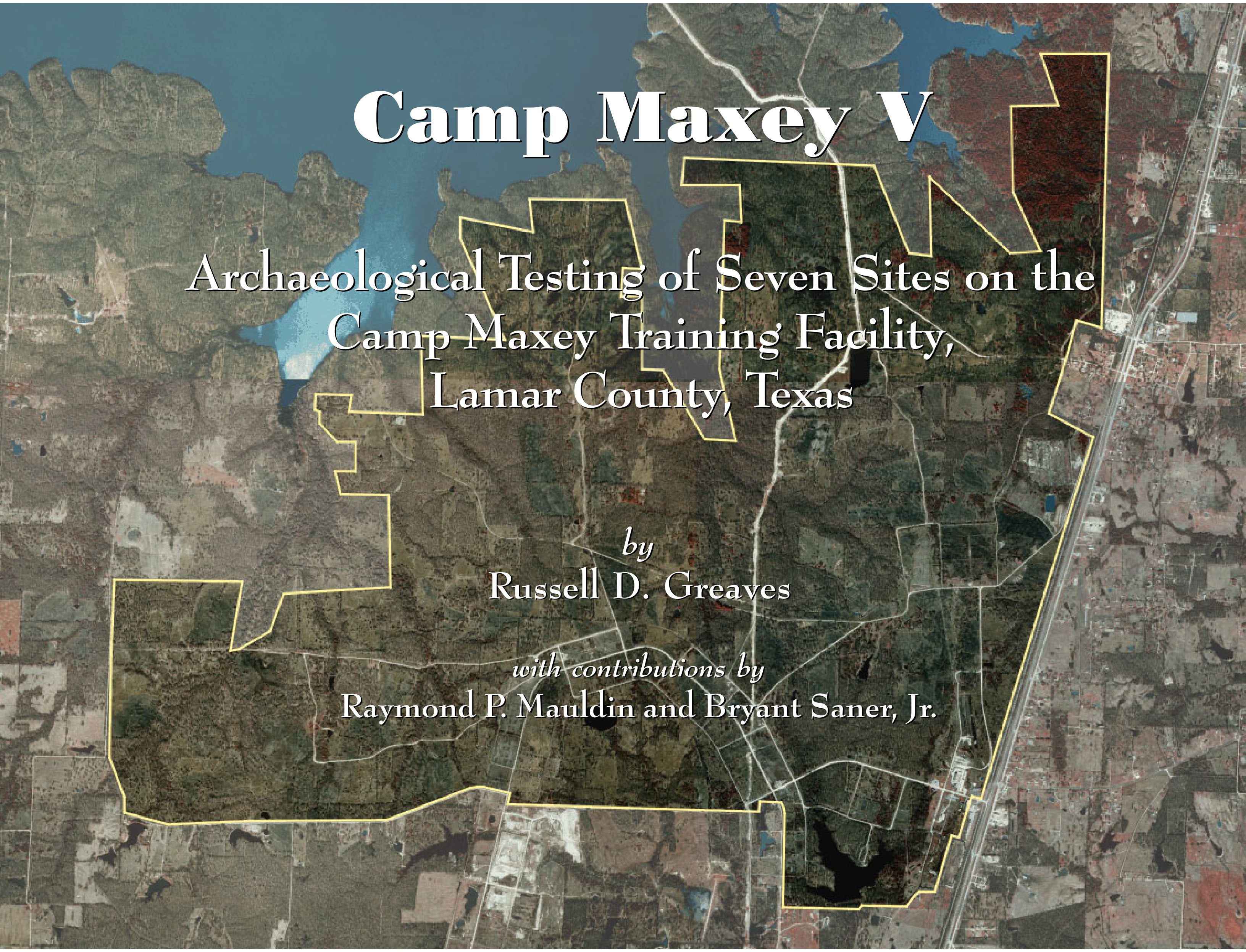

Camp Maxey V

Archaeological Testing of Seven Sites on the Camp Maxey Training Facility, Lamar County, Texas

by
Russell D. Greaves

with contributions by
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Adjutant General's Department of Texas
Directorate of Facilities and Engineering
Environmental Branch, Austin, Texas

Center for Archaeological Research
The University of Texas at San Antonio
Archaeological Survey Report, No. 330

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The University of Texas at San Antonio

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Texas Antiquities Committee Permit No. 2809

Steve A. Tomka
Principal Investigator

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Abstract:

From May to June 2002, the Center for Archaeological Research (CAR), The University of Texas at San Antonio, under contract with Texas Army National Guard (TXARNG), conducted National Register of Historic Places (NRHP) and State Archeological Landmark (SAL) eligibility testing at selected sites within the Camp Maxey training facility in north Lamar County, Texas. The purpose of the current investigations was to assess, through excavation of backhoe trenches, shovel tests, and excavation units, the archaeological significance and NRHP and SAL eligibility of seven prehistoric sites (41LR137, 41LR214, 41LR222, 41LR225, 41LR233, 41LR244, and 41LR254) determined potentially eligible during a previous survey effort. This work was performed under Texas Antiquities Permit Number 2809 issued to Dr. Steve A. Tomka, Principal Investigator for the current testing phase of continuing contractual obligations of archaeological investigations at Camp Maxey through TXARNG. All seven sites are considered ineligible for NRHP listing or SAL designation.

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* Indicates figures located in the Map Supplement at the back of this report. (These maps may be obtained by contacting AGTX-EV, Cultural Resources, P.O. Box 5218, Austin, TX 78763-5218.)

Tables:

Acknowledgments:

The successful completion of this project is the result of many peoples' indispensable hard work. Shellie Sullo-Prewitt of the Texas Army National Guard has efficiently guided this work at all stages. She has offered support, advice, interest, and enthusiasm that have been critical to this investigation. Sgt. Linda Surber of the Camp Maxey Training Center and her staff provided essential information and logistical help that made this project run efficiently and safely. Bryan Mickel excavated all of the backhoe trenches for the project. Bryan and his family were marvelously responsive to our schedule. Richard Mahoney helped create the research design, fieldwork protocols, and orient the project from his extensive experience with the archaeology of Camp Maxey. I am most grateful to the field crew for the Maxey 5 testing and survey. Fieldwork was performed by Bryant Saner, Matt Senn, Stacey Wagner, and Jason Weston. Jason Weston was indispensable as crew chief, managing equipment, supervising excavations, and cheerfully and efficiently handling all routine and unexpected developments throughout this project. Jason also performed the lithic analyses and drafted much of Chapter 3. Marybeth Tomka directed laboratory processing and curation work at the Center for Archaeological Research. Her efficiency and recall of project details significantly aided the completion of this report. Laboratory work at CAR was performed by Jenn Neel-Hartman, Jason Perez, Stacey Wagner, and Jason Weston. Drafting was done by Bruce Moses and Rick Young. I am especially grateful to Bruce Moses for resolving the complicated site maps for the Maxey 5 project. Johanna Hunziker edited this report and has diligently remedied my oversights, errors, and omissions. Vital logistical support for this work was provided by the resourceful ministrations of Sherrilyn Suñaz, Tammy Hosek, Mike Wright, and José Zapata. Dr. Steve Tomka, the Principal Investigator for the Maxey 5 project, has overseen all aspects of the research design, fieldwork, laboratory analyses, and report preparation. Dr. Raymond Mauldin provided critical information and advice during all phases of this work. I am most grateful for the assistance of all of these individuals who have helped in the completion of this project.

Chapter 1: Introduction and Problem Orientation

Introduction

From May to June 2002, the Center for Archaeological Research (CAR), The University of Texas at San Antonio (UTSA), under contract with Texas Army National Guard (TXARNG), conducted National Register of Historic Places (NRHP) testing at selected sites within the Camp Maxey training facility in north Lamar County, Texas (Figure 1). The purpose of the current investigations was to assess, through excavation of backhoe trenches, shovel tests, and excavation units, the NRHP eligibility of seven prehistoric archaeological sites determined potentially eligible during a previous survey effort (Lyle, Tomka, and Perttula 2001a). This work was performed under Texas Antiquities Permit Number 2809 issued to Dr. Steve A. Tomka, Principal Investigator for the current testing phase of continuing contractual obligations of archaeological investigations at Camp Maxey through TXARNG. The primary goal of the work for this delivery order was to perform additional shovel testing, test unit excavation, and backhoe trenching to establish the archaeological significance and eligibility for inclusion in the NRHP and for designation as State Archeological Landmark (SAL) properties of the previously identified sites 41LR137, 41LR214, 41LR222, 41LR225, 41LR233, 41LR244, and 41LR254.

Research Issues and Historic Contexts

Whether it is during survey or testing, the determination of site significance cannot be conducted without considering the potential contributions archaeological sites and data can make to broad research issues relevant to the archaeology of a specific region or area. Archaeologists working in northeastern Texas have the advantage of a large body of research conducted in the region. The Texas Historical Commission has already sponsored the publication of a comprehensive regional preservation plan for archaeological resources in the area (Kenmotsu and Perttula 1993). By design, many of the research issues mentioned below are directed by this planning document. Although many other detailed research issues can be raised about individual sites, the main topics relevant to conducting the archaeological investigations at the seven sites discussed are summarized in five subsections: Archaic mobility patterns and landscape use; development of incipient sedentism during the Woodland period; identification of Caddoan settlement systems and community structure; changing sociopolitical complexity and dynamics in Caddo society; and the development and intensification of Caddoan agriculture economies and changes in land-use strategies.

Some temporal information, relevant to the research issues discussed below, is available regarding the seven sites selected for testing. However, few data about subsistence or settlement dynamics were available before this project. The limited temporal information from initial testing suggested that one site (41LR254) has a probable Late Archaic component, one (41LR225) may have two components ranging from the Late Archaic/Woodland through the Early Caddoan periods, one (41LR214) has a single component that is probably Woodland, one (41LR222) has a single occupation that is likely Early Caddoan, two sites (41LR233 and 41LR244) appear to contain Early to Middle Caddoan components, and one (41LR137) site may represent a Late Caddoan occupation. These inferred dates are derived from small samples of temporally diagnostic projectile points and a few ceramic sherds. Much of the Camp Maxey facility lies within an upland setting proximate to the former channel of Sanders Creek, the main watercourse within the immediate region. Given this setting, it is likely that the seven archaeological sites listed above provide a sample of land use, subsistence, and technological organization within only a limited portion of annual, lifetime, or larger scale ranges of hunter-gatherer or agricultural groups. Because such upland settings tend to be used on a limited basis for short-term camping and resource procurement, it is unlikely that large residential sites occupied for extended periods and multiple seasons would be located in the confines of Camp Maxey (Perttula 1992:13). Given this dynamic, the expected archaeological visibility of activities performed at these sites is probably much lower than in proximity to Sanders Creek. The currently inundated sites in Pat Mayse Reservoir provide a denser archaeological record, greater opportunities for site preservation at the margins of a large active channel, and were probably more intensively occupied and re-used than upland sites.

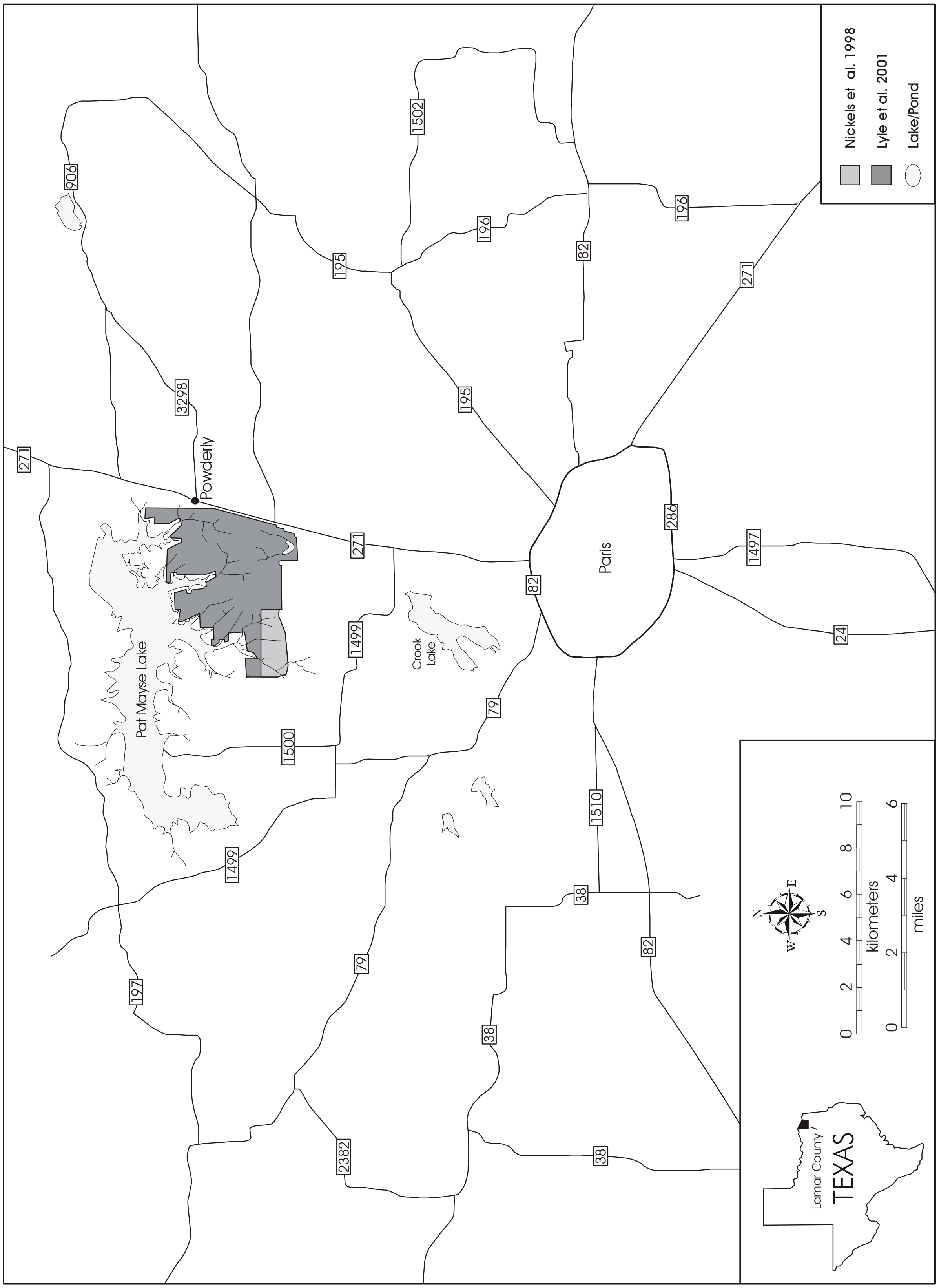

Figure 1. *General location of Camp Maxey in Lamar County, northeast Texas.* Note previous CAR survey areas within the facility.

Archaic Mobility Patterns and Landscape Use

One of the key aspects of the archaeology of the Red River Basin and its tributaries is the definition of the land-use strategies practiced by hunter-gatherers during the Archaic period. The available evidence is based primarily on interpretations of differences in occupation intensity, tool kit composition, lithic assemblage diversity, and the use of local versus non-local raw materials (Fields and Tomka 1993). Current inferences suggest significant differences over time in residential and nonresidential settlement within the northeast Texas region. The Early and Middle Archaic archaeological record is poorly known. Greater visibility of Late Archaic sites suggests an increase in population densities. This increase appears to have been accompanied by a more intensive use of forested and prairie uplands and associated resources (see Johnson 1989; Lorrain and Hoffrichter 1968; Story 1990) and decreasing territory sizes (Fields and Tomka 1993:85). Fields and Tomka (1993) also suggest that the western portions of northeast Texas (including the Camp Maxey area) were less intensively used for residential purposes than other parts of northeast Texas.

Based on the general setting and resource potential, use of the Camp Maxey area is expected to have peaked during the Late Archaic. It is probable that residential and nonresidential use by these broad-spectrum hunter-gatherers occurred at some time on virtually every level landform near available water and forest resources. Lithic procurement sites should also be present, particularly on or in the vicinity of upland gravel deposits. Archaeological signatures of such sites are expected to consist of abundant partially corticated chipping debris and possibly burned rocks from heat treating these poor quality quartzites. However, interpretations of abundant lithic debris as procurement sites often only recognizes the preservation potential of stone compared with residues of many other potential past activities. Our current knowledge only allows us to expect that locations where both lithic resources and water were available may be associated with a wide range of residential characteristics. The identification of Archaic occupations at Camp Maxey (i.e., 41LR225 and 41LR254), and the study of their lithic assemblages (most notably what information they contain on the range of activities, occupation length, frequency of re-occupation, territorial range, technology, and raw material procurement and use) can contribute important information on Archaic hunter-gatherer mobility in the Red River Basin of northeast Texas.

Woodland Period Development of Sedentism

The first apparently sedentary occupations in the Red River Basin occurred during the Woodland or Fourche Maline period (ca. 200 B.C. to A.D. 800). Although atlatls and darts may have continued in use, the introduction of bow and arrow hunting technology, and ceramic technology, appears to have accompanied the sedentarization of local hunter-gatherers. Reasons for increased population densities and decreased mobility are not well-understood. Most literature assumes that adoption of particular behaviors, such as the introduction of cultigens or the more extensive and common use of wild seed plants, created sedentary lifestyles. Teleological arguments commonly suggest that hunting-gathering lifeways are more precarious and that densely packed populations with a more limited resource base are more stable. Although it is certainly more archaeologically visible, agricultural subsistence is not inherently more sustainable than hunting and gathering adaptations.

Schambach (1997) indicates that the Caddoan mound-building tradition may have begun as a burial mound tradition during the Woodland Fourche Maline period along the Red River (perhaps between A.D. 600–900). The first flat-topped temple mounds in the Red River Woodland occupations are characterized by thick, grog-tempered ceramics with flat bottoms and stilted bases, Gary dart points, and chipped stone axes. Arrow points and Coles Creek-style vessels appear during the latter part of the period (ca. A.D. 600–700).

Woodland period sites, including components that may contain middens and structures from sedentary occupations, are abundant along the Red River and its alluvial floodplain. However, they are less common along tributaries near their headwaters, although these (i.e., the Ray Site) may also contain structures and middens (Bruseth 1998).

The identification of Woodland period sites at Camp Maxey (i.e., 41LR214 and 41LR225) and a determination of their character (e.g., presence of middens, types of ceramics, etc.) is critical in documenting the range of settlements in this part of the Red River Basin. Their potential to address significant research questions (such as adoption of agriculture, sedentism, interaction between mobile and sedentary groups, subsistence strategies among horticulturalists, and the impacts of decreased mobility on material culture [Parry and Kelly 1987; Perttula et al. 1993]) will depend on implications of the additional testing of these sites. Descriptive questions about site distribution, land-use strategies, site occupation intensity and permanence during the Woodland period within the Camp Maxey facility can be addressed through these testing data. Although these upland sites are not in prime agricultural lands where Woodland cultural changes are most often investigated, use of such areas may contribute significant information about more mobile adaptations supporting intensive reliance on agriculture. Although archaeological attention to the tempo and character of cultural changes important in subsequent Caddoan traditions is usually focused on lowland areas, the Camp Maxey area offers a complementary view of land-use strategies.

Identification of Caddoan Settlement Systems

Settlement and land-use strategies of Caddoan people was relatively complex. A variety of distinctive site types are recognized. A hierarchy of site types is frequently described relating to the density of households and characteristics of public architecture. Small sites are recognized as single homesteads or farmsteads with one or two structures and small family cemeteries. Small hamlets are identified as containing a few houses, trash middens, and family cemeteries. These sites are distinct from the few larger villages with patterned arrangements of houses and middens around plazas, and also contain cemeteries. Occasionally, the villages included small earthen mounds that capped what are inferred to be important public structures.

The dispersed communities, at least through much of Caddoan prehistory, were associated with civic-ceremonial centers containing earthen mounds and public architecture (see Story 1990). The homesteads, farmsteads, and self-sufficient hamlets could be as much as 30 km from these centers. Current archaeological evidence from the Red River suggests that during the period A.D. 850–1300 there was a shift from multi-family Caddoan residential communities, to groups approximating nuclear families after A.D. 1300.

Recent block excavations at Caddoan hamlets or farmsteads (such as the McLelland, Spoonbill, Deshazo, Musgano, Cedar Grove, and Hardman sites) in northwest Louisiana, northeast Texas, and southwest Arkansas show that they were occupied year-round, contained sturdy household structures, smaller wood granaries or ramadas (approximately 3–5 m in diameter), and extramural cooking and generalized activity areas (Bruseth and Perttula 1981; Clark and Ivey 1974; Early 1993; Kelley et al. 1994; Story 1982; Trubowitz 1984). Midden deposits from household refuse and associated cemeteries are common in and around the structures and work areas.

Archaeological investigations of Caddoan period sites at Camp Maxey (i.e., 41LR137, 41LR222, 41LR225, 41LR233, and 41LR244) may implicate social aspects of changes in Caddoan domestic settlement patterns. Are there organizational differences between the uses of these areas from Archaic periods? What kinds of mobile activities may be related to Caddo period use? Do these areas contain similar or shorter residential use compared with lowland settings? Is it possible to link how upland areas articulate with river bottom households, hamlets, and larger sites? Of particular importance in addressing this research issue for the current project is to obtain from surface collecting, shovel testing, test excavations, and backhoe trenching basic information on the internal character of Caddoan settlements. Research priorities include spatial details of ceramic (including daub and burned clay that can be signatures of Caddoan houses) and lithic distributions, midden size (if present), and spacing between features or debris concentrations. If charcoal or diagnostic artifacts can be recovered, using them to compare temporal relationships within this setting and between larger regions can productively link these smaller sites to denser Caddo records. It is expected that Caddoan settlement within the Camp Maxey area may be particularly relevant to examining the postulated residential shifts in land-use strategies following A.D. 1300.

Most Caddoan sites that have produced substantial information on land-use and social dynamics have been found in broad river bottoms that afforded rich and productive agricultural land. The upland setting of Camp Maxey, with its small deeply incised creeks, would probably not have offered prime agricultural potential. However, this area may provide complementary information on subsistence and mobility that is equally critical to improved archaeological understanding of Caddoan adaptations and economic variability.

Changing Caddo Sociopolitical Complexity

Between approximately A.D. 900 and 1300 in the Caddoan area, there is clear archaeological evidence for the development of complex and possibly socially ranked Caddoan societies. Significant research has documented well-planned civic-ceremonial centers, elaborate mortuary rituals and ceremonial practices, and evidence for extensive inter-regional trade. This development certainly occurred along the Red River (see Bruseth 1998) and its major tributaries, but the archaeological evidence for social complexity among Caddoan groups living in hinterland and marginal areas (stream headwaters, prairie/woodland-edge habitats) is not well known.

The intensified reliance on maize agriculture after A.D. 1300–1400 may be partly responsible for the demise of many of the Caddoan civic and ceremonial centers. One suggestion is that the abandonment of some of these areas may be due to habitats where maize agriculture was less fruitful. Increased household agricultural self-sufficiency among dispersed sedentary communities may have negated a primary role of the elite—to control the social and political economy. Some researchers feel this may have led to the restructuring of social and political integration at the regional and local levels (see Story 1990:340) resulting in the diminished importance of mound building and renewal of mounds and ceremonial structures.

Archaeological investigations at Camp Maxey provide opportunities to examine aspects of the sociopolitical character of the Caddoan groups that lived in the hinterlands of Sanders Creek and its tributaries. Archaeological data can be used to identify the range of site types present within the project area and their relation to the established understanding of site hierarchies (Perttula et al. 1993:138). Identification of sites dating before and after the period of inferred agricultural intensification may allow documentation of the effects of such possible economic and political shifts in prehistoric Caddo society. As already noted, only a limited portion of site variability characterizing Caddoan settlement systems will be encountered within Camp Maxey. Because only one Late Caddoan site is included in the present sample, how this location can inform about current debates on economic and organizational changes may be limited.

Intensified Caddoan Agricultural Economies

The appearance of maize among Caddoan peoples seems to have occurred after A.D. 700–800. Significantly, the development of Caddoan agricultural economies based primarily on maize, beans, and squash did not appear to have precipitated the early growth and elaboration of Caddoan culture. Horticulture appears to have played only a supportive role in Caddoan subsistence prior to A.D. 1200. Increased archaeological visibility of agricultural practices suggests dependence on maize and other cultigens occurred only after A.D. 1300–1400 in the Late Caddoan period. This is several hundred years after the initial development of Caddoan culture in the Trans-Mississippi South. Such a lag between the initial introduction of cultigens and their subsistence dominance is not unusual, and compared with the inferred geographic centers of cultivation is a relatively short interval (Kennet and Winterhalder 2002).

Caddoan sites dating between ca. A.D. 800–1700 are well represented in this part of the Red River Basin. Hamlets, villages, and mound centers along the Red River and its principal northward-flowing tributaries (such as Sanders Creek) are well known. Dispersed settlement is associated with intensification of maize production along the Red River Basin and other Caddoan areas after A.D. 1300 (Bruseth 1998:Figures 3-9, 3-10; Perttula 1996:313–322), including the upper part of the Red River (in Lamar and Fannin counties). Investigations at Camp Maxey may be able to suggest whether this pattern can be demonstrated for upland areas away from major drainages. This area was not reoccupied until the eighteenth century by Caddoan and Wichita groups, and occasional French trade contacts.

Direct evidence for Caddoan agriculture was not expected during testing of the five sites with Caddoan components. However, there are clues in the archaeological record of Camp Maxey that can implicate aspects of these research issues. Identifying Caddoan sites containing midden deposits or other features with charred plant remains and animal bones would certainly suggest research significance. Even in the absence of archaeological evidence of long-term residence, structures, trash middens, or storage features, a more ephemeral archaeological record can provide crucial information. Large lithic assemblages, identifiable features, plant and animal remains, or geoarchaeological information about site formation can be significant to improved understanding of local and regional Caddoan archaeology.

Project History and Site Significance Considerations

In 1998, personnel from CAR conducted pedestrian survey and limited shovel testing of a 1,000-acre parcel in the southwestern corner of Camp Maxey and selected roads and firebreaks throughout the facility (Nickels et al. 1998). During this survey 30 archaeological sites were found and documented. Of these, 23 sites contained only prehistoric components, two sites contained both historic and prehistoric components, and five sites were exclusively historic. Due to the difficulty of establishing site significance and determining NRHP eligibility based on survey information, CAR recommended either the avoidance of further impact on 19 of the 25 prehistoric components or testing them to clearly establish site significance.

Between April 1999 and January 2000, CAR personnel surveyed the remaining 5,000 acres of the facility and found and documented 98 additional archaeological sites. In addition to the 30 sites found during the first phase of CAR's work, and the 98 sites recorded during the larger survey, previous archaeological work conducted at the facility by James Corbin and the Cultural Resources Management Staff of TXARNG identified and recorded eight sites. Currently, a total of 136 sites have been recorded in the Camp Maxey project area.

Of the 98 sites defined by CAR, ten sites contained only historic components, 19 sites had both prehistoric and historic components, and the remainder produced only prehistoric materials. Of the 90 prehistoric components, only 22 (24%) had potentially identifiable temporal affiliation (Tomka et al. 2001:Table 12-1). Eight sites contained multiple components ranging primarily between Late Archaic and Middle Caddoan (A.D. 1100–1300) in age. One multi-component site (41LR170) included materials that range from late Paleoindian to Early Caddoan in age. Three sites appeared to be single-component Late Archaic sites and five may represent single-component Woodland occupations. Four sites evidenced Early Caddoan materials. Twenty-nine prehistoric sites were recommended for further work because their eligibility status could not be clearly determined from the survey-level efforts alone. Additional archaeological work was recommended for the prehistoric components of two previously recorded sites, 41LR137 and 41LR170, for a total of 31 prehistoric sites requiring additional evaluation.

Based on the larger site sample available after the completion of the survey of the entire facility, and given the more complete view of the range of variability in sites, it was possible to re-evaluate the recommendations of the 1997 survey. This allowed selection of the prehistoric components most likely to be of research significance. Some sites previously recommended for avoidance or testing were dropped from consideration because of their apparent low potential to contain important archaeological data (Tomka et al. 2001:155–159). The prehistoric components of ten sites within the 1,000-acre parcel were recommended for avoidance or further evaluation to establish their significance.

From August 2000 through January 2001, CAR conducted NRHP test excavations at 23 sites selected from the two previous surveys (Mahoney 2001a). The selection of these sites was based primarily on the proposed military activities in the southwestern quadrant of the facility. Of these 23 prehistoric components, four were recommended as eligible for listing on the NRHP and for inclusion as SAL sites. These included a Woodland component site, a Woodland-Early Caddoan site, and a Caddoan occupation of pre-A.D. 1300. One site containing multiple components ranging from the Late Archaic to the Middle Caddoan periods also was considered significant (see Mahoney 2001a:95–97).

During June and July 2001, CAR conducted NRHP test excavations on an additional six sites located in the northern portion of the facility (Mahoney et al. 2002). Of these six sites, only one was determined to possess the requisite integrity to warrant NRHP eligibility (Mahoney et al. 2002:34).

Sites Examined During the Current Project

Following the testing efforts summarized above, a total of 12 prehistoric sites remained untested. Seven of these sites were examined during the current project (41LR137, 41LR214, 41LR222, 41LR225, 41LR233, 41LR244, and 41LR254). A total of five sites that had been identified during the 1999-2000 archaeological survey remain untested. Of these five untested sites, three (41LR184, 41LR203, and 41LR226) are located primarily on COE property outside of the TXARNG facility fence (Lyle, Tomka, and Perttula 2001b:Figure 8-1). These sites were not included within the current testing project and are not being considered for future testing. Although seven of ten shovel tests excavated in 41LR184 were positive, based on the landform, it was estimated that the most intensively occupied portion of this site is farther west of the TXARNG fence line, on a ridge projecting west-northwest into Pat Mayse Lake (Lyle, Tomka, and Perttula 2001b:Figure 8-2). Site 41LR203 is located in the southwest quadrant of the facility. The portion of the site found within the TXARNG property lies about 30 m south-southwest of the confluence of two intermittent creeks. Only 38 percent of the shovel tests (n=26) dug in the site were positive (Lyle, Tomka, and Perttula 2001b:Figure 8-6). Based on previous testing results in the project area, the most intensively occupied portion of this site is expected to be located nearer to the confluence of the two creeks on COE property. Although a large portion of 41LR226 is within the TXARNG facility boundary, the distribution of positive shovel tests suggests that the more intensively occupied portion of the site is north of the facility fence line (Lyle, Tomka, and Perttula 2001a:94–95; Lyle, Tomka, and Perttula 2001b:Figure 8-14). Additionally, the landform configuration suggests that the most intensive occupation of this site was north of the TXARNG property line. In agreement with Shellie Sullo-Prewitt, Cultural Resource Manager at TXARNG, it was agreed that no additional work would be conducted on these sites until, and unless, the portions found on COE land could also be explored. The previous recommendations made regarding these sites were that their eligibility status is currently unknown and avoidance of any impacts are necessary until test excavations that included the COE portions could be performed (Tomka et al. 2001:Table 12-2). Access to the portions of these three sites on COE property was not part of the current investigation and the eligibility status of 41LR184, 41LR203, and 41LR226 remains unknown. However, the portions of these sites within the TXARNG property are considered to be noncontributing to any potential eligibility of the potentially more intact areas of these sites under COE jurisdiction.

Two of the remaining nine sites (41LR213 and 41LR238) are small to medium size occupations (12,849 m^2 and 23,575 m^2, respectively). These two sites also were not included within the current testing project of sites at Camp Maxey. Site 41LR213 (Perttula, Lyle, and Tomka 2001:89) yielded one Gary dart point but only 24 percent (n=5) of the 21 shovel tests excavated in the site contained prehistoric cultural materials. No datable materials were recovered from the site. Other than the single dart point, only unmodified lithic debitage was recovered. The density of prehistoric artifacts was 1.5 per positive shovel test. Previous recommendations were that the NRHP eligibility status of 41LR213 was unknown and it should be avoided until test excavations permitted determination of site significance (Tomka et al. 2001:Table 12-2). In relation to comparison of the research potential of several similarly small sites (see following paragraphs) 41LR213 was determined to be ineligible and no further testing was proposed for the current investigation.

Site 41LR238 yielded one unidentifiable dart point fragment and a bifacial drill. This corner-notched dart point fragment suggests a Late Archaic component. Only 11 percent (n=5) of the 27 shovel tests excavated in the site yielded prehistoric cultural materials. No materials that could be dated were recovered from 41LR238. In addition to the point and drill, lithics recovered included only debitage. Prehistoric artifact density was low, 1.0 per positive shovel test. Recommendations made following the recording of this site indicated that its eligibility status is unknown and it should be avoided until test excavations are performed to determine its eligibility status (Tomka et al. 2001:Table 12-2). As noted above for 41LR213, the size, shallow deposits, minimal artifact presence, and lack of features (Perttula, Lyle, and Tomka 2001:99) indicated that 41LR238 is a small site that did not provide information useful in addressing the research questions related to occupational history of the Camp Maxey area. On the basis of comparison with similar sites (see following sections) 41LR238 was determined to be ineligible as an NRHP or SAL property, and no testing of this location was performed during the current investigations.

Testing of several small sites during recent, previous evaluations at Camp Maxey did not provide significant information that could be used to address project research questions (Tomka et al. 2001:158). It was hoped that some small sites with discrete, low-density artifact concentrations might offer opportunities to sample short-term hunter-gatherer sites used for a relatively narrow range of activities. In each of these cases, the artifact recovery during testing remained low, no undisturbed features were identified, and no datable materials were recovered. The data from these sites contributed minimal information about lithic technology. However, the lack of features, subsistence remains, or significantly large lithic samples did not address project research questions. None of these sites were considered to have potential significance warranting their recommendation to the NRHP or as SAL eligible sites.

Sites 41LR213 and 41LR238 have the characteristics of the small, low-yield sites discussed above. Given the lack of return from testing efforts conducted at these earlier mentioned sites, it was recommended that 41LR213 and 41LR238 be considered ineligible to the NRHP or as SAL sites.

Following evaluation of the five sites discussed above, only seven sites with prehistoric components remained to be tested at Camp Maxey. All had probable but insecure temporal assignment based on the presence of small numbers of diagnostic projectile points or ceramics recovered from these sites. The information suggested that 41LR137 was a probable Late Caddoan occupation, 41LR214 a Woodland site, 41LR222 an Early Caddoan component, 41LR225 contained Late Archaic/Woodland and Early Caddoan materials, 41LR233 and 41LR244 had probable Early-Middle Caddoan occupations, and 41LR254 was a Late Archaic site. All of these sites required additional evaluation to determine if those time ranges were accurate and to further evaluate the nature of their artifact assemblages. Determination of their potential research significance also remained unclear following previous investigations.

Scope of the Proposed Archaeological Work

This report documents archaeological testing at the seven prehistoric sites within the Camp Maxey training facility. The primary goal of this work was to determine the archaeological significance and eligibility of sites 41LR137, 41LR214, 41LR222, 41LR225, 41LR233, 41LR244, and 41LR254 for inclusion in the NRHP or for designation as SALs.

Investigation Rationale

Based on the discussions presented in the previous section, it is clear that Late Archaic, Woodland, and Early to Late Caddoan components from Camp Maxey sites could contribute significant information to the understanding of regional archaeology and broader research issues. However, to address specific research issues, it is necessary to establish with reasonable certainty that these sites possess a number of specific characteristics. Among those considered critical are establishing their temporal affiliation, identifying the potential presence of archaeological features, and identifying discrete archaeological components. Most important is determining whether the archaeological record may contribute useful information to address either the established culture historical and organizational research questions discussed previously, or other issues not necessarily anticipated before the investigations.

At the conclusion of the 1997 survey-level fieldwork, NRHP/SAL assessments could not be made regarding these seven sites primarily because of the lack of sufficient knowledge about their temporal affiliation, site content, and the presence or lack of intact deposits and features. While limited shovel testing can sometimes be an adequate strategy to discover shallowly buried sites, it does not allow for, nor was it designed to, assess site eligibility.

The testing undertaken on these sites was designed to identify the presence of archaeological features, to improve recovery of a sample of artifacts from these sites, to identify archaeological horizons, and to evaluate site formation events. Investigations focused on increasing shovel test coverage of these sites, controlled 1x1-m excavation recovery of artifacts and stratigraphic information, backhoe trenching, and geoarchaeological examination of each site. Shovel testing was employed as a quick sampling assessment of areas of each site that only had minimal data about subsurface remains. Backhoe trenching was planned to provide a large subsurface sample that might intercept features or discrete archaeological horizons. Excavation of 1x1-m units offers the most important recovery method because it represents more controlled examination of archaeological deposits in this investigation. The general methods employed are discussed in Chapter 4. Specific efforts at each site are presented in the site descriptions in Chapter 5 of this report.

All of the sites examined in the current project had been shovel tested during the previous survey and initial site characterization appears to have done an adequate job of identifying apparent site boundaries. There were large areas of most of these sites that remained unexamined, particularly on the more extensive archaeological locations. Additional shovel tests were excavated to obtain a sample of artifacts from previously unexplored portions of each site, sample areas for evidence of features, and examine deposit formation. The actual number of shovel tests excavated on each of the seven sites varied depending on the intensity of previous examinations and size of the areas unexplored prior to this field effort. The primary goal of shovel testing was to sample unexplored portions of each site and not simply establish grid sampling.

The number of previously excavated shovel tests that contained artifacts on these seven sites is quite variable. The range is from 38 to 71 percent, with an average of 49 percent having primarily lithics or fire-cracked rock. Artifact densities per positive shovel test ranged from a high of 4.25 to a low of 2.0 with a mean of 2.7. It was expected that additional shovel tests alone would not provide a substantial increase in artifact samples. Only about one-half of the shovel tests were projected to be positive (8–11 per site) and these were expected to produce only about 20–30 artifacts per site. A very small portion of these artifacts were anticipated to be tools. However, the key role of the shovel tests was to produce data on the overall distribution of artifacts across the sites. In conjunction with the survey-level units, it was hoped they could accomplish this goal.

Actual shovel test recovery was significantly lower than anticipated. Only one site produced more than 12 total prehistoric artifacts from shovel testing. Two sites produced no materials from shovel testing and two recovered only a single prehistoric artifact per site. Of 173 shovel tests, only 37 contained any prehistoric artifacts (21%). Only one site had more than seven positive shovel tests. For all sites other than 41LR137 (with 24 shovel tests containing prehistoric artifacts), only 10 percent of the shovel tests recovered prehistoric materials (13 of 133 units). Artifact recovery means ranged from only 1–2 artifacts per positive shovel test.

Following the excavation of the proposed shovel tests, basic artifact sorting (i.e., lithic debitage, lithic tools, burned rock) and tabulation were conducted in the field. Based on these data, site maps showing the horizontal and vertical distributions of artifacts (i.e., individual or combined maps of burned rock, chipped lithics, ceramics, and burned shell distributions) identified areas of higher artifact concentrations. Artifact distribution maps combined the results of the initial survey shovel testing with the results from the testing phase work. These artifact distribution maps were used to guide the location of backhoe trenches and 1x1-m test excavation units. Because of the low recovery of artifacts from shovel testing, areas showing deeper deposits also were targeted for backhoe trenching and controlled 1x1-m excavation to increase the likelihood of encountering artifacts and features, and to provide more secure site formation information.

The presence of deeply incised drainages across most of the project area prevented the use of a backhoe on all but two sites (41LR137 and 41LR214). One site could have been reached by a backhoe if the soils had not been supersaturated for much of project and gate access had been possible prior to heavy rains. To compensate for this change in the initial research design, additional shovel tests and 1x1-m test units were excavated on the sites that could not be backhoe trenched. Detailed geoarchaeological information was recorded on at least one profile from each site and a controlled off-site soil pit. These data were valuable to suggest the probability that intact archaeological deposits might be present at any of the sites examined. Site formation data allowed a complementary form of evaluation of whether significant remains are present even if sampling these low-density sites did not encounter features, artifact clusters, or identifiable archaeological horizons. Previously extensive and detailed geoarchaeological work at Camp Maxey obviated the need for additional characterization of these deposits beyond the profiling, soil descriptions, and magnetic sediment susceptibility sampling.

Summary

Continued archaeological work within the Camp Maxey facility has the potential to contribute to a number of significant research issues. These include the documentation of Archaic mobility patterns and landscape use, the definition of the factors leading to the development of incipient sedentism during the Woodland period, the identification of Caddoan settlement systems and community structure, tracking the changing sociopolitical complexity and dynamics in Caddo society, and documenting the development and intensification of Caddoan agricultural economies and changes in land-use strategies.

Seven archaeological sites were selected for additional work under the present work order (41LR137, 41LR214, 41LR222, 41LR225, 41LR233, 41LR244, and 41LR254). All sites were identified and documented by CAR during the 2000 pedestrian survey of Camp Maxey. All seven sites were assessed as having unknown NRHP/SAL eligibility due primarily to the limited number of shovel tests excavated in each site. Although most of the regular training use of Camp Maxey does not pose an immediate threat to many archaeological sites on the facility, some aspects of normal training uses do impact archaeological sites. Several previously identified significant sites are adjacent to trafficked roadways and areas of significant erosion. The large number of bullets recovered below the upper 20 cm at some sites indicates that non-mechanized uses may also affect these resources. Additionally, future expansion of the scope and scale of training activities can lead to site endangerment and destruction if significant excavation or earth movement takes place. The primary goal of the work was to determine the archaeological significance and eligibility for inclusion in the NRHP and for designation as SALs of these seven previously identified archaeological sites.

A three-pronged strategy was employed to define significance for the seven sites. This tactic includes the excavation of 15–40 additional shovel tests on sites depending on site size, the excavation of up to four backhoe trenches on sites that could be reached by a backhoe (41LR137 and 41LR214), and the hand-excavation of at least four 1x1-m test units. These methods allowed for a more detailed examination of archaeological deposits and potential features. The goal of this combined testing strategy was to more fully and systematically sample each site, and to determine the subsurface artifact distributions, contents, and contextual integrity of each site. Because sample sizes from these sites were very small, none are considered to have produced representative artifact samples capable of addressing the research questions directing this investigation. Although none of these sites are considered eligible as SAL or NRHP sites, information about archaeological site formation does augment our understanding of landscape dynamics and archaeological preservation at Camp Maxey.

Report Organization

This report is composed of six chapters and two appendices. Following this introductory chapter, the Environmental Setting chapter discusses the general physical environment encountered within the project area. The third chapter, Cultural Setting, provides a brief overview of the cultural prehistory and history of the region and a synopsis of previous archaeological investigations within the region and an overview of previously recorded sites. Chapter 4 describes in detail the field and laboratory methods employed during the investigations, artifact analyses, and procedures employed to permanently curate the recovered assemblages. Chapter 5 presents a description of each archaeological site and a summary of the artifact analyses performed. The final chapter, Recommendations, presents recommendations for SAL and NRHP eligibility and suggestions regarding the need for further work at any of these sites.

The two appendices provide supporting data for the analyses and site assessments. Appendix A provides detailed soil and stratigraphic descriptions and Appendix B presents the results of sediment susceptibility analyses. Sensitive site maps and the Camp Maxey facility map are not included in the text but are located in a pocket at the back of this report.

Chapter 2: Environmental Background

Camp Maxey is located in the north-central portion of Lamar County, approximately 9.7 km (6 mi) north of the city of Paris, Texas. The project area is bound to the north by Pat Mayse Reservoir; to the east by US HWY 271; to the south by Gate Two County Road; and to the west by unimproved pasturage. In its current state, the training facility occupies approximately 6,400 ac (2,590 ha), far less than the original 70,000 ac (28,329 ha) allocated by the federal government in 1942.

The extant, remnant portion of Camp Maxey is wholly contained within the Post Oak Savannah vegetation region (Figure 2), with a relative diversity of flora. Oak woodlands atop upland sandy and loamy soils predominate throughout the project area, with intermittent prairies of little bluestem comprising a majority of the remainder of the project area. Persimmon and winged sumac seem to occur in greatest densities along the border of the prairies and intersecting riparian zones of intermittent tributaries and perennial streams. Riparian zones of water oak/elm border the numerous second and third order tributaries that dissect the training facility draining into Pat Mayse Reservoir.

Pat Mayse Reservoir was constructed within Sanders Creek, a tributary of the Red River. Construction in 1967 followed authorization from the Flood Control Act of 1962 (Project Document HD 71, 88th Congress, 1st Session). According to the U.S. Army Corps of Engineers (COE) station data, the reservoir occupies 7,680 ac (3,108 ha) at the top of the flood control pool (460.5 ft above mean sea level [AMSL]) with an approximate 182,940 ac-ft (~225-billion liter) capacity. Construction of the reservoir subsumed roughly ten percent of the original acreage of the training facility including some of the more intensive, live-round munitions activity areas.

All of the project area in Camp Maxey is located within the Whakana-Porum series of moderate to well-drained upland loamy soils (Ressel 1979:5–6). The sites investigated during this project fall exclusively within the Whakana-Porum complex and the Whakana fine sandy loams. These soil groups are thermic Glossaquic Paleudalfs (Ressel 1979:Table 19). Sites 41LR137, 41LR214, and 41LR254 are entirely within the Whakana-Porum complex. Site 41LR222 falls mostly within the Whakana-Porum complex and partly on the Whakana fine sandy loam with 5–12 percent slopes. Site 41LR225 is situated on Whakana-Porum complex and Whakana fine sandy loam with 1–5 percent slopes. Sites 41LR233 and 41LR244 are on Whakana fine sandy loam with 1–5 percent slopes. The Whakana-Porum soils are characteristic of high terraces of major drainages. The Whakana and Porum series are soils formed on ancient alluvial sediments (Ressel 1979:68, 72). They are present on the ridge tops and slopes of those dissected features (Ressel 1979:Figure 4). These soils are moderately well-drained and are moderately to slowly permeable, making them subject to extreme erosion (Ressel 1979:31, Table 16). This is demonstrated in the deeply incised drainages common within the study area.

Descriptions of the Whakana and Porum series identify them as deep loamy soils characterized by A horizons to 18–38 cm underlain by a series of Bt soils (Ressel 1979:68–69, 72–73). Most profiles examined during this project contained significant horizons of unmodified C horizons unconformably overlying an older remnant Bt soil. The texture of soils above the Bt were fine, well-sorted sands or loamy sands. These are not characteristics of nearby Freestone series soils (Ressel 1979:57–58). Holocene sand/sandy loams overlying weathered Pleistocene Red River terrace were observed commonly in the north-central portion of Camp Maxey (west of the current project area) during backhoe trench profiling (Crawford and Nordt 2001b:14–15, Figure 9). These sandy mantle sediments appear to be unconformable with the well-developed Bt soils (Crawford and Nordt 2001b:16–17; Waters and Nordt 1996). Some ferric masses were encountered in most excavations, especially near the contact between the upper sand sediments and the underlying Pleistocene soil.

Geoarchaeological investigations performed as part of previous work at Camp Maxey (Crawford and Nordt 2001a, 2001b; Nordt and Bousman 1998) form the basis for interpretations of local geomorphology and site formation on this project. All of the project area falls within the oldest G2 (500–540 ft AMSL) and upper portions of the youngest G3 (below 500 ft AMSL) surfaces. All of these are identified as intact and remnant Qt4 terraces of the Red River (Crawford and Nordt 2001b:12–13).

Numerous natural springs and seeps are present within the bounds of the training facility. While historic wells in the vicinity have probably reduced the resources of the springs and seeps, prehistoric occupation proximity to these natural features would have been preferred. Magnitude ranges from slow, barely noticeable seeps to active, swift-flowing springs of cold, clear water (Perttula and Tomka 2001:5).

Landform elevations range from 460 ft (140 m) to 560 ft (171 m) AMSL throughout the project area. Roughly 87 percent of the previously tested sites occur within the 480 ft (146 m) to 510 ft (156 m) AMSL elevation range, and only one site occurs above 520 ft (159 m) AMSL. The majority of these sites occupy ridges adjacent to very steep ravines. This distributional pattern is likely associated with proximity to potable water in the form of seeps, springs, or intermittent streams.

Geomorphological research also provides information on lithic resources in the region of Camp Maxey. The geomorphic surfaces in the project area consist of floodplains, fluvial terraces, slopes, and ridge crests (Barnes 1979). Nordt's geomorphological investigations (Nordt and Bousman 1998) determined that the fluvial terraces are concomitant with the Qt4 and Qt5 Red River terraces. The Qt4 contains gravel deposits and the Qt5 has a residual gravel veneer (Barnes 1979). Surface raw materials are primarily Ogallala quartzites. Site 41LR158, documented during the 1997 field season (Nickels et al. 1998:58–59), contained a moderately dense outcropping of Ogallala quartzite gravels on eroded upland knolls. The gravels are present as shallow, buried deposits. Locally available quartzites range from fine- to coarse-grained variants that can be as large as 10–12 cm in maximum dimension. Locally available chert gravels are fine-grained materials that rarely exceed 6–8 cm in maximum dimension and range in color from tan to yellowish brown and reddish pink. These cherts occur as minor components in upland gravel veneers. A much less common component of these gravel deposits consists of petrified wood. This material ranges from poorly silicified materials characterized by poor flaking qualities to well silicified variants with exceptional flaking properties. Perhaps the most concentrated, best quality, and greatest variation of knappable materials is found in Red River gravels to the north of the project area (Banks 1984, 1990). A range of cryptocrystalline materials from Oklahoma, and to a lesser extent Arkansas, form deposits of knappable materials along the Red River that are better quality and more varied in color and texture than the local materials.

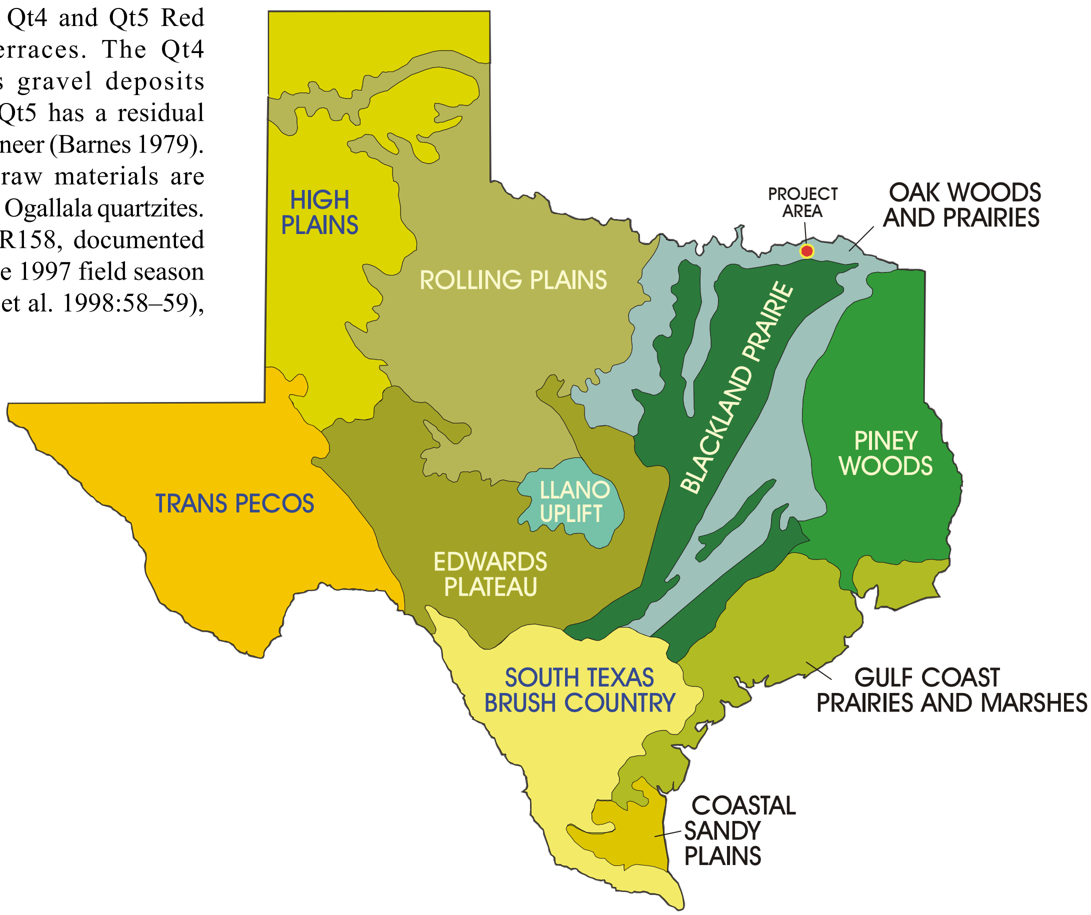

Figure 2. *Project area in relation to natural regions of Texas.*

Chapter 3: Culture History

Introduction

Camp Maxey is situated in the extreme northeastern corner of Texas, immediately north of the juncture of the Post Oak Savannah and Blackland Prairie vegetation subregions. The general region of the project area is bordered to the west by the Southern Plains, to the north by the Ouachita province, to the southwest by the Edwards Plateau, and to the south by the West Gulf Coastal Plain. The proximity to these various ecological zones and physiographic provinces provides an ecotonal environment with a variety of potential subsistence, mobility, and technological adaptations.

Accordingly, a regional chronology for this area must address this highly varied geography. Schambach (1998:7) addresses this variability by proposing the establishment of a new natural area situated east of the Great Plains and west of the Lower Mississippi Valley, that he calls the Trans-Mississippi South. Schambach suggests the northern boundary should be the Missouri River, the southern boundary as the Gulf Coastal Marshes, the South Texas Brush Country, and the Edwards Plateau. In justification of the proposed extreme northern boundary, Schambach cites the continuity of pre-Caddoan artifact assemblages across this vast region, specifically lithic technology and early ceramic types and varieties ascribed to Woodland cultures (Schambach 1998:8).

While it is generally accepted that Archaic cultures were less sedentary than Late Prehistoric cultures (such as the Caddo in northeast Texas), it seems unlikely that a single Archaic culture or series of cultures would consistently span this immense area. The relationship between scales of resolution of the archaeological record often makes identification of meaningful past behavioral units very difficult. Natural geographic boundaries such as the Ouachita or Ozark mountain ranges would seem a more likely northern extent to Schambach's natural region. Specifically, dart point typologies differ greatly across these regions. The general similarities in pre-Caddoan ceramic types and varieties also are not conclusive evidence for the combination of vastly different environmental settings during the Woodland or preceding Archaic and Paleoindian periods. Although general lifeways appear to have been quite similar across these regions, extreme lumping is likely to ignore significant local adaptations and culture historical trajectories.

One reason to suggest the extreme northern extent of the Missouri River espoused by Schambach would be expansive trade networks such as those inferred to have occurred at Spiro Mounds in Oklahoma and suggested at the Sanders Site (41LR2) in Lamar County, Texas (Jackson et al. 2000). Schambach (2000) infers that the inhabitants of the Sanders Site were likely a satellite trade group affiliated with the Spiroans, trafficking the abundant Osage Orange of Lamar County with Plains and Mississippian goods through the trade route of Spiro. Suggestions of similar trading in organic materials that are not represented in the archaeological record are commonly used to posit a trading role for Spiro and the adjacent Caddoan area between the Southern Plains and Mississippian regions. The presence of such trade in northeast Texas might suggest high mobility of peoples or goods across vast areas. Similarities in pottery styles across Schambach's Trans-Mississippi South account for the trade network during Woodland and Caddoan periods. Evidence for such networks during the Archaic period is lacking.

Other researchers (Perttula 1992:7–9) feel that geographic boundaries closer to the Western Gulf Coastal Plain and passing through the Ouachita Mountains of the Caddoan area would serve as a more accurate delineation of north Texas cultural regions. This area may be proposed as a Southern Caddoan subregion within the Trans-Mississippi South. The southern boundary, as suggested by Schambach, is appropriately provided by the Blackland Prairie, Post Oak Savannah, and Piney Woods vegetation subregions of Texas. The Southeastern Evergreen Forest of the Lower Mississippi Valley forms the eastern boundary, and the Southern Plains form the western boundary. The northern boundary might more reasonably be placed at the Arkansas River or, more conservatively, along the boundary of the Ouachita province.

A cultural chronology has been specifically developed for the northeastern Texas region (Perttula 1999). While that chronology will be used here, various other regional temporal schemes and paleoenvironmental conditions from southeast Oklahoma, southwest Arkansas, and northwest Louisiana may also be pertinent to northeastern Texas. All four chronologies are deemed germane to the current project area as all fall within the proposed subregion of the Trans-Mississippi South natural area. Each of these regional chronologies is discussed in an attempt to form a clearer picture of the prehistory of the Camp Maxey area.

Cultural Setting

Paleoindian

The Paleoindian period is the era when humans first entered the New World, an event that happened sometime during the latter part of the Pleistocene geologic epoch. Because of the frequent identification of isolated Paleoindian finds, projectile points, wide dispersal of raw materials, and the infrequent encounter of occupational features, these peoples are inferred to have been highly mobile hunters and gatherers. It is commonly assumed that Paleoindian cultures focused on specialized adaptive hunting of megafauna. Minimal evidence of Paleoindian occupation has been identified from Camp Maxey. A Dalton dart point was recovered near 41LR158 and a Plainview preform was collected from 41LR259 (Mahoney 2001a:40; Mahoney et al. 2002:49).

With some variation, the Paleoindian period for this region is generally agreed to have begun approximately 12,000 years ago and terminated roughly 9,000 to 8,000 years ago sometime during the Early Holocene climatic interval (Johnson and Goode 1994; Perttula 1999; Schambach 1998; Wood 1998). However, Girard (2000:7) argues that the Paleoindian period for Northwest Louisiana occurs from 12,000 BP until 10,000 BP. The termination for this period, relative to conventional Texas chronologies (however slightly varied they may be) is quite premature, and Girard (2000:8) qualifies this discrepancy due to the fact that "archaeologists in Texas do not routinely calibrate radiocarbon dates." Granted, the primary reference Girard cites (Collins 1995) does not use calibrated dates; however, the periods of Collin's chronology do not differ markedly from those of Johnson and Goode (1994), which are based upon calibrated dates using the methodology of Stuvier and Reimer (1993).

Johnson and Goode (1994:19) provide an explanation for this discrepancy in the temporal chronologies. This discrepancy may be from an Eastern cultural influence and that southeastern cultures may have been more directly impacted by the climatic changes at the end of the Pleistocene, specifically the megafauna extinctions (Johnson and Goode 1994:19). They cite the proximity of the Conly site (16BI19) and other sites in the Great Bend region of the Red River (e.g., Cliff et al. 1990; Kelley et al. 1988) with Mississippian cultures. They suggest this explanation for earlier appearance of Archaic lifeways in this region.

Regardless of the chronology of choice, the Paleoindian period is divided technologically into early and late phases. The early phase is characterized by the presence of primarily fluted projectile points (i.e., Clovis and Folsom) frequently produced from non-local materials. The exotic stone tools recovered from these early sites further suggest a high-mobility culture. The late phase of the Paleoindian period is regionally characterized by dart points such as San Patrice, Dalton, and non-projectile tools considered temporally diagnostic such as Dalton adzes. Most of these Late Paleoindian tools emphasize use of more local raw materials (Schambach 1998).

Early Archaic

The Archaic era represents the following ca. 6,000 to 6,500 years of prehistory for this region and is subdivided into three separate periods: Early, Middle, and Late. Environmentally, the Early Archaic is associated with the onset of the Middle Holocene geologic epoch, a time of oscillating conditions beginning as a moderate climate, trending toward a dry extreme, and returning to moderate conditions throughout the entirety of the era (Collins 1995:383; Johnson 1995; Nickels 1998:6, Figure 2-1). Dates for the Early Archaic vary by region and still are not securely identified, but commonly are identified between approximately 8000 and 6000 BP (Johnson 1995; Nickels 1998:6). The development of the Archaic within this region is often attributed to late Paleoindian plains adaptations exploiting the woodland-prairie margin and occasionally interacting with woodland cultures (Johnson 1989).

Early Archaic manifestations within the region include the apparent onset of sedentary subsistence indicated by the diversity of recovered artifact assemblages at numerous sites (e.g., Girard 2000; Wyckoff 1984). Specifically, woodworking tools, such as adzes and wedges, become more common, as well as abraders and scrapers. The Conly site in northwestern Louisiana exhibited excellent preservation of faunal remains including mussel shell, bone, snail, and crawfish exoskeletons (Girard 2000:63). Additionally, Girard (2000:63) cites the presence of burned rock, grinding stones, pounding tools, an axe, various bifaces, and bone tools as further indicators of a more diversified pattern of subsistence. It must be recognized that the occupation of sites for longer periods of time will result in richer artifact assemblages. Many of the adaptations considered hallmarks of Archaic lifeways probably have antecedents in Paleoindian adaptations, but are less visible because of higher residential mobility.

Middle Archaic

The Middle Archaic period represents the terminal portion of the Middle Holocene and is often considered to be a transitional time for prehistoric subsistence strategies. Dates for the Middle Archaic are variably identified, but may be usefully identified as approximately 6000–4000 BP (Johnson 1995). During the early part of this period, bison are present along the bordering plains and prairie regions after a nearly three millennia hiatus (Dillehay 1974). They disappear from the faunal assemblage of the Southern Plains and adjoining prairie margin by approximately 5200 BP. The evidence of relative sedentism, or routed re-use of specific locations, is inferred from the continued occupation and re-occupation of preferred landforms (e.g., Girard 2000:8). The repeated focus on plant foods with highly predictable localized distributions is considered partly responsible for these changes in residential mobility. Johnson and Goode (1994:28) also point to the specialization of targeting specific natural resources, possibly xerophytic plants. These characteristics, in response to an increasingly drier environment (c.f. Bousman 1998; Johnson 1995), would form the basis for the transformation in the overall adaptations that characterize the Late Archaic.

Late Archaic

The Late Archaic period is dated approximately 4200 BP to 1200 BP (Johnson and Goode 1994:29), and roughly coincides with the commencement of the Late Holocene. Within northeast Texas, two technological changes are generally agreed to be associated with the Late Archaic. Simple ceramics and smaller dart points appear in the archaeological record of this time and are considered diagnostic of this Woodland period.

Adaptation to a relatively dry climate with low precipitation and high temperatures marks the beginning of the period, with bison reappearing in the faunal assemblage following a hiatus of over one thousand years (Dillehay 1974). Despite these xeric conditions, human population seems to have increased within the region (Prewitt 1985). Adaptation to this changing environment is best shown in Prewitt's (1981) discussion of the Uvalde and Twin Sisters Phases for central Texas. During this time, burned rock middens and similar burned rock scatters do not appear to have been commonly used. Late Archaic diagnostic artifacts are usually encountered stratigraphically above burned rock features.

Floodplain-focused adaptation during this time is evident in various sites adjacent to the region (Girard 2000:9; Mahoney and Tomka 2001). Environmental changes are considered important to these differences in settlement patterns during this time. Sites are more commonly located on river terraces. Why focused occupation of floodplains is archaeologically more visible is an important question. Geomorphic stability of these landforms may be partly responsible for their preservation. The roles of increased population, effects of changing water availability (Meltzer 1991), and the dynamics of mobility and resource targeting remain to be addressed more systematically.

A generally xeric environment, probably correlated with the Dry Edwards Interval to the west and southwest, characterizes the Late Archaic I phase within the project area. Palynological evidence from the Boriak bog (Lee County, Texas) and the Weakly bog (Leon County, Texas) reveals relatively low arboreal canopy cover, indicating a predominantly grassland environment for these adjoining regions (Bousman 1998:Figure 7). Johnson and Goode (1994:34–35) propose that the processing of succulents in burned rock middens proliferated because of the xeric climatic conditions during the Late Archaic I period. Projectile point forms associated with this period include Bulverde, Pedernales, Marshall, Montell, and Castroville types (Johnson and Goode 1994:Figure 2).

The Late Archaic II phase is climatically associated with a trend toward a more mesic environment. The abandonment of the use of burned rock features may be due to this environmental change and dietary shift (Johnson and Goode 1994). Distinctive burial practices are identified for this period, often assigned as an influence from eastern (United States) religious practices (Johnson and Goode 1994:37). Typical projectile point styles considered diagnostic of the Late Archaic II include Marcos, Ensor, Frio, Darl, and Figueroa forms (Johnson and Goode 1994:Figure 2).

Woodland

Unique to the Caddoan areas in northeastern Texas, the Woodland period encompasses the latter 1,300 years of the Late Archaic period of other Texas temporal chronologies (2500–1200 BP). Within the Caddoan area, this period subsumes the Late Archaic II phase, described above. This pre-Caddoan, ceramic culture is distinctive of northeast Texas archaeology. The classification of Woodland period used in Texas should not be confused with the Woodland period of the Midwest and eastern United States and southeastern Canada. Diagnostic lithic artifacts include smaller (Gary) dart points and early expanding stem arrow points. Early, sandy paste ware ceramics are associated with Texas Woodland sites. Most ceramic cultures within other regions of Texas are associated with the Late Prehistoric. Within the Caddo areas Archaic dart points are associated with the use of ceramics. While the advent of ceramics in concert with the occurrence of the bow and arrow in the remainder of the state signifies the onset of the Late Prehistoric period, the advent of ceramics alone indicates the Woodland period.

Caddoan

Transition from the Late Archaic Woodland to the Caddoan is associated with significant changes in technology and subsistence. Decreases in projectile point sizes are accepted as indications of adoption of the bow and arrow for hunting. Specific ceramic vessels and decorative styles are used to differentiate several periods within the chronology of Caddoan sites. The beginnings of horticulture and increased reliance on agricultural subsistence are associated with robust floodplain remains of settlements that are variable in size and are considered indicative of hierarchical political organization. The Caddoan period is usually identified between 1200 BP until European contact, roughly 300 BP within this region.

Explicit subdivisions of the Caddoan era have been established in recent years (e.g., Story 1990) and other studies identify particular adaptations inferred to be associated with these periods (Brown 1996:442; Krieger 1946; Perttula et al. 2001). The following distinctions are adapted from Kenmotsu and Perttula (1993), providing a general synopsis of horticultural to agricultural changes.

Formative Caddoan *(A.D. 800–1000)*

Initial evidence of horticulture, with hunting and gathering still an important part of subsistence.

Early Caddoan *(A.D. 1000–1200)*

Horticulture reliance becomes pronounced so that this period marks a presumed change to an agricultural basis for subsistence. Evidence for hunting still indicates its dietary significance but gathering appears to become less important.

Middle Caddoan *(A.D. 1200–1400)*

Intensive agriculture and hunting predominate subsistence. Evidence for the collecting of wild plant foods is significantly less common.

Late Caddoan *(A.D. 1400–1680)*

Intensive agriculture, primarily maize, predominates the diet. This is reflected in archaeological remains and in adverse effects evidenced in skeletal pathologies. Hunting is less visible archaeologically and is inferred not to be a significant subsistence activity.

In the central Texas region, bordering the western and southwestern portions of the Caddoan area, Prewitt identifies the initial Late Prehistoric period as the Austin Phase, occurring from the termination of the Late Archaic II until approximately 650 BP (Prewitt 1981:Figure 3). This would be approximately contemporaneous with the Formative and Early Caddoan cultures. Other than technological changes mentioned above, Prewitt ascribes only a slight increase in the dependence upon hunting during the Austin Phase. There is a marked increase in the occurrence of cemeteries, used as indicators of this period (Prewitt 1981:74).

The succeeding central Texas Late Prehistoric phase, the relatively short Toyah phase, as defined by Prewitt (1981), is characterized by the “dramatic” shift in subsistence. Identification of Toyah phase sites through associations of diagnostic point types with faunal remains has been used to suggest a dramatic change from hunting and gathering to an economy based primarily on hunting. This phase would generally be coeval with the Middle and Late Caddoan periods. An intermediate shift to a generally dry, mesic environment is thought to be associated with an increased reliance on bison and other ungulates (Dillehay 1974; Johnson 1995). The material culture of this time-period appears to reflect subsistence based upon the procurement of bison. Various stone tools inferred to be used for bison procurement and processing include Edwards, Perdiz, and Scallorn arrow points, various scrapers, and other stone tools. However, as with Paleoindian period sites, temporal indicators are reliant on diagnostics that are associated with hunting and may overemphasize the importance of these highly visible archaeological sites.

Historic Period

Documented European contact provides significant information about native Caddoan lifeways. The Caddo at the time of contact were culturally Late Caddoan. While shown archaeologically to be in decline, they were represented by large populations of somewhat integrated communities. At this time, the Caddo consisted of three major confederacies, the Hasinai, the Natchitoches, and the Kadohadacho (Mallouf 1976). Initial European contact with the Caddo was infrequent because of the remoteness of Caddoan settlements from European strongholds, native population size, and their resistance to intrusion. Between 1541 and 1762 Spain and France made sporadic contact with the Caddo, seeking alliance or aid in their attempts to exclude each other from this part of North America. By 1762, Spain had wrested control of the area (Mallouf 1976).

In 1806, when the United States made an incursion into Spanish Texas they found many Caddo villages abandoned. It is estimated that European diseases had reduced the Caddo population to 2,000 by 1780. While under U.S. dominion, the Caddo population dropped further to only 500 by 1876 (Mallouf 1976).

The region was depopulated following European contact by the effects of epidemic disease on the local Caddo and their subsequent removal to Oklahoma (Carter 1995:345–346; Swanton 1942:112–113). European colonization occurred in the 1840s through the early twentieth century. The Camp Maxey area consisted of many small, productive farms reliant on cotton as a cash crop. Following a bust in the cotton market, some economic prosperity was restored with the construction of the Camp Maxey military base starting in 1942. A detailed overview of the establishment of Camp Maxey during World War II is presented in Leffler (2001). The original size of Camp Maxey was four to five times the current acreage with over 1,000 buildings and facilities for military training. To acquire the necessary land, the base forced the abandonment of dozens of farmsteads. Some of the farmsteads abandoned to form the military facility were used for administrative and training activities. Following WWII, most of the military and civilian buildings were razed and mechanically destroyed (Leffler 2001). The modern Camp Maxey facility contains the core of the old base. It is a much smaller training base with abundant remains of older structures and roads. Camp Maxey is still an active military training facility and is currently used by the Texas Army National Guard.

Archaeological Background

Professional archaeological investigations began in the Lamar County region with the 1931 University of Texas (UT) excavations at the Sanders site (41LR2), a Middle Caddoan site in the far northwestern portion of the county. The Sanders site contained a large number of well-preserved Caddoan burials with a wide variety of grave goods including elaborate ceramics, *Busycon* shells, carved gorgets, numerous arrow points, bead necklaces, and other elaborate items (Jackson et al. 2000). Later that year, UT also conducted limited test excavations at 41LR1, the Womack Site (Harris et al. 1965), an early Historic Caddoan location with evidence of extensive involvement in the French fur trade. The remainder of the earlier sites, primarily mound and burial sites, recorded by R. K. Harris during the mid-twentieth century, were subsequently assigned current trinomials 41LR3–41LR9.

The impending construction of Pat Mayse Reservoir on Sanders Creek necessitated archaeological surveys that resulted in the recording of an additional 23 sites within Lamar County. Sites 41LR10 through 41LR21 were recorded during the Texas Archeological Salvage Project (TASP) immediately prior to commencement of construction in March 1965 (Shafer 1965). In 1967, the Archeological Salvage Project of Southern Methodist University (SMU) conducted limited test excavations of sites recommended by Shafer (1965:38) for more intensive cultural resource investigation. SMU also conducted further survey, locating an additional eleven sites (Lorrain and Hoffrichter 1968).

Various other universities and state agencies conducted archaeological surveys and test excavations in Lamar County during the following three decades. SMU conducted two phases of cultural resource surveys in Lamar County in the early 1970s. These surveys focused on the proposed Big Pine Lake project in the eastern portion of Lamar County and western portion of Red River County. Fifty-three archaeological sites were recorded in Lamar County during the two phases of survey (Hyatt and Mosca 1972). In the late 1970s and early 1980s, the Texas Department of Water Resources (now Texas Water Development Board) recorded six sites during reconnaissance work for utility easements in the city of Reno, west of Paris (Fox 1979, 1981). North Texas State University (now University of North Texas), Institute of Applied Sciences conducted various surveys in Lamar County throughout the late 1970s and the 1980s. These surveys were primarily for the development of utility easements (e.g., Perttula and Nathan 1988) and identified 37 additional sites. The State Department of Highways and Public Transportation (now Texas Department of Transportation) conducted Phase II testing on two prehistoric sites east and south of the current project area (41LR58 and 41LR92, respectively). Neither was considered eligible for inclusion in the National Register of Historic Places

(Luke 1978; Young 1984). Additionally, the Texas Archeological Society (TAS) conducted a part of their 1991 field school at the Ray Site (41LR135), located along Nolan Creek, east of the current project area.

Prior to CAR's multi-year survey and testing efforts, only limited cultural resource investigations had been conducted within the confines of the training facility. Survey for a utility easement recorded two historic sites (41LR138 and 41LR139) and one prehistoric site (41LR137) within Camp Maxey (Corbin 1992). The prehistoric site was identified as a disturbed quarry location. During the 1990s, the Adjutant General's Department of Texas (AGD) conducted three limited pedestrian surveys within the facility, locating four historic sites (41LR145–41LR148) that predate the military era (AGD 1993, 1997; Sullo and Stringer 1998).

In May of 1998, CAR began its first investigation at Camp Maxey (Camp Maxey I). This survey of 1,000 acres resulted in the discovery of 30 previously unrecorded sites (Nickels et al. 1998). The archaeological survey of Camp Maxey continued in 1999 (Camp Maxey II) when CAR crews identified 98 additional sites within that 5,000-acre cultural resources survey (Lyle, Tomka, and Perttula 2001a). Because of the high density of archaeological sites within Camp Maxey, CAR began test excavations of known sites starting with the testing of 23 sites during the August 2000–January 2001 project (Camp Maxey III). That project resulted in four site recommendations for eligibility to the National Register of Historic Places (Mahoney 2001a). In June and July of 2001, CAR tested six additional sites (Camp Maxey IV; Mahoney et al. 2002). The current project involves additional testing of seven previously identified sites (41LR137, 41LR214, 41LR222, 41LR225, 41LR233, 41LR244, and 41LR254).

Chapter 4: Archaeological Field and Laboratory Methods

Introduction

The field methods employed during this project are based, in part, upon the results from the previous survey efforts (Lyle, Tomka, and Perttula 2001a). These sites were documented through survey shovel testing. Those results generally defined areas of artifact densities within each recorded site that would condition subsequent placement of backhoe trenches, additional shovel tests, and controlled 1x1-m excavation test units. During this project, testing efforts were undertaken at seven sites that were previously identified as requiring additional testing to determine their SAL and NRHP eligibility status. Only one of these sites, 41LR137, had been previously identified before the CAR survey (Corbin 1992). Shovel testing, excavation of test units, detailed soil profiling and description, and magnetic sediment susceptibility sampling was conducted at each of the seven sites. Backhoe trenching was performed on only two sites. Most sites were located across deeply incised streams that prohibited backhoe access. The primary purpose of this testing effort was to determine factors of site significance and eligibility as SAL or NRHP properties. Shovel testing also was performed to evaluate previously identified site boundaries.

Fieldwork was performed between April 23 and May 28, 2002 by a crew of professional archaeologists from CAR. The project archaeologist, crew chief, and three field technicians carried out the field investigations over the course of three 10-day sessions. The principal investigator, Dr. Steve Tomka, and Dr. Raymond Mauldin supervised a portion of the fieldwork and engaged in additional site and environmental sampling during this project. Research design and field orientation was assisted by Richard Mahoney, providing continuity with previous research at Camp Maxey.

Locations of all shovel tests and controlled 1x1-m test units were plotted on the existing site maps that had been previously generated. Most units were established using a Brunton pocket transit and tape, referenced to the existing site datum trees. Some shovel tests and few (4) 1x1-m test units were established using a compass and pace method. The locations of all shovel tests and test units were also collected with a Trimble Geo-Explorer II hand-held GPS unit. For the two sites with backhoe trenches, those trenches and test unit excavations adjacent them were not established on grid coordinates relative to the original datum tree. Backhoe trenches and their associated test unit locations were identified using the GPS units. The particular strategy employed at each site is presented in the individual site descriptions. Site maps were digitized by the drafting department at CAR, and reproductions are included in this report.

Mechanical Excavations

Seven backhoe trenches (BHTs) were excavated on only two of the sites investigated (41LR137 and 41LR254). This method was employed to prospect for cultural deposits and features and to provide a comparative view of the stratigraphy on each site. The initial research design included backhoe trenching of all seven sites examined during this project. Field reconnaissance indicated that most sites could not be accessed by a backhoe because of one or more deeply incised drainages. Four sites were located in areas completely inaccessible to the backhoe, and in the case of site 41LR222, the route to the site was supersaturated and impassable by heavy machinery. To compensate for this, in consultation with the Texas Historical Commission (THC), additional shovel tests and 1x1-m test units were excavated on sites not examined through backhoe trenching. The machine employed for the current investigations was a Case 580 Super K tractor equipped with a Construction King Extend-A-Hoe arm attachment and 24" bucket. Typically, a clean-out plate is welded to the teeth of the bucket for archaeological trenching to produce a cleaner view of trench floors. Based on previous experience (Mahoney 2001a:19), due to the abundant roots encountered, a standard toothed bucket was used.

The strategy employed for placement and excavation of backhoe trenches was to explore, based on the survey phase shovel test data, the apparently densest portion of each site. Specifically, the trenches were excavated adjacent the most productive shovel tests to further investigate temporally diagnostic cultural material and/or investigate possible features. Because sites examined during this project produced few diagnostic artifacts and relatively low material densities, backhoe trench placement sought to examine areas near the previously excavated shovel tests that produced the highest numbers of prehistoric artifacts. These were primarily debitage and fire-cracked rock.

The excavation of each trench was closely monitored for impact to potential intact features or significant deposits. The excavated sediments and soils were observed and backdirt examined (not screened) for any cultural materials. All walls of each backhoe trench were later troweled and scrutinized for evidence of archaeological features, artifacts, horizons, or paleosols. One backhoe trench from each of the two sites examined was selected for profiling, soil description, and sampling for magnetic susceptibility. No cultural features, archaeological horizons, prehistoric tools, or lithic debitage were identified in any of the backhoe trenches.

Manual Excavations

Shovel Tests

A total of 173 shovel tests (STs) have been excavated during this project at the seven sites discussed in this report. These were excavated to further examine areas of each site that had not been adequately tested during the previous investigation and to assist determination of locations for controlled test unit excavations. In comparison with the previous shovel testing and 1x1-m excavations, shovel test results were generally poor indicators of artifact content on these sites. This is partly because the sites examined during this project were generally low-density, and recovery success using standard shovel tests is especially problematic on such sites. The small size of the shovel tests (30x30 cm) and standard intervals between them (20–25 m) can have a low potential for intercepting any cultural remains on sites with dispersed and low-density artifacts. Where possible, all shovel tests were excavated into the basal Pleistocene Bt soil stratum. On some sites, the depth of the Bt soil was not determined in shovel tests because it exceeded the practical depth of shovel testing (1 m), or the sediments were supersaturated from recent rains and excavation was terminated before a depth of one meter was reached. Where shovel tests could not be excavated into this older soil, subsequent test unit excavation (1x1-m) established the depth of the older clay through deeper controlled excavation or the use of an auger. All shovel tests were approximately 30x30-cm in dimension and were excavated in 20-cm levels. Shovel tests were not excavated deeper than one meter because of the problems in controlling vertical provenience in deep, narrow units. Vertical provenience was recorded as depth below the modern ground surface, selecting the highest portion of that surface for reference. Each shovel test was screened through ¼" mesh hardware cloth and recorded on a unique shovel test form.

Test Units

During the current testing efforts, 35 test units (TUs) were excavated. The number of excavation units per site varied from three to seven based on site size, distribution of cultural material, and density of cultural material. An average of five units per site was deemed adequate to assess NRHP site eligibility and determine whether further mitigation efforts would be warranted.

On the two sites that had backhoe trenches, excavation units were placed immediately adjacent to those excavations, with a unit wall sharing an associated backhoe trench wall. This method allowed for a more efficient means of excavation by permitting the excavator to view the various strata to be encountered during manual excavation. In addition, the physical demands of manual excavation are lessened as the excavator may dig while standing inside the relatively shallow (~1 m) trench. This positioning permits greater leverage using hand tools, as opposed to excavation of a stand-alone unit not adjoining a backhoe trench.

Horizontal mapping of artifacts greater than 5 cm was established as a field procedure to be consistent with previous testing methods (Mahoney 2001a:20). However, the very low density of encountered artifacts resulted in minimal piece-plotting. Even adjusting the minimum size for piece-plotting to 3 cm, no chipped stone or ceramic artifacts were encountered in sufficient density to record piece-plot provenience from any of these sites. Only a few larger natural clasts or fire-cracked rocks were identified and mapped *in situ*. Vertical excavation levels did not exceed 10 cm in thickness. Vertical provenience was established using a datum at the margin of each unit. This consisted of a chaining pin or nail with a string line and level. Frequently, the highest corner of a 1x1-m unit was selected and the ground surface in that corner used as a referent zero elevation. For some units, the elevation datum reference string line was established at an arbitrary elevation above the ground surface. The particular procedure is discussed within each site description's presentation of excavation methods for test units. The first excavation level involved removing the epipedon so that a consistent elevation was registered in the entire unit. This frequently resulted in a first excavation level that was not a complete 10 cm of volume across the entire unit. Elevations were checked in each corner and the center of every excavation level. Actual excavated elevations were recorded, not simply the target elevation for each level. Most excavations did not exceed target level depths by more than 1 cm.

Due to homogeneity of texture and color of all the soils and sediments above the discrete textural and color changes in the stratigraphy of the upper stratum (i.e., sandy mantle), arbitrary 10-cm levels were excavated. These arbitrary levels were maintained until the basal clayey substrate (Bt) was encountered. Based on previous excavations that identified this as a remnant Pleistocene horizon predating human occupation (Crawford and Nordt 2001b:14–15; Mahoney 2001a:20), excavation did not usually extend into the older Bt soil. Excavation into the Bt soil was performed at 41LR233 because of the lack of an erosional unconformity with the overlying C horizons, and presence of upper Bt units not present at the other sites investigated. Control soil pits placed away from each site also examined at least 10 cm of these Bt soils. All excavated sediments and soils were dry-screened through ¼" hardware cloth. The results of excavation of each level were recorded on a unique form, including provenience data, soil data, artifacts recovered, inclusions, disturbances, and a sketch of the profile. Black and white and color slide photographs were taken of representative 1x1-m test units. A detailed profile and soil description was performed on at least one test unit at each site. All field forms and profiles were recorded on archival quality paper.

All cultural material encountered during excavation was collected and recorded on field forms identifying their provenience. Various samples were targeted for collection in the field to provide relevant environmental and geoarchaeological data. Soil susceptibility samples were collected from at least one backhoe trench or 1x1-m excavation unit and from the control soil pit (see following section) on each site. The procedures employed for soil sample collection are described below. Faunal remains and gastropods were sought during screening to provide additional environmental or cultural information. No faunal remains were recovered, and gastropods were very rare. The few *Rabdotus* shells encountered were determined to be modern remains that provided no information about paleoenvironments at the seven Camp Maxey sites examined. Although excavators were alert to other potential environmental samples such as feature fill, macrobotanical remains, or wood charcoal, appropriate feature contexts were not identified on any site examined during these investigations. Only a single charcoal sample from an undisturbed context was collected, but it was from the Pleistocene Bt soil in the soil pit on 41LR222. No features were identified and no samples were collected that could provide secure paleoenvironmental information from macrobotanical (flotation) or microbotanical (e.g., pollen, and phytoliths) analyses.

Soil Profiling and Magnetic Sediment Susceptibility Sampling

Profiling involved standard soil profiling methods employed in soil science (Soil Survey Staff 1993:117–168, 172–180, 184–193). A profile was drawn for one face of a single backhoe trench from the two sites with mechanical trenching. One controlled 1x1-m test unit also was selected for profiling from each site. On two sites, 41LR137 and 41LR254, the walls of contiguous 1x1-m units (2x1-m excavation block) were profiled. An additional profile and description was performed on a soil pit excavated off the identified site area. This provided information about the adjacent landforms that helped situate the age and geomorphology of the site setting. Soil pits were not excavated in levels and none of the backdirt was screened. The location of each soil pit was established by Brunton and pace and GPS recording. Soil descriptions were completed for every identified sedimentary and soil horizon from each profile. The only soil samples collected were those from a single magnetic susceptibility column taken from every recorded profile. Recent charcoal was frequently encountered in the uppermost horizons. This was clearly recent and none was collected. Charcoal was not identified in older soils and sediments. Field observations included Munsell colors (wet only), texture, wet and dry consistence, structure, and horizon boundaries. These attributes will permit designation of the soil and sedimentary horizons in standard soil nomenclature (Soil Survey Staff 1993:117–135). The abundance and morphology of roots, pores, and clasts also were recorded.

Sediment susceptibility samples were collected in a column from each profile recorded. Sampling involved the use of a standard template placed against the profile wall with holes drilled at 5-cm increments. Vials inserted into the holes effectively trapped sediments with almost no contamination from upper and lower contexts. Vials were labeled on their caps and placed within individual zip-closure bags. Additional provenience information was written on a piece of flagging tape included in every individual bag. The location of samples from each profile was drawn on those recorded profiles. This proved an efficient method for sampling profiles and recording their provenience. Minimally, one sample column within the site and one from off site are available for each of the seven sites examined.

Magnetic susceptibility (MS) of sediments can be a useful analytic tool for identifying past human activity. This method is especially productive in sediments and soils that do not have readily apparent stratigraphy and where the nature of potential palimpsest deposits is ambiguous (Mauldin 2001:119–120). Signature values from MS analyses are related to the organic content of sediments (Collins et al. 1994; McClean and Kean 1993; Singer and Fine 1989) and the decay of those materials (Reynolds and King 1995). Variance in values produced from analysis of samples provides relative information about the comparative differences in past organic content of adjacent sampled areas of a site. This analysis can identify vertical and horizontal areas that have experienced organic enrichment. This is an especially useful technique for examining deposits at Camp Maxey. The lack of stratigraphy and the sandy texture of these sediments make definition of sedimentary or cultural horizons difficult. Although large sediment and soil units can be readily distinguished, finer scale divisions in the vertical artifact distribution is problematic. It is hoped that MS of these sediments may assist in determining the nature of the cultural stratigraphy at these sites.

Laboratory Methods

Upon completion of each ten-day session, all recovered artifacts and special samples along with the associated paperwork were submitted to the laboratory at CAR for processing and temporary curation. Processing consisted of artifact washing, a general category sort, cataloging, and entry into a standardized database. Subsequent to this initial laboratory processing, the various artifact categories were submitted to specialists for analyses. Following the formal analyses, the results were then incorporated into the database for final curation.

Final curatorial processing was conducted in accordance with 36 CFR 79 (Curation of Federally Owned and Administered Archeological Collections) and other proprietary standards established by the Texas Archeological Research Laboratory, the permanent curatorial facility for the Camp Maxey project.

Artifact Analyses

Native Ceramics

Ceramics have been identified in previous testing of sites in Camp Maxey (Mahoney 2001a). Although single examples were recovered from three of the sites in the current project during previous testing of 41LR137, 41LR233, and 41LR244, no prehistoric ceramics were encountered during the current project.

Lithics

Previous work at Camp Maxey did re-evaluate the lithics from the initial survey (Mahoney 2001a:21). Re-analysis of previously recovered lithics was not part of the current laboratory work on the seven sites investigated. Analysis involved classification of tool and debitage types and collection of metric data. Tools are classified as intentionally modified and used lithics. These include recognized forms of arrow and dart points used as potential indicators of temporal periods and past subsistence and manufacture activities. Tools also include minimally modified flakes that can be used for a wide range of expedient activities or as part of curated tool kits. Cores are here considered as tools. This does not imply that they functioned as implements, simply that they represent rocks that had to be brought into this area and used as material sources. Natural clasts of quartzite larger than 5 cm were very rarely encountered during the current investigation. No chert gravels greater than 2 cm were found during the testing of these sites. All lithic raw materials apparently had to be transported to these sites from unspecified source locations. Cores are not simply pieces of raw material, but can provide information about the design of lithic reduction at these sites.

Debitage includes all debris from manufacture—complete and broken flakes and angular debris. Because lithic debris forms the majority of lithic assemblages in most archaeological sites, analyses of these materials is much more significant than the majority of information that much smaller tool assemblages afford. Debitage can provide critical information about raw material acquisition, reduction, tool design, use, and recycling of worn-out tools. Metric traits, as well as macroscopic and low-power microscopic morphological characteristics were recorded for each of the debitage and tools recovered during the current investigation. Quantitative data on lithics include maximum length, maximum thickness, and weight. Categorical data include raw material, lithic type (projectile point, biface, core, flake tool, flake, shatter), flake reduction stage (early, late, tool manufacturing), completeness (proximal, medial, distal, complete), and percentage of cortex present (0%, 1–50%, 51–99%, 100%). Descriptions also were made for projectile points, bifaces, flake tools, and cores. Jason Weston performed the lithic analyses under the supervision of Dr. Steve Tomka.

Historic Materials

Historic debris was uncommon, even on sites that contained remains of some historic occupation. The destruction of architecture on most of the base (Leffler 2001) has left few undisturbed remains. Only 41LR225 contained a significant amount of surface material. The majority of this was larger debris, such as cars, large metal vessels, and fencing debris that was not collected. Bullets were the only common historic item recovered from most of the archaeological sites examined. All except one specimen appear to be World War II-era ammunition.

Dating

An attempt was made to recover all charcoal or carbon-rich samples encountered during the project. However, most charcoal encountered during this testing was determined either to be very recent material or to come from obviously disturbed contexts. A single charcoal sample was collected from the Bt1 horizon of the off-site soil pit for 41LR222. This sample appeared to have a high probability of depositional integrity. Because no comparative samples could be obtained from this profile or others on 41LR222, this sample has been reserved but not submitted for analysis.

The small sample of projectile points (n=5) did not provide a secure basis for use of temporally sensitive artifact forms. These isolated examples were considered untypeable. They suggest temporal differences between dart points and arrow points, but offer no more precise suggestions about dating of the seven sites investigated. No ceramics that could have been used as temporal markers were recovered.

Magnetic Sediment Susceptibility

Sediment susceptibility samples were collected from every profile drawn and described on this project. The process of measuring the change in magnetic susceptibility of the sediments involves collecting small soil samples at regular intervals throughout the vertical column of an excavation unit, backhoe trench, or shovel test. The potential change in value of the samples can indicate an increase or decrease in the amount of organic material through the various horizontal levels. Comparisons of these peaks in magnetic susceptibility with artifact densities can determine the likely integrity and associations of archaeological artifacts. Magnetic susceptibility also provides crucial site formation information and potential identification of periodically stable soil surfaces.

Samples recovered from the selected units were placed in plastic vials and stored in the controlled laboratory at CAR until analysis was performed. Prior to analysis, all sediment samples were air dried on a non-metallic surface. After drying, the samples were then ground to a uniform grain size using a ceramic mortar and pestle. This was done to standardize particle size and make the material easier to handle and pack into sample containers. The ground samples were placed into a MS2B Dual Frequency Sensor that, in conjunction with a MS2 Magnetic Susceptibility Meter, provided the magnetic susceptibility of each sample. The results of these analyses are presented in Appendix B.

Chapter 5: Archaeological Site Descriptions and Results of Testing

Introduction

Archaeological testing was performed at seven sites in the northeastern portion of Camp Maxey, Lamar County, Texas. Fieldwork at these sites was designed to improve areal coverage of subsurface examination through additional shovel testing and to obtain more controlled artifact samples from excavation of 1x1-m units. Two sites (41LR137 and 41LR214) were trenched with a backhoe to identify site formation processes and attempt to locate potential buried features. Backhoe trenching was part of the initial research design for all of the sites examined during this testing project. However, reconnaissance of site locations found that deeply incised drainages throughout this portion of Camp Maxey prevented backhoe access to most of these sites. In compensation, a greater number of shovel tests and 1x1-m test units were excavated on the sites that could not be trenched. The efforts at all of these sites are considered adequate for the basis of recommendations about the potential SAL and NRHP eligibility of these sites.

Investigations were conducted from April 25 to May 28, 2002 by a crew of five professional archaeologists from the Center for Archaeological Research (CAR), The University of Texas at San Antonio. Shovel testing and excavation of controlled 1x1-m test units was performed at sites 41LR137, 41LR214, 41LR222, 41LR225, 41LR233, 41LR244, and 41LR254 (Figure 3-Map Supplement). Backhoe trenches were excavated on sites 41LR137 and 41LR214.

All sites were tested through additional shovel testing to improve the areal sampling of the previously identified site areas. Controlled 1x1-m excavation units were excavated on all sites. Profiling and soil description was performed to identify site formation and assist in determination of site significance and potential to address the ongoing research questions about the archaeological record of Camp Maxey. Control sediment susceptibility samples were collected from soil pits placed away from the defined site boundaries of all sites. Off-site soil pit profiles were drawn, described, and samples were collected from all of the sites tested during this investigation. All backhoe trenches in sites 41LR137 (four trenches) and 41LR214 (three trenches) were backfilled. Open backhoe trenches from previous excavations had been identified by Sgt. Linda Surber at 41LR164 (three trenches) and 41LR200 (two trenches). All of these were backfilled prior to the CAR crew leaving Camp Maxey. Additional control sediment susceptibility samples were collected from two pond locations. Three sets of samples (from submerged and adjacent shore deposits) were collected from a pond approximately 450 m southeast of 41LR222, and three sets of samples were collected from a pond located approximately 240 m northeast of 41LR231.

None of the sites examined during the 2002 testing effort at Camp Maxey are considered eligible for nomination as SAL sites or for inclusion on the NRHP. All seven sites produced very low densities of prehistoric artifacts. No prehistoric features were identified. Historic manifestations at these sites were mostly military bullets without associated training features and ephemeral recent debris. Site 41LR225 contained the most extensive historic component. Abundant surface remains suggest early-twentieth-century farming activities. No intact architectural features were identified during the initial site survey and testing effort or the current project. The historic component of 41LR225 appears to be entirely surficial and has been extensively disturbed. No remaining structures or unambiguous activity areas were identified during examination of 41LR225. On the basis of the testing performed, no additional archaeological characterization or protection is considered necessary for any of these sites. In concurrence with the Texas Historical Commission (THC), it is recommended that normal training activities be allowed to proceed in these areas with no further consultation required with the THC.

Site Descriptions

Discussions of the archaeological testing and excavation results are presented below for all seven archaeological sites (41LR137, 41LR214, 41LR222, 41LR225, 41LR233, 41LR244, and 41LR254) examined during this investigation at Camp Maxey. All of these sites had been previously identified through archaeological survey and shovel testing (Lyle, Tomka, and Perttula 2001a).

41LR137

This is a relatively large site situated in the central portion of Camp Maxey (Figure 3). It is located on the northeastern side of an unnamed third-fourth order tributary feeding into Pat Mayse Reservoir. This reservoir is situated in the former channel of Sanders Creek, encompassing all of the floodplain and confluences with drainages from more upland terraces. The southern boundary, especially the south-central and southeastern portion, is adjacent to swampy areas of this stream. The site is bounded on the north by a smaller, ephemeral stream that is deeply incised in the vicinity of 41LR137. The site is located on a narrow ridge that probably represents an incised alluvial terrace. The area of the landform with archaeological material is relatively flat, ranging in elevation from 480–500 ft (146–152 m) AMSL.

Corbin (1992:7) originally identified this site as a small quarry and camp during a water line survey. Subsequent revisitation by CAR extended the site area and recovered evidence of varied occupation activities (Perttula et al. 2001:114–115). The previous CAR excavations consisted of 40 shovel tests; twenty-four of those contained prehistoric artifacts (n=86), and five of those units also contained bullets (n=8) from military training activities. Most of the prehistoric material recovered during the initial testing was debitage (n=32, 37%, not including nine heat spalls) and fire-cracked rock (n=42, 49%). One core and one ceramic sherd also were collected during shovel testing. The previously identified site area was approximately 54,199 m^2 in extent.

Areal coverage during the initial survey combined systematic and judgment sampling to identify the site area of 41LR137 (Figure 4-Map Supplement). The goal of the additional shovel testing was to examine portions of the site that were not previously well-sampled and perform controlled excavation of 1x1-m test units. The additional shovel tests were placed to provide more systematic areal coverage of the site but not necessarily redefine the site boundaries. A total of 40 shovel tests was excavated on this site. Most were excavated in 20-cm levels to a depth of 100 cm below the modern ground surface. Shallower terminal elevations occurred in some units because the older Pleistocene Bt soil was encountered. The high amount of rainfall during the first part of the fieldwork also rendered some shovel tests impossible to excavate in a minimally controlled fashion at depths greater than the 100-cm target elevation. Results of shovel testing are presented in Table 1. In addition to the shovel tests, four 1x1-m test units were excavated. All units were excavated in 10-cm levels. Four backhoe trenches were excavated within 41LR137 (Figure 4). All were examined for the presence of features, identifiable cultural horizons, or other useful geoarchaeological information. Only one of these trenches was profiled (Figure 5).

Archaeological Investigations

Shovel Tests

Forty shovel tests were placed within the previously identified boundary of 41LR137 (Figure 4). A single baseline of shovel tests was established to sample the longest dimension of the site. These shovel tests were placed on a transect oriented at 285–105º (from magnetic north) designated Transect 1 (T1). Shovel test units were placed at 20-m intervals along this transect from a point approximately 20 m northwest of the site datum to the western boundary of the site. A total of 13 shovel tests was excavated along this transect. Six other transects were placed perpendicular (195–15º from magnetic north) to the baseline of Transect 1. Three of these transects (T2, T3, and T4) involved the initial excavation of one shovel test on both the north and south sides of the T1 baseline. Subsequently, two additional shovel tests were excavated at the south end of T3 and T4. These transects were placed perpendicular to T1-ST4 through T1-ST7 so that the intervals between all shovel tests was 20 m. A single shovel test was excavated on the north side of T1 on Transect 5. This initial testing was performed in areas where previous investigation did not provide sufficient areal coverage. Following fulfillment of the planned number of shovel tests, an additional 18 shovel tests were placed along two preexisting transects (T3 and T4) and two additional transects (T6 and T7). Two shovel test units were placed to the southwest of T3-ST1 at 20-m intervals and two shovel tests were located southwest of T4-ST1. T6 and T7 each consisted of seven shovel tests placed along transects perpendicular to T1 that extended to the previously identified site boundaries of 41LR137. These two transects were oriented to T1-ST8 (T7) and T1-ST9 (T6) and represent a contiguous grid with the other shovel tests. The target intervals were 20-m between shovel test units. Only T7-ST1 was placed at a different interval, 23 m from T7-ST2, because of a tree at the target interval.

All of the transects and shovel test intervals were established using a Brunton pocket transit and tape to set the grid. Two additional shovel tests were placed 10 m away from TU 2 (1x1-m). One was located at 205º from TU 2, the other at 15º. Both of these units were located using a compass and pace method. The use of a standard, well-controlled grid was useful for better areal coverage and mapping. The use of GPS technology did not always result in locational information about shovel tests that was completely reliable.

Table 1. Results of Shovel Tests at 41LR137

Shovel Test Unit	Artifacts (#/kind/depth)	Depth to Bt soil (cm bgs)
T1-ST1	0	51
T1-ST2	3 FCR (60-80 cm)	93
T1-ST3	0	>102
T1-ST4	1 lithic (0-20 cm); 1 lithic (60-80 cm)	>96
T1-ST5	1 lithic, 2 FCR (60-80 cm)	>100
T1-ST6	0	>99
T1-ST7	1 lithic (0-20 cm)	>89
T1-ST8	1 lithic (60-82 cm) 2 lithic (82-101 cm)	>101
T1-ST9	1 FCR (40-59 cm)	85
T1-ST10	1 lithic (60-80 cm)	>98
T1-ST11	0	37
T1-ST12	0	29
T1-ST13	0	51
T2-ST1	1 lithic (60-80 cm) 2 lithic (80-92 cm)	>92
T2-ST2	1 lithic (0-20 cm) 1 lithic (42-62 cm) 1 lithic (80-100 cm)	>100
T3-ST1	0	>95
T3-ST2	1 lithic (21-40 cm)	>98
T3-ST3	1 FCR (20-41 cm) 2 lithics (62-80 cm)	>99
T3-ST4	0	>91
T4-ST1	0	>100
T4-ST2	2 lithics (44-62 cm)	>101
T4-ST3	1 lithic (20-40 cm) 1 lithic, 1 FCR (80-83 cm)	>83
T4-ST4	2 lithics (60-80 cm) 1 lithic (80-86 cm)	>86
T5-ST1	1 lithic (0-20 cm) 1 lithic (40-60 cm)	>100
T6-ST1	0	>100
T6-ST2	0	>100
T6-ST3	0	>100
T6-ST4	1 lithic (0-22 cm) 1 lithic (22-40 cm)	>100
T6-ST5	1 lithic (40-60 cm) 1 lithic (80-100 cm)	>100
T6-ST6	1 bullet, 1 nail, 1 piece burned clay (0-20 cm)	>100
T6-ST7	0	>100
T7-ST1	1 lithic (60-81 cm)	92
T7-ST2	1 lithic (20-40 cm)	65
T7-ST3	1 lithic (20-40 cm) 1 lithic; 1 FCR (40-62 cm)	68
T7-ST4	1 lithic (80-100 cm)	>100
T7-ST5	1 lithic (0-20 cm)	>100
T7-ST6	1 proj. point, 1 lithic, 1 glass shard (0-20 cm); 4 lithics (20-40 cm); 2 lithics, 1 historic ceramic (60-80 cm)*	>100
T7-ST7	0	>100
TU2-STA	0	>100
TU2-STB	1 flake tool (40-60 cm)	>100

*disturbed context adjacent to ephemeral remains of unknown historic feature

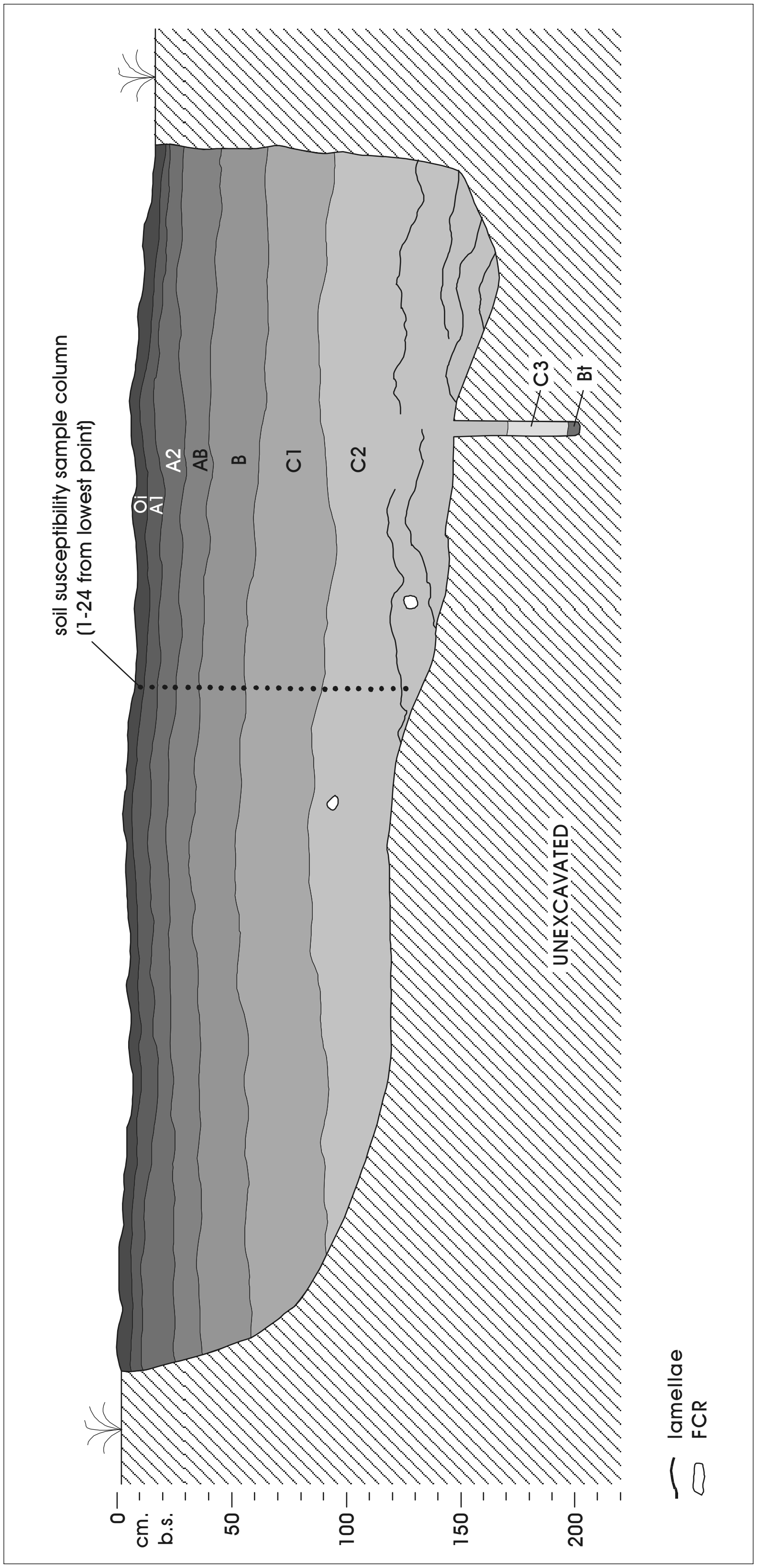

Figure 5. *North wall profile of Backhoe Trench 3 at 41LR137.*

Most of the GPS data indicate correct orientation of the shovel test units, however, in certain instances, the spatial relationships between several of the shovel tests were clearly incorrect. The use of a well-controlled grid established using a Brunton and tape was the only way to identify such GPS technology errors.

Test Unit Excavations

General survey and excavation methods are discussed in Chapter 4. Particulars of the excavation strategy for 41LR137 are presented here.

Four 1x1-m excavation units were excavated on 41BR137 (Figure 4). Two of these test units were placed adjacent to backhoe trenches and the others were located in areas near shovel tests containing artifacts. It was not possible to extend controlled testing across the entire site. Test units were placed primarily in the center of the site because these areas contained the most intact and deeper sediments above the Pleistocene Bt soil. Excavations of test units referenced the excavation levels to a subdatum located in the highest exterior corner of each unit. Test Unit 1 was placed on the northeastern corner of BHT 2. This unit was excavated to a depth of 123 cm below the unit subdatum (the 0 reference is 3 cm above the current ground surface for this unit). It was not excavated any deeper for safety concerns in these supersaturated sediments. The Bt soil was not encountered in the controlled excavations, but augering identified its presence at 159 cm below datum (bd).

Test Unit 2 was located between T1-ST7 and T1-ST8 because T1-ST8 contained a moderate density of lithics and controlled examination of this area was desirable. This test unit was placed equidistant from each of the two shovel tests (10 m) along the Transect 1 line. Test Unit 2 was excavated to a depth of 120 cm below the subdatum. The subdatum 0 elevation was referenced to the highest ground surface of this unit. The Bt soil was not present within the levels excavated in this unit. This Pleistocene soil was identified through augering at a depth of 152 cm below datum. This unit was selected for profiling. A full set of soil and sediment descriptions were performed for this unit, the west wall was profiled, and a sample column of 23 soil susceptibility samples was collected (Figure 6).

Test Unit 3 was placed at the southern end of BHT 4. This part of the site had several positive shovel tests from the previous testing. The vertical control subdatum for TU 3 was referenced 3 cm above the highest ground surface corner of this test unit. This unit encountered the Bt soil as an undulating erosional unconformity at 58–67 cm bd. No excavation of the Bt soil was performed.

Test Unit 4 was located south of BHT 1. The backhoe trench indicated that this area has a relatively thin sediment mantle overlying the Pleistocene Bt soil. Some of the denser artifact recovery from the previous testing effort was situated near to this portion of the site. The excavation subdatum for TU 4 was referenced as 0 cm at the highest ground surface. Test Unit 4 encountered the Bt soil as an erosional unconformity at a depth of 67 cm bd. This unit produced the highest density of artifacts recovered during this investigation. Most artifacts were concentrated between 30–60 cm bd.

Backhoe Trenches

Four backhoe trenches were excavated on this site (Figure 4). They were placed to maximize the spatial coverage of segments of the site that appeared relatively intact and/or were near shovel test units from this and the previous project that contained artifacts. The depth of the sediment overlying the Bt soil was variable, but the stratigraphy of each of these backhoe trenches was redundant. For this reason, only a single backhoe trench (BHT 3) was profiled (Figure 5). All of the walls of each trench were carefully examined for evidence of features, cultural horizons, isolated artifacts, or paleosols.

Backhoe Trench 1 was placed northwest of the site datum. Backhoe Trench 1 was approximately 6.1 m long, 75 cm wide, and maximally 98 cm deep. This trench was oriented 3–183º from magnetic north. The Bt soil is shallow in this location, approximately 30–50 cm below the modern ground surface. Both walls were examined and no evidence of features or artifacts were seen in these profiles. No soil description was made of these sediments and no profile was drawn for this trench.

Backhoe Trench 2 was placed north of T4-ST2. It was oriented 11–191º from magnetic north, extended 5.8 m, was 75 cm wide, and was maximally 120 cm deep. The Bt soil was not visible in the sediments exposed in this trench. There were few gravels (~1–4 cm diameter) seen in the profile. Both walls were examined and no features, artifacts, or suggestions of a paleosol or past stable surface were identified. Test Unit 1 (see following section) was placed at the northeastern corner of BHT 2. No profile was recorded for this trench.

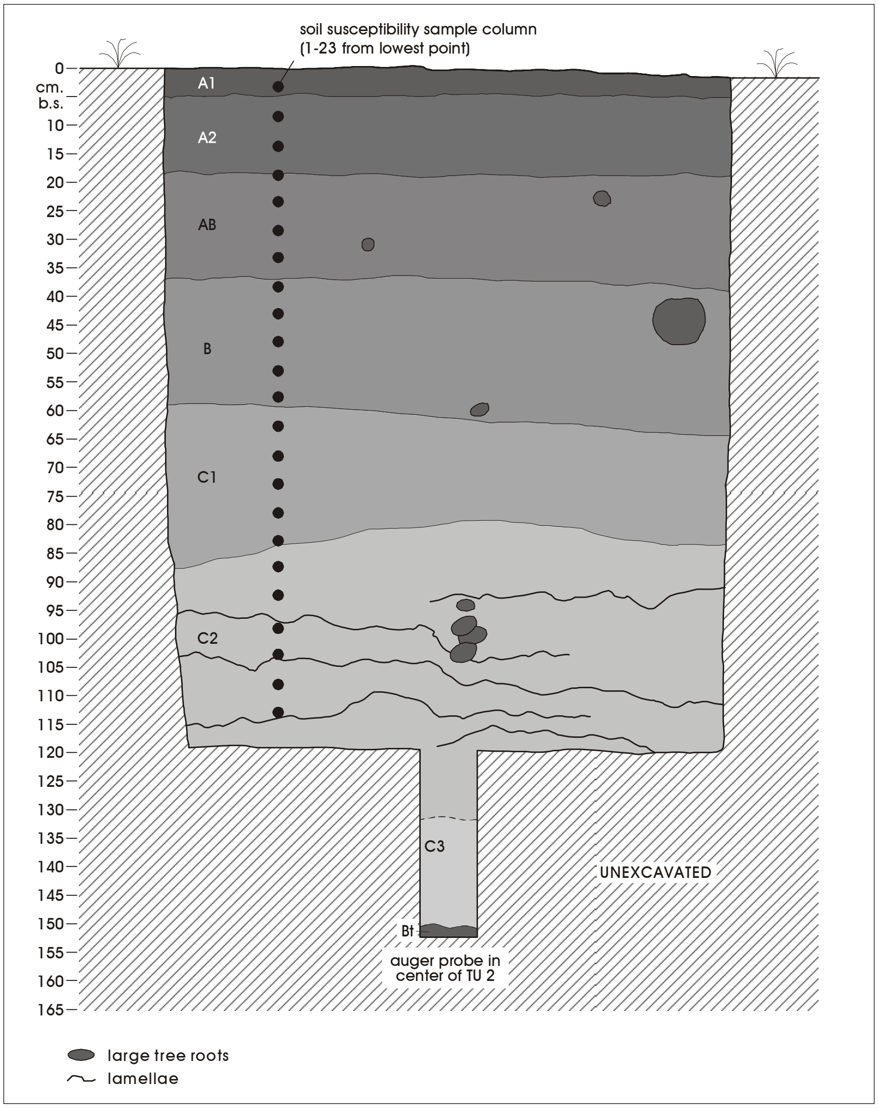

Figure 6. *West wall profile of Test Unit 2 at 41LR137.*

Backhoe Trench 3 was excavated approximately 20 m west of BHT 2, north of T3-ST2. This trench was oriented 55–235º from magnetic north, was 5.4 m long, approximately 75 cm wide, and maximally 160 cm deep. Both walls were examined for features, artifacts, paleosols, and other indications of the stratigraphic relationships between archaeological material. Two possible fire-cracked rocks (FCR) were identified in the northwestern profile wall. The Bt soil was not apparent within the backhoe trench. Lamellae were observed within the lowest C horizon exposed within the trench. Augering in the deepest portion of the trench (northeast) identified the Bt soil at approximately 198 cm below ground surface. This unit was selected for profiling and soil description (Figure 5, Table A-1). A sediment susceptibility sample column (24 samples) was collected from this profile.

Backhoe Trench 4 was placed southwest of T4-ST1. This trench was oriented 49–229º from magnetic north and was approximately 5.1 m long, 75 cm wide, and 100 cm at its deepest extent. The Bt soil was visible at approximately 57–75 cm below ground surface on the southern end of the trench. The Bt soil was not visible in the northern end of the trench; this is because the backhoe trench was excavated to a consistent depth below the modern ground surface, and Holocene sediments and soils overlying the Pleistocene Bt remnant are thicker in the northern portion of the trench. Both walls were examined and no artifacts, cultural features, or evidence of paleosols were identified. Few, small gravels were visible in the profiles, ranging approximately 0.5–3 cm in maximum diameter. There was a greater amount of ferric nodules in these sediments than in the other backhoe trenches. There was a slightly higher concentration of ferric nodules in the vicinity of the contact between the C horizon and Bt soils. One test unit (TU 3) was placed at the southern end of BHT 4 (see below). This trench was not profiled.

Soil Pit 1

One off-site soil pit was excavated on the northern side of 41LR137 on the opposite bank of the incised drainage forming the northern site boundary (Figure 4). The soils and sediments were described, the profile was drawn (Figure 7), and a soil susceptibility sample column was collected (n=17). This unit was excavated to examine the geomorphology and sediment profile of an area away from the site. It also offers critical control away from the cultural deposits for interpretation of the soil susceptibility samples from 41LR137.

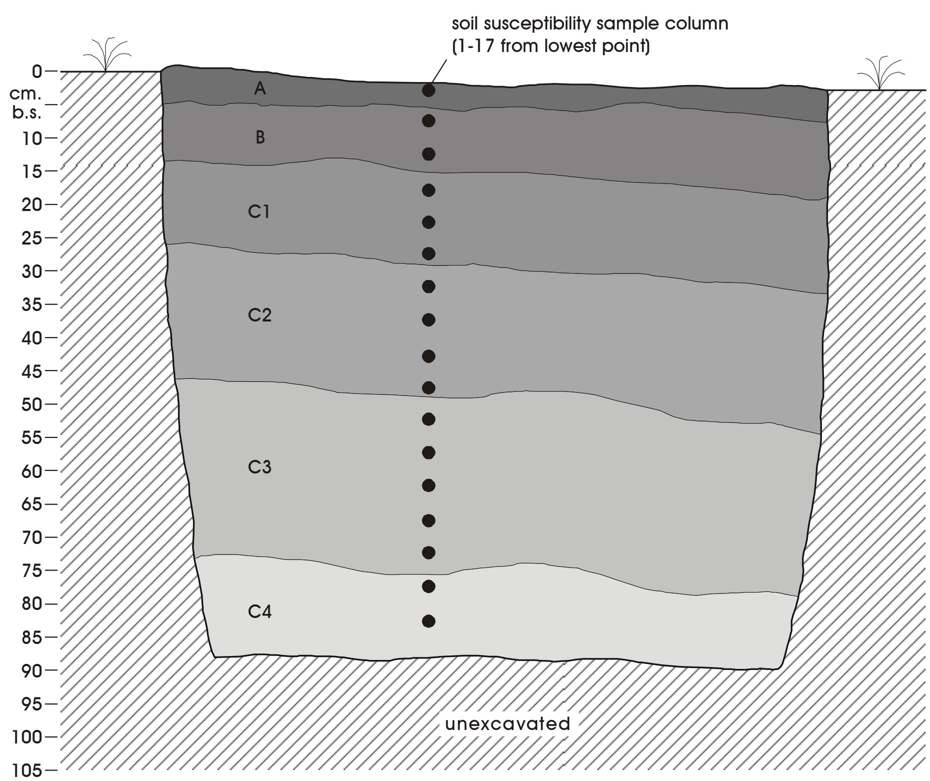

Figure 7. *South wall profile of Soil Pit 1, 41LR137.*

Excavation Results

Geomorphology and Site Formation

Profiling of BHT 3, TU 2, and the off-site Soil Pit 1 provide location specific information relative to site formation. Detailed soil descriptions, profile drawings, and magnetic sediment susceptibility sampling were performed on each of these profiles. More abbreviated profile sketches and soil and sediment descriptions were recorded on shovel testing and test unit excavation forms. The backhoe trenches and test units within 41LR137 exhibited analogous soils and sediments. The off-site soil pit indicated that the land surface to the north of the site on the opposite side of the incised ephemeral drainage was formed more recently under a different depositional regime. The area of 41LR137 is an older surface than this terrace to the north.

Soil Pit 1

The off-site soil pit profile exhibits a very thin epipedon compared to the soils within 41LR137. The A horizon in Soil Pit 1 is only maximally 5 cm thick and is underlain by a B horizon that is 8–12 cm thick. Both show massive to weak structure indicating a very young soil. Underlying these two poorly developed soils are >75 cm of C horizon sediments (Figure 7). No augering was performed to identify possible depth to older soils in this soil pit. At the incised creek bank forming the northern border of the site, the Bt soil is visible within the cutbank on the southern side (where 41LR137 is located). That Bt soil contact with the C horizons is at a higher elevation than the terrace surface where Soil Pit 1 was excavated. There are numerous gravels visible in the stream cut in greater abundance than seen in most of the excavation units. It is clear that the stream is migrating north to south so that the alluvial sediments north of the site are very recent and much younger than those within 41LR137. It cannot currently be determined how much farther to the north this site extended in the past. The active incision and recent alluvial deposition suggests that normal future migration of this creek will very likely remove sediments currently identified as part of this site. Seventeen magnetic sediment susceptibility samples were collected as a sample column from the profile of Soil Pit 1.

Test Unit 2

This unit was selected for detailed profiling because of the relatively dense artifact recovery, depth of the sediments (120 cm) and cultural deposits (80 cm), and its greater distance from BHT 3 (~45 m) than TU 1 adjacent to BHT 2 (~18 m). The greater distance between profiles offered the chance for correlation of sediments and potential archaeological horizons across the site. There also was minimal evidence of historic disturbances in the upper excavation levels of this unit.

The profile of TU 2 indicates that the current ground surface at 41LR137 is stable (Figure 6). There is minor erosion along portions of the southern margin of the identified site boundary. The ground surface slopes to the south along approximately the southern 60 m of the central-southern portion of this site. The drainage on the northern side of 41LR137 is migrating southward and reworking the terrace sediments downstream to the northwest. The majority of the site surface is relatively level and undisturbed. Stability is indicated by the relatively thick soil horizons within the profiles of TU 2 and BHT 3. The A horizons are approximately 19 cm thick, the AB horizon is 18 cm thick, and the B horizon extends 22–27 cm below the AB. The total solum is 60–64 cm thick in TU 2 compared with only 15 cm in Soil Pit 1. The solum in BHT 3 also measured approximately 50–60 cm thick. Two C horizon sediments were identified within the profile of TU 2. Lamellae of accumulated strong brown clays (5YR 4/6) were evident within the C2 horizon. An auger hole was placed in the center of the base of the unit following final excavation to 120 cm bd. A third C horizon (C3) was identified within this small auger hole. The Bt soil was encountered at 152 cm bd in the auger hole. There was a marked increase in siliceous gravels (~1–3 cm in maximum diameter) just above the contact with the Bt. This is an erosional unconformity between the C horizon sediments and the older soil. Twenty three magnetic susceptibility samples were collected from this profile.

Backhoe Trench 3

The profile and soil descriptions for BHT 3 and TU 2 indicate an identical sedimentary regime and stable ground surface at 41LR137. The BHT 3 profile is approximately 45 m from the TU 2 profile and indicates correlation of sediments and soils across much of this site. A thick Oi horizon (3–5 cm) covers all of this well-wooded area. The two weakly-developed A horizons are approximately 15–20 cm thick, an AB horizon extends 10–20 cm below the A2, and the B horizon is 15–25 cm thick (Figure 5). Two C horizons were distinguished in the profile of this trench. Lamellae of strong brown (5YR 4/6) eluvial clays are apparent within the lower half of the C2 horizon in the deep eastern half of BHT 3. An auger was used to identify the Bt soil at 192 cm below ground surface. A third C horizon (C3) was identified within the auger hole at approximately 164 cm below ground surface.

Two FCR were visible within the portion of the C2 horizon. These were the only possible artifacts noted in any of the backhoe trenches. Their presence was important in the choice of this profile for detailed recording and magnetic sediment susceptibility sampling. These two items are larger than most of the recovered lithics from 41LR137. Significant movement of the smaller clasts is more likely than displacement of these larger cultural clasts. These artifacts may offer information about a possible archaeological horizon within these deposits. Twenty-four soil susceptibility samples were collected as a sample column from this profile.

Discussion

All of the parent materials of the upper sediments in these profiles indicate deposition of relatively low energy, well-sorted fine sands. The same parent material is present in the unmodified C horizons and the solum. These sands lie unconformably over older remnant Pleistocene Bt soils. The detailed profiles (TU 2 and BHT 3) and observations of all of the shovel tests, backhoe trenches, and other test units indicate a stable alluvial geomorphic unit with weakly developed soils to a depth of approximately 60 cm. Prehistoric materials were present throughout all levels within the solum and several units had artifacts within the C horizons.

There is a significant amount of root bioturbation within the site. Insect bioturbation also appears to have been common within these soils. Animal burrowing is less common. Within these weakly developed soils and sandy sediments, artifact movement is not uncommon (Jodry and Stanford 1992:109, 111). No obvious paleosols or buried stable surfaces were identified through visual inspection, structural analysis, or vertical clustering of artifacts. In the absence of more detailed evaluation (and a much larger sample size) of artifact orientation, inclination, and other observations, it is currently not possible to determine whether these artifacts have been recovered from *in situ* deposits or from post-depositional movement within the sandy soils. The sediments do indicate that the prehistoric artifacts were deposited from human agency. These well-sorted sands do not contain many clasts, except near the contact with the older Bt soil. The artifacts are not likely to be part of a higher energy sediment load that would include gravels, lithics, and FCR. Although some movement of artifacts within the sedimentary matrix may have occurred, these do not appear to be secondary deposits.

Soil Pit 1 indicates that the area north of the site consists of much younger sediments representing recent floodplain deposits of the incised drainage at the northern boundary of 41LR137. This creek is apparently migrating southward. The Pleistocene Bt soil is evident in the exposed south bank of this drainage but not on the north bank. The north bank is lower in elevation than the exposed Bt and the upper surface of where 41LR137 is located. The creek may already have eroded some portions of the site. Periodic flood events may cause this drainage to abandon its currently incised channel and there is a strong probability it will continue to erode portions of 41LR137.

Soil susceptibility analyses from 24 samples collected from BHT 3, 23 samples from the profile of Test Unit 2, and 17 samples from the profile of the off site soil pit are presented in Appendix B. The analytic methods and details of results are also presented in that appendix. For this brief discussion, it is sufficient to note that higher magnetic susceptibility (MS) values (Table B-3, Figures B-2 and B-3) suggest greater past presence of organic materials or possible contamination with ferric materials. The largest spikes in relative values are found within the C horizons of all samples. For TU 2 and BHT 3, the most dramatic peak values are within the C1 and C2 horizons. In BHT 3 the C1 horizon peak values are from samples recovered at 67.5 and 72.5 cm bs and the highest value was in the C2 unit at 10.57 cm bs. In TU 2 a possibly anomalous value was recorded in the sample at the boundary between the A2 and AB horizons (17.5 cm bs). A minor spike in readings was present in a sample from the upper half of the B horizon (42.5 cm bs). The highest value in TU 2 is in the C1 horizon (72.5 cm bs) and second highest in the C2 (102.5 cm bs). These suggest that the greatest organic enrichments are present primarily in the C1 and C2 horizons. This could be from cultural deposition or soil surface stability. The highest densities of cultural materials from the well-controlled 1x1-m test units was from 30–60 cm bd (see following section). Artifact densities in TU 2 cluster in proximity to the three MS spike values. Interestingly, there are several differences in the samples from the off-site soil pit. The peak values are in the C4 horizon (77.5 and 82.5 cm bs), much lower in the profile relative to the solum than in BHT 3 and TU 2. There is a minor peak in the C2 unit at 32.5 cm bs. The absolute values from the soil pit also are much lower. This suggests either that the sediments in the soil pit are younger and have less pedogenic organic enrichment (even on periodically stable surfaces) or there is less cultural organic deposition in this context. Both possibilities are consistent with the interpretation that Soil Pit 1 represents a younger sedimentary sequence with more recent soils, and that it is from an area that has no archaeological deposits.

Archaeological Recovery

41LR137 produced the second largest assemblage of prehistoric materials from the seven sites examined during this investigation. A total of 97 lithics came from 22 of the 40 shovel tests and from all four of the 1x1-m test units (Tables 1 and 2). Nine pieces of FCR were recovered from six shovel tests. Two shovel tests produced fire-cracked rock but no debitage. Ten pieces of FCR were collected from the test units ranging from one to four pieces present in each. A single untyped dart point (Figure 8c), a flake tool (Figure 8h), one biface fragment, one core, and 93 pieces of debitage were recovered during testing.

Historic artifacts were less common at 41LR137 than at several of the other sites investigated during this project (Tables 1 and 2). Only two of the shovel tests and two test units contained historic materials One area of the site near T6-ST6 and T7-ST6 had a slight surface depression and associated rock debris. T7-ST6 had relatively abundant historic material and evidence of deep soil disturbance. This area represents an undefined historic feature. Historic materials included five bullets, one nail, one piece of glass, a single whiteware sherd, and a sherd of transfer ware (see Historic Artifacts section).

The historic feature noted north of T6-ST6 is a small depression and a cluster of a few rocks. The depression is approximately 15 cm deep, 50 cm in maximum diameter, and has several small pieces of fractured tabular sandstone on the eastern side of the feature. There is a small amount of relatively recent backdirt associated with this depression. The surface scatter of materials and disturbance extends approximately 2.5 m north-south and 1.5 m east-west. There is a possibility that this represents a shovel test from the previous CAR investigations. Although the map from that work does not indicate any nearby shovel tests (Figure 4), some GPS locations from that work are apparently erroneous. The previous shovel tests that were mapped in this vicinity were identified at the beginning of the current

Table 2. Results of Test Units at 41LR137

1x1-m Unit	Artifacts (#/kind/depth*)	Depth to Bt soil (cm bd*)	Maximum Unit Depth (cm bd*)
TU 1	1 bullet (3-13 cm)	159**	123
	1 lithic (33-43 cm)		
	2 FCR (43-53 cm)		
	7 lithics (53-63 cm)		
	1 lithic (63-73 cm)		
	1 lithic (73-83 cm)		
	1 lithic (83-93 cm)		
	1 lithic, 2 FCR (93-103 cm)		
	1 bullet† (103-113 cm)		
TU 2	1 lithic (10-20 cm)	152**	120
	1 lithic, 1 FCR (20-30 cm)		
	3 lithics (30-40 cm)		
	4 lithics, 1 FCR (40-50 cm)		
	1 core, 2 lithics (60-70 cm)		
	1 lithic, 1 FCR (70-80 cm)		
TU 3	2 bullets (13-23 cm)	58-67	67
	1 lithics, 1 FCR (33-43 cm)		
	1 lithic (53-63 cm)		
TU 4	1 lithic (0-10 cm)	65-67	67
	5 lithics (10-20 cm)		
	2 lithics, 1 FCR (20-30 cm)		
	5 lithics, 1 FCR (30-40 cm)		
	6 lithics (40-50 cm)		
	1 biface fragment, 5 lithics (50-60 cm)		

*below datum at highest corner of ground surface
**depth to Bt soil determined by augering
†probably displaced from upper horizons

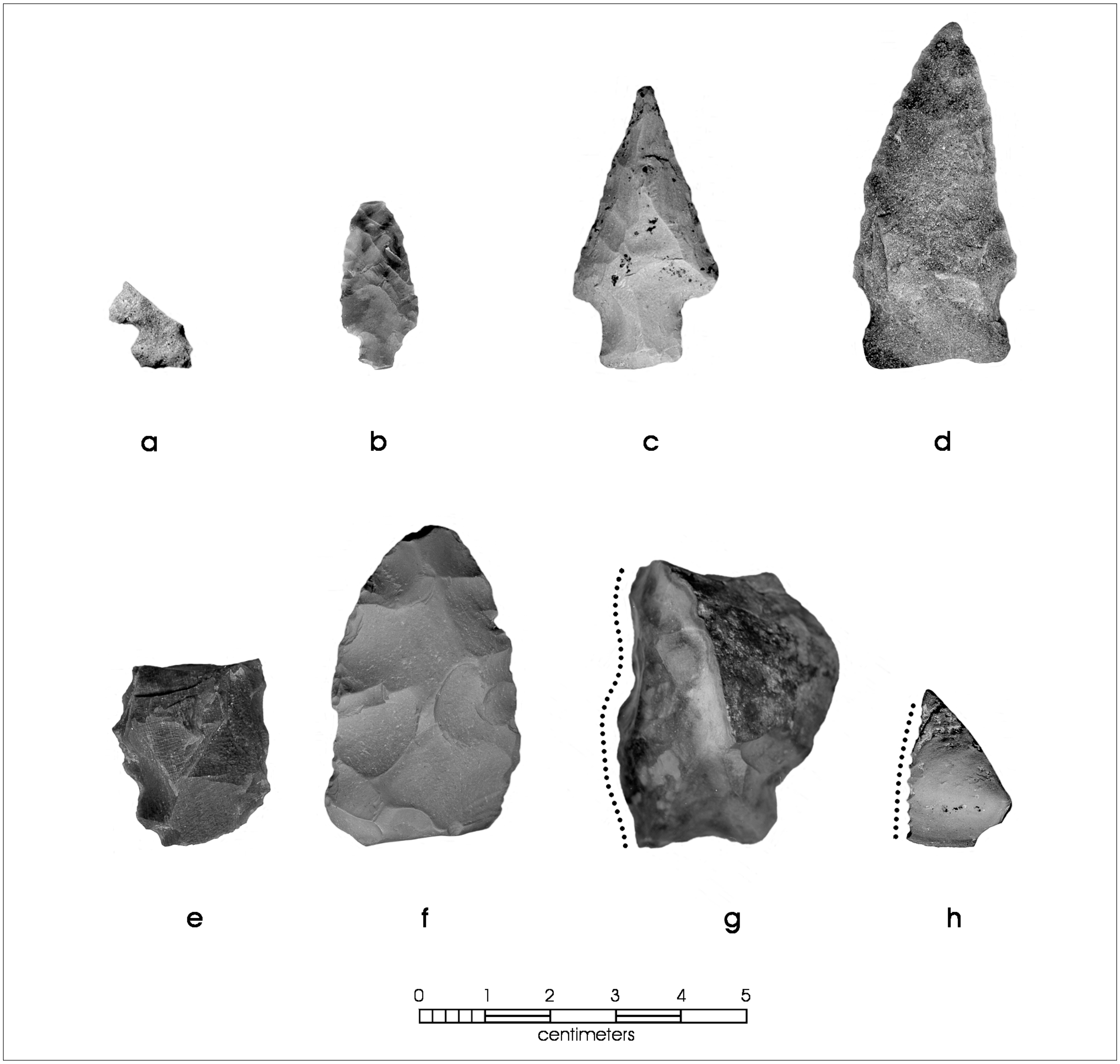

Figure 8. *Points and lithic tools recovered:* a) arrow point fragment (41LR225); b) untyped, corner-notched arrow point (41LR225); c) untyped dart point (41LR137); d) possible Edgewood or Ellis dart point (41LR225); e) biface fragment (41LR244); f) biface (41LR254); g) flake tool/side scraper (dotted line indicates worked/used edge; 41LR254); h) flake tool (dotted line indicates worked/used edge; 41LR137).

testing project (DDD-2, DDD-9, DDD-12, DDD-14). Other than these rocks, no historic artifacts were identified on the site surface. T7-ST6 indicates that there is relatively deep disturbance in this location. A low density of historic debris was encountered to a depth of approximately 80 cm bs. The soil also appeared to be mixed and was dissimilar from intact profiles seen in other shovel test units. It is unclear what these remains suggest about historic use of this area. There is no standing architecture or surface historic artifacts. The historic artifacts from 41LR137 are described in the section at the end of this chapter on historic materials from all seven sites examined during the current testing.

Prehistoric artifacts were recovered from 22 of the 40 shovel tests excavated (Table 1). Forty-three pieces of debitage, one projectile point, one flake tool, and nine pieces of FCR were collected from shovel test units. All but eight of the units containing prehistoric artifacts were excavated to 100 cm or the contact with the Bt soil (n=5). Artifact density in the shovel tests was low. Only six shovel tests contained two or more pieces of debitage within a single 20-cm level (T1-ST8, Level 5; T2-ST1, Level 5; T3-ST3, Level 4; T4-ST2, Level 3; T4-ST4, Level 3; and T7-ST6, Levels 1, 2, and 4). T7-ST6 had 2–4 lithics in Levels 1, 2, and 4, but these sediments are very disturbed from historic-period activities. T1-ST5, Level 4, T4-ST3, Level 5, and T7-ST3, Level 2 each had one piece of debitage and FCR. All other levels contained no more than a single prehistoric artifact. Historic materials associated with this location also were recovered from the uppermost 20 cm of T6-ST6. In addition to recent debris, this unit is adjacent to a depression associated with small building stones from an unspecified modern feature. All other positive excavation levels contained only a single lithic.

Shovel test excavations indicate that prehistoric artifacts are present throughout the sediments examined. From the total sample of positive shovel tests (n=22), seven lithics and a projectile point were recovered between 0–25 cm bs, nine from 20–40 cm, seven (including a flake tool) from 40–60 cm, twelve from 60–80 cm, and nine from 80–100 cm. Most of the possible FCR was recovered from the deeper sediments. One FCR was recovered from 20–40 cm bs, two were recovered between 40–60 cm bs, five from 60–80 cm bs, and one from 80–100 cm bs. Vertical control of the lithic sample from 30x30-cm shovel tests is often problematic. This is especially aggravated for recovery below 60 cm where inclusion of artifacts from higher in these small units is very difficult to prevent. For this reason, vertical patterns of distribution are examined primarily from the test unit data. For analysis purposes, shovel tests cannot reliably identify relative differences between lithic densities from 60–100 cm bs in these 20-cm excavation levels. Shovel test results do suggest relatively low density horizontal and vertical lithic distribution across 41LR137.

A total of 49 pieces of debitage, one core, one biface fragment, and 10 pieces of FCR were recovered from the four test unit excavations (Table 2). Vertical provenience information is more reliable for the better controlled lithic sample recovered from the 1x1-m test units. The highest density of materials was recovered between 30–60 cm below the ground surface (Figure 9). In the test units, there is a significant decrease in artifact frequency below 60 cm. Although part of the reason for this decrease is that two of the test units encountered the Bt soil at 58–67 cm bd, there is a dramatic decrease in artifact frequency in the deeper excavation levels of the other two units that sampled sediments to depths of approximately 120 cm bd. On the

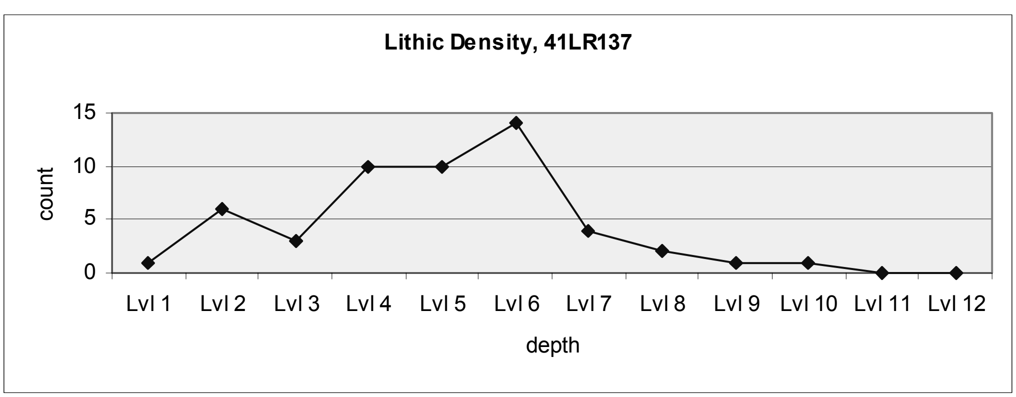

Figure 9. *Vertical distribution of lithics from test units, 41LR137.*

basis of these limited samples, and in the absence of more specialized taphonomic investigations, it is not possible to determine whether the lithic debris is likely to represent single or multiple occupation events. Bioturbation from small events (roots, annelids, gastropods) is especially apparent and can be responsible for significant movement of cultural clasts (Claassen 1998:71, 78–79).

Analysis of the debitage indicates that most of the lithics represent later stage reduction. This contrasts with the initial site interpretation as a quarry site (Corbin 1992:7). The assemblage is divided evenly between chert (n=44) and quartzites (n=49; Table 3). Although there are slightly more quartzites, these differences are not statistically significant. Most of the flakes are complete (n=32) or distal fragments (n=28). Distal portions include all flakes missing their platforms, so this category actually represents a number of nearly complete flakes with the platforms absent because of their common separation from the rest of the flake during reduction. Medial (n=16) and proximal (n=16) flake portions each represent only 17.2 percent of the sample. Only a single piece of angular debris was recovered. The amount of cortex indicates that most of the flakes have been removed from completely decorticated nuclei. The majority of the flakes have no cortex (n=53, 57%) or 50 percent or less (n=26, 28%; Table 3). Only six pieces exhibit greater than 50 but less than 100 percent cortex and eight pieces had 100 percent dorsal cortex cover.

The thickness to length ratios of flakes can be used to identify them with particular probabilities of belonging to early or late stage reduction or tool manufacturing. Table 4 provides the thickness to length ratios for 32 complete flakes. Only 16 percent (n=5) of this small sample appear to be early stage reduction flakes with ratios greater than 0.25. Tool manufacturing is represented by 34 percent of the complete flakes (n=11), and 50 percent are identified as late stage reduction (n=16). Evidence of heating is uncommon. Only four pieces of chert and seven pieces of quartzite had any evidence of heating.

Although the sample of flakes (n=93) is too small for secure interpretations, the attributes of those flakes suggest later stage reduction. Although contrary to the initial statements about the function of site 41LR137, this is not surprising. Natural gravel clasts are very uncommon within the areas examined during this project. Informal observation of drainages and a variety of settings during daily traverses to sites failed to locate any natural sources of significant amounts of river cobbles large enough to serve as sources for tool production. Few

Table 3. 41LR137 Debitage Attributes

Category	Variables	Percentage of Sample	n
Raw material	chert	47.3%	44
	quartzite	52.7%	49
Condition	complete	34.4%	32
	proximal	17.2%	16
	medial	17.2%	16
	distal	30.1%	28
	angular debris	1.1%	1
Cortex	0%	57.0%	53
	1-50%	28.0%	26
	51-99%	6.4%	6
	100%	8.6%	8

Table 4. 41LR137 Flake Thickness to Length Ratios for Complete Flakes

Variable	Percentage of Sample	n
<0.15 (late reduction)	50.0%	16
0.16-0.25 (tool manufacture)	34.4%	11
>0.25 (early reduction)	15.6%	5

siliceous pebbles, all too small to represent the source of material used in lithic reduction, were the only cherts encountered. Toolstone sources are probably not local. It would not be expected that these sites are likely to contain significant amounts of early stage reduction debitage.

A single untyped dart point was recovered from T7-ST6, Level 1. This shovel test contained historic debris to a depth of 80 cm below the current ground surface and one piece of glass was recovered from the same level as the point. This unit is adjacent to an area containing significant historic disturbance. The association of this point with this portion of the site must be considered suspect. Its near surface location (0–20 cm bs) within a shovel test that had one historic sherd at a depth of 60–80 cm suggests that association with 41LR137 may also be unreliable. Prehistoric points can become incorporated into historic debris deposits due to collecting. This is a complete, corner-notched point that is 44 mm long made on a non-lustrous, grainy chert. It is a finished piece that exhibits minimal edge shaping. The piece is quite thick (8 mm) and broad flake removals are apparent on both faces. The base is more carefully shaped and is unground. This point resembles Carrollton or Kent forms but was not considered distinct enough for firm typological assignment. Because of its association with historic disturbance, its provenience is uncertain, but it may suggest Middle-Late Archaic temporal association for 41LR137.

A biface fragment was collected along with five flakes in Level 6 (50–60 cm bd) of TU 4. This is an early-middle stage biface on a fine-grained chert exhibiting mostly broad removals. It measures 27 mm in maximum dimension and has been broken from a sharp and hard blow to the center of the piece. The cross-section is markedly asymmetrical and one face remains strongly keeled (maximum thickness=28 mm). The flat face retains a central area of cortex. This face is the origin point for the blow that broke the piece. There is a deep bulbar scar that is step fractured. The impact point shows much crushing and impact rings around the very small platform. There is a slight possibility that this piece was used as an informal tool subsequent to breakage. Two of the edges show small scars that may not be edge preparation and strengthening from bifacial reduction. This also may represent incidental damage.

One multidirectional core also was identified from 60–70 cm bd in TU 2. This is a 40 mm piece of poor quality chert with five or six removals. The poor knappability makes it difficult to determine if one face represents a negative flake scar or a ventral face where this piece was removed from the remainder of the nucleus. Numerous checks and thin veins of quartz are present that have made controlled removals problematic. There is some crazing of this piece visible on all faces, suggesting it has been exposed to heat subsequent to discard.

A single flake tool was recovered from TU2-STb, one of two shovel tests placed near TU 2. This was the only artifact found in this shovel test and came from 40–60 cm bs. This is a small flake (16 mm) made on a fine-grained quartzite with serrated retouch along most of the dexter edge. Flaking has been performed bifacially along this edge as a series of single removals. Two slightly larger flakes are apparent on the dorsal face towards the proximal end. The serrations have been carefully manufactured and are not simply isolated platforms between other removals. Paired removals form the troughs between each of eight teeth. The serrated teeth show minimal wear, the most distal is completely broken off and the next proximal one exhibits rounding and some damage.

Nine pieces of FCR were recovered from six of the shovel tests and an additional ten pieces were from the 1x1-m test units (Tables 1 and 2). Slightly more than half of the burned rock (n=10) came from 20–60 cm below ground surface (T1-ST9, T3-ST3, T7-ST3, TU 1, TU 2, TU 3, and TU 4) and more dispersed FCR (n=9) was found between 60–103 cm bs (T1-ST2, T1-ST5, T4-ST3, TU 1, and TU 2). No concentrations of burned rock were identified on the site. The low-density ubiquitous presence of FCR in all of the test units suggests that features are probably present on 41LR137. Two pieces of FCR were seen in the profile of BHT 3, both in the C2 horizon. One piece was noted at 90 cm bs and the other at 120 cm bs.

41LR214

This is a moderate-sized site containing a relatively low density of lithics. The site is located on the T_2 surface on the eastern bank of a permanent tributary into Pat Mayse Reservoir (Figure 3). There are springs present that can be seen feeding the stream on the southwestern portion of the site boundary. Several other sites (41LR213, 41LR215, 41LR216, and 41LR217) have been identified in close proximity to this location. The northern margin of the site is located at an intermittent drainage that represents a terrace at a lower elevation than the majority of 41LR214 (Figure 10-Map Supplement). There is a distinct tread separating the upper, older terrace from the more recent alluvial surface. Data from the off-site control soil pit indicates that the soils on the western side of the perennial stream forming the approximate western boundary of 41LR214 are older than those on the site. The site rests on a level terrace surface that has evidence of plowing (Perttula, Lyle, and Tomka 2001:89). 41LR214 is 35,718 m^2 in extent. Elevation of this area ranges from approximately 460–500 ft (140–152 m) AMSL. Although this appears to represent much topographic variation, the majority of the site is situated between 470–490 ft (143–149 m) AMSL. The older Pleistocene Bt soil is relatively close to the ground surface and impedes drainage of these soils and sediments. During the rainy period of May, these soils remained waterlogged for most of the month.

Figure 10 shows the location of previous shovel test units and the current excavations. The initial archaeological testing provided good spatial testing of the identified site area. Testing recovered lithics from nine of 31 shovel tests. Three other units produced only one to two pieces of FCR. During that previous testing, one hammerstone, a Gary point, 19 pieces of debitage, and nine pieces of FCR were recovered. Only one test unit from the current testing project contained artifacts: TU 3 produced 14 lithics and 18 pieces of FCR.

There is a U.S. Army Corps of Engineers (COE) survey marker on the fence line corner at the northern end of 41LR214. The fence separates Camp Maxey from the COE property around Pat Mayse Reservoir.

Archaeological Investigations

Shovel Tests

Fifteen shovel tests were excavated on this site during the current work (Table 5). The previous shovel test coverage sampled most portions of the site relatively well. A baseline transect (Transect 1), that extended across the maximum site length, was established for the current shovel testing. This transect was oriented at 140°–320° from magnetic north, running through the site datum. Twelve shovel tests were excavated along this transect. Intended spacing of shovel tests was to establish them at 25-m intervals from each other. Several shovel tests were placed at closer intervals for better site inspection and some adjustments were made because of tree locations. The southern group of shovel tests (T1-ST1 through T1-ST7) were placed at closer intervals because the ground position of previously excavated units was not as distant as their GPS plotted locations suggested. The intervals between T1-ST1, T1-ST2, and T1-ST3 was 10 m. T1-ST3 was placed 15 m from T1-ST4, T1-ST4 was 10 m from T1-ST5, T1-ST6 was established 15 m from T1-ST5, and T1-ST7 was placed 10 m from T1-ST6. One other transect (Transect 2) was placed at 90°–270° from the site datum to sample an area with minimal previous shovel testing. T2-ST1 was placed 25 m west of the site datum and the other two shovel tests along Transect 2 were placed at 25-m intervals. All shovel test units on Transect 1 were established using a Brunton pocket transit and tape. Shovel tests along Transect 2 were set using a compass and pacing.

No prehistoric or historic artifacts were encountered in any of these shovel test units. All were excavated to the contact with the Pleistocene Bt soil, which ranged from 11–92 cm below the modern ground surface. Only five of these shovel tests contained 50 cm or more of sediment and soil above the Bt soil contact.

Backhoe Trenches

Three backhoe trenches were excavated on 41LR214 (Figure 10). They were placed in areas adjacent to positive shovel tests from the previous testing effort in an attempt to locate archaeological deposits and possible features.

Table 5. Results of Shovel Tests at 41LR214

Shovel Test Unit	Artifacts (#/kind/depth)	Depth to Bt soil (cm bgs)
T1-ST1	0	15
T1-ST2	0	32
T1-ST3	0	16
T1-ST4	0	11
T1-ST5	0	12
T1-ST6	0	18
T1-ST7	0	21
T1-ST8	0	30
T1-ST9	0	51
T1-ST10	0	77
T1-ST11	0	42
T1-ST12	0	92
T2-ST1	0	46
T2-ST2	0	55
T2-ST3	0	85

Backhoe Trench 1 was excavated north of the datum on the same terrace surface as the majority of the site. This trench was approximately 5.7 m long, 70–80 cm wide, and maximally 100 cm deep. This trench was oriented 45°–225° from magnetic north. The Bt soil was visible within this trench at approximately 40 cm below the modern ground surface. All walls of this trench were troweled and examined. No artifacts were identified in the walls and no evidence of features or paleosol horizons was apparent. No profile was drawn of this trench. There was an over-thickened A horizon with dark staining visible in this backhoe trench. Test Unit 1 was excavated at the southwestern corner of BHT 1.

Backhoe Trench 2 was excavated southeast of the site datum. It was oriented at 21°–201° from magnetic north, originating near the T1 baseline. BHT 2 is approximately 5.8 m long, 80 cm wide, and maximally 100 cm deep. The Bt soil was approximately 60–70 cm below the current ground surface. The A horizon was not as thick in this profile as in BHT 1. There was no evidence of archaeological horizons, features, or artifacts in this backhoe trench. The deposits in BHT 2 were similar to those in the other two backhoe trenches. The soils and sediments above the Bt horizon were thicker than in the other trenches. This area is adjacent to the portions of the site with the highest number of artifacts encountered during the 1999–2000 testing. For these reasons, BHT 2 was selected for profiling (Figure 11, Table A-4). The eastern wall of this profile was drawn and a full description of the soils and sediments was performed. Test Unit 2 was excavated on the northwestern corner of this trench.

Backhoe Trench 3 was located south of BHT 2. This trench was oriented 50°–230° from magnetic north. The trench was 4.9 m long, 60–75 cm wide, and 80 cm deep at its maximum depth. The A horizons were thin (13 cm) compared with BHT 1. An unconformable contact with the Bt soil was approximately 35–40 cm below the modern ground surface. All walls were examined and no artifacts, features, or suggestions of cultural deposits were apparent in this trench. No profiling of this trench was performed. Test Unit 4 was excavated off of this trench, approximately one meter east of the northwestern corner of BHT 3.

Test Unit Excavations

A total of four 1x1-m test units was excavated on 41LR214 (Figure 10). Units TU 1, TU 2, and TU 4 were located directly adjacent to BHT 1, BHT 2, and BHT 3 respectively. There were no cultural materials recovered from TU 1, TU 2, or TU 4. Test Unit 3 was placed in the vicinity of the shovel test unit with the largest assemblage recovered during the initial testing (ST 38-5). This unit contained lithics and FCR from Level 3 (24–36 cm bd) and from Level 5 (44–54 cm bd) through Level 12 (113–125 cm bd).

Soil Pit 1

One soil pit was excavated away from the identified boundaries of 41LR214 (Figure 10). This unit was placed on the western side of the drainage forming the approximate western margin of the site. Soil Pit 1 was excavated approximately 75 m at 225° (from magnetic north) from the main site datum. Several locations on the southeastern and eastern sides of 41LR214 were initially examined, but the soils were extremely shallow in these locations, the A horizons were only 5 cm or less above the Bt soils. These initial probes were not profiled and an alternate location with sufficient soil for comparative examination was selected. Adjacent archaeological sites are located to the south (41LR217) and west (41LR215) of 41LR214. Soil Pit 1 is outside, or just at, the previously identified boundary of 41LR215.

Excavation Results

Geomorphology and Site Formation

Profiling and soil description of BHT 2 and an off-site soil pit were performed at 41LR214. Magnetic sediment susceptibility samples were collected from both profiles. Additional sketch profiles and sediment observations were made on all shovel tests and 1x1-m test units. Although profiles were not drawn for each backhoe trench, they were very similar to BHT 2 that was selected for complete recording.

Soil Pit 1

Soil Pit 1 is on an equivalent T_2 surface to 41LR214. It is on the western side of the drainage forming the western boundary of the site. There is a higher terrace to the southwest of Soil Pit 1 that is not in an equivalent position to the site. This soil pit is at the margin of 41LR215 that also extends onto the upper terrace surface. Even if it is within 41LR215, this was the only location where sufficient sediments are present above the Bt soil to make useful comparisons with the setting of 41LR214. This soil pit was excavated to a depth of 98 cm bs. Seventeen magnetic sediment susceptibility samples were collected from this profile.

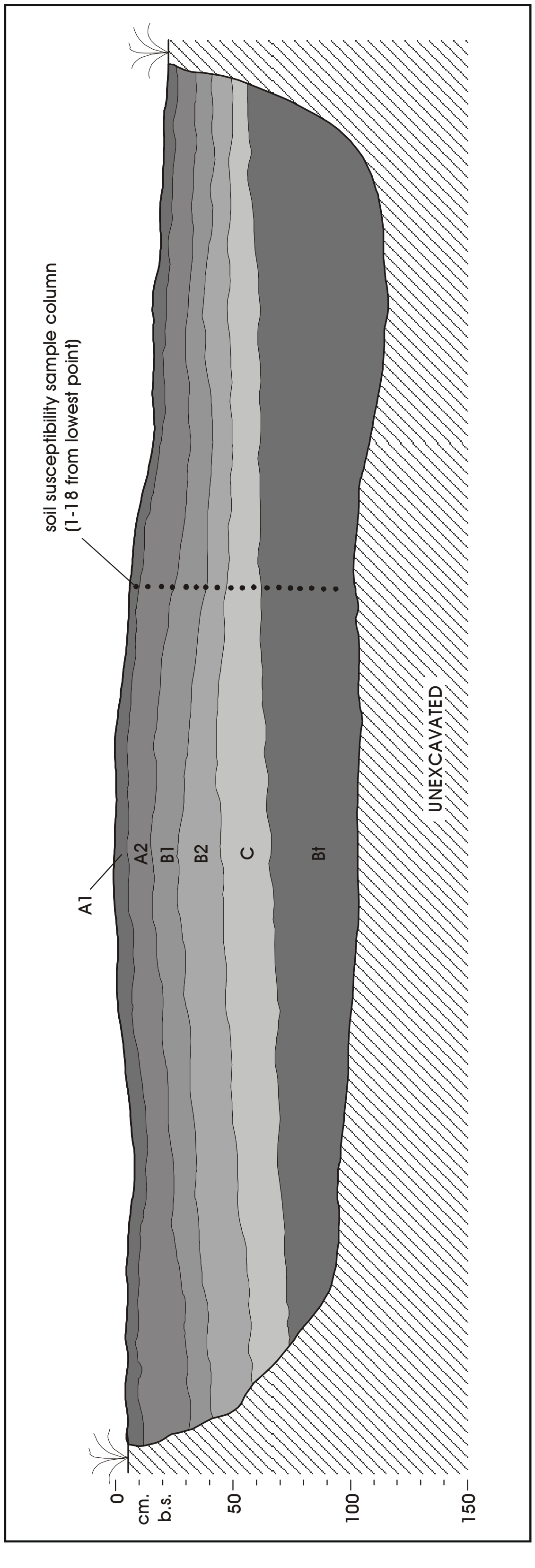

Figure 11. *East wall profile of Backhoe Trench 2 at 41LR214.*

Soil Pit 1 contains a very different soil profile (Figure 12, Table A-5) than those seen in the shovel tests, test units, and backhoe trenches on 41LR214. There is a thick solum that represents relatively well-developed soils for this area. The A horizons extend 24–28 cm below the modern ground surface. The B horizons are maximally 50–55 cm below the base of the A3 horizon. A moderately-developed Bt soil is apparent above unmodified C horizon sediments. This soil is part of the modern solum and not equivalent to the older Bt underlying C horizons unconformably in many portions of Camp Maxey. Approximately 15 cm of C horizon was exposed in this excavation underneath the Bt unit. The Pleistocene Bt soil was not identified in Soil Pit 1. This control unit clearly indicates that 41LR214 is on a younger surface than the location of Soil Pit 1. Soil Pit 1 is on the same terrace surface as 41LR215. That site is also associated with the next highest (older) terrace to the west. Because 41LR215 is located on these older geomorphic surfaces, there is a strong possibility that some of the archaeological remains at 4LR215 are older than those at 41LR214.

Backhoe Trench 2

Profiling the east wall of BHT 2 (Figure 11, Table A-4) indicated a stratigraphic sequence analogous to the other archaeological sites examined during this project, but quite unlike Soil Pit 1. The modern solum extends to a depth of 35–52 cm below the modern ground surface. These are weakly developed soils. The A horizons are present from 12–25 cm, and the B horizons are 20–30 cm thick. There is only 10–20 cm of C horizon sediments resting above the Pleistocene Bt soil remnant. The contact between the C and Bt is unconformable. Significant bioturbation was apparent above the upper boundary of the Bt soil. There was no evidence of buried soils within this profile. Compared with the profile from Soil Pit 1, this is a much younger surface. The soils in BHT 2 are much less well- developed than in the off- site soil pit and there is probably a thinner sedimentary mantle above the Pleistocene Bt on 41LR214 than the older terrace to the west of the site (if the Pleistocene Bt is inferred to be present at a deeper position below the base of the final excavation depth of Soil Pit 1). Many

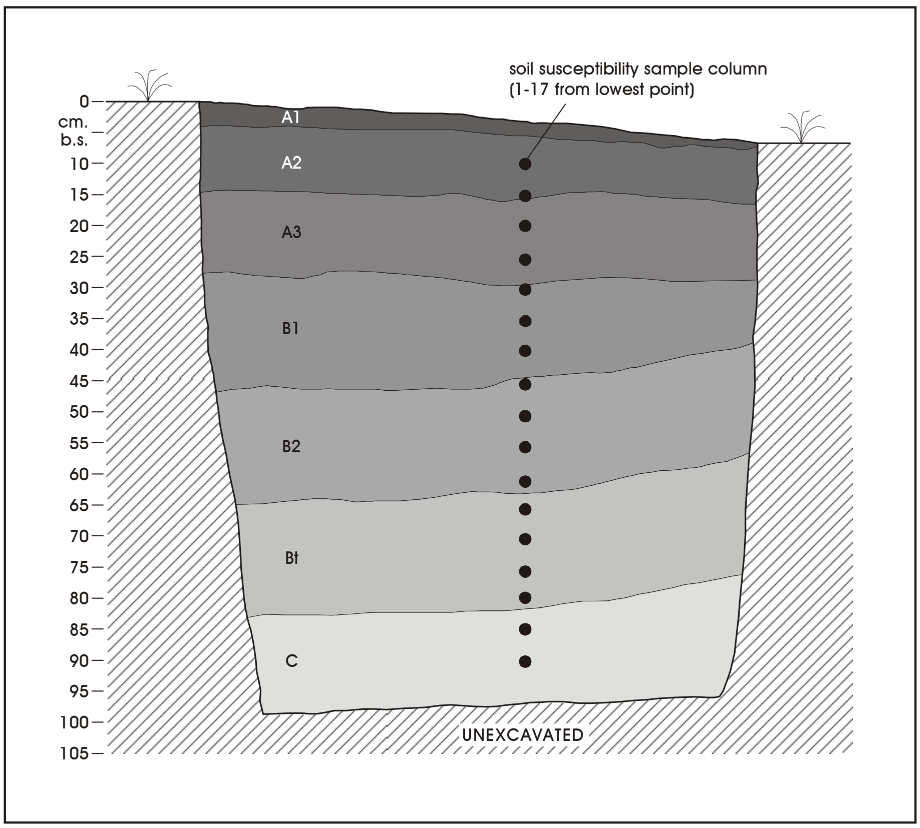

Figure 12. *East wall profile of Soil Pit 1, 41LR214.*

portions of 41LR214 exhibited very minimal soil above the Bt unit and there has been significant erosion of several parts of the solum on this site.

No artifacts, features, or evidence of archaeological horizons were apparent in this profile. Eighteen soil magnetic susceptibility samples were collected as a sample column from BHT 2.

Discussion

Although both 41LR214 and 41LR215 could have been occupied any time subsequent to sediment deposition, older sediments are present at 41LR215. It is possible that older archaeological remains are present at 41LR215 than at 41LR214. In the absence of absolute dates or suggestive diagnostic artifacts, it is difficult to determine the relative ages of these two sites. This area does have a dense archaeological presence, evidenced by the cluster of five archaeological sites in this vicinity. This is likely related to the proximity of springs expressed in the drainage forming the western boundary of 41LR214. The large area of relatively low-density remains suggests that the archaeological record is the result of multiple occupational uses of this location. The one test unit containing archaeological material on 41LR214 produced artifacts throughout the vertical sediments. Temporal assignment cannot be resolved with the current data, but the implications for use of this area are interesting. 41LR214 may possess evidence that the area was used throughout the period when different sediments were being deposited. The soils on this terrace are demonstrably younger than those observed in Soil Pit 1. That soil pit was placed on the younger of two terrace surfaces where 41LR215 is located. Potentially, the area encompassing 41LR214 and 41LR215 may contain a long occupational sequence. Alternatively, the restricted distribution of artifacts throughout the sediments of TU 3 may indicate natural erosional accumulation of cultural materials at the location of this excavation unit (see below).

Magnetic susceptibility results from 18 samples collected in BHT 2 and 17 samples from the off-site soil pit are described in Appendix B. The MS results from Soil Pit 1 show very minor variations in values and indicate very different soil formation events from BHT 2. The MS values from BHT 2 show a dramatic distinction between the values in the Pleistocene Bt soil and the overlying sediment and solum. A significant peak at 82.5 cm bs may indicate a buried paleosol now obscured by pedogenesis or a localized concentration of ferric materials. All of the values for the Bt unit are much greater than the overlying soils. Very minor peaks are present in the lower portion of the B1 horizon (27.5 cm bs) and the middle of the B2 horizon (37.5 cm bs). The artifact sample from 41LR214 came exclusively from only one test unit (TU 3) and provides an insufficient amount of material (see following section) to evaluate subsurface archaeological distribution in relation to the MS results.

Archaeological Recovery

No artifacts were recovered from any of the shovel tests on this site, during the current project. Only a single test unit contained artifacts. Test Unit 3 contained artifacts in most of the 10-cm excavation levels below 24 cm bd to 125 cm bd (Table 6). This unit provides a very small sample of 15 lithics including a single possible flake tool and 14 pieces of debitage. One bullet also was recovered within the first 10-cm excavation level of this test unit. Five pieces of debitage are chert and nine are quartzite. Six of the flakes are complete, six are distal portions, one proximal fragment was identified, and there is a single piece of angular debris. The majority of the flakes have no cortex (n=5) or have 50 percent or less (n=5) present on their dorsal surfaces. Only two flakes have evidence of any heating. Because of the small sample size and limited spatial information available from this single unit, these lithics provide insufficient information for a discussion of technology at this site.

The single possible flake tool is from 93–103 cm bd in TU 3. This is a complete flake, 29 mm long, made on hard chert exhibiting a small amount of gravel cortex. There is some edge damage in the medial portion of the sinister edge where the cortex forms the dorsal face of the edge. There is irregular bifacial damage to this relatively strong portion of the edge that is greater than on the more delicate margins of this flake. This could represent informal use. The damage is ambiguous and it may be incidental edge damage. The relative difference of this one portion of the edge suggests it may have been expediently used.

A total of 18 pieces of FCR was recovered from 41LR214; all came from TU 3 (Table 6). One piece came from 44–54 cm bs and the remainder were found in all excavation levels between 64–103 cm bd. Eight pieces came from 93–103 cm bd. There was no evidence of clustering of this rock and no associated charcoal staining was encountered. The occurrence of lithics and FCR only within this unit may suggest a discard area or toss-zone proximate to a feature, or it may be a natural accumulation of archaeological clasts due to erosional concentration. The lack of clustering of this amount of FCR strongly suggests that they are not in

Table 6. Results of Test Units at 41LR214

1x1-m Unit	Artifacts (#/kind/depth*)	Depth to Bt soil (cm bd*)	Maximum Unit Depth (cm bd*)
TU 1	0	35-36	36
TU 2	0	46-66	66
TU 3	1 bullet (3-18 cm)	130-135	135
	3 lithics (24-36 cm)		
	2 lithics; 1 FCR (44-54 cm)		
	3 lithics (53-64 cm)		
	2 FCR (64-74 cm)		
	4 FCR (74-84 cm)		
	1 lithics; 3 FCR (83-94 cm)		
	4 lithics; 8 FCR (93-103 cm)		
	1 lithic (103-113 cm)		
	1 lithic (113-125 cm)		
TU 4	0	23-30	30
*below datum at highest corner of ground surface			

primary context. The presence of these artifacts only within this single unit from 24–125 cm below the unit datum may imply that natural processes are a likely cause of the spatial segregation of artifacts in this area of the site.

41LR222

This site is a lithic scatter located on the eastern bank of an unnamed intermittent stream that currently is a tributary feeding into Pat Mayse Reservoir (Figure 3). The site is situated almost entirely on a high terrace landform. There is a sharp divide along the northern and western margins of the site where a lower terrace is inset into the surface where 41LR222 is located. This lower, younger terrace surface extends to the west and to the north. Previous work identified the site area as 22,018 m^2. A portion of the northwestern margin previously identified as part of site 41LR222 is considered outside of the documented and inferred site boundary. The current site size is 20,888 m^2. Elevations of this level landform range from 500–515 ft (152–157 m) AMSL. The locations of previous testing efforts and the current archaeological examinations are presented in Figure 13-Map Supplement.

This site was previously identified as a moderately-sized (22,018 m^2) unspecified prehistoric site with a low-density of lithics (Perttula, Lyle, and Tomka 2001:93). A single broken corner-notched point was recovered from this site. Historic materials collected during previous testing included one sherd of crockery and four bullets. One untyped dart point base was recovered during the current project and no other temporal indicators were found.

Areal coverage of previous shovel testing of the eastern half of the site was inadequate to determine the nature of archaeological deposits in this area. This was one of the reasons that additional examination of 41LR222 was needed. Shovel testing during the current project emphasized examination of this portion of the site.

Archaeological Investigations

Shovel Tests

Nineteen shovel tests were excavated on 41LR222 during this project (Figure 13, Table 7). Most were placed on the eastern half of the site to provide more precise information on subsurface distribution of archaeological materials. Transects were established in relation to a baseline that sampled the entire previously identified eastern area of the site that required additional testing. Transect 1 was established approximately 25 m south of the site datum. Two shovel tests, T1-ST1 and T1-ST2, were excavated on this transect. T1-ST1 was placed directly south (180° from magnetic north) of the site datum and T1-ST2 was 25 m east of that position. The placement of both of these units was accomplished using a compass and pace. Transects 2–6 were established north of Transect 1. All of these were oriented east-west at 90°–270° from magnetic north. Intervals between all shovel tests and transects was 25 m, with only a few minor adjustments for tree positions. All shovel tests locations on Transects 2–5 were placed using Brunton and tape. T6-ST1 was placed arbitrarily to sample the lower terrace position on the northern side of the site that had been included within the site boundary during the

Table 7. Results of Shovel Tests at 41LR222

Shovel Test Unit	Artifacts (#/kind/depth)	Depth to Bt soil (cm bgs)
T1-ST1	0	70
T1-ST2	0	>100
T2-ST1	0	>103
T2-ST2	0	>100 (near at 100)
T2-ST3	1 lithic (40-60 cm)	~110
T2-ST4	0	>97
T2-ST5	0	>80
T2-ST6	0	26
T3-ST1	0	105
T3-ST2	0	>101 (near 101)
T3-ST3	0	100
T3-ST4	0	>96
T3-ST5	0	55
T3-ST6	0	95
T4-ST1	1 lithic (0-22 cm)	22
T4-ST2	1 bullet (40-60 cm)*	54
T5-ST1	1 FCR (0-20 cm)	24
T6-ST1	0	24
T7-ST1	0	57-61
>X cm indicates Bt soil not encountered *probably displaced from upper horizons		

initial site description. One shovel test (T7-ST1) south of T1-ST1 was established using a Brunton and pace method to sample an area with few previous shovel tests at the margin of a steep drop-off to the lower terrace.

The Bt soil was encountered in a shallow context on the eastern end of the site. The northern, southern, and western margins of the site also contained shallow soils above the older Bt remnant. Prehistoric artifacts were recovered from only three shovel tests and one bullet was found in another unit.

Test Unit Excavations

A total of six controlled 1x1-m excavation units was excavated on 41LR222 (Figure 13). All were excavated to contact with the Bt soil or augering identified the upper boundary of the Pleistocene Bt horizon. Test units were placed in areas where shovel testing indicated the presence of deeper sediments with relatively high densities of prehistoric artifacts. All units were oriented to the grid used for shovel testing. Test Unit 1, placed 60 m south (180° from magnetic north) of TU 3, examined deposits at the southern end of the site near where the arrow point was recovered during the previous testing. Test Unit 2 was excavated 25 m north (0° from magnetic north) of the site datum. Test Unit 3 was placed 20 m east (90° from magnetic north) of the site datum. Test Units 4–6 were placed along Transect 2 in areas where one current shovel test with debitage and two previously excavated positive shovel tests were located. Each of these was placed between shovel test units and form a sample of 1x1-m units approximately 25 m apart. All test units were placed on grid using a Brunton and tape. Test Unit 4 was located 9 m east of T2-ST3, TU 5 was 10 m east of T2-ST4, and TU 6 was situated 10 m east of T2-ST2. Only TU 3, TU 4, and TU 6 contained prehistoric artifacts. Bullets were recovered in all of the test units except TU 2. A profile was drawn, described, and magnetic susceptibility samples were collected from TU 3.

Soil Pit 1

A single control soil pit was placed southeast of the identified site boundary (Figure 13). This unit was placed approximately 65 m south of T2-ST4. This area is at a lower, slightly sloping surface that is contiguous with the site area of 41LR222. A profile of this soil pit was drawn, described, and magnetic susceptibility samples were collected from this unit (Figure 14, Table A-6). The soil removed from this unit was not screened. No artifacts were observed in the backdirt or profile walls.

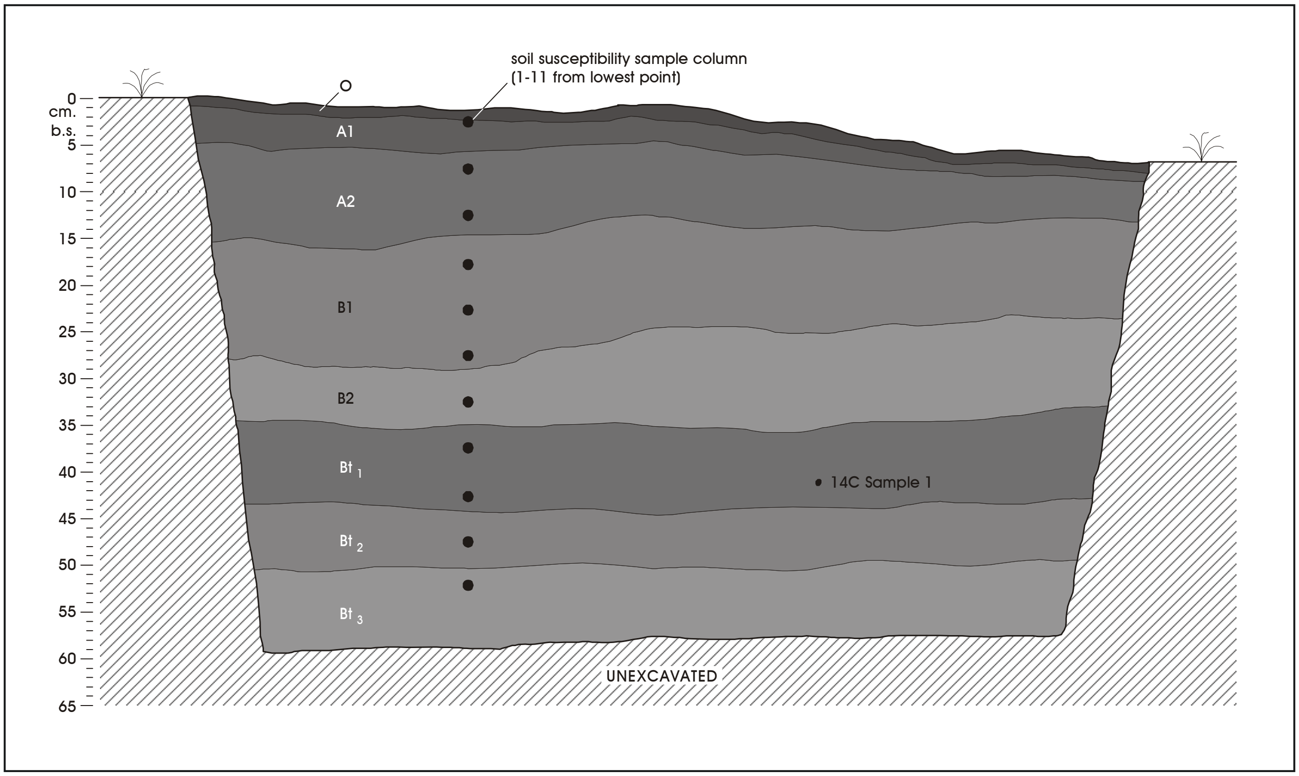

Figure 14. *North wall profile of Soil Pit 1, 41LR222.*

Excavation Results

Geomorphology and Site Formation

Soil horizons within the shovel tests and test units indicate redundant sediment and soil development history, essentially identical to those on other sites investigated during this project. Sediments above the older Pleistocene Bt horizon are thin at the eastern, western, and southern ends of the site (Tables 7 and 8). There is a lower terrace to the west and north of the identified site area. This younger terrace is separated from the older, upper terrace where 41LR222 is located by a steep scarp between the upper and lower tread surfaces. T6-ST1 was excavated on this lower terrace surface north of the site boundary. This shovel test contained a much darker A horizon (wet color 10YR 2/2) than seen on the upper terrace (10YR 3/2 and 10YR 4/3). The Bt soil was encountered only 22–24 cm below the modern surface. The Bt horizon boundary sloped, mimicking the modern scarp (26 percent grade to the north) of this area. The control soil pit, southeast of the main portion of the site, contained a solum identical to that found on the site overlying the Pleistocene Bt soil but with no unmodified C horizon deposits present. Profile description of TU 3 demonstrated a relatively deep accumulation of sediments overlying the Bt horizon (~110–115 cm) and 45 cm of modern solum.

Soil Pit 1

This pit was excavated to a depth of 52–59 cm below the modern ground surface. The northern wall of this pit was profiled and the soils described (Figure 14, Table A-6). Soils within this profile were markedly different from the profiles within the site area. No C horizon sediments were present within Soil Pit 1. B horizons rested directly on Bt soils, although they appear to be part of the modern solum and not remnant B horizons associated with the older Bt regime. Charcoal was common within the B1 horizon. This was presumed to be relatively recent charcoal associated with forest fires. This charcoal was large (greater than 1 cm), appeared very solid, and the amount strongly indicated a recent origin. One piece of charcoal was collected from the Bt1 horizon. This sample has not been submitted for dating. Only a single piece of charcoal was identified within the Bt1 horizon and there are no comparative samples to determine whether this charcoal is intrusive or contemporaneous with formation or deposition of the horizon. This sample has been reserved for possible future analysis to identify the potential age of the Bt horizons. A sample column of 11 magnetic susceptibility samples was collected from this profile.

Test Unit 3

Test Unit 3 was selected for detailed recording of soils and sediments because it contained a relatively deep profile and was the 1x1-m excavation unit with the highest number of prehistoric artifacts. The profile of the northern wall of this unit was drawn and described (Figure 15, Table A-7). The A horizons were approximately 15 cm thick. B horizon soils extended 33 cm below the base of the A2 horizon. There was one lamella visible in the eastern half of the profile forming an abrupt, wavy contact between the B2 and C1 horizons. Another single lamella was identified in the western two thirds of the profile marking the boundary between the C2 and C3 horizons.

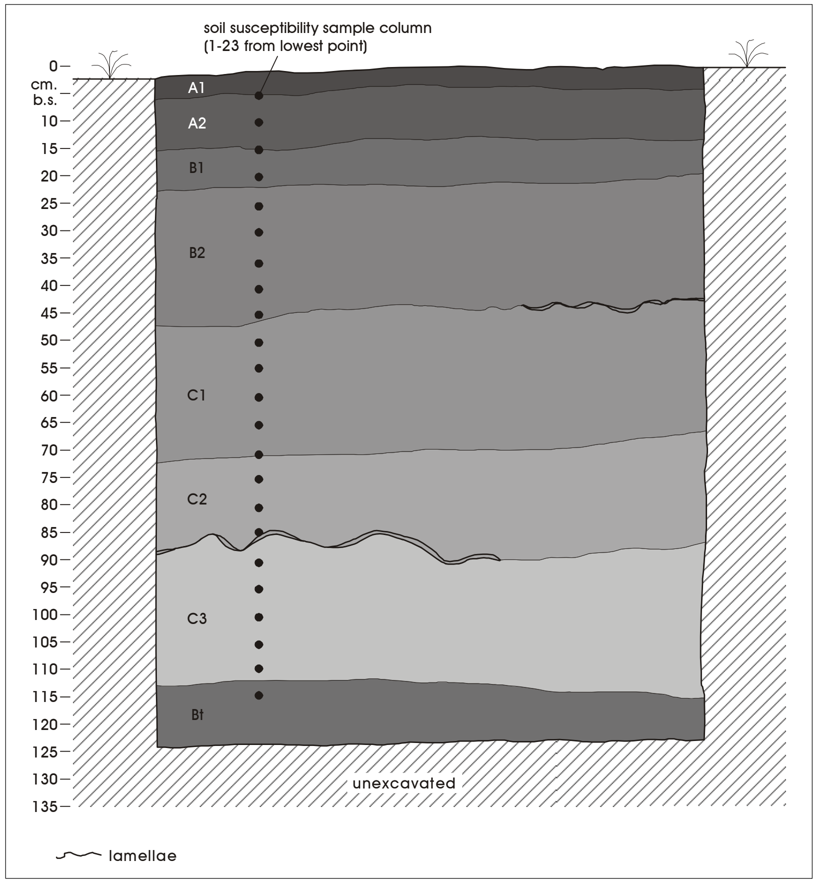

Figure 15. *North wall profile of Test Unit 3 at 41LR222.*

Discussion

Shovel test coverage indicated that the deepest deposits are located away from the eastern, western, and southern margins of 41LR222. Soils indicate formation of A and B horizon soils on sediments that overly a much older Pleistocene Bt soil. Most portions of the site demonstrated a relatively thick C horizon below weakly-developed B horizons. Test Unit 3 had minimal evidence of lamella formation within all portions of the C horizons. The etiology of these features is uncertain, but suggests effects of water perched above the less permeable Bt contact. There is a low potential for *in situ* deposits on the lower terrace settings to the west and north of the identified area of 41LR222. Much of the A horizon of this slope and lower terrace is probably colluvial sediment relocated from the solum of the upper terrace and scarp to the south. The soil pit south of the identified site location contained no C horizons. The B horizons rest conformably on the uppermost contact with the Bt soils in the soil pit profile. These Bt horizons appear to be genetically related to the upper portions of the solum in Soil Pit 1. The site area does represent a unique soil location. 41LR222 is on the margin of a terrace within relatively deep sediments resting unconformably on an older Pleistocene Bt soil remnant. This older unit is capped by C horizon sediments and recent, weakly-developed soils.

Magnetic susceptibility results are provided in Appendix B for analysis of 23 samples from TU 3 and 11 samples collected from Soil Pit 1. These two sets of samples also indicate different values that suggest contrasting soil formation between the identified site area of 41LR222 and the off-site soil pit. A single peak value in the A2 horizon (12.5 cm bs) of Soil Pit 1 may be related to greater recent organic content of this horizon. There is a minor peak in the middle of the B1 horizon at 22.5 cm bs within the soil pit. The highest MS values from the TU 3 profile all come from the lower portion of the profile. The high value from a sample at the top of the C2 horizon (72.5 cm bs) may represent organic enrichment of a short-term stable surface associated with the identified boundary between the C2 and C1 horizons. Two minor peak values come from samples above and below the robust lamella at the C2 and C3 boundary (82.5 and 87.5 cm bs). Another peak in MS is from a sample in the middle of the C3 horizon at 97.5 cm bs. The second highest value is from the Bt horizon (112.5 cm bs). Artifacts are present throughout the lower portion of the profile of this unit although they are not more abundant in proximity to the high MS readings. Test Unit 4 did exhibit the highest artifact concentrations below 50 cm bd, but there also were two bullets recovered between 40–50 cm bd.

Archaeological Recovery

The recovered prehistoric archaeological sample is very small. Only two lithics and one FCR were recovered from the 19 shovel tests. Only three of the six test units contained prehistoric artifacts (TU 3, TU 4, and TU 6; Table 8). A total of 27 lithics was recovered from these units. This includes a single stem fragment of a dart point, one cobble tool, and 25 pieces of debitage. Four pieces of FCR came from the test unit excavations. Bullets were the only historic materials recovered from 41LR222. Eighteen military bullets and six recent .22 caliber bullets were found from 0 cm to a maximum depth of 70 cm bs.

The subsurface distribution suggests that archaeological materials are present throughout all of the sediments above the Bt soil. In TU 3, 17 lithics and two FCR were recovered from 10–90 cm and 100–110 cm below the unit datum (current ground surface). Test Unit 4 contained eight lithics and two FCR from 10–30 cm, 50–80 cm, and 90–100 cm bd. A single FCR fragment was collected from TU 6, 30–40 cm bd. This FCR was unassociated with any lithics. Units TU 1, TU 5, and TU 6 were dominated by bullets (n=12), found to a maximum depth of 60–70 cm bd. An additional 10 bullets were recovered in TU 3 and TU 4 within the upper 50 cm of excavation. Test Unit 2 contained no prehistoric or historic artifacts.

The majority of the flakes are quartzite (n=15, 60%) and the point base and cobble tool also are made from quartzite. Most of the 25 flakes are complete (n=14, 56%) or distal portions (n=7, 28%). Two medial and two proximal fragments also were identified. Most of the flakes had no cortex present (n=14, 56%), six had 50 percent or less, three exhibited between 51–99 percent cortex, and two showed

Table 8. Results of Test Units at 41LR222

1x1-m Unit	Artifacts (#/kind/depth*)	Depth to Bt soil (cm bd*)	Maximum Unit Depth (cm bd*)
TU 1	3 bullets (20-30 cm)	82**	72
	2 bullets (30-40 cm)		
	1 bullet (50-60 cm)		
	1 bullet (60-70 cm)		
TU 2	0	38-43	43
TU 3	1 bullet (0-10 cm)	113-121	121
	2 lithics; 2 bullets (10-20 cm)		
	3 lithics (20-30 cm)		
	1 lithic (30-40 cm)		
	3 lithics; 2 bullets (40-50 cm)		
	2 lithics (50-60 cm)		
	1 lithic; 1 flake tool (60-70 cm)		
	1 FCR (70-80 cm)		
	1 point base; 1 FCR (80-90 cm)		
	3 lithics (100-110 cm)		
TU 4	2 bullets (0-10 cm)	124**	102
	1 lithic; 1 bullet (10-20 cm)		
	1 lithic (20-30 cm)		
	2 bullets (40-50 cm)		
	2 lithics; 1 FCR (50-60 cm)		
	3 lithics; 1 FCR (70-80 cm)		
	1 lithic (90-100 cm)		
TU 5	1 bullet (10-20 cm)	97**	80
TU 6	2 bullets; 1 FCR (30-40 cm)	118**	99
	2 bullets (40-50 cm)		

*below datum at highest corner of ground surface
**depth to Bt soil determined by augering

100 percent cortex. The small sample of complete flakes (n=14) shows a predominance of late reduction flakes (n=9) and tool manufacturing debris (n=4). None of the lithics showed any evidence of heating. This small sample provides little information about possible technological activities at 41LR222.

A single untyped dart point base was recovered from TU 3 in Level 9 (80–90 cm bd). This is a contracting stem form with a convex base, made from fine-grained quartzite. The piece is 19.4 mm long. The entire blade of this piece is missing and only a small portion of one shoulder is present. The edges of the base are still sinuous and it represents an unfinished piece. The break indicates a manufacturing error on this piece prior to its final shaping.

A cobble tool recovered in TU 3 from 64–74 cm bd represents an informal, heavy-duty tool. This is a split, coarse-grained quartzite cobble with a few removals along one edge that is 93.9 mm in maximum length. The edge is somewhat sinuous (edge view) and presents an irregular plan view outline. There are three large scars on the interior surface and three scars on the face with cortex. There are abundant step fractures on the exterior face with cortex that suggest use on a hard material. There are a few step fractures on the interior face as well. This piece appears to be an informal chopping tool used for repeated events on a relatively large and hard material.

One piece of FCR was recovered in a single shovel test and five other pieces came from three of the 1x1-m test units. There was no apparent clustering of these rocks and no evidence of charcoal or organic staining. Three of the FCR were found between 70–90 cm bs. The low density of these burned rocks and lack of associated staining do not suggest that any of the shovel tests or test units have sampled a near-feature context.

41LR225

This is a large site with prehistoric and historic components. The site is located along the margin of an unnamed tributary currently feeding into Pat Mayse Reservoir at the northernmost portion of Camp Maxey (Figure 3). 41LR225 is at least partially located on COE land outside of the boundaries of this portion of Camp Maxey. There is no information about the historic or prehistoric components of the portions of the site that are on COE land. The site area is directly west of an incised intermittent or ephemeral drainage. Elevations of 41LR225 range between approximately 480–500 ft (146–152 m) AMSL, with most of the site situated between 490–500 ft (149–152 m). The site is located on a high, relatively level area, adjacent to a portion of the reservoir that is usually perennially flooded. The landform where 41LR225 is located is an identical portion of the surface where 41LR226 was identified.

The site is directly adjacent to 41LR226 and these two sites are separated only by an incised drainage. There is a strong likelihood that both sites are part of single area of multiple occupational use. Because an unknown amount of the site is outside of the permitted project area, there is no accurate estimate of the site area of 41LR225. Site area information only identifies the portion of 41LR225 that is within Camp Maxey's jurisdiction (27,450 m^2; Figure 16-Map Supplement). The adjacent site of 41LR226 is also defined only between the fence lines separating Camp Maxey from COE property. 41LR226 is minimally also identified as 27,450 m^2. A COE datum is located in the northwestern fence corner of this site.

Previous work identified 41LR225 as containing an Archaic and Caddoan occupation. Two Gary points and one Alba point were recovered from this site during the previous testing effort (Lyle, Perttula, and Fox 2001:126). All three points came from subsurface shovel test units. The arrow point was recovered from 0–20 cm below the modern ground surface and the Gary points from 40–60 cm below surface. Sherds recovered from 41LR226 were considered indicative of an unspecified Caddoan affiliation (Perttula, Lyle, and Tomka 2001:95). The historic component of 41LR225 was associated with early-twentieth-century use (Lyle, Perttula, and Fox 2001:125–127). Previous areal coverage during testing provided good coverage of the identified site area.

Three prehistoric projectile points were recovered from 41LR225 during the current project. Two are arrow points and one may be an Edgewood or Ellis dart point (Figure 8a, b, and d). None are considered distinctive enough to be classified with assurance. They do suggest Archaic and Late Prehistoric components, consistent with the previously identified diagnostic artifacts from 41LR225.

Historic surface debris is associated primarily with the southern half of the site area within Camp Maxey. Some additional distributions of historic debris were noted during this testing project, but the majority of materials mapped during the previous investigation constitute most of the large surface manifestations. The original interpretation of this area was a homestead dating no later than the 1930s (Lyle, Perttula, and Fox 2001:126). That time period is still considered accurate. The debris on 41LR225 suggests a greater likelihood of a barn facility than domestic remains. The feature in the south-central area of the site identified as a well appears to be a second small stock pond. There is no evidence of a constructed or excavated well or cistern feature. This material was mapped during the previous testing and site recording effort (Lyle, Perttula, and Fox 2001:125–127). No additional mapping or surface collection of these historic artifacts was performed during the current testing.

Archaeological Investigations

Shovel Tests

Seventeen shovel tests were excavated on 41LR225 during the current project (Figure 16, Table 9). Previous shovel test coverage was good. Additional units were placed on portions of the site with minimal coverage, focusing especially on sampling the western and southwestern portions of the site. Several units also were placed in the northern area of 41LR225. Shovel test transects were established in reference to magnetic north. A baseline of six shovel tests were placed on Transect 1, oriented 0°–180° from magnetic north. The intervals between shovel tests were 20 m, except T1-ST6 which was placed 40 m north of T1-ST5. There are two shovel tests from the previous testing effort near to the 20-m interval north of T1-ST5 where T1-ST6 would have been located. The location of those shovel tests (49-5 and 49-6) from the 1999–2000 survey warranted this greater space between T1-ST5 and T1-ST6, the northernmost shovel tests on Transect 1. Transects 2–8 represent east-west sample transects (90°–270° from magnetic north) oriented in relation to the baseline shovel tests on Transect 1. Only one or two shovel tests were excavated on Transects 2–8. The intervals between shovel tests on these transects were variable because of the locations of previous shovel tests and trees. The poorest previous testing coverage was on the western side of the site, so these transects targeted areas approximately 40 m west of the Transect 1 baseline. T4-ST1, T5-ST1, T6-ST1, and T7-ST1 all were placed 40 m west of their reference shovel tests on Transect 1 (T1-ST3, T1-ST4, T1-ST5, and T1-ST6 respectively). T2-ST1 was 20 m west of T1-ST1, T3-ST1 was 30 m west of T1-ST2, and T3-ST2 was excavated 20 m east of T1-ST2, but encountered the Bt soil just below a very thin (<1 cm) A horizon. T4-ST2 was placed 40 m east of T1-ST3. Shovel test units T6-ST2 and T7-ST2 were excavated 20 m east of Transect 1 (T1-ST5 and T1-ST6 respectively). T8-ST1 was placed 20 m east of the Transect 1 baseline referent to the skipped 20 m midpoint interval between T1-ST5 and T1-ST6. The positions of all shovel tests were established using Brunton and tape.

Table 9. Results of Shovel Tests at 41LR225

Shovel Test Unit	Artifacts (#/kind/depth)	Depth to Bt soil (cm bgs)
T1-ST1	0	12
T1-ST2	1 piece glass (0-20 cm); 1 nail (39-60 cm)	58
T1-ST3	1 FCR (21-40 cm)	49
T1-ST4	0	49
T1-ST5	1 piece glass (0-20 cm)	32
T1-ST6	0	49
T2-ST1	0	9
T3-ST1	0	<10
T3-ST2	0	<1
T4-ST1	1 lithic (0-20 cm); 1 piece flat metal (20-40 cm)	89
T4-ST2	1 nail (0-20 cm)	30
T5-ST1	0	26
T6-ST1	0	24
T6-ST2	0	77
T7-ST1	0	30
T7-ST2	0	49
T8-ST1	0	42

Only five of these shovel test units contained artifacts (Table 9). Three shovel test units were very shallow. T2-ST1 exhibited only 9 cm of soil, T3-ST1 had less than 10 cm of soil above the Bt horizon, and T3-ST2 had less than 1 cm. One shovel test contained a single piece of FCR, one produced a flake and piece of metal, and only historic debris was recovered in the other three positive shovel test units.

Test Unit Excavations

Seven controlled 1x1-m units were excavated on 41LR225 (Figure 16). All were oriented to the same grid used to establish the shovel tests and were placed using a Brunton and tape. All test units were within 20 m of shovel tests. Because little prehistoric material was identified during the shovel testing on this project, most units were placed in relation to the results of the previous testing effort. Four of the test units were placed in the northern half of the site because of the higher recovery of artifacts in shovel tests on this portion of the site during the previous testing (Lyle, Perttula, and Fox 2001:126). Test Unit 1 was located 15 m west (270° from magnetic north) of T1-ST4. Test Unit 2 was placed 20 m west of T1-ST5 and TU 3 was placed directly adjacent to this unit on the eastern side, forming a contiguous 1x2-m unit. Test Unit 4 was 16 m west of T1-ST6. Test Unit 5 was placed 20 m west of T1-ST2, but was not fully excavated. Initial shoveling identified the Pleistocene Bt soil at <1 cm below the thin A epipedon. T3-ST1, 10 m west of this location, also had very thin deposits above the Bt. No attempt to excavate a complete level in this thin soil was made for TU 5. Test Unit 6 was placed 20 m east (90° from magnetic north) of T1-ST3. Test Unit 7 was situated 20 m east of the site datum. Test Unit 8 was located 20 m east of the Transect 1 baseline, 20 m north of T6-ST2 and 20 m south of T7-ST2.

All test units contained at least one artifact. Test Unit 2 and TU 3 each contained only one military bullet. Test Unit 1 contained only a single nail and TU 6 produced only one piece of glass. Only TU 4, TU 7, and TU 8 contained prehistoric artifacts. A single bullet was recovered from TU 7, and all other materials from these three test units were prehistoric.

Soil Pit 1

It was not possible to locate an adjacent area for an off-site soil pit near to 41LR225. The site extends to the fence line of COE property on the northern, western, and southern sides. The eastern margin of the site is an entrenched stream exposing the Bt soil. On the eastern side of this drainage, 41LR226 occupies all of the equivalent landform east of the small drainage. As noted above, there is a strong likelihood that the stream is an arbitrary boundary separating these two sites. East of 41LR226 there are several small sites that are tightly clustered. In order to find a surface for a soil pit that was securely located away from archaeological deposits, an excavation was made approximately 700 m east of the identified eastern margin of 41LR225 (see Figure 3).

Soil Pit 1 was placed approximately 30 m south of the fence line marking the northern boundary between Camp Maxey and COE property. Soil Pit 1 was excavated approximately 55–57 cm deep, approximately 3–5 cm below the upper boundary of the Bt soil. The northern wall of this unit was profiled.

Excavation Results

Geomorphology and Site Formation

Soil Pit 1

The off-site control soil pit was excavated on an equivalent surface approximately 700 m east of the eastern margin of 41LR225. This location is at the same elevation as the site. A drawing of the soil stratigraphy was made and a complete description of all horizons in this profile was performed (Figure 17, Table A-8). A column of 11 magnetic susceptibility samples was collected from this profile.

The profile exhibited a horizon sequence equivalent to that seen on 41LR225 and on most of the sites investigated during this field effort. The A and B horizons are pedogenically related. The thin A1 horizon (3–5 cm thick) overlies a 10–12 cm thick A2 horizon. The B horizons extend 19–22 cm below the base of the A horizons. The B2 horizon contained a few small (5 mm) ferric nodules. The modern solum rests above a C horizon that is approximately 15 cm thick. The contact with the Bt soil is unconformable and indicates that the Bt is not genetically related to the upper horizons. The Bt in this soil pit contained abundant ferric or manganese concretions that were as large as 2 cm in maximum diameter. The large size of these concretions was exceptional among the Bt horizons examined during this project.

Test Units 2 and 3

The southern wall of the two adjacent units was profiled (Figure 18, Table A-9). These test units were excavated only 35–41 cm deep. The slightly undulating surface of the Bt

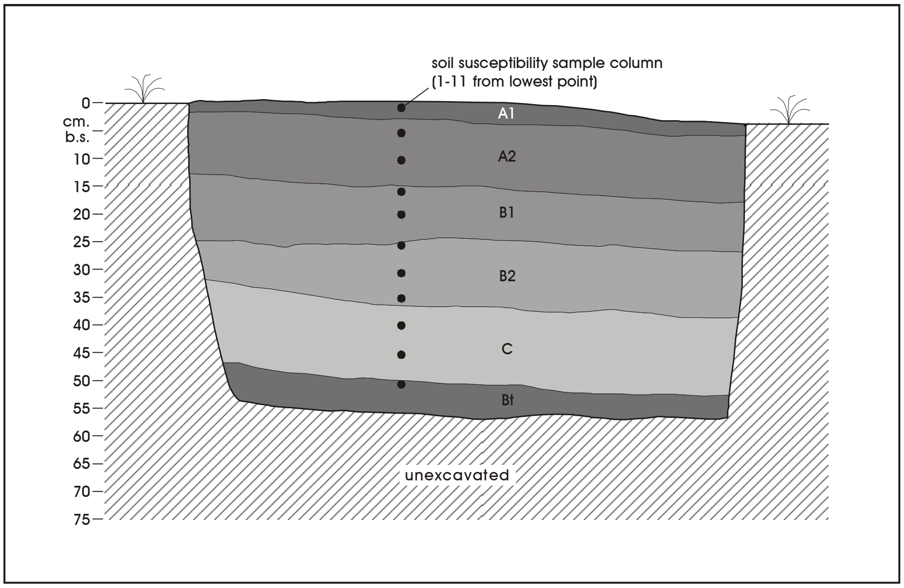

Figure 17. *North wall profile of Soil Pit 1, 41LR225.*

horizon was encountered from 32–41 cm below the modern ground surface. The weakly-developed A and B horizons extend 20–25 cm below ground surface and rest on approximately 5 cm of C horizon deposits. The Bt contact with the C horizon is unconformable. Five magnetic soil susceptibility samples were collected from a column on the described profile. No prehistoric or historic artifacts were recovered in TU 2 or TU 3. The depths of these units was not shallow compared with the two units that did contain significant amounts of prehistoric artifacts (TU 4 and TU 8). Both of those test units produced cultural materials in almost all excavated levels (Table 10). Although TUs 2 and 3 did not contain artifacts, the soil profile is analogous to those seen in all of the other test units on 41LR225.

Discussion

Examination of the soil profiles of the contiguous walls of TUs 2 and 3 and of Soil Pit 1 indicate that this site contains relatively shallow soils overlying the Pleistocene Bt soil surface. The soil sequence was identical between the profile examined on 41LR225 and the control soil pit approximately 700 m east of the site. Because of the shallow soils on this site, only five magnetic susceptibility samples were collected from the profile of TU 3. There is a peak from the B1 horizon (12.5 cm bs) and a less pronounced spike value in the B2 horizon (22.5 cm bs). Neither TU 2 or TU 3 contained any artifacts and the recovery from TU 4 and TU 8 had the highest material densities from 30–40 cm bd. The small number of MS samples from the shallower TU 3 profile makes interpretation difficult. It is uncertain whether soil formation, surface stability, or cultural organic enrichment may be responsible for the MS values from the 41LR225 sample. The 11 samples from the off-site soil pit provide three peak values. There is one in the middle of the B1 horizon (22.5 cm bs), a higher peak in the upper portion of the C horizon (42.5 cm bs), and the highest value was registered in the Pleistocene Bt soil (52.5 cm bs). These values may represent past stable surfaces, but there are a few ferric nodules present within the B2 horizon and common nodules in the Bt soil that could have influenced these analyses.

Archaeological Recovery

Four of the 17 shovel tests excavated on 41LR225 during the current project contained artifacts. Within the shovel tests, historic artifacts were more common than prehistoric materials (Table 9). Only three of seven 1x1-m test units contained prehistoric artifacts (Table 10), an additional test unit produced only a wire nail between 10–20 cm bd. Three test units had no historic or prehistoric artifacts. All of the prehistoric artifacts came from TU 4, TU 7, and TU 8. Test Units 4 and 8 contained lithics and FCR throughout the sediments above the Pleistocene Bt soil. Testing did not sample the southern area of the site dominated by surface remains because shovel testing indicated that the Oi and A1

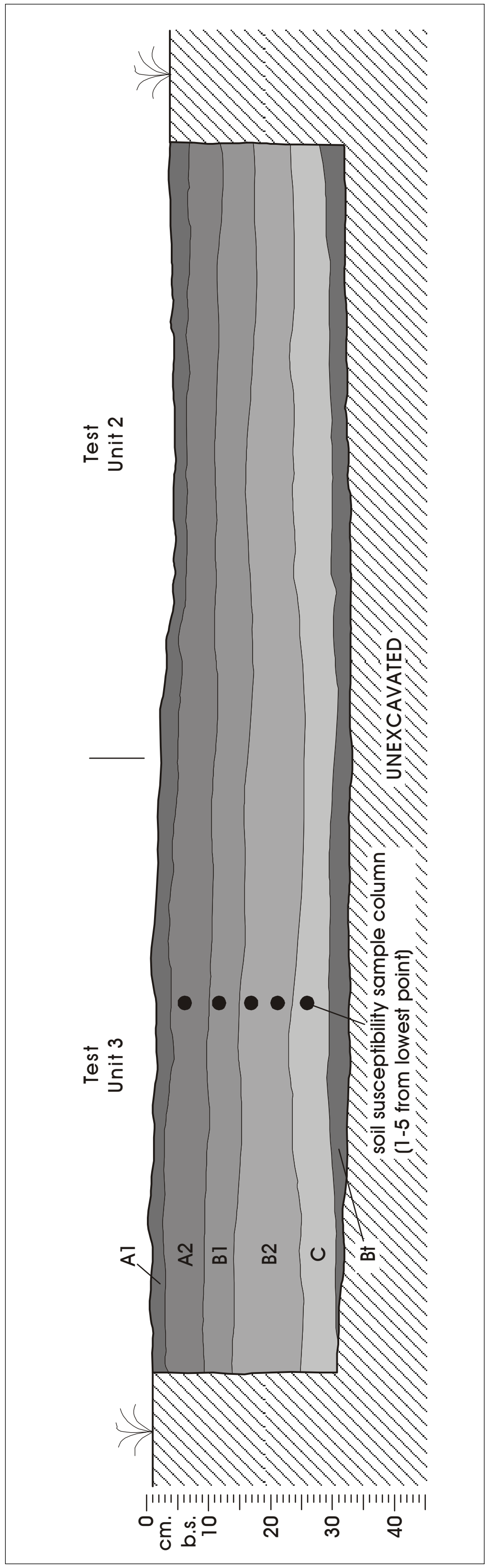

Figure 18. *South wall profile of Test Units 2 and 3 at 41LR225.*

Table 10. Results of Test Units at 41LR225

1x1-m Unit	Artifacts (#/kind/depth*)	Depth to Bt soil (cm bd*)	Maximum Unit Depth (cm bd*)
TU 1	1 nail; 1 piece glass (10-20 cm)	32-35	35
TU 2	1 bullet (7-16 cm)	39-41	41
TU 3	1 bullet (10-20 cm)	40-42	42
TU 4	1 lithic (9-20 cm)	64-68	68
	4 lithics (20-29 cm)		
	3 lithics; 6 FCR (29-40 cm)		
	1 projectile point; 5 lithics; 5 FCR (39-53 cm)		
	6 lithics; 3 FCR (53-60 cm)		
TU 6**	2 pieces glass (3-16 cm)	24-26	26
TU 7	1 lithic; 1 bullet (14-26 cm)	50-53	53
TU 8	15 lithics; 1 FCR (0-10 cm)	53-60	60
	16 lithics (10-20 cm)		
	1 projectile point fragment; 29 lithics (20-30 cm)		
	1 projectile point; 11 lithics (30-40 cm)		
	9 lithics; 1 FCR (40-50 cm)		
	2 lithics (50-60 cm)		
*below datum at highest corner of ground surface ** TU 5 not excavated			

horizons rested directly on top of the Bt soil. Historic materials are discussed in the section on historic artifacts at the end of this chapter.

41LR225 had the largest lithic assemblage recovered from this testing effort at Camp Maxey. A total of 105 lithics was identified including three projectile points, one tested cobble, one flake tool, and 100 pieces of debitage. Almost all were recovered in TU 8 (Table 10). Eighty-five lithics were found in this unit including two of the projectile points, and the single flake tool.

Summary statistics for the debitage are presented in Tables 11 and 12. The assemblage of 100 flakes is evenly mixed between chert (n=55) and quartzite (n=43). Two pieces of a distinctive red jasper were tallied separately from the chert. Most of the flakes are distal fragments (n=38), many of these are nearly complete flakes that are only missing the platform and a small amount of the bulb of percussion. A total of 23 flakes are complete. There is as greater amount of angular debris (n=18) among this debitage than from 41LR137 (n=1) or 41LR254 (n=4), the only other assemblages with sample sizes greater than 80 pieces. Among the complete flakes (n=23), the relative amount of tool manufacturing flakes (Table 12) also is higher at 41LR225 (n=11, 48%) than for 41LR137 (34%) or 41LR254 (27%). Flakes classified as early and late reduction are equally represented (n=6, 26% each). The majority of the flakes from 41LR225 are decorticated (n=42 with 0%, n=33 with <50% cortex). Only 11 have 51–99 percent cortex and 14 flakes exhibit 100 percent cortex on their dorsal face. The number of flakes with 100 percent dorsal cortex from 41LR225 (14%) is only slightly higher than those from 41LR137 (9%) but much higher than those from 41LR254 (1%). 41LR225 also exhibits more evidence of heating than other sites. Fourteen percent of the chert and nine percent of the quartzites have been heated.

The vertical distribution of lithics (Figure 19) shows that most were recovered from the ground surface to 60 cm bd (datum is equivalent to ground surface), with a peak at 30–40 cm bd. All of the distributional patterns and lithic attributes are dominated by their recovery from a single test unit (TU 8). Apparent differences from the other relatively large assemblages of 41LR137 and 41LR254 are unlikely to reflect site level differences in lithic reduction and use behavior. As noted for the other sites, even this sample of 100 flakes is too small for evaluation of patterns of lithic organization, especially when most of the assemblage is derived from a single 1x1-m unit.

Three projectile points were recovered at 41LR225 (Figure 8a, b, d). A single expanding base dart point (Figure 8d) was found at 39–53 cm bd in TU 4. This complete piece is made on coarse-grained quartzite and has an asymmetrical blade. This point is 52 mm long. Flaking is well-controlled

Table 11. 41LR225 Debitage Attributes

Category	Variables	Percentage of Sample	n
Raw material	chert	55%	55
	quartzite	43%	43
	jasper	2%	2
Condition	complete	23%	23
	proximal	15%	15
	medial	6%	6
	distal	38%	38
	angular debris	18%	18
Cortex	0%	42%	42
	1-50%	33%	33
	51-99%	11%	11
	100%	14%	14

Table 12. 41LR225 Flake Thickness to Length Ratios for Complete Flakes

Variable	Percentage of Sample	n
<0.15 (late reduction)	26.1%	6
0.16-0.25 (tool manufacture)	47.8%	11
>0.25 (early reduction)	26.1%	6

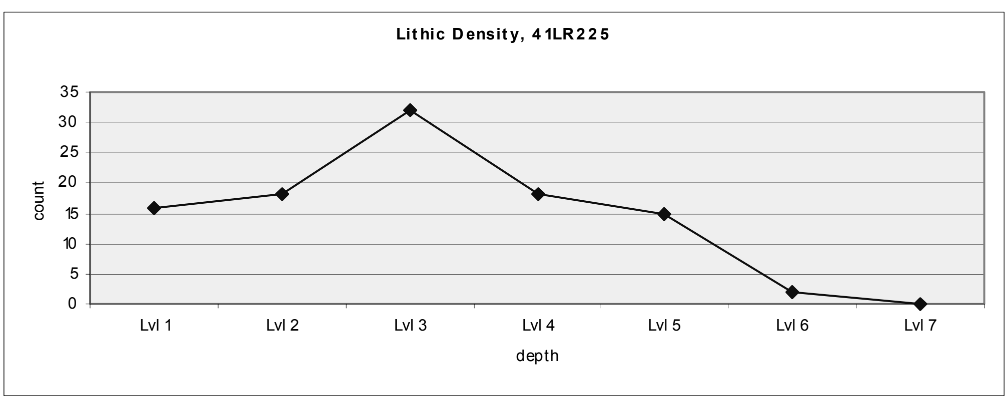

Figure 19. *Vertical distribution of lithics from test units, 41LR225.*

and the asymmetry appears to be due to the inability to thin one face of this point. The base is finely formed and there is grinding that extends distally of the notch to each shoulder. This point resembles Edgewood or Ellis forms, and may suggest Middle-Late Archaic occupation. Two untyped arrow points were found in TU 8. A partial point (Figure 8a) that includes the base, one barb, but almost none of the blade, was recovered between 20–30 cm bd. This small (11 mm maximum length) point fragment is made from a coarse-grained quartzite. It is a corner-notched form with a slightly expanding base. There is no basal grinding. This point is broken from an apparent impact fracture. The other arrow point from TU 8 (Figure 8b) was collected from 30–40 cm bd, and is a complete, untyped corner-notched point. This point is 26 mm long and was made on a lustrous chert. The blade is asymmetrical, one face is concave and the other convex. This point was probably made on a flake. There are several large initial reduction scars on the proximal portion of the blade and base. There is extensive pressure flaking to shape the edges and the distal portion of the blade. A central portion of the convex face shows step terminations that did not remove a thick mass. The tip is broken. The stem is very small and only minimally trimmed. Because of the indeterminate morphology of these points and absence of additional examples, no more precise temporal identification is ventured for these three tools.

One flake tool was recovered from Level 5 (40–50 cm bd) of TU 8. This appears to be a very informal tool. The implement is made on a proximal flake fragment that is broken along a fault in the material just distal of a wide bulb. A steep portion of the sinister edge has been trimmed showing larger flake scars that flatten the entire face and smaller scars from slight edge regularization. Trimming has been done from the ventral towards the dorsal surface. Although most of the ventral face is quite convex, this small area with retouch at the dexter margin of the bulb is relatively flat. Some of the scars are probably use damage of this 5-mm section of the edge.

One tested cobble was found between 30–40 cm bd in TU 8. This piece is 95 mm long in maximum dimension and has two overlapping removal scars at one end. Weathering of the surface has affected up to 5 mm of the exterior of this cobble, producing some poor fracturing qualities. Although the quality of the interior quartzite is not poor, the overall shape of this piece would present several reduction difficulties to overcome the amount of cortex weathering. There is no evidence of pecking that would suggest that this is a hammerstone that was broken during use.

A total of 17 pieces of burned rock was recovered from 41LR225. Most (n=14) came from TU 4 (Table 10). All of these were encountered between 29–60 cm bd. No clustering of these rocks was noted during excavation and there was no evidence of charcoal or other organic staining. This density may suggest proximity to a discard area or thermal feature. Test Unit 4 had the second highest density of artifacts on the site.

Although this is the largest artifact assemblage recovered from this testing effort at Camp Maxey, the sample from 41LR225 is still insufficient for characterization of the lithic technology at this site. What is apparent from the recovery of almost the entire assemblage from two 1x1-m units (TU 4 and TU 8) is that this site is very likely to contain subsurface artifact clustering. Test Unit 8 contained 85 percent of the debitage, two of the three projectile points, a tested cobble, and a flake tool. Test Unit 4 contained one projectile point and 82 percent of the FCR recovered from the site. Although this only represents 14 individual pieces of FCR, that is a high concentration relative to the other sites examined during this testing project. Both these test units indicate that clusters of artifacts are present at 41LR225 and that they are likely to possess unique assemblage characteristics. This strongly suggests that there is a high probability they represent buried deposits. Although the assemblage from 41LR225 is larger than those at other sites investigated during the current project and suggests some spatial segregation of deposits, this is still not sufficient to suggest that the site may be eligible as an NRHP or SAL property. The overall low site density of artifacts, lack of identified features, and inability to define paloesols or discrete vertical subsurface deposits are considered to offer a low research potential.

41LR233

This is a small site with a low density of prehistoric artifacts. 41LR233 is situated on a remnant terrace between two deeply incised first order tributaries draining northwest into Pat Mayse Reservoir (Figure 3). The site area is level and situated at the margin of a wooded area with a small open meadow on the western side of the site (Figure 20-Map Supplement). Elevations vary little between 520–530 ft (158–162 m) AMSL. The site dimensions inferred from the current work are much smaller than the previously identified site area of 7,607 m^2 (Perttula, Lyle, and Tomka 2001:98). This investigation identified an area of 2,891 m^2 that contained artifacts and could confidently be designated within the site boundary (including the areas with positive shovel tests from the previous investigation of 41LR233). A single ceramic sherd was recovered in the previous investigation, but no additional examples were found during this testing project. On the basis of this sherd, this site was considered to potentially be an Early-Middle Caddoan period site (Tomka et al. 2001:Table 12-1). The current examinations were designed to recover additional information and determine the research value of the suspected Caddoan occupation events. The previous shovel testing did not systematically cover the identified site area or adjacent locations considered to be outside of the inferred site boundary. The current shovel testing and controlled 1x1-m excavation was designed to provide a more adequate spatial sample of the subsurface archaeological and soil record of 41LR233.

Archaeological Investigations

Shovel Tests

Nineteen shovel tests were excavated during the current investigation (Figure 20, Table 13). Twelve shovel tests had been placed within the identified site boundary during the previous site characterization efforts. Five of those shovel tests contained one to two prehistoric artifacts. The southern and eastern portions of the identified site area were not adequately tested. A baseline, oriented 0°–180° from magnetic north, was established through the site datum and where the previous investigations had the densest cluster of shovel tests containing artifacts. A series of five shovel tests were excavated along this Transect 1 baseline. Six additional transects were oriented perpendicular (90°–270° from magnetic north) to this baseline with shovel test units excavated at 20-m intervals on the eastern and western side of the Transect 1 units. Eighteen of the nineteen shovel tests were placed at 20-m intervals from each other using Brunton and tape. T7-ST1 was placed 21 m from T1-ST5 because of brush coverage at the 20-m interval location. The Bt soil contact was not encountered in most of these shovel tests. One unit (T1-ST1) was supersaturated at the time of testing and could not be excavated deeper than 63 cm bs. Three shovel tests (T4-ST3, T5-ST3, and T7-ST2) found the Bt soil contact between 70–108 cm below the modern ground surface. Only a single lithic was recovered from one shovel test unit (T4-ST3).

Table 13. Results of Shovel Tests at 41LR233

Shovel Test Unit	Artifacts (#/kind/depth)	Depth to Bt soil (cm bgs)
T1-ST1	0	>63
T1-ST2	0	>89
T1-ST3	0	>102
T1-ST4	0	>103
T1-ST5	0	>93
T2-ST1	0	>99
T2-ST2	0	>96
T3-ST1	0	>70
T3-ST2	0	>100
T4-ST1	0	>100
T4-ST2	0	>100
T4-ST3	1 lithic (41-62 cm)	108
T5-ST1	0	>98
T5-ST2	0	>100
T5-ST3	0	80
T6-ST1	0	>102
T6-ST2	0	>76
T7-ST1	0	>95
T7-ST2	0	70-75
>X cm indicates Bt soil not encountered		

Test Unit Excavations

Five 1x1-m test units were excavated on 41LR233 (Figure 20). All test units were placed within the central portion of the site where previous testing identified the highest density of artifacts. All 1x1-m controlled excavation units were located at 10-m intervals from shovel tests on the same grid used to establish those shovel test units. Test Unit 1 is 10 m east (90° from magnetic north) of T1-ST3, TU 2 is 10 m west of the site datum (and 10 m east of T5-ST3), TU 3 is 10 m east of the datum (10 m west of T5-ST1), TU 4 is 10 m west of T1-ST4, and TU 5 was placed 10 m east of T1-ST4.

Prehistoric materials were recovered most commonly below 50 cm from the ground surface. All units contained some archaeological materials, although TU 4 and TU 5 both contained only single artifacts between 60–73 cm below surface. The Bt soil was encountered between 107–115 cm below ground surface in the controlled excavation of TU 1. Augering identified this contact in the other four units between 124–137 cm below surface.

Soil Pit 1

A single soil pit was excavated away from the site area as a comparative control on local off-site soil and geomorphology. This unit was placed approximately 70 m north (0° from magnetic north) of T1-ST5, the northernmost shovel test excavated on the site. This soil pit was established using Brunton and pacing. No archaeological sites have been previously identified in this area. This pit was excavated approximately 61–64 cm deep and the southern wall was selected for profiling and description.

Excavation Results

Geomorphology and Site Formation

As noted in several of the shovel tests, auger probes, test units, and profiles, the soils on this site are different from those encountered in other site contexts examined during this project. Unlike the other archaeological sites in this study, there is a significantly greater amount of soils present that are genetically related to the Pleistocene Bt identified on those other sites. In several parts of 41LR233, more weakly developed Bt horizons that have not been eroded prior to deposition of sediments and pedogenesis associated with the Holocene sedimentary and archaeological record are present in shovel tests and test excavation units. The site occupies an area that appears to contain an older, intact sequence of Pleistocene soils that are, in places, conformable with the overlying C horizons and recent solum. 41LR233 occupies an area that is partially an older terrace remnant that is much less eroded and infilled with recent deposits than the other archaeological sites investigated during the current project.

Soil Pit 1

Soil Pit 1 was placed 62 m north of the identified site location. The southern wall of this control pit was described and drawn (Figure 21, Table A-10). This location contained soils similar to those seen in several shovel tests and in TU 2 and TU 4, which have a more complete Bt profile record.

This unit was located in an open meadow setting with fewer organics than the forested location of most of 41LR233. Weakly-developed A horizons extended 25–26 cm below the modern ground surface. These were directly underlain by a 13 cm thick C horizon and no B horizon was apparent. The C horizon rests conformably above 25 cm of two Bt horizons visible above the termination of the soil pit. These soils are less rubified (7.5YR 4/6-5/8) than the Bt that is an unconformable remnant in some of the shovel test and 1x1-m units on this site and at others. No ferric clasts or siliceous gravels were seen within these Bt soils. A total of 11 magnetic sediment susceptibility samples was collected from the profile of Soil Pit 1.

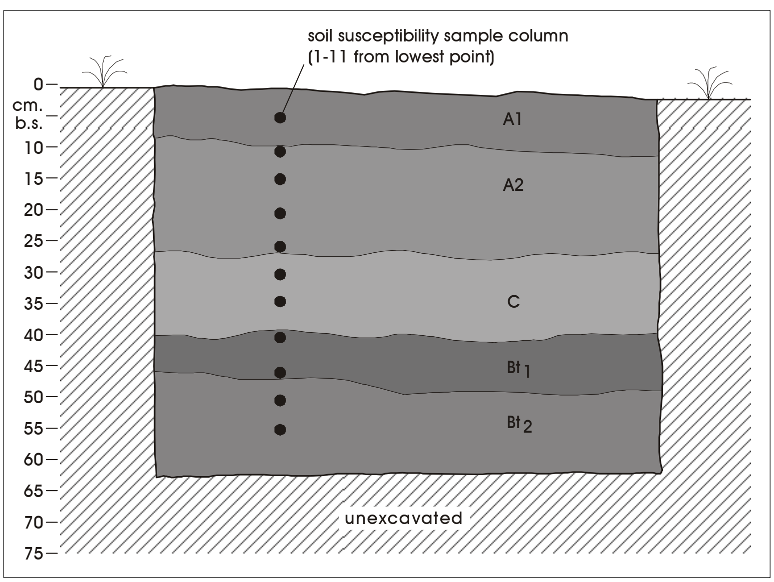

Figure 21. *South wall profile of Soil Pit 1, 41LR233.*

Test Unit 1

Test Unit 1 represents a soil sequence similar to that noted on most other sites in the current project at Camp Maxey. It does not contain the untruncated Bt horizons seen in several shovel tests and some test units on this site. The morphology of the Pleistocene Bt horizon differs dramatically in structure and transition from the overlying C horizon. This test unit does contain a relatively thick modern soil and C horizon sediments above the Pleistocene remnant (Figure 22, Table A-11).

The A horizons extend 13–15 cm below the modern ground surface. There is an Oi horizon approximately 3 cm thick at this location and other parts of the site located within the wooded area. There is a 17–20 cm thick AB horizon underneath the A2, and 15–18 cm of a weakly-developed B horizon. The C horizons are a thick unit (58–60 cm) that unconformably overly the strongly red (2.5YR 4/6) Bt horizon. The lowermost 10 cm of the C2 horizon has a few lamellae visible above the Bt contact. There is some colloidal staining of sand grains within the C2.

Test Units 1 and 3 both have abrupt transitions from the C horizon sediments to the strongly rubified Bt horizons with moderate structure. These appear to represent erosional unconformities. The Bt soils in these units have abundant clay bridges between grains, compared with few clay bridges on the Bt horizons in Soil Pit 1, TU 2, TU 4, and T5-ST3.

Discussion

The Bt horizons within Soil Pit 1 and the profiles of several units on this site are dissimilar to their expression at other sites examined during this testing effort. The Bt encountered in Soil Pit 1, TU 2, TU 4, and T5-ST3 all exhibit conformable contacts with the overlying C horizon. These Bt soils have less clay than the Bt in the position underlying the C sediments in most sites. Other than Soil Pit 1, all of the Bt soils have abundant ferric or manganese nodules but no siliceous gravels were noted. The presence of intact, possibly upper portions of the Pleistocene soils and lack of gravels suggest this area was subject to less pronounced fluvial erosion than seen at the other sites and off-site locations

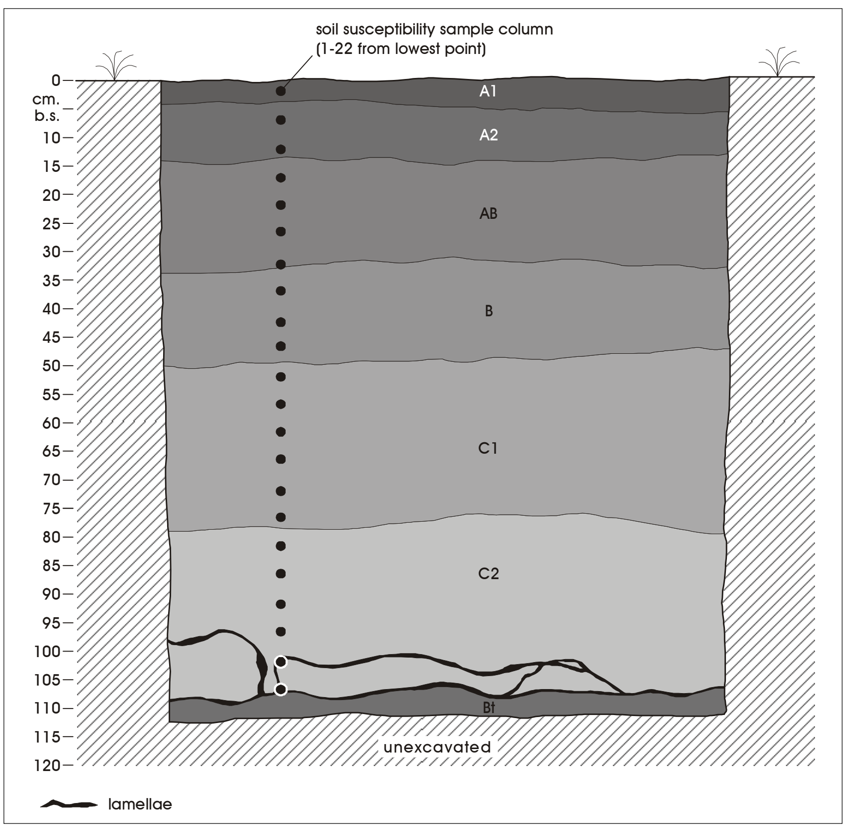

Figure 22. *North wall profile of Test Unit 1 at 41LR233.*

examined during this project. Soil Pit 1 on 41LR244 (approximately 460 m to the southwest [221°]) on an equivalent landform also may retain some portions of the upper Bt horizons that have been truncated in other settings examined during this investigation. The lack of clasts and the conformable contacts between the Bt and C horizons also is consistent with the inference that alluvial processes at this site (erosion of some portion of the Bt and deposition of sandy sediments) involved lower energy events. This has resulted in better preservation of upper portions of the Bt soil at 41LR233 than at other sites examined. The contrast in the morphology of the uppermost Bt is interesting. Several areas of the site do exhibit an erosional unconformity between the C and Bt horizons. Those units also appear to lack the less well-developed Bt soils that are associated with the modern solum. This area of Camp Maxey could offer an interesting context for additional evaluation of the controversies about formation of the sandy mantle deposits (C horizon sediments and modern pedogenesis).

Magentic susceptibility analyses from 41LR233 included 11 samples from Soil Pit 1 and 22 samples from the profile of Test Unit 1 (Appendix B). The off-site soil pit samples provide a view of the more intact, older soil profile seen in portions of this remnant terrace. Only two peak values are apparent, one in the A1 horizon (2.5 cm bs) and the other in the A2 horizon (17.5 cm bs). The lack of higher values in the two Bt horizons in Soil Pit 1 contrasts with the common identification of relatively high peaks within the older, Pleistocene Bt soil in several other sites. This probably indicates that these are younger units that are not completely equivalent to the remnant Bt unit encountered at the other sites examined in this investigation. Test Unit 1 did not contain the more intact soil profile seen in several portions of the site (TU 2, TU 4, and T5-ST3) and in Soil Pit 1. The MS values from the TU 1 profile show a series of relatively minor contrasting peak values. There is one at the base of the A2 horizon (12.5 cm bs) and a series of low amplitude high value readings within the C horizons. Minor peaks are evident at the top of the C1 horizon (52.5 and 57.5 cm bs), the middle of the C1 (67.5 cm bs), at the C1 and C2 boundary (77.5 and 82.5 cm bs), the middle of the C2 (92.5 and 97.5 cm bs), and at the base of the C2 unit just above the contact with the Bt horizon (107.5 cm bs) where the lamellae suggest eluvial accumulation of clays. Within TU 1, all the other test units, and the one positive shovel test, most artifacts were present below 40 cm bd (see following section). The minor MS peaks suggest a possible series of short-term periods of surface stability associated with artifact accumulations. There are no dramatic differences in the MS values that indicate significant temporal duration to these surface stability events associated with natural or cultural organic enrichment.

Archaeological Recovery

A single lithic was recovered during the shovel testing (Table 13) and only 16 lithics were recovered from four of the five 1x1-m test units (Table 14). Test Units 1, 2, and 3 contained almost all of the artifacts in the sample from this site. All of the prehistoric material was encountered below 30 cm below the current ground surface, and most (n=12) was below 60 cm. Test Units 4 and 5 had only a single artifact each, also between 60–70 cm bd.

A total of 17 pieces of debitage was recovered from 41LR233. The majority of these flakes were chert (n=11, 65%). Five pieces of quartzite (29%) and a single piece of jasper (6%) were represented. Only four flakes (24%) were complete. Most common were distal segments (n=7, 41%) followed by proximal portions (n=3). Two medial fragments and a single piece of angular debris were also present. This is a very small sample of complete flakes. Cortex was present on most of the flakes. Five flakes (29%) had 1–50 percent cortex, four had 51–100 percent cortex, one flake possessed 100 percent cortical cover on the dorsal surface, and only seven flakes (42%) had no cortex. No tools were recovered from 41LR233. This sample is too small for characterization of lithic reduction or other aspects of stone technology at 41LR233. Only one of the 19 shovel tests contained a single flake, all other shovel test units contained no lithics. All of the 1x1-m units were excavated to deep contacts with the Bt soil (94–123 cm below the current ground surface). The site has a very low-density artifact scatter and no suggestions of possible subsurface concentrations.

Only three pieces of fire-cracked rock were recovered from three 1x1-m test units (TU 2, TU 3, and TU 4). All three came from below 50 cm bd as did most of the prehistoric material on 41LR233.

Table 14. Results of Test Units at 41LR233

1x1-m Unit	Artifacts (#/kind/depth*)	Depth to Bt soil (cm bd*)	Maximum Unit Depth (cm bd*)
TU 1	1 lithic (50-60 cm)	107-115	118
	1 lithic (70-80 cm)		
	1 lithic (80-90 cm)		
	2 lithics (90-100 cm)		
	1 lithic (100-110 cm)		
TU 2	1 frag barb wire; 1 lithic (10-20 cm)	137**	123
	1 fence staple (20-30 cm)		
	1 fence staple (40-50 cm)		
	1 FCR (80-90 cm)		
	1 lithic (90-100 cm)		
	1 lithic (110-120 cm)		
TU 3	1 lithic (30-40 cm)	124**	120
	2 lithics; 1 FCR (50-60 cm)		
	2 lithics (60-70 cm)		
	1 lithic (90-100 cm)		
TU 4	1 FCR (63-73 cm)	125**	94
TU 5	1 lithic (60-70 cm)	125**	104
*below datum at highest corner of ground surface **depth to Bt soil determined by augering			

41LR244

This was the smallest site examined during the current project. 41LR244 is located at the southern end of the same geomorphic surface that includes 41LR233 (Figure 3). Deeply incised creek drainages isolate this higher meadow area from lower terraces to the south. 41LR244 is a very small, low-density lithic site (Figure 23-Map Supplement). The site is located at the headcut of a deeply incised ephemeral drainage. The main trunk of this drainage forms the southern margin of this site and a branch extends northwards along the western site boundary. This is a level terrace landform at the margin of an area of open meadow to the north. The elevation of the site area is approximately 520 ft (158 m) AMSL at the northern end of the previously identified site location, sloping gently to almost 500 ft (152 m) at the south. The small area where artifacts have been recovered is approximately 510 ft (155 m) AMSL.

Few artifacts were identified from the previous testing of this site. Four pieces of debitage, one heat spall, and a single sherd were recovered from three of six shovel tests (Perttula, Lyle, and Tomka 2001:101). This site was previously identified as having the potential to be an Early-Middle Caddoan period site based on the recovery of a single sherd (Tomka et al. 2001:Table 12-1). Previous investigations identified a site boundary that represented areas that had not been shovel tested. The current examination placed systematic grid shovel tests across the entire previously delimited site area. Controlled 1x1-m test units were restricted to the near vicinity of the site datum. Based on shovel test and test unit results, the currently defined site boundary is significantly smaller than the prior site definition of 4,592 m^2 (Perttula, Lyle, and Tomka 2001:101). The area containing artifacts is only 556 m^2.

Archaeological Investigations

Shovel Tests

Previous shovel testing did not examine the northern two-thirds of the identified site area. A grid of shovel tests was established to systematically sample subsurface deposits on 41LR244 (Figure 23). An initial baseline transect (Transect 1) was oriented along magnetic north-south (0°–180°) in relation to the site datum tree. Perpendicular (90°–270° from magnetic north) transects (T2–T6) were oriented from these initial baseline shovel tests. Two to four shovel tests were excavated on each of these east-west transects. All of the shovel tests encountered the Pleistocene Bt soil between 27–77 cm below the modern ground surface (Table 15). Only six shovel tests had 60 cm or more of sediments above the Bt contact. Twenty-two shovel tests were excavated on 41LR244 during the current examination. No artifacts were recovered in any of the shovel tests. The locations of all shovel tests were established using a Brunton and tape.

The intervals between most units were 20 m except where the drainages required a closer spacing of shovel tests. T1-ST1 was placed 15 m south of the site datum because the ground surface sloped significantly into the drainage farther south of this position. Transect 2 shovel tests also were located only 10 m south of the datum because of the ground surface slope. T2-ST1 was placed 10 m west of the Transect 1 baseline and T2-ST2 was excavated 8 m east of the baseline. The drainage on the western side of the site dictated a closer interval spacing west of Transect 1. T3-ST1 was placed 25 m west of the datum and T3-ST2 15 m from the datum because of the position of the deeply incised drainage on the western side of this portion of the site. T3-ST4 was excavated only 15 m east of T3-ST3 because of the incised drainage. T4-ST1 was located 25 m west of T1-ST2 and T4-ST2 was placed 15 m west of T1-ST2. T5-ST1 was excavated 34 m west of T1-ST3 and T6-ST1 was only 8 m west of T6-ST2. This spatial coverage is considered to provide a good sample of potential subsurface archaeological remains.

Table 15. Results of Shovel Tests at 41LR244

Shovel Test Unit	Artifacts (#/kind/depth)	Depth to Bt soil (cm bgs)
T1-ST1	0	27
T1-ST2	0	51
T1-ST3	0	55
T1-ST4	0	65
T1-ST5	0	57
T2-ST1	0	53
T2-ST2	0	58
T3-ST1	0	41
T3-ST2	0	40
T3-ST3	0	35
T3-ST4	0	49
T4-ST1	0	54
T4-ST2	0	68
T4-ST3	0	58
T4-ST4	0	49
T5-ST1	0	45
T5-ST2	0	69
T5-ST3	0	57
T5-ST4	0	62
T6-ST1	0	52
T6-ST2	0	68
T6-ST3	0	77

Test Unit Excavations

Four 1x1-m test units were excavated on 41LR244 (Figure 23). All encountered the Bt soil between 41–61 cm below the modern ground surface (Table 16). Test Units 1, 2, and 4 were located 10 m from the datum along three cardinal directions—south, west, and east respectively (relative to magnetic north). Test Unit 3 was placed 2 m north of the site datum because the 10-m interval location was within a shallow drainage. All test units were located using a Brunton and tape. No additional test units were excavated because the previous shovel testing only recovered artifacts within this southern area of the site and the current shovel testing identified no other areas containing prehistoric or historic debris. Low recovery in test units also did not identify a need for additional subsurface examination. Test Unit 3 contained lithics from 1–31 cm and 41–51 cm below datum (equivalent to ground surface). Test Unit 4 recovered one bullet and a single lithic from 10–20 cm bd. Test Unit 1 and TU 2 contained no artifacts.

Soil Pit 1

A control soil pit was excavated 20 m north (0°, magnetic north) of T1-ST5. This location was established using Brunton and pace method. The Bt soils examined in this profile may lie unconformable under the C horizon but also suggest the presence of some upper portions of this older soil that have been truncated in most other areas examined during this project (except the nearby site 41LR233). The eastern wall of this unit was described, drawn, and sampled for magnetic sediment susceptibility analysis.

Excavation Results

Geomorphology and Site Formation

Descriptions of the soils in TU 1 within 41LR244 and the off-site soil pit demonstrate a similar soil profile for this area adjacent to significant and deeply incised erosion of these sediments apparent in the drainages to the south and west of the identified site area. This area has been subject to previous erosional events that have resulted in a relatively thin C horizon remnant and very thin, weak recent soil development. The very ephemeral nature of the site

Table 16. Results of Test Units at 41LR244

1x1-m Unit	Artifacts (#/kind/depth*)	Depth to Bt soil (cm bd*)	Maximum Unit Depth (cm bd*)
TU 1	0	46-51	51
TU 2	0	45-47	47
TU 3	1 biface (1-12 cm)	58-61	61
	1 lithic (21-31 cm)		
	1 lithic; 1 FCR (41-51 cm)		
TU 4	1 bullet; 1 lithic (10-20 cm)	41-45	45
*below datum at highest corner of ground surface			

manifestation is consistent with erosion of much of the archaeological record rather than suggestive of this location representing a behaviorally small site.

Soil Pit 1

This soil pit exhibits a very similar profile to those seen at most sites examined during this project (Figure 24, Table A-12). Weakly-developed A horizons extend 14–15 cm below the modern ground surface. A single, weak B horizon is 7–9 cm thick. The C horizon sands are 23–30 cm thick and rest unconformable on the uppermost Bt horizon (Bt1). Within this soil pit a maximum of 46 cm of Bt soil was exposed. The Bt1 horizon is weak-moderately developed with an increase in clay, but few clay bridges or films. The Bt2 and Bt3 horizons exhibit moderate-strong structure and increased robustness of clay bridges and films. A magnetic susceptibility sample column of 18 samples was collected from this profile.

Test Unit 1

The southern wall of TU 1 was profiled, described, and a column of seven magnetic sediment susceptibility samples was collected (Figure 25, Table A-13). The soils in TU 1 are very shallow, but typical of the pedon identified at this site in all of the shovel tests and 1x1-m test units. Approximately 15–18 cm of A horizon soils rest on a 13–15 cm thick B horizon. All of these soils are weakly-developed with maximally medium-sized subangular blocky peds. The C horizon is only 8–9 cm thick and has an unconformable contact with the Bt horizon.

Discussion

The profile of TU 1 describes the thin soils encountered in all excavations on 41LR244. The thickness of the modern solum is not unusual at this location. Soil Pit 1 exhibits a similarly thin A1-A2-B sequence overlying a much thicker C horizon than in TU 1. All excavations indicated a very minimal B horizon development. Analogously thick C horizons were encountered within the deeper shovel tests and test units on this site. The soil profiles at 41LR244 suggest these thin, recent soils have formed over a more eroded C horizon than were encountered at several of the other sites. Although artifact recovery at this site was low, artifacts were present within the C horizon. It is apparent that this site has probably been subject to erosion of some portion of its prehistoric component. The site position directly adjacent to significantly incised drainages suggests that much of the site has been impacted by natural erosion. It is very likely that the very small site area that can be defined for 41LR244 is due to erosion associated with migration of this nearby ephemeral drainage. This has probably caused removal of much of the cultural deposits that were present at this location and the identified site area may be only a remnant of a larger site that is now gone because of arroyo formation. The evidence for erosion of the C horizon deposits strongly indicates that much of the archaeological record at 41LR244 has been removed prior to recent surface stabilization and the formation of thin soils. The very small horizontal area containing artifacts does suggest that much of the original site has been removed through erosion. The geomorphological setting and soil information indicate that there is a low probability that the small size of 41LR244 represents a limited activity site or a minimally re-occupied location. This site has a very poor likelihood of producing spatial data or artifact assemblages with associational integrity.

Magnetic susceptibility analysis results (Appendix B) from the 18 samples collected in Soil Pit 1 and seven samples from TU 1 identify similar peak values in both profiles. In TU 1, below the A1 horizon sample, the only spikes in MS values are from the lower portion of the B horizon and the contact of the B and C horizons (22.5 and 27.5 cm bs). Soil Pit 1 has an identical peak at the B and C horizon boundary (22.5 cm bs). Two minor peaks are present in the middle (37.5 cm bs) and lower (47.5 cm) C horizons. The Bt horizons in the soil pit exhibit no MS variations, reminiscent of the Bt units in the soil pit at the nearby site of 41LR233. This correlation indicates that the distinction between the B and C horizons may mark a sedimentary interruption and period of surface stability prior to recent soil development. The occurrence both within the defined site area and the off-site soil pit suggests that natural organic accumulation is responsible for these peak readings. Alternatively, pedogenesis of the solum may be entirely responsible for these MS spikes in both sets of samples. Eluviated organics may have preferentially accumulated at the B/C boundary and may not represent any temporal stability of a past surface. Artifact recovery from 41LR244 is too low to assist in determination of the reasons for these MS correlations.

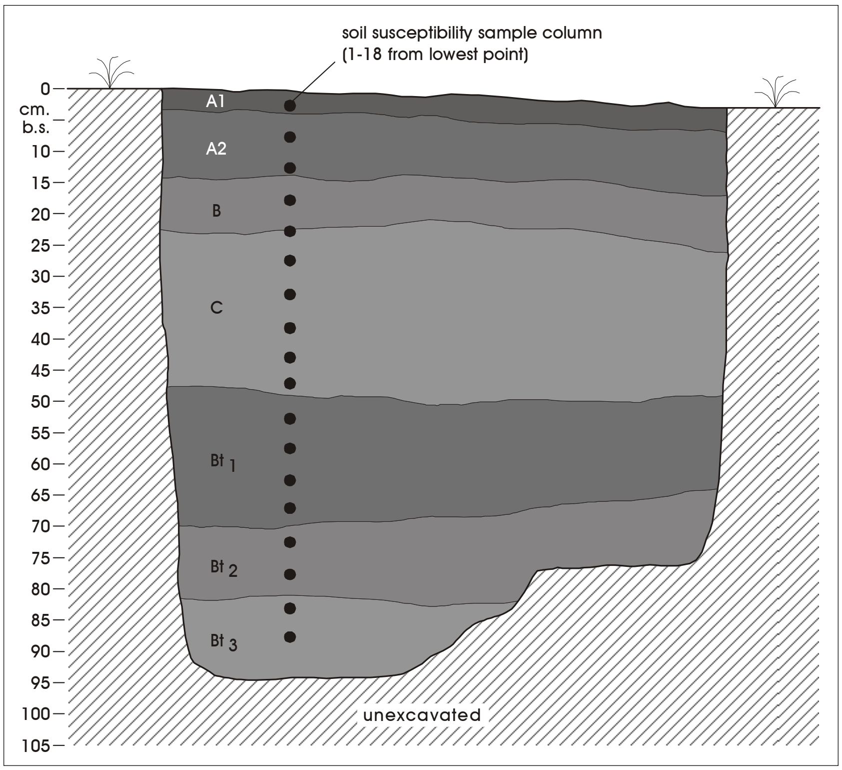

Figure 24. *East wall profile of Soil Pit 1, 41LR244.*

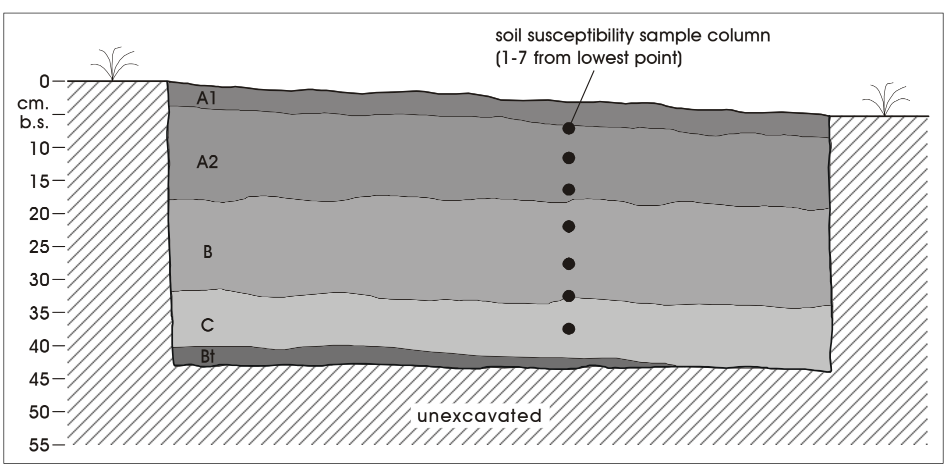

Figure 25. *South wall profile of Test Unit 1 at 41LR244.*

Archaeological Recovery

This site produced very low recovery of archaeological materials. None of the 22 shovel tests contained any artifacts. Only two 1x1-m test units contained cultural materials (TU 3 and TU 4). Test Unit 4 contained only a bullet and a single flake. Three lithics were recovered in TU 3, including a biface and two flakes, in addition to one piece of FCR.

The biface fragment (Figure 8e) is a 28 mm long piece of petrified wood exhibiting large initial flake removals. There is cortex present on both faces and several step fractures suggest difficulty in thinning the middle portions of each face. The piece is broken from a probable manufacturing error. This is one of only two pieces of petrified wood identified from any assemblage during this investigation at Camp Maxey. Only one piece of FCR was recovered from this site.

This site has extremely low subsurface artifact presence. The sample size of lithics from this site is too small for any meaningful statement about lithic technology or site taphonomy. Sampling through shovel testing identified no clusters of artifacts. The controlled test units were all clustered in the area that produced the positive shovel tests during the previous site survey and testing. It appears that 41LR244 is a very ephemeral site. The nearby location of deeply incised drainages is quite likely to have eroded potentially denser artifact presence at this site.

41LR254

This site is an extensive, low-density lithic scatter located approximately 200 m southeast of 41LR137 (Figure 3). It also is situated upstream on the northern bank of the same unnamed third-fourth order tributary feeding into Pat Mayse Reservoir. There is an ephemeral stream on the northern portion of the site forming an extensive swamp along the northern site margin (Figure 26-Map Supplement). The northwestern portion of the site, where the two drainages are less than 50 m apart, also was very swampy. 41LR254 is situated on the northwestern portion of a ridge rising to the southeast between these two drainages. Most of the site represents eroded slope margins of a terrace ridge remnant. The initial site characterization identified 41LR254 as a multi-component site (Lyle, Perttula, and Fox 2001:128–129). Eight of the 15 previously excavated shovel tests on the site produced five flakes, two cores, and one Late Archaic Yarbrough dart point. Two historic ceramics collected during survey and testing suggested a late-nineteenth-century occupation of this site. The originally defined site area was 39,532 m^2.

The majority of the higher density subsurface deposits were identified within the middle of the site. This is a broad, flat area that is on a lower terrace surface than the highest portion of the site to the southeast. All of 41LR254 is on a set of younger, separate geomorphic surfaces from a much higher, older terrace approximately 100 m to the south of the southeastern site boundary. This site exhibits great variation in surface elevation, between 490–520 ft (149–158 m) AMSL. Many portions of the identified site area have experienced significant erosion. Areas to the east, north, and northwest of the site datum are slopes where artifacts are likely redeposited from colluvial processes. Fine, well-sorted sand sediments are thinnest at the southeastern end of the site and the northeastern slope. The south-central portion of 41LR254 is the only part of the site that appears to be relatively intact. More precise geomorphic interpretation of the relationship between the slope deposits and the more level portions of the site are difficult because backhoe trenches could not be excavated on this site. The presence of several deeply incised streams prevented backhoe access to examine the subsurface sediments. The evidence for extensive impacts to the site from previous military training use does indicate significant loss of deposit integrity in several areas of 41LR254.

Archaeological Investigations

Shovel Tests

Additional shovel tests were placed on 41LR254 to augment the previous coverage from the initial excavations performed by CAR (Figure 26). The majority of these were in the central portion of the site. A total of 41 shovel tests was excavated during the current project. They were laid out along a series of transects to systematically and judgmentally sample the site area. A baseline transect (Transect 1) was established to sample the longest dimension of the site. This was placed at 300º–120º from magnetic north using a Brunton pocket transit and tape. T1-ST3 was located 10 m northeast (30º) of the datum. Eleven shovel tests were excavated along this line. Perpendicular (210–30º from magnetic north) to this baseline transect, eight other sample transects were established for placement of additional shovel tests and the controlled test units. The intervals between all shovel tests along Transect 1 were 20 m. Intervals between almost all of the other shovel tests were 20 m. Exceptions were made based on landform and tree locations. A few intervals between shovel tests were reserved for placement of 1x1-m test unit excavations.

Seven grid shovel tests were not placed at 20 m grid intervals from adjacent shovel tests or test units, and variable spacing was necessary between these other excavations. T1-ST1 was excavated 33 m northwest (300º) of T1-ST2. T1-ST8 was placed 40 m southeast (120º) of T1-ST7. T6-ST4 was placed 30 m northeast (30º) of T6-ST2. T8-ST3 was placed 10 m southwest (210º) from T8-ST1, and T8-ST2 was 10 m southwest of T8-ST3 (210º). T4-ST2 was excavated 30 m from T1-ST11. T5-ST2 was placed 36 m northeast of T5-ST1. Six additional shovel tests were placed approximately 10 m from three of the test units. These were oriented perpendicular to transects where those shovel tests were located (parallel with the T1 orientation of 120–300º from magnetic north). TU1-STa was placed southeast (120º) of TU 1, TU1-STb was placed northwest (300º) from TU 1. TU3-STa was situated southeast of TU 3, and TU3-STb placed northwest of that unit. Likewise, TU4-STa and TU4-STb were excavated southeast and northwest respectively from TU 4. The 10-m distances between these units were measured by pace not tape.

Ten of these shovel tests contained artifacts (Table 17). Three of those contained only historic debris and one produced a bullet in Level 1 (0–20 cm bs) and prehistoric material in lower levels. The two shovel tests east of the datum sloping down to the intermittent stream contained lithics only in the upper 20 cm. Deeper artifacts were found in the area west and south of the datum and in the vicinity of T1-ST6. Although the sample is quite small, shovel testing suggested that the low-density of prehistoric cultural material on this site was concentrated below the upper 20 cm of recent soil. The concentration of artifacts along the northern site boundary recovered during the previous testing is in a low, eroded area that appears to be disturbed.

Test Unit Excavations

Test units were concentrated on the middle portion of the site (Figure 26). Shovel testing indicated that this area possessed the highest subsurface artifact density and the deepest sediments (Table 17). A total of six 1x1-m units was excavated on 41LR254. Test Units 1 and 2 were contiguous, producing a good sample of this portion of the site. The northern wall of these two units was profiled and a complete set of soil and sediment descriptions performed. All 1x1-m units, except TU 5, produced artifacts in excavation levels throughout the sediments overlying the Bt soil.

Following standard methods used at the other sites examined during this project, excavation levels were referenced to an individual unit datum placed on the highest corner of each test unit excavation. Test Units 1 and 2 used the same datum so that both units contained excavation levels to identical depths. This datum also was used to profile these units. These two units were placed southeast of the site datum, approximately 20 m southwest of T1-ST4 along the T5 transect. They were on a level area that appeared to represent a relatively intact terrace surface. Test Units 1 and 2 were excavated to a maximum depth of 92 cm bd. The Bt soil was encountered at 90–92 cm bd. Two shovel tests were placed 10 m from TU 1 on the southeastern side (120º from TU 1) and the northwestern side (300º from TU 1). These are perpendicular to the orientation of TUs 1 and 2 along Transect 5, following the orientation of Transect 1.

Test Unit 3 was placed 20 m southwest of T1-ST6 along Transect 8 because this was one of the only shovel tests to contain a prehistoric artifact and T1-ST6 contained a thick deposit above the Bt soil. A very high concentration of bullets was recovered from TU 3. The Bt soil in TU 3 was encountered at 83–86 cm bd. Two shovel tests were excavated 10 m away from this unit (at 120º and 300º from TU 3)

Test Unit 4 was excavated 20 m southwest of the site datum along Transect 6. The Bt soil was located at 98–100 cm bd in TU 4. Two additional shovel tests were excavated 10 m away from this test unit.

Test Unit 5 was situated downslope of TU 4, and the sediments overlying the Bt soil were much shallower. The older Pleistocene soil was 47–65 cm below the unit datum (modern ground surface). This unit contained the lowest lithic density from any test unit. Only two lithics were recovered from 30–40 cm bd.

Test Unit 6 was excavated 40 m southwest of TU 2 along Transect 5 because this surface contained the most intact and densest subsurface prehistoric materials. The Bt soil was 78–86 cm below the ground surface at this location.

Table 17. Results of Shovel Tests at 41LR254

Shovel Test Unit	**Artifacts (#/kind/depth)**	**Depth to Bt soil (cm bgs)**
T1-ST1	0	>52
T1-ST2	0	68
T1-ST3	0	59
T1-ST4	0	29
T1-ST5	0	45
T1-ST6	1 lithic (60-80 cm)	84
T1-ST7	0	>60
T1-ST8	0	29
T1-ST9	0	41
T1-ST10	0	25
T1-ST11	0	40
T2-ST1	0	44
T2-ST2	0	89
T2-ST3	0	10
T2-ST4	0	29
T3-ST1	0	56
T3-ST2	0	92
T3-ST3	0	34
T3-ST4	0	>80
T4-ST1	0	81
T4-ST2	0	>87
T5-ST1	0	72
T5-ST2	2 bullets; 1 lithic (0-21 cm)	86
T5-ST3	0	63
T6-ST1	0	52
T6-ST2	0	>98
T6-ST3	0	72
T6-ST4	0	>100
T6-ST5	1 lithic (0-22 cm)	56
T7-ST1	1 historic ceramic (0-20 cm); 2 lithics (40-61 cm)	78
T8-ST1	0	71
T8-ST2	0	59
T8-ST3	2 bullets (0-20 cm); 1 bullet (20-40 cm)	53
T8-ST4	0	25
T8-ST5	0	1
TU1-STa	1 bullet (0-20cm); 1 lithic (20-40 cm); 1 lithic (40-60 cm); 2 lithics (60-80 cm);	89
TU1-STb	1 lithic (40-60 cm); 1 lithic (60-80 cm)	86
TU3-STa	1 bullet (40-60 cm)	73
TU3-STb	1 bullet (0-20 cm)	90
TU4-STa	1 historic ceramic (0-20 cm)	>62
TU4-STb	0	84
>X cm indicates Bt soil not encountered		

Soil Pit 1

A control excavation to examine sediments away from the previously identified site area was placed outside the southern identified boundary of 41LR254 (Figure 26). This unit was placed approximately 50 m at 180º (from magnetic north) away from T1-ST10. This location was chosen because it represents a relatively stable surface that was nearly equivalent to much of the site area. Approximately 20 m farther south there is a high geomorphic surface with very different parent sedimentary material that includes a greater amount of relatively large clasts. That high surface represents a much older sedimentary unit unrelated to the lower, younger stable surface where the majority of prehistoric artifacts and most intact site context were identified. Soil Pit 1 was excavated to approximately 15 cm below the upper contact with the Bt soil. This area contains only a very thin epipedon (~12–13 cm) of recent soils.

Excavation Results

Geomorphology and Site Formation

Profiling and detailed soil description was performed on the contiguous north walls of TUs 1 and 2. Comparable standard soil description was done on Soil Pit 1. Sketch maps and brief observations on all of the shovel tests and other test units confirm the general scheme of site formation that may be established from these two areas of 41LR254. The profile of TUs 1 and 2 and from Soil Pit 1 provide a good representative sample of the major regimes of surface formation, deposition, and modifications of the sediments and soils at 41LR254.

Soil Pit 1

The thin sediments above the Pleistocene Bt soil in this unit (and nearby T1-ST8, T1-ST9, and T1-ST10) indicate that the southern portion of the previously identified site boundary includes areas with minimal recent sediments that could contain prehistoric archaeological material (Figure 27, Table A-14). Several shovel tests at the southeastern end of the site (T1-ST8, T1-ST9, T1-ST10, T2-ST3, T2-ST4, T8-ST4, and T8-ST5) are in areas that have previously been eroded to the Bt soil and have minimal recent sediments and soils developed on top of the older surface (1–41 cm of deposit above the Bt unit). Soil Pit 1 is on a higher portion of the landform than those shovel tests listed above with very thin soils. The B1 and B2 horizons in Soil Pit 1 are more well-developed than those described within 41LR254. These appear to be portions of the soil horizon that are genetically related to the Bt unit that is isolated in other portions of the site. Magnetic sediment susceptibility samples were collected from a column on the north wall profile. A total of five samples was collected from Soil Pit 1.

Soil Pit 1 is located in an area that has not been subject to as much erosion of older soils as the portions of site 41LR254 that contain archaeological deposits. The robust B horizons overlying the Bt are not present in other portions of 41LR254

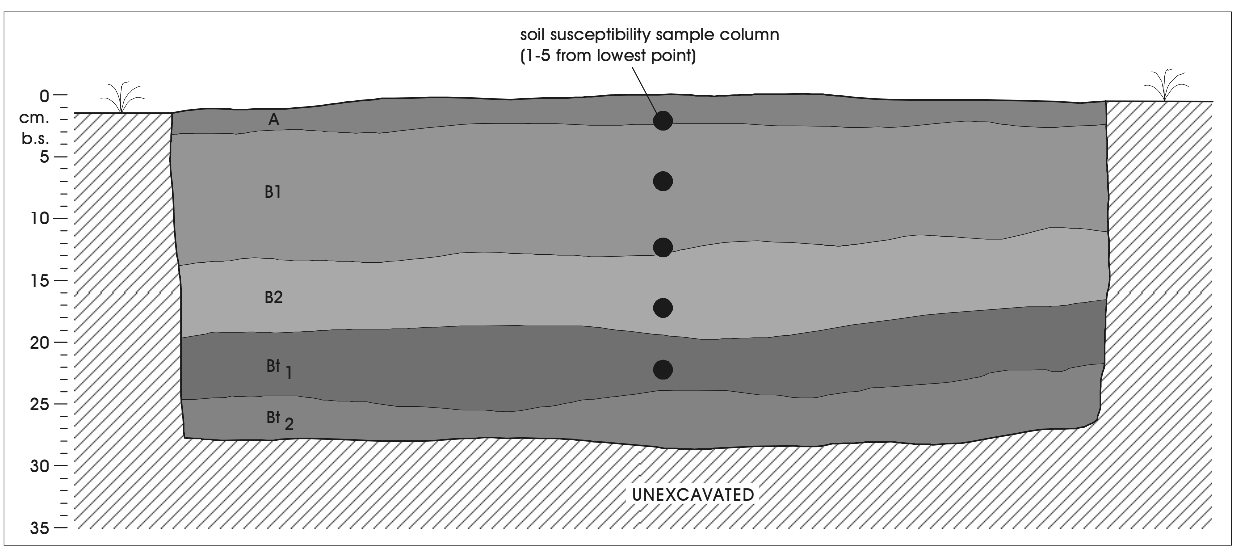

Figure 27. *North wall profile of Soil Pit 1, 41LR254.*

where artifacts were recovered. There also is not a comparable thick mantle of C horizon sands as is common to the more intact portions of this site near to the datum and upslope to the west and southwest of the site datum. This indicates that the erosional events and subsequent burial of the Bt soil by sands forming an unconformity between these units are probably related events. Scouring of the upper Bt (and possibly analogous B horizons to those encountered in Soil Pit 1) and subsequent burial with alluvial sands is apparent in the northern two-thirds of the site, but not the southernmost portion. Much of the eastern-northeastern slope of the site does not have as thick a mantle of C horizon sands. This slope has been subject to erosion from the drainage on the northern side of the site and some colluvial movement of sediment.

Test Units 1 and 2

This long profile provides an excellent view of the relatively deep, sandy sediments unconformably overlying the Bt soil (Figure 28, Table A-15). The recent soil formation is weak and significant zones of unmodified C horizon sediments are present above the contact with the remnant Pleistocene soil. Only the uppermost 40 cm represent the modern solum and approximately 40 cm of C horizon underlies the base of the B horizon. This sequence was typical for many of the shovel tests and test units excavated on this site. Few lithics were found within the weakly-developed recent A and B horizons. These appear to be more recent than the archaeological occupation of this site. Most of the prehistoric material in these units was recovered from the C horizons. A magnetic sediment susceptibility sample column of the profiled north wall collected 17 samples from 5-cm intervals.

Discussion

Profiling of TUs 1 and 2 indicates that archaeological material is not common in the upper portions of the profile because these are recent, weakly-developed soils. No evidence of paleosols are present in lower portions of the soil profile, but the majority of archaeological material is located within the B and C horizons of shovel tests and test units on 41LR254.

Several units on the northeastern slope had shallower deposits than those described for TU 1 and TU 2. However, the presence of C horizons with weakly-developed soil was similar to those examined on the more intact upper portion of the site. These did not resemble the older soil remnants identified in Soil Pit 1. The southeastern portion of the site has clearly been most affected by erosion and colluvial redeposition of sediments from higher settings. The most intact deposits were identified on the more level current surfaces of the central ridge and western portion of the site. Both the landform slope and the thinner soils on the eastern and southeastern portions of 41LR254 indicate that much of the areas away from the central and western portions of the site have low potential to contain intact archaeological deposits.

The results of analysis of the magnetic susceptibility samples is provided in Appendix B. Only five samples were collected from the very shallow profile represented by off-site Soil Pit 1. Other than the high values associated with the epipedon, a single subsurface peak is present in the sample from the Bt1 horizon (22.5 cm bs). There is very little interpretive potential with this very small sample. A series of 17 samples from the profile of Test Unit 2 does offer information about possible stratification of archaeological deposits. The highest peak MS value is in the lower portion of the C1 horizon (52.5 cm bs). Two minor peaks are identifiable within the B horizon (32.5 cm bs) and upper portion of the C1 horizon (42.5 cm bs). There is another peak in MS value at the base of the C2 horizon (82.5 cm bs) just above the contact with the Pleistocene Bt soil. Shovel tests produced the highest frequency of artifacts from the C horizons (see following section). The association of subsurface artifact densities and MS values is very close for the 1x1-m test units (see Figure 29). The peak MS values in TU 2 in the B and upper C1 horizons correlate with the marked increase in prehistoric material frequency from all 1x1-m test units in Level 4 (30–40 cm bd). The highest density excavation level in TU 2 is Level 6 (50–60 cm bd) that correlates with the highest MS value from that profile in the lower portion of the C1 horizon. This greatest bulge in artifact frequency for all test units is also from 50–60 cm bd. The deepest peak in artifact frequency from test units is from 70–80 cm bd and there is a dramatic spike in MS value in the sample from the base of the C2 horizon at 82.5 cm bs. These correlations strongly suggest that magnetic susceptibility results from the TU 2 profile indicate possible past stable surfaces associated with the highest organic enrichment and greatest accumulation of artifacts. Given the current sample, it not possible to determine whether cultural or natural incorporation is likely responsible for the MS results.

Archaeological Recovery

41LR254 contained the third largest lithic assemblage from this project. There are four bifaces, one flake tool, one core, and 83 pieces of debitage. Additionally, historic materials were relatively abundant on this site. A total of 150 military

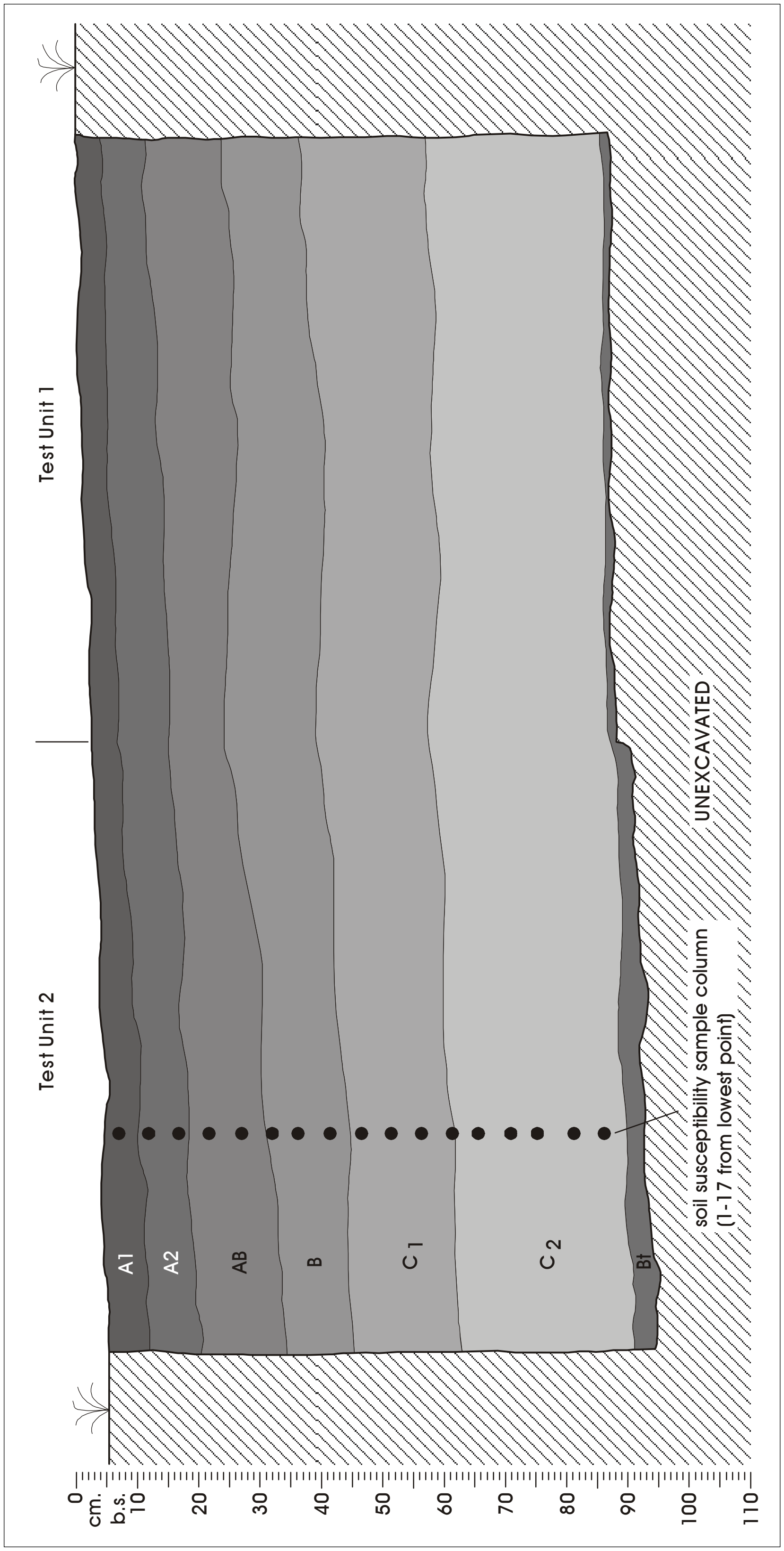

Figure 28. *West wall profile of Test Units 1 and 2 at 41LR254.*

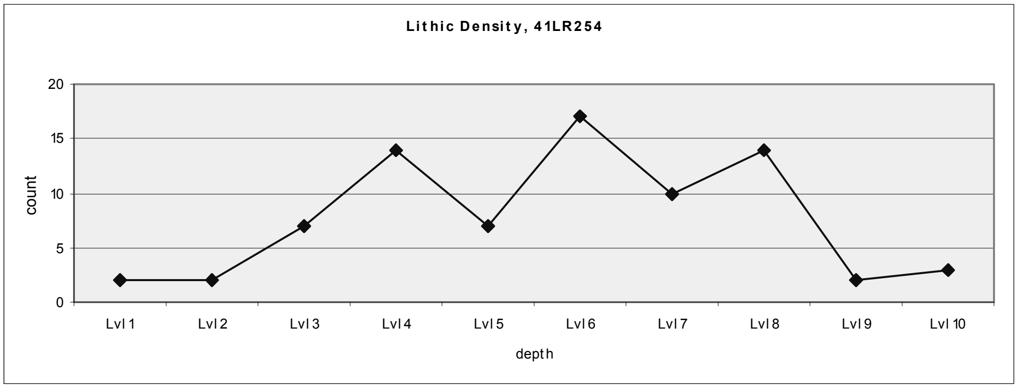

Figure 29. *Vertical distribution of lithics from test units, 41LR254.*

bullets represents the largest recovered assemblage of historic period materials on any site investigated during this project.

Comparison across all shovel tests (n=6 with lithics) suggests that most prehistoric materials were encountered within the C horizons. Eleven pieces of debitage were found in shovel tests. Two lithics were recovered from 0–20 cm below the modern ground surface, one from 20–40 cm, four from 40–60 cm, and four from 60–80 cm (Table 17). A single historic ceramic was collected from 0–20 cm. All six test units contained prehistoric artifacts (Table 18). A total of 72 pieces of debitage, four bifaces, one core, and one flake tool were recovered from test units. Test Unit 3 contained the smallest artifact assemblage. Only four flakes were recovered from 30–80 cm below the current ground surface in this 1x1-m unit. Although there is some variability in surface topography that may complicate some comparisons, most test units were placed on the more intact, higher, level surfaces with nearly equivalent soil profiles. Within the 1x1-m test units, prehistoric materials appear to be more common in deeper sediments (Figure 29). For all six test units, few lithics were recovered within the upper 20 cm (two from 0–10 cm, two from 10–20 cm). There is a slight increase in lithics from 20–30 cm below surface (n=7) and a marked bulge in lithic frequency at 30–40 cm below surface (n=14). At 40–50 cm bs only seven lithics were recovered. Seventeen lithics came from 50–60 cm, 10 from 60–70 cm, and 14 from 70–80 cm. Although four units were excavated below 80 cm, only five lithics were recovered this deep. Test Unit 4 is the only 1x1-m unit that was excavated to 100 cm and three lithics were recovered from 90–100 cm. Although the sample is small, these frequency bulges in Levels 4 (30–40 cm bd), 6 (50–60 cm bd), and 8 (70–80 cm bd; Figure 29) suggest the record may contain separate occupation pulses indicating multiple occupations at 41LR254.

Historic materials were recovered from four 1x1-m units (Table 18), mostly confined to the uppermost horizons. Four bullets and one glass shard were recovered from Level 1 (0–10 cm bd). Excluding TU 3 for the moment, 13 bullets came from Level 2 (10–20 cm bd) and one bullet from 30–40 cm. Test Unit 3 was excluded because it contained a very high number of bullets that were concentrated in animal burrows. Test Unit 3 contained 117 bullets in Levels 1 (0–10 cm bd) through 7 (20–80 cm bd). Approximately 92 of those were recovered from 0–50 cm in one krotovina along the southwestern wall of TU 3. The concentration of 25 bullets from 70–80 cm was from a different krotovina in the northeastern quadrant of the test unit. Only a single prehistoric flake was recovered from 50–60 cm in this unit. Six of ten positive shovel tests contained historic debris. Six bullets were recovered from 0–20 cm, one from 20–40 cm, and one from 40–60 cm below surface in these six units. There is a strong likelihood that those recovered in sediments below 20 cm derive from displaced materials in the looser upper horizons. One historic ceramic was recovered from 0–20 cm bs in TU4-STa. Historic material previously identified included two ceramics, barbed wire, and four bullets (Lyle, Perttula, and Fox 2001:128–129). Other than the military debris, this sample is inadequate to suggest the nature of the historic occupation. Shovel Test T5-ST2, located at the base of the northeastern slope near the site margin, contained very disturbed sediments in the upper 20 cm. These appeared to be anthropically disturbed with very mixed soil and sediment from the solum and C horizons and poorly sorted clasts. Given the abundant ammunition evidence for training at this site, there is a possibility that 41LR254 was partly modified during military training exercises (Leffler 2001:Figure 3-15).

Lithic assemblage attributes are presented in Tables 19 and 20. Most of the artifacts on this site are made from chert

Table 18. Results of Test Units at 41LR254

1x1-m Unit	Artifacts (#/kind/depth*)	Depth to Bt soil (cm bd*)	Maximum Unit Depth (cm bd*)
TU 1	2 bullets, 1 lithic (0-10 cm)	90-92	92
	8 bullets, 1 lithic (10-20 cm)		
	2 lithics (20-30 cm)		
	1 bullet (30-40 cm)		
	2 lithics (40-50 cm)		
	2 lithics (50-60 cm)		
	3 lithics (60-70 cm)		
	1 lithic (70-80 cm)		
TU 2	1 lithic (3-10 cm)	91-92	92
	5 bullets, 1 lithic (10-20 cm)		
	4 lithics (20-30 cm)		
	2 lithics (30-40 cm)		
	1 biface, 1 lithic (40-50 cm)		
	6 lithics, 3 FCR (50-60 cm)		
	4 lithics (60-70 cm)		
	3 lithics, 1 FCR (70-80 cm)		
	1 biface (90-92 cm)		
TU 3	2 bullets (0-10 cm)	83-86	86
	15 bullets** (10-20 cm)		
	6 bullets** (20-30 cm)		
	18 bullets**, 2 lithics (30-40 cm)		
	50 bullets** (40-50 cm)		
	1 bullet, 1 lithic (50-60 cm)		
	25 bullets **, 1 lithic (70-80 cm)		
TU 4	1 shard glass (0-10 cm)	98-100	100
	5 lithics (30-40 cm)		
	2 lithics (40-50 cm)		
	1 core, 5 lithics, 1 FCR (50-60 cm)		
	2 lithics (60-70 cm)		
	4 lithics (70-80 cm)		
	1 lithic (80-90 cm)		
	2 lithics (90-100 cm)		
TU 5	2 lithics (30-40 cm)	47-65	65
TU 6	1 lithic (20-30 cm)	77-86	86
	3 lithics (30-40 cm)		
	1 lithic (40-50 cm)		
	1 flake tool, 1 lithic, 1 FCR (50-60 cm)		
	1 lithic (60-70 cm)		
	1 biface, 4 lithics, 3 FCR (70-80 cm)		
	1 biface (80-90 cm)		

*below datum at highest corner of ground surface
**from krotovina

Table 19. 41LR254 Debitage Attributes

Category	Variables	Percentage of Sample	n
Raw material	chert	60.2%	50
	quartzite	37.4%	31
	jasper	1.2%	1
	petrified wood	1.2%	1
Condition	complete	39.8%	33
	proximal	16.9%	14
	medial	9.6%	8
	distal	28.9%	24
	angular debris	4.8%	4
Cortex	0%	51.8%	43
	1-50%	31.3%	26
	51-99%	15.7%	13
	100%	1.2%	1

Table 20. 41LR254 Flake Thickness to Length Ratios for Complete Flakes

Variable	Percentage of Sample	n
<0.15 (late reduction)	51.5%	17
0.16-0.25 (tool manufacture)	27.3%	9
>0.25 (early reduction)	21.2%	7

(n=50, 60% for debitage). Thirty-one pieces of quartzite debitage were recovered (37%) and single examples of jasper and petrified wood (each makes up 1% of the sample). Most of the debitage is complete (n=33, 39%) or represents distal portions (n=24, 29%). Some of the distal fragments may represent nearly complete flakes with only a small portion of the proximal end missing. Proximal fragments are the third most common (n=14, 17%), followed by medial pieces (n=8, 10%). Only four pieces of angular debris were identified (5%). The majority of flakes have little cortex present. Forty-three flakes (52%) had none, 26 (31%) had less than 50 percent, 13 (16%) exhibited 51–99 percent, and only one flake possessed 100 percent cortex on its dorsal face. Thickness to length ratios for the 33 complete flakes (Table 20) suggest that most are late reduction (n=17, 52%). The number of tool manufacturing flakes (n=9, 27%) and early stage flakes (n=7, 21%) are not statistically different. Two pieces of chert and four pieces of quartzite exhibited some burning.

A single core of poor quality lustrous chert was recovered from 50–62 cm bd in TU 4. There is a small portion of cortex present on one portion of this piece. Most of the removals are unidirectional. Extensive step fracturing on one side evidences difficulty in removing a thick area with abundant checks. This piece has a number of impurities and cracks that made further reduction problematic. It is unlikely that good quality flakes were removed from this nucleus.

A nearly finished biface (Figure 8f) was recovered from 70–80 cm bd in TU 6. This piece is made of chert and has cortex present over much of the proximal end. Large percussion flake scars predominate on both faces. The edges are slightly sinuous but regular in outline. This piece exhibits extensive smoothing of the flake scar ridges of both faces and the edges as though it has been subject to subsurface or fluvial abrasion under relatively low-energy conditions. This complete implement appears to have been discarded or lost before final shaping.

Three additional bifaces were recovered at 41LR254. A fragment of chert gravel from TU 6, Level 9 (80–90 cm bd) represents an abandoned early stage biface. One face has approximately 60 percent cortex cover and has five small hard hammer centripetal removals. The opposite face presents irregular fracturing of a ventral flake with three small removal scars. Poor flaking quality is probably responsible for the abandonment of additional reduction of this piece. A fragment of a thin biface was recovered from Level 5 (40–50 cm) of TU 2. This is a thin (3.6 mm) broken portion of a chert implement with hard hammer reduction and minimal evidence of final pressure retouch along one edge. This relatively hard chert has some flaws that caused step fracturing. It is possible that the retouched edge could have served as a used tool edge. There is minimal evidence of shaping on other portions of this implement. A small (maximum length=17.3 mm) biface fragment also was recovered from Level 10 (90–100 cm bd) of TU 2. This piece may be a flake removal from a larger biface. Both faces show minimal hard hammer removals, but it appears too small and irregular to represent a tool preform. One face appears to represent a distal termination of an outrepassé flake associated with an unsuccessful attempt to thin an area of step terminations.

One steep edged flake tool (Figure 8g) was recovered from 50–60 cm bd in TU 6. This is a 41 mm long piece made on lustrous chert with shaping and use damage along the sinister edge of this very thick (20 mm) flake. This implement is a side scraper. All retouch and use damage is from the ventral surface to the dorsal. Cortex covers approximately 60 percent of the dorsal surface. The edge outline is slightly irregular. This piece has few small step fractures along the worked and used edge.

As with all of the assemblages from this testing effort, this is a very small lithic sample from a scattered group of shovel tests and test excavation units. It is not possible to make secure inferences about manufacture, use, or discard on the basis of this sample. However, much of the debitage appears to represent late stage reduction. Prehistoric materials were found mostly between 30–80 cm below the modern ground surface. The debitage includes mostly decorticate pieces or flakes with less than 50 percent dorsal cortex coverage. This is consistent with the flake thickness/length ratio that also suggests a dominance of later stage debris. There were no formal tools recovered from these excavations at 41LR254. This site contained a significant number of subsurface historical materials, almost exclusively military bullets. Several contexts (especially TU 3) document that military activities are associated with disturbance of even some of the deeper cultural deposits on 41LR254. The low density of recovered material, lack of a diverse assemblage, recovery of no diagnostic artifacts or other datable materials, inability to identify discrete archaeological deposits, and the lack of features indicate that this site does not meet the criteria for inclusion as an SAL or NRHP property.

Historic Artifacts

Bryant Saner, Jr.

In the early part of 1942, the U.S. Army obtained a tract of land in Lamar County, Texas, north of the city of Paris to be used as a military base. It was named Camp Maxey and grew to approximately 70,000 acres (Leffler 2001). Portions of the base were retained after WWII and used as a training base for troops. The present-day Camp Maxey is about 6,424 acres and is used by the Texas Army National Guard for training. When the U.S. Army acquired the land, civilian structures were demolished and the rubble was bulldozed into trenches and buried. Scattered remnants of these structures and historical debris can still be found, although it is unlikely that any intact historic components remain (Mahoney 2001a).

Some historic materials were recovered from all seven sites examined in the current investigation. Two historic features were encountered at two archaeological sites (41LR137 and 41LR225). Most of the historic debris encountered was from military activities and 41LR225 contained evidence of pre-WWII economic activities. Historic artifacts recovered during this project include bullets (n=186), burned clay (n=1), ceramics (n=4), glass (n=6), and metal (n=7; Table 21).

An ambiguous feature encountered on 41LR137 consisted of a depression and associated historic materials to a maximum depth of 80 cm bs. The center of this feature was 2.3 m northwest of T6-ST6. The depression is approximately 50 cm in maximum diameter and 15 cm deep. Some additional disturbance was noted that extends approximately 2.5 m north-south by 1.5 m east-west. There are small mounds of relatively recent backdirt around the edges of the feature that appear to have been removed from the depression. This disturbance does not appear to represent a shovel test from the previous investigation (see discussion of site 41LR137). Tabular sandstone cobbles were observed around the depression and near T6-ST6. A sherd of transfer-printed ware was recovered 3.1 m west of the shovel test. A cut nail (square nail), one bullet, and a piece of burned clay also were recovered from Level 1 (0–20 cm bs) of T6-ST6. T7-ST6, located 20 m west of T6-ST6, also contained a significant amount of historic material. One fragment of thin aqua glass came from Level 1 (0–20 cm bs) and a whiteware sherd was recovered from Level 4 (60–80 cm bs).

Table 21. Historic Artifacts Recovered

Artifact Classes		**Sites**							**Totals**
		41LR137	**41LR214**	**41LR222**	**41LR225**	**41LR233**	**41LR244**	**41LR254**	
bullets	regular	5	0	16	0	0	1	150	172
	long	0	2	2	3	0	0	1	8
	22 cal.	0	0	6	0	0	0	0	6
metal	cut nail	1	0	0	0	0	0	0	1
	wire nail	0	0	0	2	0	0	0	2
	fence staple	0	0	0	0	2	0	0	2
	strip	0	0	0	1	0	0	0	1
	unidentified	0	0	0	1	0	0	0	1
glass	thin aqua	1	0	0	0	0	0	0	1
	thin clear	0	0	0	0	0	0	1	1
	thin purple	0	0	0	1	0	0	0	1
	thick purple	0	0	0	1	0	0	0	1
	lip/neck purple	0	0	0	1	0	0	0	1
	thick amber	0	0	0	1	0	0	0	1
ceramics	faience	0	0	0	0	0	0	1	1
	transfer	1	0	0	0	0	0	0	1
	whiteware	1	0	0	0	0	0	0	1
	stoneware	0	0	0	0	0	0	1	1
possible baked clay		1	0	0	0	0	0	0	1
Totals		10	2	24	11	2	1	154	204

The other historic feature is a series of remains identified on the surface of site 41LR225. Much of this material was documented during the previous survey and shovel testing effort at this site (Lyle, Perttula, and Fox 2001:125–127). This site contains an extensive surface presence of early-twentieth-century building debris, evidence of ground modification, and associated large discarded materials. The historic component of this site appears to be the scattered remains of at least one structure. Large sheets of tin or zinc plate, several metal basins, bricks, parts of 1920s vehicles, and parts of an old fence are present on the site surface. Three long bullets were recovered. Four pieces of glass were recovered in test excavations. One shard of amber glass was recovered and the other three fragments were purple glass from both thick and thin portions of vessels. Only one piece of purple glass could be identified as a fragment of a bottle lip and neck. No seam was identified on this piece that could be used to date its manufacture. These bottle fragments suggest an early-twentieth-century date (see following discussion). Two wire nails, one unidentified metal strip, and one unidentified piece of metal also were recovered from excavations. Most of the artifacts were recovered from the ground surface to 20 cm bd. One piece of metal was collected from 20–40 cm bs and a single nail was found between 39–60 cm bs. No materials were collected from the site surface and the larger debris and areas of surface modification had been previously mapped (Lyle, Tomka, and Perttula 2001b:Figure 9-5). Other than these two sites, most historic materials were recovered as isolated items in the uppermost soil contexts.

Bullets

The most common historic artifacts recovered were bullets. A total of 186 bullets was recovered during testing. One hundred eighty of these are brass coated, have a “boattail” base, and average >0.30 inches (>7.7 mm) in diameter (Figure 30c). There are eight bullets that average 1.41 inches (36 mm) and 172 that average 1.11 inches (29 mm) in length. Both these bullet types are very similar to the .30 06 caliber type used in the US M1 (Garland) rifle used during WWII and the Korean War (Hardin 1980). The other six bullets recovered (all from 41LR222) are .22 caliber.

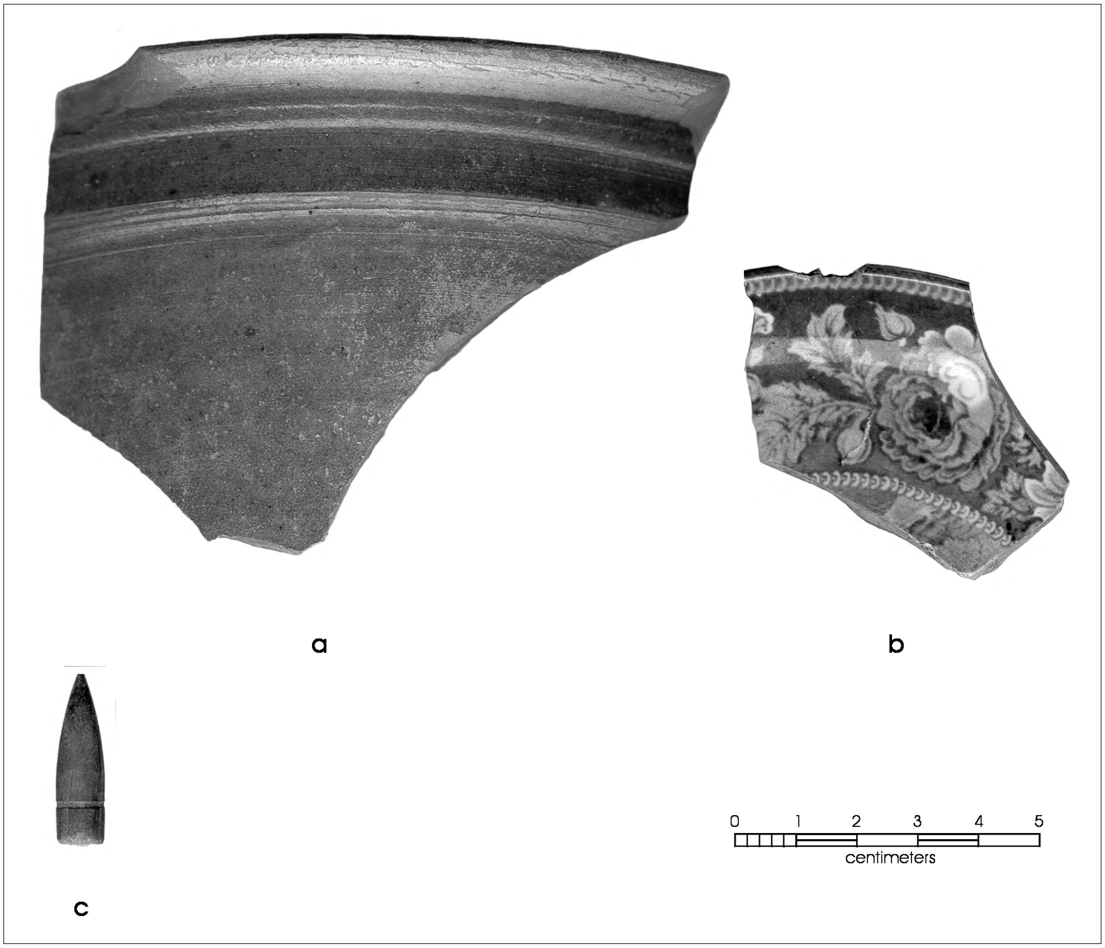

Figure 30. *Examples of historic artifacts recovered:* a) Albany slip stoneware (41LR254); b) transfer ware (41LR137); c) example of bullet with "boattail" base.

Burned Clay

A single piece of burned clay was recovered near the small historic feature at 41LR137. There is little clay in the surficial soils of this site. The burned clay may be associated with this depression or hole feature and large the number of historic artifacts.

Ceramics

Four sherds of historic ceramics were recovered during the current investigations. Two sherds were collected at 41LR137 and two came from 41LR254. At 41LR137, a fragment of whiteware was recovered from 60–80 cm bs in T7-ST6 and a sherd of transfer ware (Figure 30b) was found on the surface near the historic feature. At 41LR254, a sherd of faience was recovered from 0–20 cm bd in TU4-STa and a rim sherd of stoneware jar (Figure 30a) was collected from 0–20 cm bs in T7-ST1.

Whiteware was manufactured in England beginning in the early 1800s. Creamware, pearlware, and ironstone are often placed in this group. Whiteware became common in many households after the Civil War (Uecker et al. 1991). Transfer-printed ware began to be manufactured in England in the mid-1700s. Plates made of copper were engraved with a design and pigment was placed on the plate and pressed on paper. The paper was then placed on an unfired vessel, transferring the design. The vessel was fired and glazed (Godden 1963). Transfer-printed ware was very popular in America in the last part of the 1800s (Miller 1991).

Faience is tin-glazed with a milk white surface having a blue cast. It was named after Faenza, Italy where it was first made in the mid-1500s. In the 1600s, plain Faience became popular in France and Europe (Lane 1946). Faience is still made today. The stoneware sherd from 41LR254 has a greenish-brown exterior salt glaze and a brown interior Albany slip glaze. Salt glaze was produced by placing salt in the kiln while the vessel was being fired. It produced a textured glaze. This glaze was common in the last half of the 1800s. Albany slip glaze was created by making a thin solution of clay that was strained to leave only the fine particles. This solution was applied to the vessel prior to firing. Albany slip was very popular in the late 1800s.

Glass

Seven fragments of glass were recovered during the 2002 investigations at Camp Maxey. One fragment of thin aqua glass came from 0–20 cm bs in T7-ST6 on 41LR137. A single shard of thin, clear glass was recovered from 0–10 cm in TU 4 on 41LR254. The four pieces of glass from 41LR225 were described previously in the discussion of the historic remains from that site.

Color can be used to determine the relative age of glass manufacture. Most aqua-colored glass was manufactured before 1900. Purple glass, an altered form of clear glass, was introduced in the latter part of the 1800s. Nineteenth-century and early-twentieth-century clear glass was made by adding manganese during the manufacture process. This was done between 1880 and 1914. When this glass is exposed to sunlight for any length of time it turns purple. Amber glass is produced by adding nickel during the manufacturing process. Thick amber glass is usually indicative of vessels made before 1903 (Polak 2000).

Style of manufacture also can suggest manufacturing dates for some glass vessels. Bottles or jars without uniform thickness on the sides and base usually predate 1900. The seams left by the mold used to make bottles also may be temporally diagnostic. In the mid-1800s, glass companies started using molds instead of hand-operated blowpipes to make bottles. The molds from this time were only used to make the body of each bottle. The neck and lip were made separately. The two parts were heated and joined later in the process. The molds were modified in the 1860s and this resulted in the seam running half-way up the neck. In the early 1880s, another mold modification was made and the seam occurs to the lip, but not through it. In 1903, machine molds made an appearance. The entire bottle was made at one time, eliminating the second step of heating and adding the lip to the neck. Bottles made after 1903 have a seam that extends through the lip (Polak 2000).

Nails

A total of three nails and one fence staple were recovered from three of the sites investigated. A single cut nail was collected from 0-20 cm bs in T6-ST6 at 41LR137. Two wire nails were recovered at 41LR225; one from T1-ST2 (39–60 cm bs) and one from T4-ST2 (0–20 cm bs). Two fence staples came from excavations of TU 2 (20–30 and 30–40 cm bd) at 41LR233.

In the late-1700s, a machine was introduced to mechanically manufacture nails. Prior to this, nails were made by hand. A flat sheet of steel was placed in the machine and spikes were cut perpendicular to the sheet. The flat sheet and perpendicular cut created a square nail. The head was manually attached to the widest end of the spike. The narrow end remained blunt. Eventually, the heads also were mechanically manufactured. Square or iron cut nails were in widespread use until the early 1900s (Wells 1998). Iron cut nails in various sizes and shapes can still be purchased from specialty stores today (Tremont Nail Company 1992). Wire nails are made by cutting short, sturdy wire into spikes. The heads are mechanically made on one end of the spike. This type of nail was introduced in the late 1800s. The popularity of wire nails gradually increased and by 1920 wire nails greatly surpassed cut nails in production and use (Wells 1998).

Conclusions

Except for 41LR225, historic materials represent a minor component of the recovered materials from the seven sites investigated during the current testing project at Camp Maxey. The samples of historic materials are generally small and provide only minimal information about late-nineteenth- and early-twentieth-century activities in the vicinity of these prehistoric sites. Material at 41LR225 suggests a farm location, although negligible investigation of the historic component was undertaken during this project. Most of the military bullets recovered indicate activities associated with training during WWII. Approximate dates are suggested below for the historic remains from the three sites (41LR137, 41LR225, and 45LR254) with the largest inventory of historic materials. However, these are based on very small artifact samples and manufacturing dates offer only the earliest relative dates for the use of particular items.

Many historic materials are documented to be curated for significant amounts of time and can have significantly longer use lives than relative seriation might imply.

The historic artifacts recovered at 41LR137 suggest a time frame no earlier than the late-1800s and most probably in the early-1900s; transfer ware and iron cut nails were commonly in use during this time. Whiteware was in use before and after this period.

The more robust artifact and large historic debris at 41LR225 provided several dating opportunities. The amber glass predates 1900 and was used primarily for liquor and beer bottles. The purple glass was produced between 1880–1914 when glass makers added manganese to glass. Two fragments of light purple glass and the dark purple neck and lip fragment were recovered in the upper 20 cm of the units. The presence of wire nails suggest a date after 1900. The car parts remains found on this site were 1920s or early 1930s models. The data indicates the earliest probable occupation of the site was the early 1880s through at least the 1930s. The glass, nails, and unidentified metal artifacts were buried when the structure was demolished by the military in the early 1940s. Milk pail remains, at least one stock pond, and the remains of a fence all are consistent with the suggestion that this portion of 41LR225 represented farming activities.

The isolated artifacts at 41LR254 provide very little information about the historic presence at this location. There was no debris at this site that indicated the presence of a structure and the mix of artifacts identified during the previous investigation (Lyle, Perttula, and Fox 2001:129) suggest no more than the presence of a plate and sherd of stoneware. The age of the faience sherd recovered at 41LR254 is unknown. However, the glaze on the stoneware indicates it was manufactured in the late 1800s.

The six .22 caliber bullets identified from 41LR222 provide no secure temporal information. They were recovered from the surface to 70 cm bs. This ammunition was available prior to 1900 and is still in use today.

The most common historic artifacts were WWII bullets. The dimensions of the bullets recovered are very close to the known dimensions of those used during WWII. The size of the bullets and location of the various WWII weapons training ranges, in relation to the sites tested, demonstrate it is likely that 180 of the bullets recovered during the investigation are WWII-era ammunition. Firing and combat ranges from WWII training were located on the periphery of the investigation area. According to a WWII map of the Camp Maxey facility (Mahoney 2001b:Figure 12), the line of fire was towards the sites investigated during this project. 41LR254 was at the end of a rifle training range.

Chapter 6: Recommendations

Summary

None of the seven archaeological site investigated during this testing project at Camp Maxey are considered significant cultural properties meriting additional testing or mitigation efforts. The recovery of single ceramic sherds from three sites (41LR137, 41LR233, and 41LR244) during the previous shovel testing (Perttula, Lyle, and Tomka 2001:98, 101, 114–115) suggested a possibility that Caddoan period sites with significant remains might be encountered during this testing. No additional ceramics, evidence of features, habitation debris, or dense archaeological horizons were identified. 41LR137 was the only site that produced a comparatively high density of lithics and is a location with good geomorphic integrity. This group of sites offers poor prospects for addressing the research questions and comparative work that have been part of the ongoing Camp Maxey testing projects (see Chapter 1 and Perttula 2001).

None of the sites investigated are considered to be potentially eligible as SAL or NRHP cultural properties. It is recommended that training activities be allowed to proceed on all of these locations without additional consultation with THC. All of the sites exhibit low-density artifact presence, no identifiable features were encountered during the testing, and several have experienced significant erosion that has affected their integrity. Three sites (41LR137, 41LR214, and 41LR225) may possess some archaeological remains of interest that were not encountered simply due to the nature of sampling. The shovel testing and 1x1-m test excavations are considered to be an adequate and sufficient examination for determination of their potential research significance. The low density of artifacts, inability of testing to identify discrete archaeological deposits or paleosols, and the lack of any encounter with features during the current testing efforts indicate that these sites are ineligible as potential NRHP or SAL properties. It is recommended that normal training activities be allowed to proceed at all of the seven site locations examined during this testing project with no further need for additional archaeological investigations or future consultation with THC.

Summary discussions of each site and the reasons for recommendations that no additional work is considered necessary are presented in the following sections.

41LR137

41LR137 had one of the highest densities of archaeological materials recovered from this testing effort (n=97 lithics). The site context suggests a relatively high degree of geomorphic integrity. Despite good potential integrity, this is a low-density site with minimal opportunities to address the significant research questions outlined as critical for improved understanding of the Camp Maxey area (Chapter 1). The recovered remains did not indicate the presence of dense artifact deposits, identifiable features, or other suggestions that additional research would provide significant data relative to questions of culture history, technology, or past subsistence adaptations. 41LR137 is the most intact and densest site examined during this archaeological testing project. Although no features were identified during this testing effort, the presence of 19 pieces of FCR indicates that features are likely present on this site. Dispersed FCR may suggest that they have either been disturbed, were from relatively small features, or are infrequent and were not encountered because of sampling. This low-density site is not considered eligible as an SAL or NRHP property. Although this site produced a relatively large artifact assemblage compared with other sites investigated during this project, 41LR137 did not produce evidence of dense prehistoric occupation. The diversity of recovered materials is quite low, and no identifiable archaeological horizons were encountered. The single projectile point recovered was not diagnostic (possible Middle-Late Archaic) and came from a context associated with mixed historic materials. Geomorphically, this is a relatively intact and stable landform with deep Holocene deposits above the truncated Pleistocene Bt soil remnant. There is a very ephemeral historic component at this site. Only minimal evidence of historic debris and a small historic excavation were identified. The historic debris appears to represent remains of a relatively small, unknown facility that has been completely demolished. There is no suggestion of relatively intact historic features of any identifiable significance. With the caveat that some deeper areas of this site may contain more robust prehistoric occupation remains or features not encountered because of sampling, no further archaeological investigation is recommended at this site.

41LR214

41LR214 is located in an area near the only identified spring within the Camp Maxey facility. There are four other locations closely adjacent to this site that have been identified as separate archaeological sites (41LR213, 41LR215, 41LR216, and 41LR217). One of these sites (41LR215) is directly west of 41LR214, extends onto a higher and older terrace, and may represent a location that contains deposits behaviorally related to at least some occupations of 41LR214. Although the testing did not identify a significant archaeological site with more than a low density of artifacts, the location suggests that more robust remains may be present in this vicinity that were not encountered simply because of sampling. No additional archaeological investigations are recommended for this site. The very low density of artifacts recovered from 41LR214 and the absence of identified features did not indicate the presence of an apparently significant archaeological site. No formal tools were recovered and no other datable materials were encountered. Potentially, testing may have missed materials that would suggest a robust component to this site. However, what is interesting about this location is the large area covered by relatively low-density remains. 41LR215 produced artifacts in only seven of 38 shovel tests (Perttula, Lyle, and Tomka 2001:90–91). The presence of artifacts on at least three different geomorphic surfaces suggests that the location of the spring made this an attractive area for significant amounts of time. This kind of repeatedly used location has the potential to be critically informative about changing land use, subsistence opportunities, and social organization through time. The attractiveness of this location renders it a spatial magnet, but there is no *a priori* reason to expect that its use reflects identical system states. Predictable resources can be incorporated into many potential hunter-gatherer or agricultural strategies. Although many of the individual episodes of use may have produced a very ephemeral record that is difficult to interpret, the vicinity provides valuable information about pulses of use across time. Despite the landscape value of this site in comparison with the density of adjacent sites, testing did not identify characteristics that would make this site eligible as an NRHP or SAL resource. Artifact density at 41LR214 is very low, there was minimal diversity in the lithic assemblage, and no features or discrete archaeological deposits were identified. It is recommended that normal facility training use the area of 41LR214 be allowed to proceed without additional archaeological evaluation of this site or further consultation with THC.

41LR222

This is a moderate-sized site with a relatively low density of prehistoric artifacts. Only three of the current shovel tests contained single prehistoric artifacts and only two of six 1x1-m test units recovered subsurface prehistoric materials. Similarly low recovery was encountered during the previous archaeological testing of this site. Although soils at this location are relatively deep, and within the main identified site area show little evidence of erosion and minimal historic disturbances, there appears to be only a scattered and minimal archaeological presence at 41LR222. This site is not considered eligible as an NRHP or SAL property. Given the site context on a level and undissected high terrace, the very small amount of material identified is considered indicative of an ephemeral archaeological presence. It is recommended that normal military use of this location be allowed to proceed without further consultation with THC and no additional archaeological characterizations are considered necessary at this site.

41LR225

Archaeological testing indicates the presence of a very small amount of prehistoric material and a very disturbed early-twentieth-century site. Relatively thin soils in most portions of the site and evidence of significant erosion also suggest a limited potential for encountering intact archaeological deposits. This site did produce more finished tools than any other location examined during this work effort at Camp Maxey. Three projectile points were recovered from buried contexts between 20–53 cm below ground surface. They are not considered typeable, but suggest Archaic and Late Prehistoric occupations of this site. The prehistoric component of 41LR225 is low-density and has been affected by significant erosion of upper soils in many parts of the site. The highest frequency of projectile points (n=3) encountered during this project was recovered from the subsurface contexts at this site. The historic presence also has been severely impacted by destruction of the architecture at this location. Although 41LR225 may contain prehistoric and historic remains not identified through sample testing, the lack of significant geomorphological integrity of the deposits and the impacts to the historic component during WWII indicates a low potential that 41LR225 contains material in context that can address significant research questions about this region. Although this site produced the largest lithic assemblage recovered from this testing effort, it was derived almost entirely from two test units. The majority of the site contained very thin soils and no prehistoric artifacts. Because of the poor integrity suggested by the archaeological testing and disturbances from erosion and destruction of some of the historic component, no additional archaeological characterization of this site is recommended. 41LR225 is not considered eligible as an NRHP or SAL property. It is recommended that normal facility use of this site area be permitted to proceed without further consultation with THC. Although the site extends onto COE lands that have not been investigated, the extensive disturbances, thin soil, and low prehistoric recovery indicate that the portion on Camp Maxey should be considered a non-contributing portion should any future investigations identify significant archaeological remains on the COE portions of this site.

41LR233

This is a very small site with a very minimal prehistoric artifact inventory recovered in the sample shovel tests and controlled 1x1-m excavations. Only a single lithic was recovered during the shovel testing. Previous testing recovered one ceramic, two FCR, and a single heat spall. No evidence of any additional ceramics was encountered during the current testing. Debitage was also low-density within the controlled 1x1-m test units. Soil information suggests a very intact profile with significant amounts of remnant Bt above the portion that is represented at most other sites investigated at Camp Maxey during this project. The site setting is a relatively intact terrace remnant and preservation is considered to be very good. Despite the conditions that would result in excellent site preservation, 41LR233 represents a very minimal archaeological record of past activities. This site is considered ineligible as an SAL or NRHP property and no additional archaeological characterizations are considered necessary. No further investigations of this cultural resource are considered necessary and it is recommended that normal training uses in this area be allowed to proceed.

41LR244

This is a very small and ephemeral archaeological site that does not appear to have any significant archaeological deposits. None of the 22 shovel tests excavated during this testing produced any evidence of archaeological remains. Only one biface, two flakes, and one piece of FCR were recovered from 41LR244. Previous investigations recovered one ceramic and a single heat spall. No additional ceramics were encountered during this examination of 41LR244. Two of the four 1x1-m controlled excavation units contained prehistoric materials. Only one of those contained lithics to a depth greater than 20 cm below the modern ground surface. The presence of a deeply incised drainage south and southwest of 41LR244 may suggest that additional portions of the site have previously been eroded. It may represent a poorly preserved short-term use location. The very small size of this site, lack of a discrete archaeological deposit, minimal artifact recovery, and lack of any identifiable features indicates that 41LR244 does not have any potential to address the research questions about Camp Maxey and this region discussed in Chapter 1. There is a strong probability that the currently identified extent of this site represents a margin of a larger site that has been significantly eroded. This site is not eligible as an NRHP or SAL property. No further archaeological investigations are considered necessary at 41LR244. It is recommended that military training activities be allowed to proceed at this location without additional consultation with THC.

41LR254

41LR254 is a relatively large site exhibiting significant variability in surface topography. The eastern, northeastern, and northern portions of the site slope towards an unnamed drainage that runs northwest into the modern reservoir. The site's position between two intermittent drainages is responsible for the instability and erosion apparent at the site. Much of the northern and eastern areas of the site that contain artifacts appear to represent colluvial redeposition onto a previously scoured surface. The central portion of 41LR254 appears to be relatively intact. This is a very low-density archaeological site. No features were identified and minimal evidence of fire-cracked rock gave little indication whether features are likely preserved at 41LR254. The amount of erosion present suggests that only a limited portion of the center of the site may contain minimally disturbed archaeological deposits. There is extensive evidence of use of this area for military training. A greater number of WWII period bullets were recovered at this site than any other examined during this testing effort. Although this site produced the third largest lithic assemblage recovered during this investigation, the density of materials is extremely low. No formal tools were identified, and the assemblage contains minimal artifact diversity. No datable materials were encountered. The disturbed condition of this site and the small amount of cultural material present do not suggest that 41LR254 has significant research potential.

On the basis of this investigation it is not considered to be potentially eligible as an SAL or NRHP property. No additional archaeological research on this site is considered necessary, and it is recommended that normal training activities be allowed to proceed in this area without additional consultation with THC.

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Appendix A

Soil and Stratigraphic Descriptions

Table A-1. Soil Descriptions for Backhoe Trench 3, 41LR137

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	few organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 2/2	much decomposed organic material in this horizon
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	very few organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 4/6	decomposed organic material common in this horizon
AB	fine; well-sorted sand	w: non-sticky; non-plastic d: loose-soft	0	very few organic stains	weak; fine-medium; subangular-blocky	abundant; fine-coarse	0	clear; smooth	10YR 4/4	very few organics
B	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	very few silt	weak; medium-coarse; subangular-blocky	many; fine-coarse	0	clear; smooth	10YR 3/6	
C1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	very few colloidal stains	weak; fine-coarse; subangular-blocky	common; fine-coarse	0	gradual; smooth	7.5YR 4/6	
C2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	colloidal stains	weak; coarse; subangular-blocky	few; fine-coarse	0	gradual; smooth	7.5YR 5/6	2 possible FCR collected; few gravels (~1-2 cm diameter); several lamellae
lamellae	fine; well-sorted sandy loam	w: sl-sticky; sl-plastic d: soft	abundant thin, continuous clay bridges	colloidal stains	weak; fine; platey	very few; fine-coarse	few; very fine	abrupt; irregular-broken	5YR 4/6	irregular thickness (~3-7 mm)
C3	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	very few colloidal stains	weak; fine-medium; subangular-blocky	few; fine-coarse	0	abrupt; smooth	7.5YR 5/6	
Bt	fine; well-sorted sandy loam	w: sl-sticky; sl-plastic d: hard	common thin, discontinuous clay bridges	colloidal stains	moderate; medium-coarse; subangular-blocky	very few; fine	few; very fine	unknown	5YR 5/6	

Table A-2. Soil Descriptions for Test Unit 2, 41LR137

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 2/1	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	few organic stains; silt	weak; fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 4/4	moderate-small amount of organics staining on grains
AB	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few organic stains	weak; fine-coarse; subangular-blocky	abundant; fine-coarse	0	clear; smooth	10YR 4/4	small amount of organic staining on grains
B	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; fine-coarse; subangular-blocky	many; fine-coarse	0	clear; smooth	10YR 4/6	
C1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	very rare silt stains	weak; medium-coarse; subangular-blocky	many; fine-coarse	0	gradual; wavy	7.5YR 4/6	
C2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	few thin, discontinuous clay bridges	colloidal stains	weak; medium-coarse; subangular-blocky	many; fine-coarse	0	unknown	7.5YR 4/6	discontinuous lamellae readily visible in lower 25-30 cm
lamellae	fine; well-sorted sandy loam	w: non-sticky; non-plastic d: soft	many thin, continuous clay bridges	colloidal stains	weak; fine; platey	few; fine	0	abrupt; irregular-broken	5YR 4/6	

Table A-3. Soil Descriptions for Soil Pit 1, 41LR137

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	silt	massive-weak; single grain-fine; subangular-blocky	many; fine-medium	0	abrupt; smooth	10YR 4/3	few organics, young A horizon
B	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	massive-weak; fine-medium; subangular-blocky	common; fine-medium	0	clear; smooth	10YR 4/6	very few organics
C1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose-soft	0	silt	massive; single grain-coarse; subangular-blocky	common; fine-coarse	few; fine-med	gradual; smooth	10YR 4/6	few gravels (#3 cm diameter)
C2	fine; well-sorted sand	w: non-sticky; non-plastic d: loose-soft	0	silt	massive; single grain-medium; subangular-blocky	common; fine-coarse	few; fine-med	gradual; smooth	10YR 4/6	few gravels (#3 cm diameter)
C3	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; single grain-coarse; subangular-blocky	common; fine-coarse	few; fine-coarse	gradual; smooth	7.5YR 4/6	common gravels (#3 cm diameter)
C4	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	silt	massive; single grain-medium; subangular-blocky	few; fine-coarse	0	unknown	7.5YR 4/6	Common-many gravels (#4 cm diameter); mottling = 5YR 4/6

Table A-4. Soil Descriptions for Backhoe Trench 2, 41LR214

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	abundant; fine	0	abrupt; smooth	10YR 2/2	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: loose-soft	0	few organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	clear; smooth	10YR 3/2	moderate decomposed organic material; much bioturbation
B1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	common silt bridges	weak; medium-coarse; subangular-blocky	abundant; fine-coarse	v few; v. fine	clear; smooth	10YR 4/4	
B2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	v few silt bridges	weak; medium-coarse; subangular-blocky	few; fine-coarse	v few; v. fine	clear; smooth	10YR 4/4	
C	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few silt bridges	weak; medium-coarse; subangular-blocky	many; fine-coarse	v few; v. fine	abrupt; smooth	10YR 4/4	
Bt	fine; well-sorted sandy clay loam	w: sl sticky; sl plastic d: hard	abundant thick, continuous clay bridges	colloidal stains	strong; coarse; prismatic	few; fine-coarse	v few; v. fine-fine	unknown	5YR 4/6	

Table A-5. Soil Descriptions for Soil Pit 1, 41LR214

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	many organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 2/2	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	organic stains	weak; fine-medium; subangular-blocky	abundant; fine-coarse	0	clear; smooth	10YR 3/3	much decomposed organic material
A3	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	organic stains; silt bridges	weak; fine-coarse; angular-blocky	abundant; fine-coarse	0	abrupt-clear; smooth	10YR 3/3	
B1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	abundant silt bridges	weak; medium-coarse; angular-blocky	many; med-coarse	few; fine	gradual; smooth	10YR 3/6	lower boundary is the base of the major root zone
B2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	few thin, discontinuous clay bridges	abundant silt bridges	weak; medium-coarse; angular-blocky	common; med-coarse	many; fine-med	clear- gradual; smooth	10YR 4/6	slight clay bulge
Bt	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	common, med, discontinuous clay bridges	colloidal stains	mod-strong; coarse; angular-blocky	few; med-coarse	abundant; fine-coarse	clear; smooth	7.5YR4/6	abundant soft ferric nodules (#1 cm)
C	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	common silt bridges	weak; coarse; subangular-blocky	many; med-coarse	common; coarse	unknown	7.5YR4/6	abundant soft ferric nodules (#1 cm)

Table A-6. Soil Descriptions for Soil Pit 1, 41LR222

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	few organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 3/2	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	0	weak; fine-coarse; subangular-blocky	many; fine-coarse	0	clear-gradual; wavy	10YR 4/4	few organics
B1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; coarse; subangular-blocky	common; med-coarse	0	clear; wavy	10YR 4/6	much recent charcoal
B2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	common; silt bridge	weak-moderate; coarse; subangular-blocky	few; fine-coarse	0	clear; smooth	10YR 4/6	common ferric nodules (<5 mm)
Bt1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	colloidal stains	weak-moderate; medium-coarse; subangular-blocky	many; fine-coarse	few; fine-coarse	abrupt; smooth	7.5YR 4/6	few ferric nodules (<5 mm); abundant mottling (mottles=5YR 4/6)
Bt2	fine; well-sorted sand	w: sl sticky; sl plastic d: hard	few; thin; discontinuous	colloidal stains	moderate-strong; coarse; angular-blocky	common; fine-coarse	few; fine-coarse	abrupt; smooth	7.5YR 4/6	few ferric nodules; abundant mottling (mottles=5YR 4/6)
Bt3	fine; well-sorted sandy clay loam	w: sl sticky; sl plastic d: hard	common; thin, ped faces	colloidal stains	strong; medium-coarse; angular-blocky	few; fine-coarse	few; fine-coarse	unknown	7.5YR 4/6	abundant large mottling (mottles=2.5YR 4/8)

Table A-7. Soil Descriptions for Test Unit 3, 41LR222

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	abundant organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 2/1	much decomposed organic material in this horizon
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few organic stains	weak; fine-medium; subangular-blocky	many; fine-coarse	0	clear; smooth	10YR 4/4	
B1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; medium-coarse; subangular-blocky	many; fine-coarse	0	clear; smooth	10YR 4/6	
B2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; coarse; subangular-blocky	many; fine-coarse	0	clear; wavy-smooth	7.5 4/6	lamellae forming the lower boundary of this horizon in eastern half of profile
C1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few silt	weak; medium-coarse; subangular-blocky	few; fine-coarse	0	gradual; smooth	7.5 4/6	
C2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few silt	weak; coarse; angular-blocky	few; fine-coarse	very few; fine	clear; wavy-irregular	7.5 5/6	lamellae forming the lower boundary of this horizon in western half of profile
C3	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few, thin silt bridges	moderate; coarse; angular-blocky	few; fine-coarse	many; fine	abrupt; smooth	7.5 5/6	
Bt	fine; well-sorted sand	w: non-sticky; non-plastic d: sl hard	abundant medium clay bridges	colloidal stains	moderate; coarse; angular-blocky	few; fine-coarse	many; fine	unknown	7.5 5/6	abundant mottling (mottles=7.5 5/6)

Table A-8. Soil Descriptions for Soil Pit 1, 41LR225

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	much organic stains	weak: single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 2/2	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; medium-coarse; subangular-blocky	many; fine-coarse	few; fine	clear; smooth	10YR 4/4	
B1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; coarse; angular-blocky	common; fine-coarse	few; fine	clear; smooth	10YR 4/6	
B2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; coarse; angular-blocky	common; fine-coarse	few; fine	clear-gradual; smooth	10YR 4/6	few ferric nodules (#5 mm)
C	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	common; thin, silt bridges	weak; coarse; angular-blocky	few; fine-coarse	few; fine-coarse	abrupt; smooth-wavy	10YR 4/6	
Bt	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: hard	common; med, continuous clay bridges	colloidal stains	moderate; coarse; angular-blocky	few; fine-coarse	few; fine-coarse	unknown	5YR 4/6	common ferric nodules (#2 cm); very few gravels (#1 cm)

Table A-9. Soil Descriptions for Test Units 2 and 3, 41LR225

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	few; very fine	abrupt; smooth	10YR 3/2	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; fine-medium; subangular-blocky	many; fine-coarse	few; v fine-fine	abrupt; smooth	10YR 4/3	much bioturbation
B1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	many silt bridges	weak; fine-medium; subangular-blocky	few; fine-coarse	few; v fine-coarse	clear; smooth	10YR 4/3	some bioturbation
B2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	abundant silt bridges	weak; medium-coarse; subangular-blocky	few; fine-coarse	abundant; fine-coarse	clear; smooth	10YR 5/4	small amount bioturbation
C	fine; well-sorted loamy sand	w: non-sticky; non-plastic d: soft	0	abundant silt bridges	weak-moderate; medium-coarse; subangular-blocky	few; fine-coarse	abundant; fine-coarse	abrupt; smooth	10YR 5/4	few mottles of Bt soil
Bt	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: hard	Abundant, continuous	colloidal stains	moderate-strong; coarse; subangular-blocky	few; fine-coarse	few; v fine-coarse	unknown	7.5YR 4/6	

Table A-10. Soil Descriptions for Soil Pit 1, 41LR233

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 2/2	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few organic stains	weak; fine-medium; subangular-blocky	many; fine-coarse	0	abrupt; smooth	10YR 4/4	few organics
C	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few silt bridges	weak; medium-coarse; subangular-blocky	few; fine-coarse	0	clear; smooth	10YR 4/6	
Bt1	fine; well-sorted loamy sand	w: sl sticky; sl plastic d: hard	few, thin, discontinuous clay bridges	colloidal stains	weak; medium-coarse; subangular-blocky	few; fine-coarse	0	clear; smooth	7.5YR 4/6	
Bt2	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: hard	common, thin, discontinuous clay bridges	colloidal stains	weak; medium-coarse; subangular-blocky	very few; fine-coarse	v few; coarse	unknown	7.5YR 5/8	

Table A-11. Soil Descriptions for Test Unit 1, 41LR233

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 3/2	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few; organic stains	weak; medium; subangular-blocky	abundant; fine-coarse	0	clear; smooth	10YR 4/4	few organics
AB	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	0	weak; medium-coarse; subangular-blocky	abundant; fine-coarse	very few, coarse	clear; smooth	10YR 4/4	
B	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	0	weak; fine-coarse; subangular-block	many; fine-coarse	0	gradual; smooth	7.5YR 4/6	
C1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	0	weak; medium-coarse; subangular-block	common; fine-coarse	very few, coarse	clear; smooth	7.5YR 4/6	
C2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few; colloidal stains	weak; coarse; subangular-block	few; fine-coarse	very few, coarse	abrupt; wavy	7.5YR 4/6	
Lamellae	fine; well-sorted sandy loam	w: non-sticky; non-plastic d: soft	common; thin, discontinuous clay bridges	abundant; colloidal stains	weak; fine; platy	few; fine	0	abrupt; wavy	5YR 4/6	lamellae=3-10 mm thick
Bt	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: hard	abundant, thick clay bridges	abundant; colloidal stains	moderate; medium-coarse; subangular-block	few; med-coarse	very few, coarse	unknown	2.5YR 4/6	

Table A-12. Soil Descriptions for Soil Pit 1, 41LR244

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 4/2	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	silt	weak; fine; subangular-blocky	many; fine-coarse	0	abrupt; smooth	10YR 4/4	few organics
B	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	silt	weak; medium-coarse; subangular-blocky	many; fine-coarse	v few; fine	clear; smooth	10YR 4/4	
C	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	few silt bridges	weak; medium-coarse; subangular-blocky	common; fine-coarse	0	abrupt; smooth	10YR 4/6	
Bt1	fine; well-sorted loamy sand	w: sl sticky; sl plastic d: hard	abundant; thin discontinuous clay bridges	colloidal stains	weak; medium-coarse; subangular-blocky	few; fine-coarse	0	abrupt; smooth	10YR 4/6	
Bt2	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: hard	common; thin continuous clay bridges		moderate; medium-coarse; subangular-blocky	few; fine-coarse	0	abrupt; smooth	10YR 5/8	
Bt3	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: hard	abundant; thick		moderate-strong; coarse; subangular-blocky	few; fine-coarse	few; fine-coarse	unknown	7.5YR 4/6	much mottling (mottles=5YR 4/6)

Table A-13. Soil Descriptions for Test Unit 1, 41LR244

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	many; fine-coarse	0	abrupt; smooth	10YR 3/1	much decomposed organic material
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; medium; subangular-blocky	many; fine-coarse	few; coarse	abrupt; smooth	10YR 4/6	few organics
B	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt	weak; fine-medium; subangular-blocky	abundant; fine-coarse	few; coarse	clear; smooth	10YR 5/6	
C	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	silt bridges	weak; medium; subangular-blocky	many; fine-coarse	0	abrupt; smooth	10YR 5/6	
Bt	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: hard	few, thin, continuous clay bridges	colloidal stains	weak; coarse; subangular-blocky	few; fine-coarse	many; coarse	unknown	7.5YR 4/6	not an erosional unconformity between C and Bt horizons

Table A-14. Soil Descriptions for Soil Pit 1, 41LR254

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	many; fine-coarse	0	abrupt; smooth	10YR 3/1	very abundant organics
B1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	common silt bridges	weak; medium-coarse; angular-blocky	common; fine-coarse	0	clear; smooth	7.5YR 4/6	
B2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft-sl hard	0	common silt bridges	weak; medium-coarse; angular-blocky	few; fine-coarse	few; med-coarse	abrupt; smooth	7.5YR 5/6	
Bt1	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: hard	on ped faces; common thin, discontinuous clay bridges	colloidal stains	moderate-strong; coarse; angular-blocky	v few; fine-medium	few; fine	abrupt; wavy	5YR 4/6	
Bt2	fine; well-sorted sandy loam	w: sl sticky; sl plastic d: v hard	on ped faces; common thick, continuous clay bridges	colloidal stains	strong; coarse; angular-blocky	v few; ine	0	unknown	2.5YR 4/6	

Table A-15. Soil Descriptions for Test Units 1 and 2, 41LR254

Horizon	Texture	Consistence: wet (w) dry (d)	Clay Films	Grain Coatings	Structure	Roots	Pores	Boundary	Color: wet only	Comments
A1	fine; well-sorted sand	w: non-sticky; non-plastic d: loose	0	organic stains	weak; single grain-fine; subangular-blocky	abundant; fine-coarse	0	abrupt; smooth	10YR 2/2	much decomposed organic material in this horizon
A2	fine; well-sorted sand	w: non-sticky; non-plastic d: loose-soft	0	few organic stains	weak; fine-medium; subangular-blocky	abundant; fine-coarse	0	clear; smooth	10YR 4/4	few organics
AB	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	0	weak; medium-coarse; subangular-blocky	abundant; fine-coarse	v few; v fine	clear; smooth	10YR 4/4	few organics
B	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	many silt bridges	weak; medium-coarse; subangular-blocky	many; fine-coarse	v few; fine-coarse	gradual; smooth	10YR 4/6	
C1	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	few silt bridges	weak; coarse; subangular-blocky	common; fine-coarse	few; fine-coarse	gradual; smooth	10YR 4/6	
C2	fine; well-sorted sand	w: non-sticky; non-plastic d: soft	0	common silt bridges	weak; coarse; subangular-blocky	common; fine-coarse	few; fine-med	abrupt; smooth	10YR 5/6	no lamellae identified
Bt	fine; well-sorted sandy clay loam	w: sl sticky; sl plastic d: hard	abundant thick, continuous clay bridges	colloidal stains	moderate; medium-coarse; subangular-blocky	few; coarse	v few; fine	unknown	7.5YR 4/6	

Appendix B

Magnetic Sediment Susceptibility Testing

by
Raymond P. Mauldin

Appendix B: Magnetic Sediment Susceptibility Testing

Raymond P. Mauldin

The magnetic susceptibility (MS) of a given sediment sample can be thought of as a measure of how easily that sample can be magnetized (Dearing 1999; Gose and Nickels 2001[1998]). At low magnetic field strengths, this measure is primarily related to the concentration and grain size of ferro and ferromagnetic minerals in the sample (Gose and Nickels 2001[1998]). A number of processes can result in an increase in MS values in a sediment sample. Of these processes, those that are of concern here are related to an increase in the organic constitutes or changes in the mineralogy of sediments in a given sample (see Collins et al. 1994; McClean and Kean 1993; Singer and Fine 1989). Sediments with higher organic content tend to have higher magnetic susceptibility values, probably as a result of the production of maghemite, an iron oxide, during organic decay (Reynolds and King 1995). Pedogenic processes, such as soil formation and weathering, can result in the concentration of organic material, as well as alterations in the mineralogy of a given zone. These processes can significantly impact susceptibility readings. Cultural processes, such as the concentration of ash, charcoal, and refuse, would also produce higher MS readings. A measure of the magnetic susceptibility of a sediment sample, then, may provide information on both the presence of past stable surfaces, as well as a measure of the concentration of cultural activity on those surfaces.

Collection Procedures and Laboratory Methods

For the current project, 229 samples were collected, processed, and analyzed for magnetic sediment susceptibility. The samples came both from within sites and from off-site contexts, representing 15 different excavation units, backhoe trenches, and off-site soil pits. A total of 139 on-site samples was collected. The site samples came from 41LR137 (n=47), 41LR214 (n=18), 41LR222 (n=23), 41LR225 (n=5), 41LR233 (n=22), 41LR244 (n=7), and 41LR254 (n=17). For each site, off-site samples were collected. Whenever possible, the 90 off-site samples, collected as controls for the on-site material, were placed in similar depositional settings. In both on-site and off-site contexts, the samples were collected at regularly spaced, 5-cm intervals, from profiles in selected 1x1-m excavation units, backhoe trenches, and soil pits. The samples were collected in plastic vials and stored in the laboratory at CAR until analysis.

Sediment samples were air dried on a non-metal surface. After drying, several of the samples with high clay content were ground into a uniform grain size using a ceramic mortar and pestle. This was done to standardize particle size and make the material both easier to handle and pack into sample containers. For most samples, grinding was not necessary. The sediment samples were then poured into plastic cubes with external dimensions of 2.54 x 2.54 x 1.94 cm. The cubes have an average weight of 4.83 grams. Each sediment filled cube was then weighed, and the weight of the sample calculated by subtracting the empty cube weight. This was done to correct for differences in mass. Assuming that sample volume and material is constant, larger samples should have higher susceptibility values simply as a function of greater mass.

Each cube was placed into a MS2B Dual Frequency Sensor that, in conjunction with a MS2 Magnetic Susceptibility Meter, provided a measure of the magnetic susceptibility of the sample (see Dearing 1999). For each cube sample, a single reading was taken using the SI (standard international) scale. The value, referred to as volume specific susceptibility and noted with the symbol κ (Kappa), is recorded on a scale of 10^{-5}, although there are no units associated with the value. That is, the value is dimensionless (Dearing 1999).

In order to correct for differences in sample weight, and provide units to the value κ, the mass specific susceptibility value (χ) was calculated using the formula

$$\chi = (\kappa / p)$$

where p is the sample bulk density expressed in kg m^{-3}. The bulk density is determined by dividing the sample mass by volume. However, as all samples were measured in identical cubes, and all cubes were full, the sample volume is assumed to be constant. Only the mass of the sample varied. Mass specific susceptibility can be determined by

$$\chi = \kappa * \text{calibrated mass/ sample mass}$$

where sample mass is determined by subtracting the cube weight from the total sample weight (Dearing 1999). Calibrated mass is assumed to be 10 grams.

While the resulting values have both a scale and associated units, the critical element for the current discussion is related to relative differences between X sample values within a given profile or site, rather than absolute differences. That is, the principal interest is in rapid changes in the mass specific susceptibility values along a profile. This change may signal either a buried surface and/or cultural activity at that location. Comparisons of absolute values between samples from different areas, especially when the parent material of the soils is different, are of limited utility given our current goals.

This can be seen in Table B-1, which lists a variety of examples of mass specific susceptibility values for several different materials. In all cases, the analysis was performed following the procedures outlined previously. Note that the values differ widely, from a low of -1.47 for tap water, to a high of 97.62 for sediments collected from a burned rock midden. Samples 5 and 6 are on two different clays from the same general setting, far northern Lamar County. The mass specific susceptibility is different for these samples, probably as a function of different frequencies of trace elements that, although small in absolute quantity, can dramatically impact the susceptibility values.

The potential impacts of cultural processes on susceptibility values can be seen by considering a data set collected from an archaeological site located in Brown County, 41BR473. A total of 279 sediment susceptibility samples was collected from each level of over 50 shovel tests placed at this site. In all cases, the analytical procedures followed those outlined previously. Table B-2 presents summary data on all 279 cases, along with susceptibility scores for those settings that had FCR or chipped stone present. If cultural inputs result in higher susceptibility values, then it should be the case that significantly higher susceptibility values will be present in levels that have cultural material.

Table B-1. Magnetic sediment susceptibility data for a variety of substances

Sample Type	Total Wt. (gr.)	Sample Wt. (gr.)	Reading 1 (k)	Reading 2 (k)	Reading 3(k)	Average K	Corrected Mass (X)
1) Sandy sediment with organics	13.7	8.85	27.9	28	28.1	28.00	31.64
2) Modern mesquite charcoal and sediment	9.4	4.55	10.7	10.8	10.7	10.73	23.59
3) Modern oak wood ash	7.5	2.65	16.1	16.2	16.2	16.17	61.01
4) Sediment from burned rock midden	11.3	6.45	62.9	63	63	62.97	97.62
5) Gray clay-no human occupation	12.6	7.75	10.4	10.3	10.4	10.37	13.38
6) Red clay-no human occupation	10.8	5.95	11.9	12	12	11.97	20.11
7) Sandstone	14.7	9.85	6.9	7	7.1	7.00	7.11
8) Limestone	12.7	7.85	-0.5	-0.5	-0.5	-0.50	-0.64
9) Tap water	10.5	5.65	-0.8	-0.8	-0.9	-0.83	-1.47

Table B-2. Presence/absence of cultural material and mass specific susceptibility scores for shovel tests at 41BR473

	All Cases	**FCR Present**	**FCR Absent**	**Chipped Stone Present**	**Chipped Stone Absent**
Number of Samples	279	84	195	38	241
Mean Value	48.3	56.9	44.6	55.2	47.2
Standard Deviation	17.2	17.7	15.6	16.1	17.1

An examination of Table B-2 shows that this is indeed the case. Levels that have FCR present do have higher scores relative to those that lack FCR. Similarly, those levels that have chipped stone present have a higher average mass specific susceptibility score relative to those that lack chipped stone. As the distribution is approximately normal, a t-test was used to test the overall significance of these differences. In both the FCR and chipped stone comparisons, the test confirms that those levels with cultural material have significantly higher scores than those without cultural material (FCR t-statistic=5.804, df=277, $p<.001$; chipped stone t-statistic=2.674, df=277, $p=.008$). Our preliminary investigations, then, coupled with the previous work, clearly suggest that an analysis of the magnetic susceptibility of sediment can provide additional information on both the presence of buried surfaces, as well as the impact of cultural material on those surfaces.

Results

Table B-3 presents the results of the susceptibility analysis of all 229 samples from the current project, along with specific provenience information. Those locations listed as soil pits constitute the off-site samples. Examination of the 139 site level samples as a group shows that the magnetic soil susceptibility values range from a low of 7.09 to a high of 84.78. The distribution has a median value of 16.9 and a mean of 19.08 (sd=11.76). The non-site values range from a low of 4.84 to a high of 26.16. This distribution has a mean of 11.65 (sd=5.00) and a median of 11.99. Figure B-1 presents a box plot of the two distributions which clearly shows that not only are the on-site values higher, but extremely high values, identified as outliers on the box plot, are always associated with sites. The differences in the medians, as well as the parametric statistics summarized above, clearly suggest that the two distributions are significantly different. That is, sites have sediment that has significantly higher magnetic soil susceptibility values than off-site sediment. This is consistent with our previous discussion regarding interpretation of the variability in soil susceptibility values. That is, sites should be enriched in organic material, including ash and charcoal, relative to off-site contexts.

At a project level, individual plots were constructed for each of the 15 different units from the seven different sites and their off-site counterparts. As previous work on sediments in the Camp Maxey area has demonstrated the occasional presence of ferrous particles in the sediments (see Mauldin 2001), each individual graph was examined for any anomalously high readings. Ferrous particles can significantly increase the overall magnetic susceptibility within a sample, an increase that can mimic that expected for a buried soil. Only one potentially anomalous reading, a sample collected from between 15 and 20 cmbs in Test Unit 2 on site 41LR137, was present. Figure B-2 presents the graph for this unit, with the significant jump in the value of this single sample clearly visible. While this spike may indicate a buried surface on which organic material has been concentrated, the magnitude and lack of overall patterning in this sample relative to other samples hints at the presence of ferrous particles contaminating the sample. As such, this case was eliminated from consideration.

Figures B-3 through B-9 present site level comparisons for each of the seven sites. Additional discussions of these results are provided in each site description in Chapter 5. As we are looking for relative differences in values within a given site, the data have been standardized. The standardization procedure, which produces a distribution with a mean of approximately 0 and a standard deviation of 1 for the set of values associated with a site, allows us to easily plot and overlay a variety of different data units, with different absolute values, onto a single site level graph.

Table B-3. Magnetic soil susceptibility results for Camp Maxey sites

Site	Location	Total Sample Weight (grams)	Initial Reading	Second Reading	Average Reading	MSS Value	Sample Depth (cmbs)
41LR137	bht3	13.1	7.3	7.4	7.35	8.89	2.5
41LR137	bht3	11.6	8	8	8	11.82	7.5
41LR137	bht3	13.2	10.5	10.4	10.45	12.49	12.5
41LR137	bht3	13.5	10.4	10.6	10.5	12.11	17.5
41LR137	bht3	13.5	12.5	13.1	12.8	14.76	22.5
41LR137	bht3	13.3	13	13.1	13.05	15.41	27.5
41LR137	bht3	13.4	12.9	13	12.95	15.11	32.5
41LR137	bht3	13.5	14.1	14.5	14.3	16.49	37.5
41LR137	bht3	13.4	14	14.1	14.05	16.39	42.5
41LR137	bht3	13.5	14.5	14.5	14.5	16.72	47.5
41LR137	bht3	13.4	14.6	14.6	14.6	17.04	52.5
41LR137	bht3	13.3	15	15	15	17.71	57.5
41LR137	bht3	13.4	15.4	15.2	15.3	17.85	62.5
41LR137	bht3	13.3	16.4	16.5	16.45	19.42	67.5
41LR137	bht3	13.2	16.3	16	16.15	19.30	72.5
41LR137	bht3	13.4	15.9	15.9	15.9	18.55	77.5
41LR137	bht3	13.3	15.7	16.1	15.9	18.77	82.5
41LR137	bht3	13.4	16.4	16.6	16.5	19.25	87.5
41LR137	bht3	13.3	14.6	14.7	14.65	17.30	92.5
41LR137	bht3	13.2	15.7	15.8	15.75	18.82	97.5
41LR137	bht3	13.2	16.5	16.6	16.55	19.77	102.5
41LR137	bht3	13.4	18.7	18.9	18.8	21.94	107.5
41LR137	bht3	13.4	17.7	17.7	17.7	20.65	112.5
41LR137	bht3	13.5	16.4	16.7	16.55	19.09	117.5
41LR137	Soil Pit 1	13.2	12	12.3	12.15	14.52	2.5
41LR137	Soil Pit 1	13.4	12.2	12.5	12.35	14.41	7.5
41LR137	Soil Pit 1	13.3	10.7	11	10.85	12.81	12.5
41LR137	Soil Pit 1	13.5	11.6	11.5	11.55	13.32	17.5
41LR137	Soil Pit 1	13.3	10.2	10.2	10.2	12.04	22.5
41LR137	Soil Pit 1	13.5	11	11	11	12.69	27.5
41LR137	Soil Pit 1	13.4	14.3	13.3	13.8	16.10	32.5
41LR137	Soil Pit 1	13.3	13.3	13.2	13.25	15.64	37.5
41LR137	Soil Pit 1	13.5	11.9	12.1	12	13.84	42.5
41LR137	Soil Pit 1	13.5	12.5	12.8	12.65	14.59	47.5
41LR137	Soil Pit 1	13.3	12.8	12.5	12.65	14.94	52.5
41LR137	Soil Pit 1	13.4	13.4	13.4	13.4	15.64	57.5
41LR137	Soil Pit 1	13.6	14.3	14.3	14.3	16.31	62.5
41LR137	Soil Pit 1	13.6	13.5	13.3	13.4	15.28	67.5
41LR137	Soil Pit 1	13.2	15.2	15.3	15.25	18.22	72.5
41LR137	Soil Pit 1	13.6	16.7	16.8	16.75	19.10	77.5
41LR137	Soil Pit 1	13.6	17.4	17.1	17.25	19.67	82.5
41LR137	tu2	13.4	9.1	8.9	9	10.50	2.5
41LR137	tu2	13.2	8	8.1	8.05	9.62	7.5
41LR137	tu2	13.4	10.4	10.8	10.6	12.37	12.5
41LR137	tu2	13.3	59	59.8	59.4	70.13	17.5
41LR137	tu2	13.4	11.3	11.7	11.5	13.42	22.5
41LR137	tu2	13.1	12.4	12.5	12.45	15.05	27.5
41LR137	tu2	13.3	13.7	13.6	13.65	16.12	32.5
41LR137	tu2	13.2	12.8	13.3	13.05	15.59	37.5

Table B-3. continued…

Site	Location	Total Sample Weight (grams)	Initial Reading	Second Reading	Average Reading	MSS Value	Sample Depth (cmbs)
41LR137	tu2	13.3	17.2	17.7	17.45	20.60	42.5
41LR137	tu2	13.4	15	15.1	15.05	17.56	47.5
41LR137	tu2	13.4	17.5	17.2	17.35	20.25	52.5
41LR137	tu2	13.1	16.5	16.7	16.6	20.07	57.5
41LR137	tu2	13.2	18.3	18.4	18.35	21.92	62.5
41LR137	tu2	13.4	22	22.1	22.05	25.73	67.5
41LR137	tu2	13.5	24.5	24.8	24.65	28.43	72.5
41LR137	tu2	13.3	22.1	21.9	22	25.97	77.5
41LR137	tu2	13.5	22.4	22.5	22.45	25.89	82.5
41LR137	tu2	13.3	22.2	22.2	22.2	26.21	87.5
41LR137	tu2	13.5	21.8	21.8	21.8	25.14	92.5
41LR137	tu2	13.1	18.7	18.8	18.75	22.67	97.5
41LR137	tu2	13.3	20.8	20.5	20.65	24.38	102.5
41LR137	tu2	13.6	15.6	15.9	15.75	17.96	107.5
41LR137	tu2	13.6	16.6	16.4	16.5	18.81	112.5
41LR214	BHT2	10.5	18.8	19.6	19.2	33.86	2.5
41LR214	BHT2	13.4	22.4	22.7	22.55	26.31	7.5
41LR214	BHT2	13.5	20.2	20.8	20.5	23.64	12.5
41LR214	BHT2	13.5	21.1	21.6	21.35	24.63	17.5
41LR214	BHT2	13.4	20.5	19.9	20.2	23.57	22.5
41LR214	BHT2	13.4	23.7	23	23.35	27.25	27.5
41LR214	BHT2	13.4	21.1	21.1	21.1	24.62	32.5
41LR214	BHT2	13.4	25.7	25.7	25.7	29.99	37.5
41LR214	BHT2	13.2	21.3	21.2	21.25	25.39	42.5
41LR214	BHT2	13.5	22.5	22.6	22.55	26.01	47.5
41LR214	BHT2	13.3	22.1	22.7	22.4	26.45	52.5
41LR214	BHT2	13.4	33.9	33	33.45	39.03	57.5
41LR214	BHT2	13.4	39.1	39.3	39.2	45.74	62.5
41LR214	BHT2	13.3	44.9	45.1	45	53.13	67.5
41LR214	BHT2	13.3	50	49.1	49.55	58.50	72.5
41LR214	BHT2	13.2	53	52.2	52.6	62.84	77.5
41LR214	BHT2	13.5	74.1	72.9	73.5	84.78	82.5
41LR214	BHT2	13.2	51.9	51.7	51.8	61.89	87.5
41LR214	Soil Pit 1	13.4	13.6	13.4	13.5	15.75	2.5
41LR214	Soil Pit 1	13.5	13.7	13.6	13.65	15.74	7.5
41LR214	Soil Pit 1	13.2	18.4	18.5	18.45	22.04	12.5
41LR214	Soil Pit 1	13.2	18	18.1	18.05	21.57	17.5
41LR214	Soil Pit 1	13.4	16.9	17.2	17.05	19.89	22.5
41LR214	Soil Pit 1	13.5	16	16.2	16.1	18.57	27.5
41LR214	Soil Pit 1	13.2	14.1	14.5	14.3	17.08	32.5
41LR214	Soil Pit 1	13.3	12.9	13.1	13	15.35	37.5
41LR214	Soil Pit 1	13.2	11.6	11.9	11.75	14.04	42.5
41LR214	Soil Pit 1	13.5	11.9	12	11.95	13.78	47.5
41LR214	Soil Pit 1	13.2	11	11.1	11.05	13.20	52.5
41LR214	Soil Pit 1	13.5	10.3	10.8	10.55	12.17	57.5
41LR214	Soil Pit 1	13.3	9.2	9.5	9.35	11.04	62.5
41LR214	Soil Pit 1	13.4	7.8	8.5	8.15	9.51	67.5
41LR214	Soil Pit 1	13.2	8.3	8.5	8.4	10.04	72.5
41LR214	Soil Pit 1	13.3	5.8	5.9	5.85	6.91	77.5

Table B-3. continued…

Site	Location	Total Sample Weight (grams)	Initial Reading	Second Reading	Average Reading	MSS Value	Sample Depth (cmbs)
41LR214	Soil Pit 1	13.5	5.4	5.4	5.4	6.23	82.5
41LR222	Soil Pit 1	13.3	9.3	9.4	9.35	11.04	2.5
41LR222	Soil Pit 1	13.3	9.8	9.8	9.8	11.57	7.5
41LR222	Soil Pit 1	13.2	21.6	22.2	21.9	26.16	12.5
41LR222	Soil Pit 1	13.5	7	6.9	6.95	8.02	17.5
41LR222	Soil Pit 1	13.4	7.8	7.6	7.7	8.98	22.5
41LR222	Soil Pit 1	13.3	5.1	5	5.05	5.96	27.5
41LR222	Soil Pit 1	13.5	4.2	4.4	4.3	4.96	32.5
41LR222	Soil Pit 1	13.5	4.3	4.1	4.2	4.84	37.5
41LR222	Soil Pit 1	13.2	4.3	4.1	4.2	5.02	42.5
41LR222	Soil Pit 1	13.3	4.5	4.5	4.5	5.31	47.5
41LR222	Soil Pit 1	13.2	4.3	4.3	4.3	5.14	52.5
41LR222	TU3	13.2	6.3	6.4	6.35	7.59	2.5
41LR222	TU3	13.3	11.5	11.5	11.5	13.58	7.5
41LR222	TU3	13.3	8.9	8.9	8.9	10.51	12.5
41LR222	TU3	13.3	11.1	11	11.05	13.05	17.5
41LR222	TU3	13.2	11	10.8	10.9	13.02	22.5
41LR222	TU3	13.5	12.1	11.9	12	13.84	27.5
41LR222	TU3	13.4	12.7	12.6	12.65	14.76	32.5
41LR222	TU3	13.4	12.3	12	12.15	14.18	37.5
41LR222	TU3	13.4	14	14.1	14.05	16.39	42.5
41LR222	TU3	13.4	13.2	13.4	13.3	15.52	47.5
41LR222	TU3	13.4	14.7	14.6	14.65	17.09	52.5
41LR222	TU3	13.4	15	14.9	14.95	17.44	57.5
41LR222	TU3	13.3	14.5	14.6	14.55	17.18	62.5
41LR222	TU3	13.5	15.5	15.6	15.55	17.94	67.5
41LR222	TU3	13.4	20.9	21.3	21.1	24.62	72.5
41LR222	TU3	13.4	16.8	16.4	16.6	19.37	77.5
41LR222	TU3	13.4	17.1	17.3	17.2	20.07	82.5
41LR222	TU3	13.4	16.8	16.7	16.75	19.54	87.5
41LR222	TU3	13.2	13	13	13	15.53	92.5
41LR222	TU3	13.5	14.9	15.1	15	17.30	97.5
41LR222	TU3	13.3	10.7	10.9	10.8	12.75	102.5
41LR222	TU3	13.4	13.2	14	13.6	15.87	107.5
41LR222	TU3	13.4	18.2	18.1	18.15	21.18	112.5
41LR225	Soil Pit 1	11.1	10.2	10.3	10.25	16.35	2.5
41LR225	Soil Pit 1	13.3	20.7	20.5	20.6	24.32	7.5
41LR225	Soil Pit 1	13.2	10.3	10	10.15	12.13	12.5
41LR225	Soil Pit 1	13.2	11.7	11.6	11.65	13.92	17.5
41LR225	Soil Pit 1	13.5	13	13.1	13.05	15.05	22.5
41LR225	Soil Pit 1	13.3	14.6	14.4	14.5	17.12	27.5
41LR225	Soil Pit 1	13.2	10.6	10.6	10.6	12.66	32.5
41LR225	Soil Pit 1	13.5	12.1	12.1	12.1	13.96	37.5
41LR225	Soil Pit 1	13.3	11.8	11.6	11.7	13.81	42.5
41LR225	Soil Pit 1	13.3	16.7	16.9	16.8	19.83	47.5
41LR225	Soil Pit 1	13.3	10.9	10.5	10.7	12.63	52.5
41LR225	TU3	13.2	12.2	12.4	12.3	14.70	7.5
41LR225	TU3	13.5	16.1	15.8	15.95	18.40	12.5
41LR225	TU3	13.3	8.7	8.8	8.75	10.33	17.5

Table B-3. continued…

Site	Location	Total Sample Weight (grams)	Initial Reading	Second Reading	Average Reading	MSS Value	Sample Depth (cmbs)
41LR225	TU3	13.3	10.4	10.7	10.55	12.46	22.5
41LR225	TU3	13.2	7.4	7.4	7.4	8.84	27.5
41LR233	Soil Pit 1	13.3	8.3	8.2	8.25	9.74	2.5
41LR233	Soil Pit 1	13.3	5.8	5.9	5.85	6.91	7.5
41LR233	Soil Pit 1	13.4	6.9	7.1	7	8.17	12.5
41LR233	Soil Pit 1	13.5	8.5	8.7	8.6	9.92	17.5
41LR233	Soil Pit 1	13.3	7.1	7.2	7.15	8.44	22.5
41LR233	Soil Pit 1	13.4	6.6	6.6	6.6	7.70	27.5
41LR233	Soil Pit 1	13.5	6.2	6.4	6.3	7.27	32.5
41LR233	Soil Pit 1	13.3	6.2	6.3	6.25	7.38	37.5
41LR233	Soil Pit 1	13.3	5.2	5.4	5.3	6.26	42.5
41LR233	Soil Pit 1	13.5	5.5	5.4	5.45	6.29	47.5
41LR233	Soil Pit 1	13.5	5.2	5.2	5.2	6.00	52.5
41LR233	TU1	13.3	11.6	11.6	11.6	13.70	2.5
41LR233	TU1	13.4	10	10.2	10.1	11.79	7.5
41LR233	TU1	13.4	11	11.4	11.2	13.07	12.5
41LR233	TU1	13.5	9.5	9.7	9.6	11.07	17.5
41LR233	TU1	13.2	8.9	9.4	9.15	10.93	22.5
41LR233	TU1	13.3	9.9	10	9.95	11.75	27.5
41LR233	TU1	13.4	11.4	11.5	11.45	13.36	32.5
41LR233	TU1	13.3	11.5	11.9	11.7	13.81	37.5
41LR233	TU1	13.5	11.8	12	11.9	13.73	42.5
41LR233	TU1	13.3	11.1	11.2	11.15	13.16	47.5
41LR233	TU1	13.3	13.6	13.7	13.65	16.12	52.5
41LR233	TU1	13.5	14.5	14.8	14.65	16.90	57.5
41LR233	TU1	13.2	13.4	13.7	13.55	16.19	62.5
41LR233	TU1	13.5	15	15.3	15.15	17.47	67.5
41LR233	TU1	13.4	14.3	14.7	14.5	16.92	72.5
41LR233	TU1	13.3	15.4	15.4	15.4	18.18	77.5
41LR233	TU1	13.5	16	16.4	16.2	18.69	82.5
41LR233	TU1	13.4	15	15.3	15.15	17.68	87.5
41LR233	TU1	13.3	15.9	16.4	16.15	19.07	92.5
41LR233	TU1	13.2	15.6	15.8	15.7	18.76	97.5
41LR233	TU1	13.2	14.7	15.1	14.9	17.80	102.5
41LR233	TU1	13.5	16.9	17.2	17.05	19.67	107.5
41LR244	Soil Pit 1	13.3	8	8.2	8.1	9.56	2.5
41LR244	Soil Pit 1	13.2	10	10	10	11.95	7.5
41LR244	Soil Pit 1	13.2	9.2	9.2	9.2	10.99	12.5
41LR244	Soil Pit 1	13.4	10.4	10.7	10.55	12.31	17.5
41LR244	Soil Pit 1	13.3	14.8	15.1	14.95	17.65	22.5
41LR244	Soil Pit 1	13.4	11.8	11.7	11.75	13.71	27.5
41LR244	Soil Pit 1	13.3	7.6	7.7	7.65	9.03	32.5
41LR244	Soil Pit 1	13.2	10.1	10.3	10.2	12.19	37.5
41LR244	Soil Pit 1	13.2	6.1	6	6.05	7.23	42.5
41LR244	Soil Pit 1	13.5	7	7.2	7.1	8.19	47.5
41LR244	Soil Pit 1	13.4	4.2	5.3	4.75	5.54	52.5
41LR244	Soil Pit 1	13.3	5.2	5.2	5.2	6.14	57.5
41LR244	Soil Pit 1	13.4	5	5.3	5.15	6.01	62.5
41LR244	Soil Pit 1	13.4	4.5	4.9	4.7	5.48	67.5

Table B-3. continued…

Site	Location	Total Sample Weight (grams)	Initial Reading	Second Reading	Average Reading	MSS Value	Sample Depth (cmbs)
41LR244	Soil Pit 1	13.2	4.3	4.5	4.4	5.26	72.5
41LR244	Soil Pit 1	13.4	4.5	4.5	4.5	5.25	77.5
41LR244	Soil Pit 1	13.4	4.2	4.4	4.3	5.02	82.5
41LR244	Soil Pit 1	13.5	4.5	4.5	4.5	5.19	87.5
41LR244	TU1	13.3	18.4	18.4	18.4	21.72	2.5
41LR244	TU1	13.2	10.2	10.4	10.3	12.31	7.5
41LR244	TU1	13.4	10.2	10.1	10.15	11.84	12.5
41LR244	TU1	13.2	11	11	11	13.14	17.5
41LR244	TU1	13.3	13.6	13.5	13.55	16.00	22.5
41LR244	TU1	13.4	14.3	14.5	14.4	16.80	27.5
41LR244	TU1	13.5	9.3	9.2	9.25	10.67	32.5
41LR254	Soil Pit 1	13.1	6.3	6.3	6.3	7.62	2.5
41LR254	Soil Pit 1	13.2	6.6	6.4	6.5	7.77	7.5
41LR254	Soil Pit 1	13.2	5.6	5.6	5.6	6.69	12.5
41LR254	Soil Pit 1	13.5	6.2	6.7	6.45	7.44	17.5
41LR254	Soil Pit 1	13.6	6.8	6.9	6.85	7.81	22.5
41LR254	tu2	12.9	8.4	8.5	8.45	10.47	2.5
41LR254	tu2	13.3	7.7	7.7	7.7	9.09	7.5
41LR254	tu2	12.8	7.1	7.2	7.15	8.97	12.5
41LR254	tu2	13	7.2	7.2	7.2	8.81	17.5
41LR254	tu2	13.2	7.9	7.9	7.9	9.44	22.5
41LR254	tu2	13.2	8.1	8.3	8.2	9.80	27.5
41LR254	tu2	13.4	9.2	9.2	9.2	10.74	32.5
41LR254	tu2	13.5	8.3	8.7	8.5	9.80	37.5
41LR254	tu2	13.4	9.4	9.2	9.3	10.85	42.5
41LR254	tu2	13	8.6	8.7	8.65	10.59	47.5
41LR254	tu2	13.7	11.5	11.7	11.6	13.08	52.5
41LR254	tu2	13.3	9.2	9.5	9.35	11.04	57.5
41LR254	tu2	12	7.2	7.2	7.2	10.04	62.5
41LR254	tu2	13.1	7.5	7.8	7.65	9.25	67.5
41LR254	tu2	13.4	7.6	7.9	7.75	9.04	72.5
41LR254	tu2	13.5	6	6.3	6.15	7.09	77.5
41LR254	tu2	13.1	8.6	8.6	8.6	10.40	82.5

Figure B-3 presents the two standardized site level profiles, from Test Unit 2 and Backhoe Trench 3, for 41LR137. In addition, the single off-site soil pit profile is shown. Note that in all three cases, the values increase with depth. Clearly, Test Unit 2 has the most complex profile, with one major spike, potentially indicating a buried surface at 72.5 cmbs, and two smaller spikes at 42.5 and 102.5 cmbs. These are not reflected in the soil pit profile, further suggesting that they may be indicative of cultural events. A similar spike is present near the bottom of Backhoe Trench 3. Artifact densities in TU 2 are associated with these peak values, and overall artifact recovery was highest from 30–60 cmbs.

Figure B-4 presents the two profiles associated with site 41LR214. A single peak at roughly 82.5 cmbs is present in Backhoe Trench 2. Comparison with the soil pit profile suggests that this peak is related to the presence of a different stratigraphy within the defined archaeological site compared with the off-site location. This peak is within the Pleistocene Bt horizon that contains abundant ferric nodules at this site.

Figure B-5 presents the two profiles associated with site 41LR222. Here, the soil pit profile reveals a strong spike, potentially indicating a buried surface, at 12.5 cm. This peak is not present in the on-site profile. Note, however, that within the Test Unit 3 profile, a strong peak is present at 72.5 cmbs. Although the soil pit does not reach this same depth, this peak is associated with the boundary of the C1 and C2 horizons that are not expressed in the soil pit profile. This spike value cannot readily be associated with artifact density from 41LR222, but probably represents a stable surface that may be enhanced from natural cultural inputs.

The two profiles for site 41LR225 are presented in Figure B-6. The readings for the shallow test unit, TU 3, hints at a buried surface at 12.5 cm, and a second surface at 22.5. The upper surface is not present in the soil pit profile. However, four natural surfaces are suggested by the soil profile, with relatively high values at 2.5 cmbs, 22.5 cmbs, 42.5 cmbs, and 52.5 cmbs. The lower surface potentially present at 22.5 cm in Test Unit 3 corresponds with the natural surface at 22.5 cm in Soil Pit 1.

Figure B-7 presents the two susceptibility profiles associated with site 41LR233. Both the soil pit profile and Test Unit 1 have similarly shaped upper profiles. While Test Unit 1 values increase throughout the profile, there is no strong peak present, with the possible exception of a slight increase at around 50 cmbs. The most important distinction between these two profiles is the presence of younger Bt soils in Soil Pit 1 that have been eroded from the profile in TU 1.

Figure B-8 presents two profiles associated with site 41LR244. Examination of the Test Unit 1 curve suggests two spikes, the first associated with the current surface (ca. 2.5 cmbs), and a second peak between 20 and 30 cmbs. The second peak matches closely a peak in the soil test pit and, as such, is probably natural rather than cultural.

Finally, Figure B-9 presents the two profiles associated with 41LR254. Below the current modern surface, the Test Unit 2 profile has three interesting peaks, with potential surfaces at 32.5 cmbs, 52.5 cmbs, and one at the bottom of the Test Unit at 82.5 cmbs. These peaks match the density bulges in artifact frequencies within TU 2 and other units on the site. These values may reflect either cultural enhancement or natural inputs on stable surfaces. The shallow soil test pit provides no additional information on the three peaks.

Examination of 229 sediment samples collected for soil susceptibility on the seven sites examined in this report hints that in several cases buried surfaces are present. Comparisons between site and off-site samples suggest that in several cases these surfaces may be natural in origin. However, there are also several peaks that potentially are the result of cultural activities.

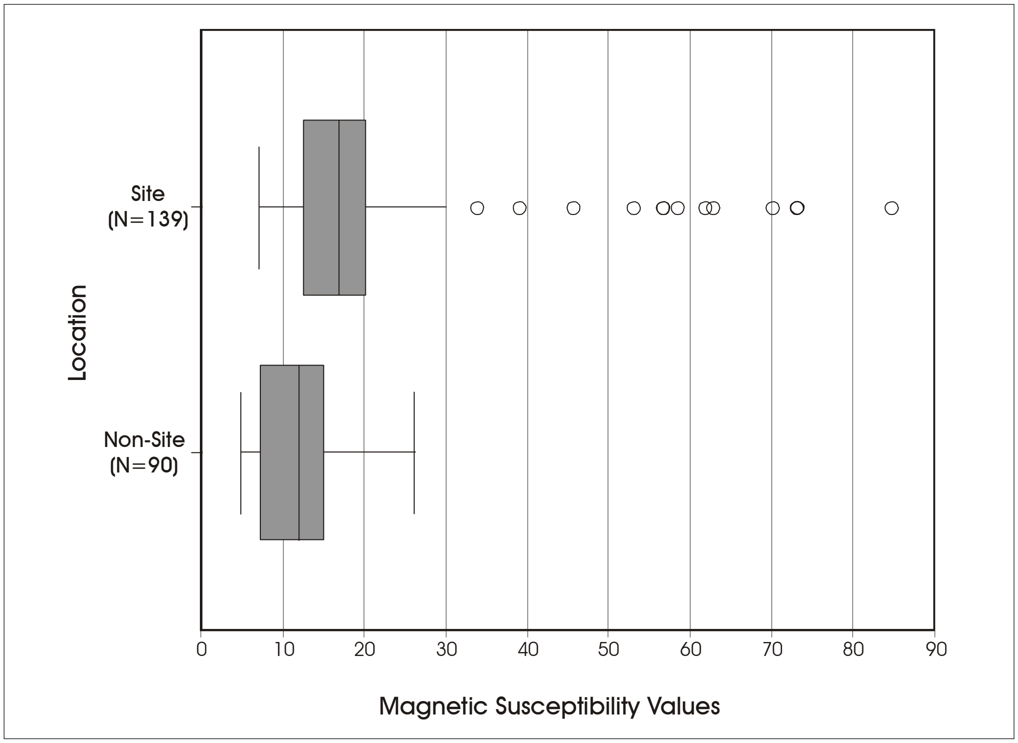

Figure B-1. *Comparison of site and non-site magnetic susceptibility values.*

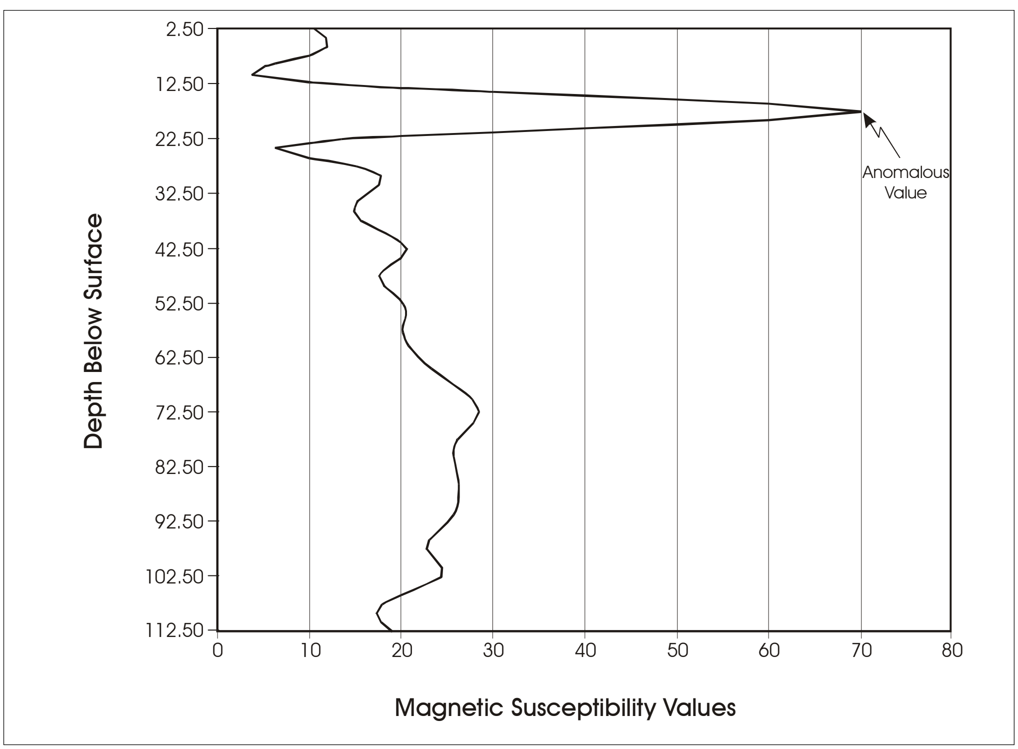

Figure B-2. *Magnetic susceptibility values for Test Unit 2 on site 41LR137.*

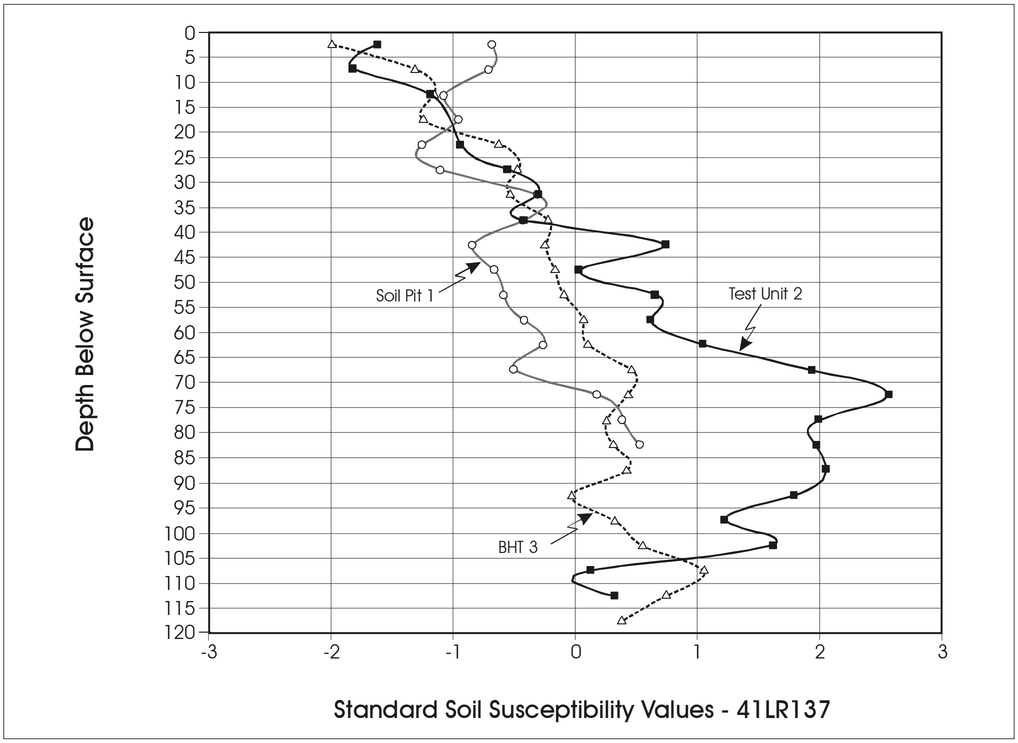

Figure B-3. *Standardized values for samples on site 41LR137.*

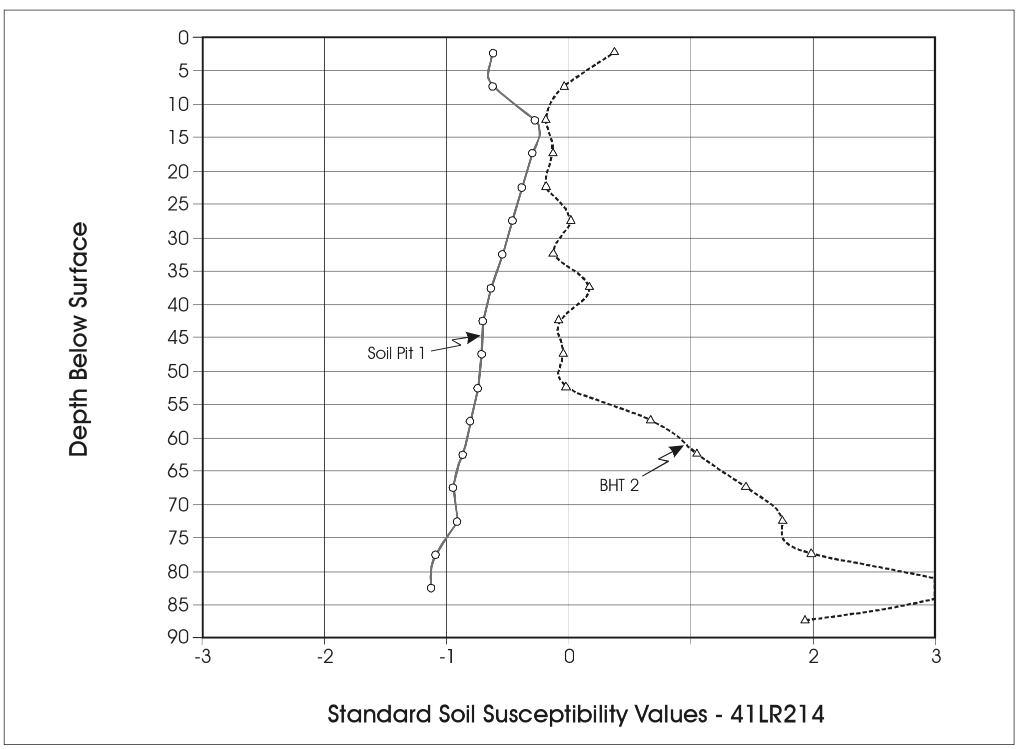

Figure B-4. *Standardized values for samples on site 41LR214.*

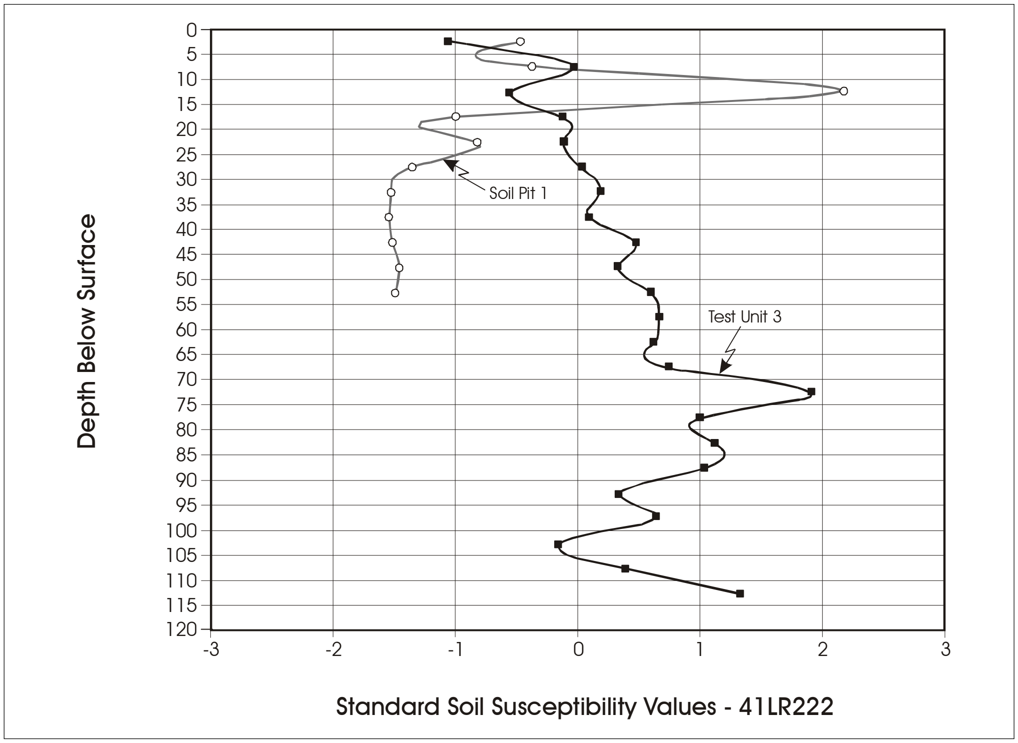

Figure B-5. *Standardized values for samples on site 41LR222.*

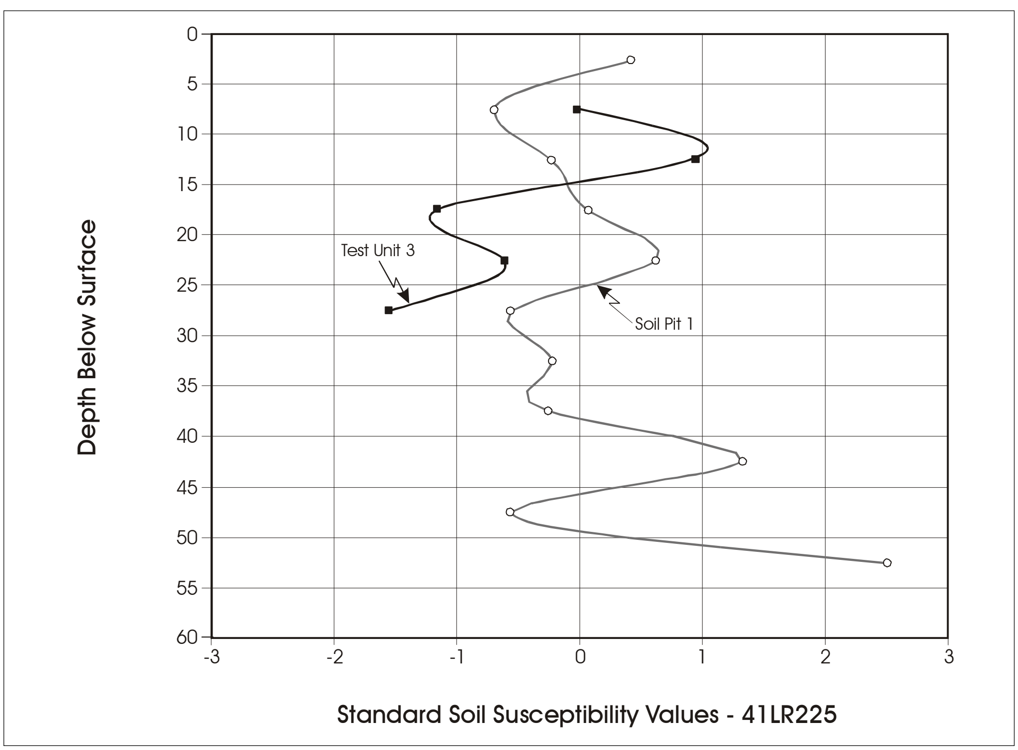

Figure B-6. *Standardized values for samples on site 41LR225.*

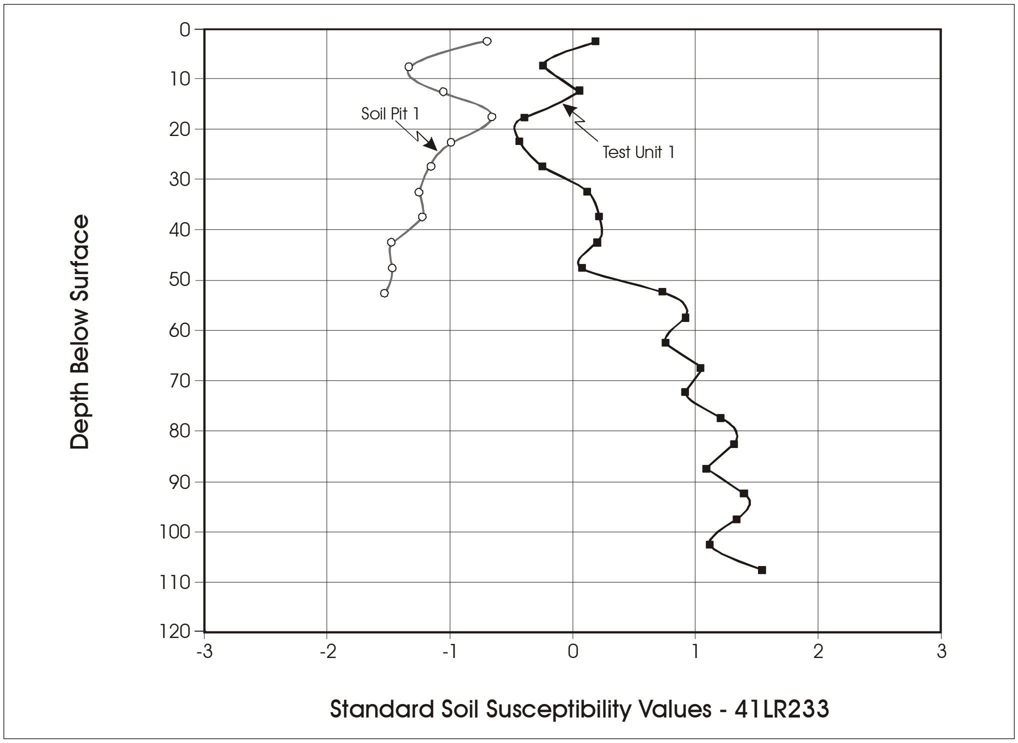

Figure B-7. *Standardized values for samples on site 41LR233.*

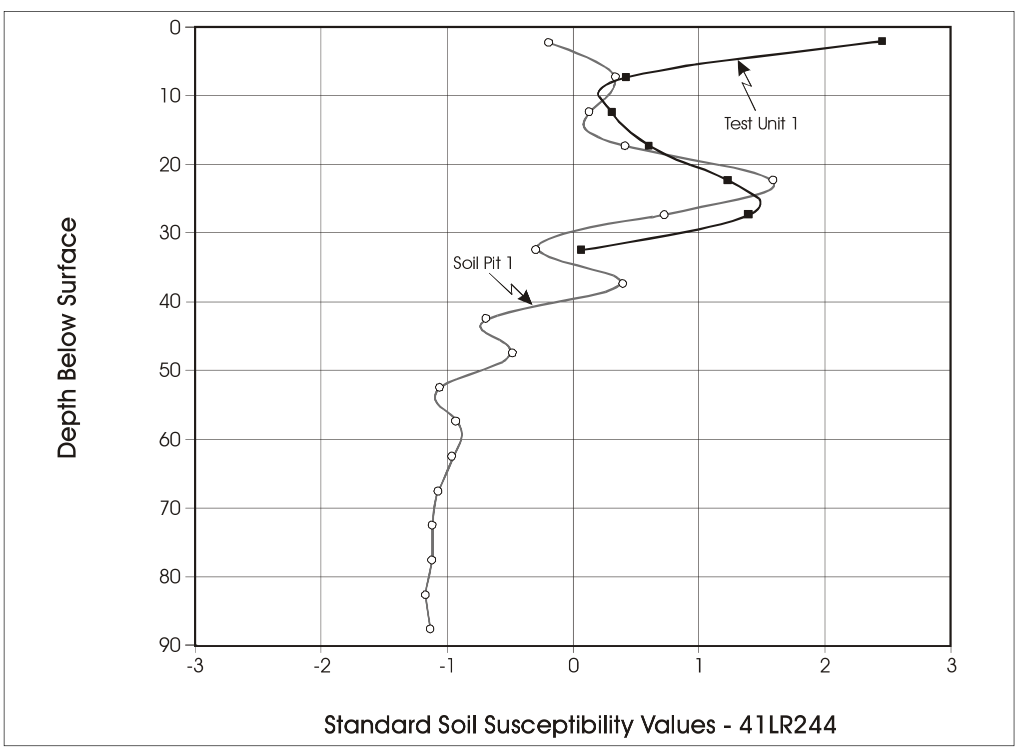

Figure B-8. *Standardized values for samples on site 41LR244.*

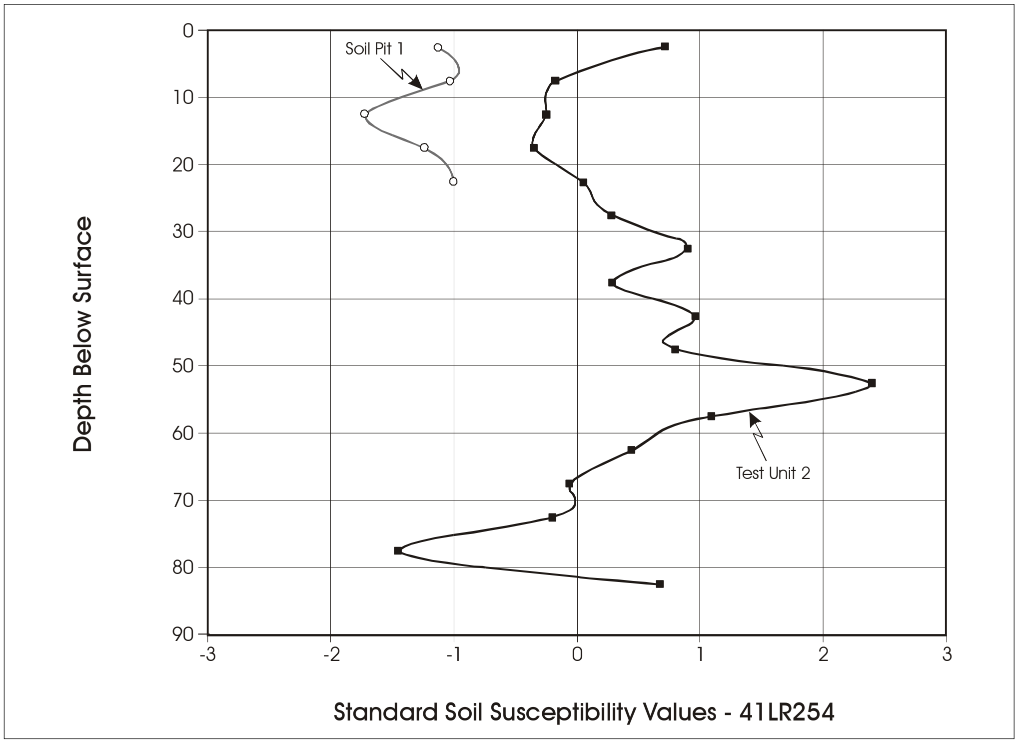

Figure B-9. *Standardized values for samples on site 41LR254.*

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