varying levels of skill and patience encountered reduced the effectiveness of the archeological observer, since it was difficult to anticipate the depth and evenness of individual blade passes. The situation was unresolvable, and trial and error dominated decision making. This problem was due to the unusual conditions by which heavy equipment was made available, and would be less serious where a single, trained operator was used.

Use of wide area stripping procedures was found to be extremely damaging to midden and feature deposits, at least when compared with unit screening operations. Whenever such a procedure is used, the tradeoff between information recovery and information destruction must be recognized and weighed. If the information to be gained is greater than that which could be gained by other available methods, the procedure can be quite valuable. At Zebree effort was made to restrict stripping operations to areas that would be totally destroyed. Furthermore, even though

stripping operations removed most plowzone and midden levels, information was available from previous seasons, in particular from the random excavation units.

Field Mapping and Data Recording

Once an area was opened, features had to be quickly removed before the soil dried out. Mapping and record keeping, therefore, had to be updated on an almost hourly basis. This tended to be somewhat hectic when several people were opening features at once.

One person (Anderson) was assigned responsibility throughout the excavation for mapping, assigning feature numbers, and maintaining general notes. This proved useful in that confusion and duplication of effort was minimized. One source of bias in the data was that only excavated features were mapped. Information about feature distribution was lost in areas where only part of the total exposed feature record was examined. This must be recognized as a trade-off situation; often only complete excavation was capable of demonstrating even the presence of a feature where surface staining was ambiguous.

While mapping, the transit had to be continually checked for accuracy. The movement of equipment, and in the final days of the salvage the repeated nearby impact of the dragline bucket, tended to throw the instrument off level. Care also had to be taken to ensure that the transit (or other equipment) were not accidentally run over by vehicles moving about the site. The main site datum, for example, was lost during the final week of excavation when an overzealous equipment operator

continued to cut after he was signaled to stop!

A major problem during record keeping operations was errors brought about by haste. The contents of three features were lost because the bags were mislabeled, and in a few cases features were excavated but not mapped in. Shallow pit bases were sometimes removed in a matter of minutes, and if no artifacts were encountered they were rarely flagged for mapping. Because of this, and additional problems caused by variable control over cut depth, some bias exists in reported feature distributions within the 1976 excavation units.

Heavy Equipment Use at Zebree in 1976

Heavy equipment use in 1976 can be best described as opportunistic. If a piece of machinery and someone to supervise it were available to recover site information, they were put to use. A log skidder was used to pull up the historic well shoring, the dragline was used to remove dangerous overburden from the sides of the well shaft, and bulldozers were used both to strip away topsoil and to build access bridges for vehicles over the old ditch. The success that the excavation achieved was due entirely to its availability.

Perhaps the greatest problem encountered in the use of heavy equipment was that of control. Consistent, precise operation was rarely achieved, and only then with highly skilled, patient operators. Even the best operators, furthermore, grew fatigued after two to three hours work and tended to grow careless. The removal of thin, even bulldozer cuts, or the precision placement of the dragline bucket to remove fill,

was beyond normal operator experience. If an operator was careless, or grew tired, erratic, destructive cuts resulted. Heavy equipment operators should be allowed to familiarize themselves with the demands of archeologists in non-site areas, if time and budgetary constraints permit.

Heavy equipment operation can also be dangerous. Deep cuts may collapse, burying the unwary excavator. Fortunately, this situation never occurred at Zebree. A more common hazard was the posibility of crew, excavation units, or equipment getting run over by moving machinery. As the example with the site datum illustrated, operators usually could not hear over the machinery. Heavy equipment may also unintentionally damage excavation units; their weight can collapse profiles up to a meter or more away in loose soils.

A final problem in the use of heavy equipment involved the need for careful judgment by the archeologists as to the size of the area opened or the amount of dirt to be moved. Very large areas could be rapidly exposed. Unless these were quickly shovel skimmed and features tagged, they dried to concrete-like hardness and a uniform color. The cuts also had to be opened, in most cases, around large stumps or standing trees. The amount of site area opened on any given day, therefore, depended to some extent on the number of excavators available. Dirt from the cuts was piled at either end; these heaps were difficult to move once they had reached a substantial size. At the north end of the site they covered part of the pallisade area, and precluded serious investigation of more than two segments. Movement would have been a minor

problem if more time had been available; in 1976, time was limited. The piles did, however, make excellent towers for photographic documentation (Figure 39).

Aerial and Other Photography

It was possible to obtain a large number of aerial photographs of the site during the final week of the excavations, thanks to the loan of a light airplane by Jerry Cohen. Black and white, color slides, and infra-red color slides were shot. At the time of the overflight the draglines were within 100 meters of the site, and it was also possible to dramatically document the channelization.

Comparison of the aerial photographs with the 1976 site map prepared using transit and stadia indicated that no marked mapping errors had been made. While none were expected, additional confirmation of map accuracy proved at least psychologically reassuring given the hectic conditions of the excavations. In addition, the aerial photographs provided a useful source of information about features that were not mapped, or were difficult to map. They helped delimit the swamp tree line, the meander in the river east of the site, and the location of the new channel and levees.

Infra-red was no more useful than the other photographic techniques in revealing site features, but the sharp and unusual color contrast made for a dramatic visual effect. Even though the day was fairly clear, a light haze was present that reduced the quality of photographs taken more than a few hundred feed above the site. Shots were taken

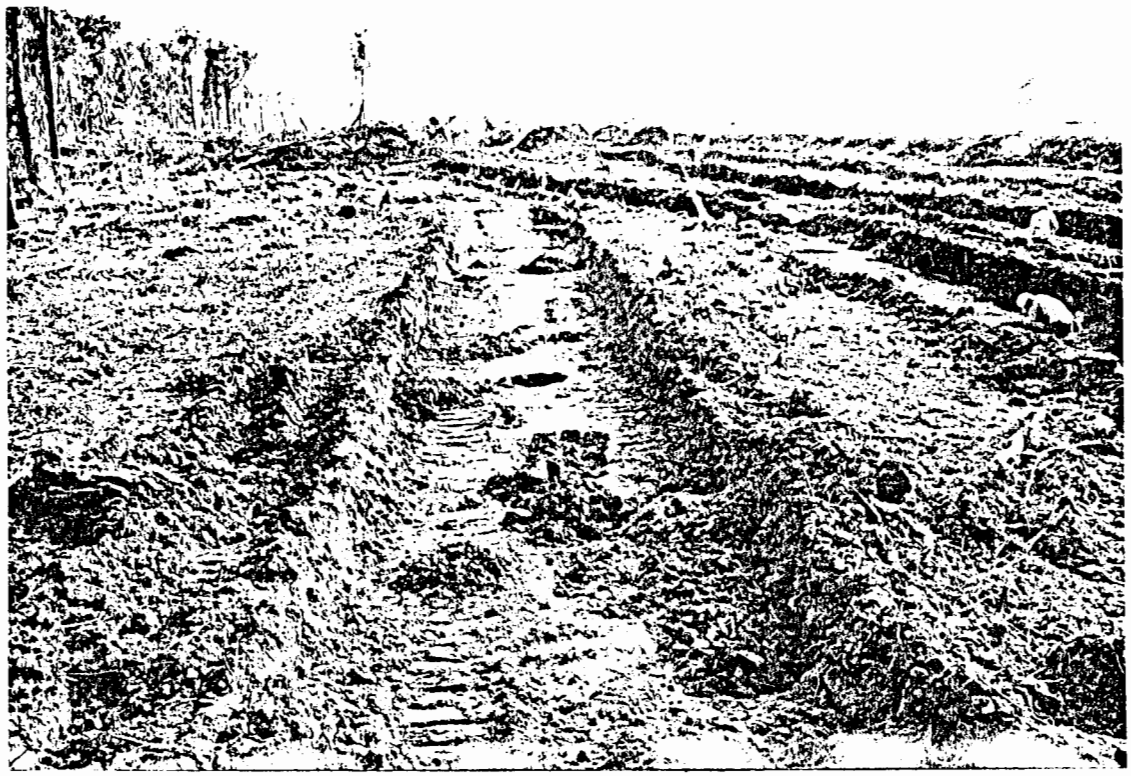

Figure 39. Bulldozer cut with hastily removed features, 1976 excavations. Extent of bulldozer tread disturbance along cut sides is indicated in the foreground. (Negative 763672)

Figure 40. Aerial view of Zebree the last week of excavation, 1976. Note well scar near truck "north arrow" and other visible features. Compare with transit and stadia map in Figure 20. (Negative 763795)

from 300 to 1500 feet; the lower the altitude, the better the clarity. In the best frames it was even possible to detect individual excavated pits (Figure 40). Prior to the flight , Morse's truck was carefully aligned north in the center of the site, to provide both a scale and bearing, something occasionally left out in archeological aerial photography.

While several rolls of color and black and white film document the on-the-ground activity, some potentially useful categories of information were overlooked. In particular, while the photography of clearing and dragline operations was excellent, few shots were taken documenting the effects of these actions on individual artifacts and features. The base of the historic well was carefully cleaned and photographed, but for some reason these pictures did not come out. The fact that only one camera was used illustrates the value of back-up color/black and white shots using different equipment. In the defense of the excavators, however, it should be noted that conditions were extremely hectic, making record keeping of any kind difficult.

Other Field Procedures

One of the more distinctive field procedures employed during the 1976 excavation was the combination water-screening/flotation area set up in the ditch below the site (Figure 11), used for the careful examination of the historic well fill. While a crude operation--the screens and flotation area were set up on rocks and logs with a shoveled sluice channel--the case does illustrate the opportunistic nature of the excavations.

All fill that was not processed in the stream sluiceway was hand picked. Fill was quickly scooped out and broken up using small short handled shovels and trowels. Artifacts were placed in sacks, and in some cases only large artifacts were collected. Smaller sherds were occasionally ignored, as their collection would have been too time-consuming. Unquestionable bias is evident in the 1976 collections; this is clearly demonstrated by the fact that no microliths were recovered, and only a small number of microcores.

An Overview of the 1976 Excavations

It is difficult to be overly critical of the 1976 excavation procedures, in spite of their limitations. A tremendous amount of information was recovered that otherwise would have been lost. Field procedures were opportunistic in the extreme, and took advantage of all available equipment and personnel. From a purely technical point of view, the excavations were hurried and sacrificed much information that could have been recovered had more time or personnel been available. Given the goals of the excavation, and the inevitability of site destruction, however, the procedures must be viewed as highly successful.

Chapter 11

THE ZEBREE FIELD STRATEGIES IN RETROSPECT

Introduction

The excavations at Zebree made use of a wide range of field procedures, including many common to American archeology, and a number that were highly novel. Fill at the site, for example, was removed by hand, with bamboo picks, trowels, shovels, backhoes, bulldozers, and, in a few cases, with a dragline. The diversity of procedures reflected a mixture of circumstances and necessity; in all cases, the goal was information recovery.

The procedures employed each season were largely formulated prior to actual fieldwork, and were designed to recover information relevant to project goals. A flexible outlook was maintained, however, if a particular technique did not work, it was modified or replaced as necessary. Field activity each season was highly opportunistic and sought to maximize available resources. While every effort was made to maximize data recovery, this activity did not become an end in itself. In all cases, field operations were designed to provide data useful in planned laboratory analyses, toward the resolution of specific research problems. Each season, field and laboratory processing were closely linked, with analysis following quickly after fieldwork.

After 1968, each season was conducted as if it were a final effort; in effect, three terminal salvage operations were conducted on the site. Considering the problems left unanswered by even the combined

data base, it is humbling to realize that archeological "mitigation" is probably only rarely realized in the strict sense of the term.

The Zebree Fieldwork in Retrospect

Components documented at Zebree included a late Woodland (Barnes phase) camp or village, an early Mississippian (Big Lake phase) pallisaded village, a middle Mississippian (Lawhorn phase) farmstead or hamlet, and two Euro-American homesteads, one dating to the mid-nineteenth century and the other, the Sebree occupation, from the 1890's to the mid-twentieth century. A detailed interpretive synthesis of these occupations is nearing completion, under the direction of Dan F. and Phyllis A. Morse.

About 875 person-days were spent in actual on-site data recovery operations over the four field seasons, with some 3700 square meters of site area at least cursorily examined (Table 5). The extent of the early Mississippian Big Lake phase deposits, which extended over the entire site, is estimated to have originally been about 11,000 square meters (Dan F. Morse: personal communication). Roughly one-third of this area was examined prior to the destruction of the site, with detailed, level-by-level excavations over about four percent of the area.

The 1968 testing operations at Zebree were judgmental and opportunistic in nature, and employed two-meter units as well as the cleaning and profiling of pothole scars. The testing identified all

Table 5. Comparison of Field Activity by Excavation Season, Person-Days, and Area Examined, at the Zebree Site (3MS20), 1968 through 1976 Field Seasons.

FIELD SEASON	DAYS IN FIELD	TOTAL PERSON-DAYS	AREA EXAMINED
1968	8	25	11 m^2
1969	45	350	180 m^2
1975	50	600	1040 m^2
1976	18	100	2500 m^2
TOTALS	121	875	3731 m^2

of the major components ultimately recognized at the site except for the mid-nineteenth century occupation, and demonstrated the combined role of luck and developed intuition in field data recovery. The findings of the 1968 testing were generally representative of the site as a whole, but this conclusion could only be confirmed after three additional seasons of extensive, and in some cases, probabilistically-based, sampling.

The 1969 "final" salvage excavations were again, as in 1968, judgmental and opportunistic. Two large block units were opened, formed from contiguous two-meter pits, with other tests scattered over the site. Actual unit size varied considerably: if features or floors were encountered, they were (usually) exposed as completely as possible, even if this meant following them under backdirt piles or into modern tree root disturbances. Data recovery procedures were sometimes over-done, as in the case of the artifact piece-plotting, but every procedure paid off one way or another; due to the extensive piece-plotting a Lawhorn phase house floor was recognized. As in 1968, the site's assemblage variability was superbly documented, but once again the size of the scatter was underestimated. So much information was recovered that several years were required for analysis. The analytical require-ments of the assemblage were only minimally considered when the field-work was planned. This is a failing common to much of archeology, and a reminder of the need to carefully coordinate analyses with data recovery in the design of research.

The 1975 operations combined judgmental and probabilistic sampling procedures in a multistage approach to data recovery. Standard size test units were randomly dispersed over the scatter, with block units and trenches intuitively placed into areas with rich or unusual deposits. Use of random sampling procedures was valuable for delimiting component locations, midden formation processes, and post-depositional effects, but the analytical and computational requirements were exceedingly complex and time-consuming. Through comparative analysis with the bucket and flotation samples, the one-meter test pits were found to be much larger than necessary to document midden contents, and generally too small to effectively delimit features. Given the biased nature of previously available knowledge about the site, however, the sampling strategy was still valuable, documenting the size and nature of the respective component assemblages. The trenching procedure was an excellent method for quickly locating large numbers of features, although at least as many were destroyed as were detected. Both the trenches and the several block units proved to be most manageable, and capable of providing the most data, when opened one or a few at a time. Too many units open at once led to confusion and some data loss due to unforeseen flooding. The logistical and coordination responsibilities of a multistage field program, especially when the stages are occurring simultaneously, are thus extremely complex.

The 1976 season at Zebree made extensive use of heavy equipment, and was a classic salvage operation: the site was literally being ditched away as the fieldwork proceeded. Field procedures used during the 1976 season tended to follow a similar, destructive pattern.

Extensive damage to the site deposits was justified, however, by the data recovered, and the knowledge that the areas examined were slated for complete destruction. The 1976 field procedures were hurried and provenience control was a tedious but essential task. Heavy equipment operation required careful control. Operators had to be restrained or replaced frequently to prevent erratic or totally destructive stripping. Aerial photography, employed at the last, was effective for documenting the site destruction, and as an aid in mapping and placing the site within its immediate environmental setting. As during all of the previous seasons, a vast amount of new and important data was recovered in 1976. Each of the three "final" salvage operations revealed important new information about the site assemblage, data which render difficult the casual use of "adequate" or "comprehensive" in reference to mitigation.

Conclusion

The Zebree site was largely destroyed in August of 1976. Only a small portion of the midden was left intact, buried under a levee. The remaining deposits may be revisited by archeologists in the future, but the vast majority are gone. The current data set, therefore, will have to serve to answer questions about past site occupation.

In spite of the seemingly limited excavation sample, a tremendous amount of information was recovered from Zebree, almost all of which is exceptionally well-documented in terms of both provenience

and recovery procedures. Even a casual inspection of the regional literature indicates that the Zebree data base is one of the more extensive, securely documented archeological samples extant.

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