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An Assessment of Previous Archaeological Surveys at Fort Campbell Kentucky/Tennessee

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Abstract: From September 2003 through June 2004 the Public Service Archaeology Program (PSAP) of the University of Illinois at Urbana–Champaign and ERDC CERL conducted an assessment of archaeological site surveys previously conducted at Fort Campbell, Kentucky/Tennessee. For a variety of reasons, the Fort Campbell cultural resource management (CRM) program had reason to believe that the archaeological site surveys conducted over the past twenty-five years do not provide the quality of information required to meet current Army cultural resource regulations and land management objectives. Data on 18 archaeological site surveys conducted at Fort Campbell were gathered and analyzed. A small-scale baseline archaeological survey then was conducted at two previously recorded sites to evaluate the effects that different shovel-test intervals have on site definition. The baseline survey suggested that transect intervals are correlated with the number of positive tests, which in turn is the basis for delimiting, interpreting, and evaluating an archaeological site. The baseline survey also provided some insight into the range of variation likely to be present in the numerous sites located at Fort Campbell that have poorly defined site boundaries.

Overall, this project identified numerous deficiencies in previous archaeological site surveys at Fort Campbell. Pervasive problems included the excavation of too few shovel tests, inadequate documentation of the use of pedestrian survey, errors in site mapping, and errors in artifact categorization. Suggested remedial and proactive measures include resurvey of a stratified random sample of previously surveyed areas to quantify the reliability of extant site data, a detailed analysis of field maps from previous projects to identify areas that may not have been surveyed, a greater specificity in future Scopes of Work, and frequent monitoring of ongoing fieldwork. Some of these recommendations had already been implemented by the current Fort Campbell CRM staff prior to this project.

Preface

This study was conducted for the Fort Campbell Cultural Resources Program under Environmental Project 116-16-96X "Evaluation of Previous Archaeological Surveys", Work Item 7294KH. The technical monitor was Mr. Richard Davis, AFZB-PW-E-R.

The work was performed by the Land and Heritage Conservation Branch (CN-C) of the Installations Division (CN), Construction Engineering Research Laboratory (CERL). The CERL Principal Investigator was Dr. Michael L. Hargrave. Part of this work was done by Dr. Paul Krejsa, Public Service Archaeological Program, University of Illinois at Urbana-Champaign, under contract DACA42-00-D-0011 Delivery Order 10. Dr. Lucy Whalley is Chief, CEERD-CN-C, and Dr. John T. Bandy is Chief, CEERD-CN. The associated Technical Director was Dr. William Severinghaus, CEERD-CV-T. The Acting Director of CERL is Dr. Ilker R. Adiguzel.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC is COL James R. Rowan, and the Director of ERDC is Dr. James R. Houston.

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The assistance and hard work of numerous individuals was required to bring this project to completion. Two individuals are foremost, and our thanks go to each: Dr. Richard Davis and Mr. Richard Williamson, both of Fort Campbell. Davis and Williamson gave freely of their time discussing their concerns regarding Fort Campbell archaeological site surveys; helping the senior author access reports, artifacts, and other forms of documentation crucial to conducting this analysis; and obtaining clearance to conduct the archaeological reconnaissance baseline survey. Without the help and input of these individuals, this project would have been infinitely more difficult to conclude.

PSAP personnel also contributed significantly to the completion of this project. While the senior author supervised the fieldwork, the archaeological field crew consisted of Meghan Buchanan, Frank Nardulli, and Michael Ryia. Thanks to this crew for their hard work in completing the fieldwork under adverse conditions. The senior author analyzed the artifacts, Michael Ryia and Meghan Buchanan processed the artifacts, and Jacqueline McDowell processed the artifacts and documentation for curation at Fort Campbell. Susan Brannock–Gaul produced the graphics, and Jacqueline McDowell edited and formatted the report and coordinated its production. We thank all of these individuals for their help.

Paul Krejsa (University of Illinois, PSAP)

Michael Hargrave (ERDC CERL)

CHAPTER 1. INTRODUCTION

In September 2003 the Engineer Research and Development Center/Construction Engineering Research Laboratory (ERDC/CERL) contracted with the University of Illinois at Urbana–Champaign to undertake an assessment of previous archaeological survey projects conducted at Fort Campbell, Kentucky/Tennessee (Figure 1). The objectives of the project were to assemble all pertinent information sources, to tabulate survey data pertaining to variables defined by ERDC/CERL, to inspect artifacts from selected sites, to assess the reliability of categorization and tabulation, to conduct a baseline archaeological field survey, and to prepare a written report pertaining to these tasks. The project was conducted by personnel from the Public Service Archaeology Program of the University of Illinois at Urbana–Champaign (PSAP), with fieldwork and documentary research taking place between October 2003 and June 2004. This report details the results of the documentary research and field investigations undertaken for this project.

Federal cultural resource laws, including Sections 106 and 110 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations (36 CFR 800), and Army Regulation 200–4, require the identification and assessment of archaeological sites on federal property. Large-scale Phase I cultural-resource inventories have been conducted within the installation since 1980, resulting in identification of more than 1,000 historic and prehistoric sites. These projects have been conducted by a number of different entities, including private firms and universities, and have employed different methods and standards. Additionally, professional standards have changed over the last 20 years. There is reason to believe that some of the previous investigations do not, for various reasons, provide the quality of information required to meet Army cultural resource management (CRM) regulations and objectives. This project is intended to evaluate each previous survey, to identify problem areas, and to suggest a strategy for remedial measures, if necessary.

Project Objectives

The ERDC/CERL Statement of Work identified six project objectives: first, to assemble a list of all information sources available on previous surveys conducted at Fort Campbell; second, to tabulate data regarding previous surveys pertaining to variables defined by the ERDC/CERL Contracting Officer's Technical Representative (COTR), Dr. Michael Hargrave; third, to inspect a sample of artifacts from sites identified during the previous surveys to assess the reliability of categorization and tabulation; fourth, to conduct a baseline archaeological survey against which previous surveys could be compared; fifth, to analyze past site survey performance and to suggest, if possible, remedies to "equalize" those past efforts; and sixth, to prepare a written report that documents the results of records research and field investigations conducted for this project. This report represents the fulfillment of the sixth project objective. An introduction to the operationalization of each of the other objectives is presented below.

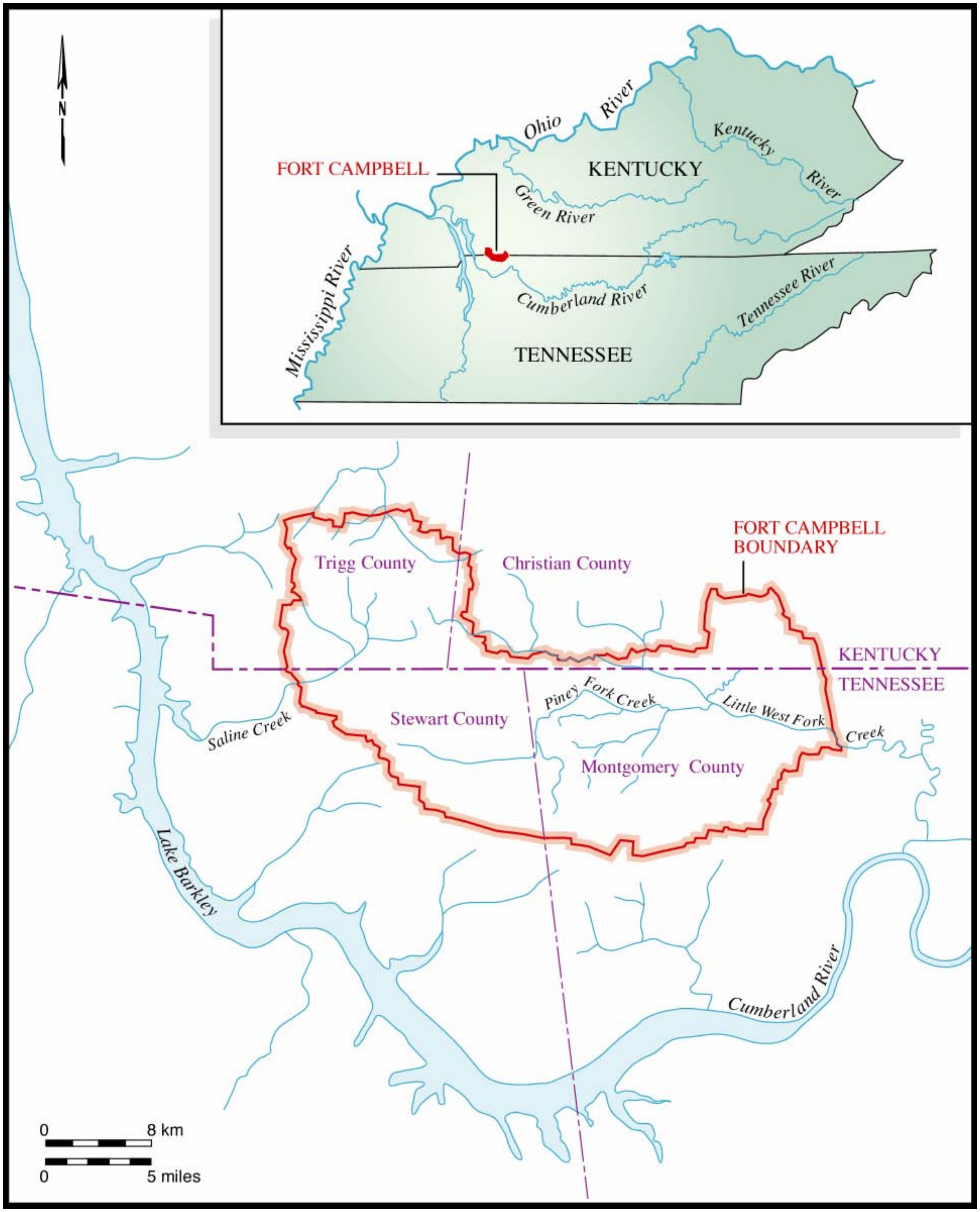

Figure 1. Location of Fort Campbell, Kentucky/Tennessee.

Information Sources (Objective 1)

The compilation and inspection of information sources was conducted in October 2003. At that time an inventory of all previous archaeological survey projects conducted at Fort Campbell was developed. In all, 20 archaeological survey projects were identified as having been undertaken at Fort Campbell. Of these, 18 were sponsored by Fort Campbell, and two were sponsored by outside federal and state agencies (i.e., Tennessee Valley Authority and Tennessee Department of Transportation). In discussions with the Fort Campbell CRM staff, it was decided that the two projects sponsored by outside agencies would not be included in this project. Some consideration was also given to the pros and cons of excluding from this study the surveys conducted by Duvall and Associates. Fort Campbell had already determined that the results of those surveys did not meet current program needs, and was in the process of resurveying the relevant areas. Nevertheless, the Duvall surveys represent part of the history and range of variation in previous surveys at Fort Campbell, and it was ultimately decided to include them.

Data for the remaining 18 projects then were collected. These data include the year in which the project was conducted, the reported acreage surveyed, identification of the contractor that undertook the work, final report reference, the presence of a Statement of Work, and an inventory of field maps, photographs, field notes, artifact analysis forms, artifacts, site forms, project correspondence, and any other information that was deemed pertinent and was present at Fort Campbell. A data base was developed with this information that was then submitted to Dr. Michael Hargrave, the ERDC/CERL COTR. Various reports and other information sources were also copied during the trip and submitted to the ERDC/CERL COTR.

Survey Data (Objectives 2 and 3)

Collection of data concerning the results of the 18 archaeological survey projects was conducted during two trips to Fort Campbell in April and May 2004. Data collection also took place at PSAP using electronic copies of various reports supplied by the Fort Campbell CRM staff. The ERDC/CERL COTR, in consultation with the Fort Campbell CRM staff, developed a two-step sequence of data collection. The first step was designed to collect data pertinent to the overall survey project for each of the 18 surveys conducted at Fort Campbell. The second step was designed to collect more specific data from a sample of 11 sites found by each of the 18 surveys.

The first step of data collection can be divided into three parts. The first group of data that was collected consisted of overview-type information pertinent to each project: project report reference, location of survey tracts, total acreage surveyed, and field conditions encountered (i.e., acreage in agricultural fields, pasture, developed, or other). The second group of data collected included field methods employed by each project: transect spacing, orientation, discovery method (i.e., pedestrian or shovel testing), criteria for omitting shovel tests, shovel-test spacing within defined site areas, depth of excavation, screening of soils, whether soils were excavated by level, the presence of shovel test profiles, shovel test documentation, artifact collection strategies, and any other information deemed pertinent. Information from both the Statement of Work requirements, when available, and the methods employed during the survey, when stated, was collected. The third group of data collected pertained to the results of the survey: predicted number of shovel tests, actual number of shovel tests, acres omitted from the survey, number of prehistoric and historic sites and isolates identified, average site areas for prehistoric and historic sites, and any other information deemed pertinent.

The second step of data collection, concerning more specific data from a sample of 11 sites for each of the 18 surveys conducted at Fort Campbell, can also be broken down into three parts. The first group of data measures reporting consistency: number of shovel tests excavated at the selected site as mentioned in the text and as depicted on the site map, number of artifacts recovered from the selected site as mentioned in the text and as presented in accompanying tables, and any other information deemed pertinent. The second group of data measures accuracy of site locations: comparison of site locations on maps and as presented in the text, accuracy of Universal Transverse Mercator (UTM) coordinates for the site, and whether areas omitted from the survey are depicted in the report. The third group of data centers on the National Register of Historic Places (NRHP) evaluations offered for each selected site: the discussion of site condition or integrity, the evaluation of the site under Criterion D, whether an evaluative context is provided, and finally, the NRHP finding. Consistency of findings arguments presented, both within a project report and between project reports, can also be addressed based on the data collected here.

Baseline Survey (Objective 4)

The baseline archaeological survey at Fort Campbell, Kentucky/Tennessee, was conducted during a field trip in May 2004. The ERDC/CERL Statement of Work indicated that 300 shovel tests were to be excavated at a chosen location(s). A shovel-testing grid was to be established and a map made of the location. Shovel tests were specified as 30-x-30 cm with excavations to a depth of either 75 cm or culturally sterile subsoil, with all soils screened through 6.35-mm mesh hardware cloth. Shovel tests were excavated in 10-cm levels, and soils data on each test were recorded on a standardized form.

Prior to the initiation of fieldwork, the ERDC/CERL COTR and Fort Campbell CRM staff identified both the transect spacing to be employed while conducting the baseline survey and two areas for survey. The baseline survey was to be conducted using 10-m intervals, both between and within transects, and was to be undertaken at two locations along Piney Fork in Training Area 4. The survey tracts were the location of two previously identified sites, 40MT302 and 40MT303. Both sites had been identified as prehistoric lithic scatters found along a road to the north of Piney Fork by O’Malley et al. (1983). Actual site sizes and density of material present at the two sites was considered largely unknown based on the results of the O’Malley/University of Kentucky survey.

Initially, a baseline with transects flagged at every 10 m was established in both tracts. Crew members were oriented along a cardinal direction (north-south) and were instructed to excavate a ca. 30-x-30-cm shovel test every 10 m along the transect. The shovel test soils were screened through 6.35-mm mesh hardware cloth. A detailed log of shovel tests for each transect was recorded. Soil conditions for all tests were described on a soil profile form.

Report Overview

The remainder of this report provides environmental and cultural overviews of the Fort Campbell area, details the research goals and field and laboratory methods used during this project, and describes and interprets the results of the documentary research and field investigations. Chapter 2 is a brief description of the regional environmental setting. Chapter 3 provides an overview of previous work performed on and near Fort Campbell and a summary of the regional prehistoric and historic chronology. Chapter 4 outlines the field and laboratory methods and procedures. Chapter 5 presents the results of the documentary research that includes a summarization of each previously conducted archaeological inventory survey conducted at Fort Campbell and an evaluation of previously employed artifact analyses. Chapter 6 details the results of the field investigations including site descriptions, descriptions of the investigations conducted and their results, description and analyses of the artifact assemblages, interpretations of the results, recommendations for further work, and NRHP findings for each site. Chapter 7 summarizes the results of the current project and details a suite of additional projects that are aimed at "equalizing" the results of past site survey efforts. References Cited are followed by Appendix A, which contains additional information on site-specific data, and Appendix B, which is a detailed description of the artifacts recovered from the survey.

CHAPTER 2. ENVIRONMENTAL SETTING

Fort Campbell is located within the Western Highland Rim or Pennyroyal District of the Interior Lowland Plateau region (Figure 2). This region is characterized by rolling uplands, moderate local relief, and many drainages. The karstic limestone setting is also characterized by a number of sinkholes and caves. At present, much of the area is covered by oak, hickory, beech, and chestnut forests, the composition of which is influenced by drainage and soil conditions. This section presents a detailed overview of the environment of the Fort Campbell area including physiography and geology, soils, drainage patterns, climate, and floral and faunal communities.

Physiography

Fort Campbell is located within the Interior Lowland Plateau Physiographic Province, a region of ancient, eroded peneplains composed of Paleozoic limestone and sandstone formations (Fenneman 1938). This physiographic province is underlain by layered sedimentary rock that has been warped and deformed into a series of long arches or anticlines, broad basins, and domes by tectonic forces acting throughout much of the Paleozoic. These forces have also resulted in the creation of numerous faults. For the most part, the basins and arches within the Lowland Plateau province are structural and not topographic; topography here is largely determined by erosional processes and/or deposition of younger strata that mantle the underlying rock (Roberts 1996). Within Kentucky, the region is referred to as the Pennyroyal District or Mississippian Plateaus; in Tennessee the region is referred to as the Western Highland Rim (Figure 2).

The Mississippian limestone plateaus of the Western Highland Rim surround older Silurian and Ordovician strata of the Nashville Dome, a structural high forming the southern end of the Cincinnati Arch, an extensive northeast/southwest-trending anticline. The region is typified by rolling uplands, moderate local relief, and many, often steep-sided but relatively shallow, drainages connected in a dendritic drainage pattern. The karstic limestone setting is also characterized by sinkholes, caves, and extensive underground stream drainages. The Western Highland Rim varies in elevation between about 228 m (750 feet) asl in its eastern portion to 122 m (400 feet) asl along the Cumberland River. Elevations generally range between 152 and 183 m (500 to 600 feet) within the installation. Immediately to the west of the installation along the Cumberland River the topography changes from rolling uplands to a more heavily dissected and rugged terrain at a higher elevation. To the north, an extensive sandstone formation, the Dripping Springs Escarpment, represents the edge of a Pennsylvanian deposit that has been elsewhere eroded within the Western Highland Rim, exposing the underlying older Mississippian deposits.

Geology

The surface bedrock of the Western Highland Rim is composed of Mississippian-age sedimentary strata, primarily limestones, which have been exposed through the erosion of younger geologic deposits. These Mississippian formations dip to the west and northwest on the western

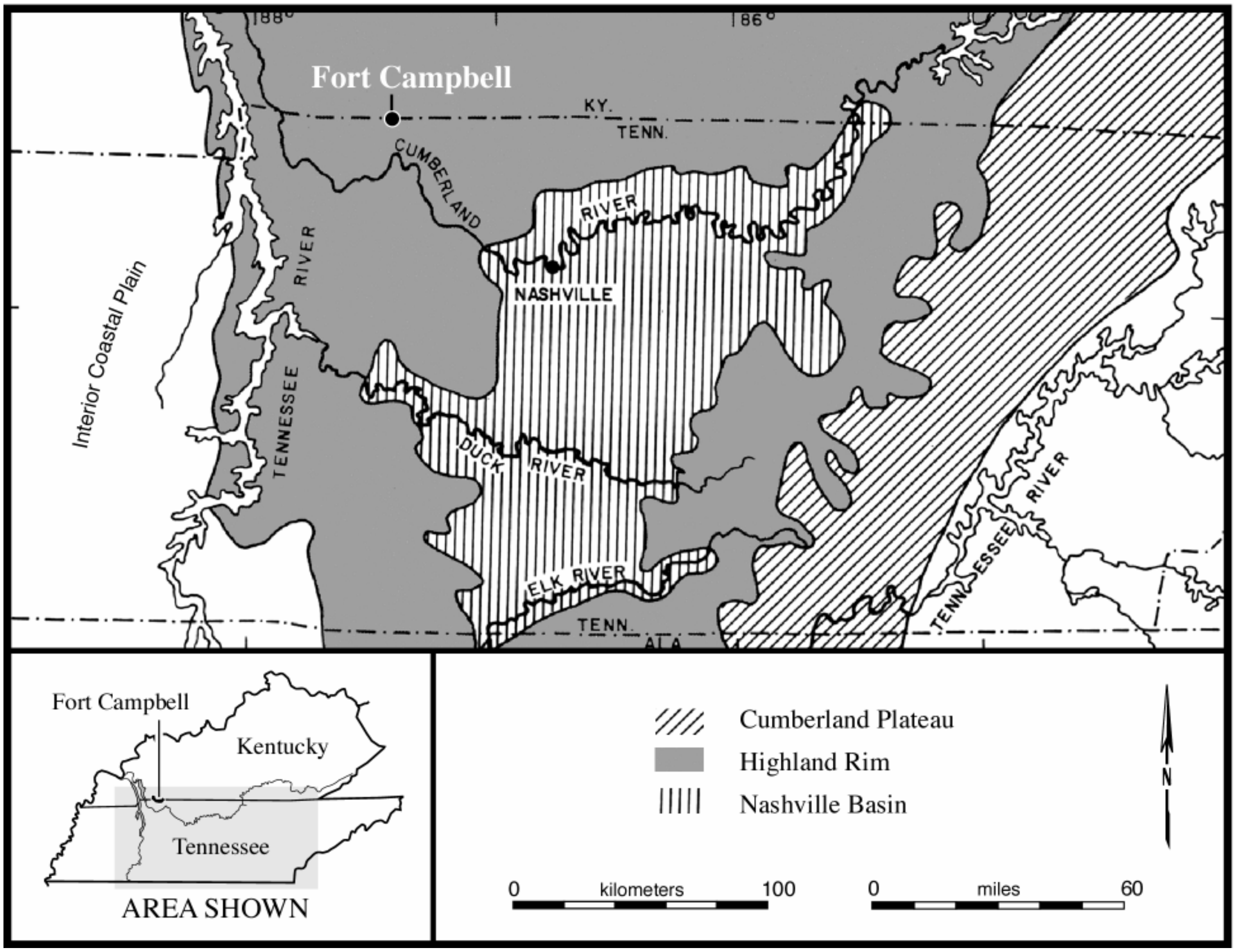

Figure 2. Physiographic provinces in western Kentucky and western Tennessee (after Faulkner and McCollough 1973:Figure 1).

flank of the Cincinnati Arch, where they become buried beneath younger Pennsylvanian sandstone formations and more recent deposits within the Illinois Basin to the north. To the west of the installation, Cretaceous formations composed of sands, clays, silts, and gravels are present on the east side of the Cumberland River valley atop the Mississippian limestone. The Mississippian limestones of the Western Highland Rim lie directly over Ordovician formations that comprise the core of the Nashville Dome. The Mississippian deposits also cover the remaining portions of eroded strata dating to the Silurian and Devonian periods that are found at the margins of the dome center (Kentucky Geological Survey 1979; Roberts 1996:161–171; Tennessee Department of Environment and Conservation 1983). The Nashville Dome is a structural rather than topographic feature, however, and the Mississippian limestones of the Western Highland Rim encircle the older Ordovician limestones present at the center of the topographic Nashville Basin. Remnant, heavily eroded Mississippian formations within the Nashville Basin are responsible for local relief.

In the Fort Campbell area, the uppermost limestone formation is Ste. Genevieve, a gray, cherty limestone with inclusions of shale and fine-grained sandstone and a maximum thickness of about 21 m (70 feet) (Miller 1974). Underlying the Ste. Genevieve Formation are the St. Louis and Warsaw Limestones, also of Mississippian age (Miller 1974). These formations are exposed in erosional down cuts, primarily in the southern portion of the base, and are more extensively exposed to the west along the dissected uplands bordering the Cumberland River. To the west of the base, along the lower Tennessee River, the Mississippian Fort Payne Limestone and underlying Chattanooga Shale is exposed (Miller 1974). The Chattanooga Shale is the lowest member of the Mississippian deposits and is considered to be part of the Fort Payne Formation (Miller 1974). All of the Mississippian limestones contain abundant chert deposits of varying quality, and the soluble nature of the limestone matrix has resulted in chert being readily available either as residuum in the uplands or as stream gravels and cobbles in alluvial settings (Miller 1974).

Geological deposits dating to the late Tertiary and Quaternary periods are also present in the region in the form of gravels, sands, and loess (Humphrey 1981). These gravels are primarily chert with smaller amounts of quartz, and the rounded nature of the gravel is indicative of water transport. Aeolian sand and loess deposits are also present on the upland ridges and on some high stream terrace formations (Humphrey 1981). The loess deposits, ranging in thickness from a thin coating to 1.2 m (4 feet) or more, were deposited during interglacial and postglacial periods from source areas along the lower Ohio River floodplain and the Mississippi River floodplain (Humphrey 1981). Even in soils with high chert or gravel content in the upper layers, loess comprises most of the fine silty materials present within the soil matrix (Humphrey 1981).

Drainage

Fort Campbell is located within the Cumberland River drainage basin, a major tributary of the lower Ohio River. The Cumberland River drainage system originates well to the east of the installation along the western slope of the Cumberland Plateau and Eastern Highland Rim sections of Kentucky and Tennessee. Much of the base is included within the Little West Fork drainage basin, an eastward-flowing drainage system that empties into the Red River near Clarksville, Tennessee. The Red River then joins the Cumberland River about 3 km downstream. Tributaries of the Little Fork basin include Weavers Creek, Noah’s Spring Branch, Dry Fork Creek, Little Creek, Piney Fork, Moss Creek, Jordan Creek, Elk Fork Creek, Fletcher’s Creek, and Raccoon Branch. The extreme northwest portion of the base, located in Trigg County, Kentucky, drains in a northerly direction into Skinner and Casey Creeks, which then join and flow north to join the Little River, which subsequently joins the Cumberland River (Lake Barkley) northwest of Cadiz, Kentucky. The western portion of the base is included within the Saline Creek drainage basin, which flows southwesterly directly into the Cumberland River (Lake Barkley).

The karstic nature of the limestone bedrock underlying the installation contains numerous sinkholes and caves leading to subterranean drainages. The extensive subterranean drainage system results in the presence of both dry intermittent valleys and streams such as Noah’s Spring Branch, which runs at the surface, becomes subterranean, and reemerges to again flow at the surface (Albertson et al. 1999:19).

Soils

Soils within the installation have formed primarily within the late Pleistocene Peoria Loess, which was deposited over the weathered limestone surface and residuum on the uplands, and in redeposited alluvial silts, gravels, and older alluvial deposits within floodplains prior to 12,000 B.P. Uplands soils are characterized by silt loam-textured surface horizons overlying subsoils with moderate to high clay content. Fragipans, densely compacted subsurface soil horizons, are present in some upland soils at depths below 30 cm and may overlie archaeological deposits. The subsoil may also contain a high percentage of angular chert and/or cherty limestone fragments derived from the residuum. The depth of the surface horizon on upland soils is strongly influenced by the angle of slope and the amount of erosion that has occurred (Bettis 1999; Humphrey 1981).

Soils at Fort Campbell have previously been classified into seven groups or units of related soil series based on aspects of landform and slope by Soil Systems, Inc. A summary of this work is presented in tabular form in Albertson et al. (1999:20). This work references the Official Series Descriptions for soils rather than the United States Department of Agriculture county soils maps for Trigg (Humphrey 1981) and Christian (Froedge 1980) Counties in Kentucky and the Montgomery County (Lampley et al. 1975) and out-of-print Stewart County, Tennessee, volumes (Austin 1953). The following discussion of soils distribution and characteristics is drawn from both the summary of the Soil Systems, Inc. information provided in Albertson et al. (1999:19–20) and the Official Series Descriptions for soils from the National Soil Survey Center (2000). Soils of the Brandon and Lax series are found on strongly rolling to steep ridges in 50–101 cm (20–40 inches) of loess or silty material deposited over gravelly alluvium or residuum. Where intact, the Brandon series may exhibit an E horizon, and the Lax series is characterized by a fragipan between 61 cm and 91cm (24 and 36 inches) below surface. Brandon and Lax series soils are found on about 15 km^2 of the landscape within Fort Campbell.

Soils of the Arrington, Newark, and Lindside series are found in floodplains, upland drainages, and upland depressions on about 73 km^2 of the installation. The Arrington and Lindside series soils are deep, well-drained to moderately well-drained soils formed in silty alluvium on nearly level floodplains and drainages. The Newark series soils are classified as very deep, somewhat poorly drained soils formed in mixed alluvium, loess, and glacial deposits on nearly level floodplains and in upland depressions.

Nearly level, poorly drained portions of the uplands are associated with soils of the Dickson, Guthrie, Taft, Sango, and Lax series. Together these five soil series cover about 90 km^2 of the uplands at Fort Campbell. These soil series are developed in deep loess and silty materials on nearly level uplands and upland depressions, and, in the case of the Taft series, on stream terraces in alluvium. Fragipan development within the lower subsoil of these series leads to low water permeability through the subsoil and moderate to slow runoff of surface water. The Guthrie series, found in upland depressions and flats, commonly remains under ponded water for a period of weeks during the winter and spring, and runoff is negligible during other portions of the year. Over a large geographic extent on more rolling and better drained uplands, the Crider and Pembroke series soils developed in thin to thick loess deposited over residuum or old alluvial deposits. These soils are well-drained and are found on level to moderately sloping terrain. The associated Pickwick series soils are deep and well-drained and are found on stream terraces. Pickwick soils formed in old alluvium or alluvium mantled with 30–100 cm (1–3 feet) of loess or silty alluvial deposits. The Crider, Pembroke, and Pickwick series soils cover approximately 75 km^2 of the installation.

In rolling uplands characterized by numerous sinkholes, the Mountview, Pembroke, Arrington, and Lindside series predominate. This grouping is present over about 54 km^2 of the installation. The Mountview series soils are formed in deep loess over residuum or old alluvium on undulating and rolling ridge tops and on broad, level to sloping plateau-like landforms. Pembroke series soils formed in thinner loess deposits but occupy a landscape location similar to the Mountview series. The deep and well-drained Lindside and Arrington series soils are found on alluvial deposits within floodplains and along drainages and range from nearly level to minimally sloping.

About 77.5 km^2 of Fort Campbell is categorized as gently rolling, well-drained uplands and terraces that are associated with soils of the Mountview, Dickson, and Statler series. Statler series soils are deep, well-drained soils formed in loamy alluvium on low terraces flanking streams and drainages. The Mountview and Dickson series are found on level to sloping uplands mantled in thick loess. The Dickson series soils have a fragipan within the subsoil and are less well-drained than the Mountview series.

On rolling to steeply sloping terrain, soils of the Baxter, Humphreys, and Cumberland series are characteristic. These three series cover about 42 km^2 of Fort Campbell. The Baxter soils are on moderate to strongly sloping hillsides and ridge tops, and the Cumberland series are found on nearly level to strongly sloping uplands. Both of these series are well-drained with medium to rapid surface runoff. The associated Humphreys series soils are found on terraces and foot slopes where they formed in alluvium and colluvial deposits. Humphreys series soils are well-drained and are found on nearly level to moderately sloping landforms.

Vegetation

Fort Campbell is located within the Western Mesophytic Forest Region, a transitional climax region between the Mixed Mesophytic Forest Region of the Cumberland and Allegheny Plateaus to the east and the Oak–Hickory Forest Region to the west (Braun 1950). The Western Mesophytic Forest Region is characterized by a mosaic of distinct climax vegetational communities including extensive prairies, mesic deciduous forest, dry cedar forest, and swamp forest. The distribution of these communities is strongly influenced by the underlying limestone bedrock and past patterns of landscape use. In general, forests within this region are less diverse and complex than those of the adjacent Mixed Mesophytic Forest Region, which represents the oldest and most complex forest association in eastern North America, and one which has great similarity to forests of the late Tertiary period (Braun 1950:507–510). While the Western Mesophytic Forest Region is marked by the juxtaposition of discrete habitats and climax associations, distinct transitions in species composition are apparent from the Mixed Mesophytic Forest on the east to the Oak–Hickory Forest to the west. Two of the deciduous tree species most characteristic of the Mixed Mesophytic Forest, white basswood (*Tilia heterophylla*) and yellow buckeye (*Aesculus octandra)*, are not found within the Western Mesophytic Forest Region while numerous other species of trees, shrubs, and herbaceous plants reach their eastern or western distributional limits within the Western Mesophytic Forest (Braun 1950:122–124).

The eastern portion of the Mississippian plateau is characterized by forests in which beech (*Fagus grandifolia*) and white oak (*Quercus alba*) predominate on ridge slopes, and more xeric oak, oak-hickory, and oak-chestnut forests are found on drier slopes and ridges. Oak forests predominate in the western portion of the plateau where oak-hickory forests are also common on isolated limestone hills. In the eastern plateau up to 50 percent of the canopy species may be composed of several oak types — white oak (*Q. alba*), black oak (*Q. velutina*), and chinquapin oak (*Q. muhlenbergii*) — followed in frequency by sugar maple (*Acer saccharum*), beech (*F. grandifolia*), and chestnut (*Castanea dentata*). Understory species include dogwood (*Cornus* sp.), cherry (*Prunus* sp.), redbud (*Cercis canadensis*), and many other small tress and shrubs. Xerophytic communities, including eastern red cedar (*Juniperus virginiana*) and many herbaceous plants and grasses typical of prairie habitats such as little bluestem (*Andropogon scoparius*), are found on limestone outcrops, ledges, and drier slopes and ridges. Swamp forest and flatwoods communities are found in poorly drained upland depressions and upland flats and include many water-tolerant oaks — pin oak (*Q. palustris*), swamp white oak (*Q. bicolor*), swamp chestnut oak (*Q. prinus*) — along with sweet gum (*Liquidambar styraciflua*), red maple (*A. rubrum*), beech (*F. grandifolia*), and many species of swamp and wetland herbaceous plants (Braun 1950:151–154).

Extensive prairies, referred to as “barrens” by the early Euroamerican settlers crossing the Appalachians, covered the karstic limestone uplands of western Kentucky and Tennessee. These barrens were principally covered in tall grass when initially viewed by Euroamericans and represented the first major North American grassland habitat to be encountered during westward expansion. While groves of large trees were not uncommon within the otherwise grass-covered uplands, they were not extensive. Dense hardwood forest did cover many of the river valleys and ravines, however. The extent of the grassland is discernible in a description given by Gilbert Imlay in 1792 and quoted in *The Geography of the Pennyroyal* by the geographer Carl O. Sauer. Imlay notes that south of the Elizabethtown, Kentucky, area “…is a considerable extent of fine land…but traveling a few leagues farther southward you arrive at extensive plains, which stretch upwards of one hundred fifty miles in a southwest course, and end only when they join the mountainous country” (Sauer 1963:24).

Despite their unfamiliarity with the open largely treeless expanse of grasslands, the early trans-Appalachian settlers did not avoid this region, and the term barrens apparently held no negative connotation regarding the potential for agricultural production and fertility of these lands. Indeed, a map created in 1784 by John Filson carries this notation in the region between the Green and Salt Rivers, “Here is an extensive tract, call’d Green River Plains, which produces no Timber, and but little Water; mostly Fertile, and cover’d with excellent Grass and Herbage” (Sauer 1963:24).

The origins of the barrens are believed to be primarily attributable to human rather than edaphic, topographic, or ecological factors, although specific characteristics such as the relatively smooth limestone plateau, soil depth, drainage characteristics, and habitat requirements for forest growth and reproduction cannot be overlooked in their formation. These edaphic and environmental conditions alone, however, do not account for the extensive grasslands within an otherwise heavily forested region. Thus the barrens are seen as being created within a forest-dominated ecosystem in which the isolated groves of large trees represent remnants of the former forest rather than the vanguard of an invading forest encroaching upon a relict prairie. The intentional burning of the uplands by the aboriginal inhabitants of the region, perhaps as a means of improving hunting and foraging opportunities, coupled with naturally occurring fires, resulted in the creation and maintenance of the open grasslands prior to the arrival of Euroamerican settlers. Many nineteenth-century accounts describe the formerly open barrens as being thickly covered in forest within fifty or so years of the expulsion of the Native American population and subsequent Euroamerican settlement. The resurgence of forest at the expense of grasslands is attributed to the cessation of intentional burning and the suppression of wildfires as the region became more heavily settled and domesticated by the growing Euroamerican population (Sauer 1963:27–31).

Fauna

Many species of terrestrial mammals, birds, reptiles, and amphibians are found within the region along with aquatic animals and abundant fish within the rivers and streams. Important taxa for prehistoric and historic human populations of the area include such large herbivores as elk (*Cervus canadensis*), white-tailed deer (*Odocoileus virginianus*), and the American buffalo (*Bison bison*). Large predators include wolf (*Canis lupus*), cougar (*Puma concolor*), black bear (*Ursus americanus*), and coyote (*Canis latrans*). Small and medium-sized mammals include raccoon (*Procyon lotor*), woodchuck (*Marmota monax*), beaver (*Castor canadensis*), eastern cottontail (*Sylvilagus floridanus*), swamp rabbit (*Sylvilagus aquaticus*), and gray squirrel (*Sciurus carolinensis*) (Kellogg 1939).

Resident and migratory birds important to the region's inhabitants included many species of dabbling ducks (Anatinae), geese (Anserinae) and swans (Cygninae), along with passerine birds and such nonpasserine species as wild turkey (*Meleagris gallopavo*), common bobwhite (*Colinus virginianus*), greater prairie-chicken (*Tympanuchus cupido*), and the now-extinct passenger pigeon (*Ectopistes migratorius*) (Peterson 1980; Pough 1946).

Fishes native to the region's rivers and streams include the largemouth bass (*Micropterus salmoides*), Kentucky or spotted bass (*M. punctulatus*), smallmouth bass (*M. dolomieui*) and rock bass (*Ambloplites rupestris*). Panfishes include white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), and several varieties of sunfishes (*Lepomis* spp.). Large catfish such as the blue catfish (*Ictalurus furcatus*), flathead catfish (*Pylodictis olivaris*), and channel catfish (*I. punctatus*), along with smaller species such as the black bullhead (*I. melas*) and yellow bullhead (*I. natalis*), were found in many rivers, streams, and lakes. Other important species include smallmouth buffalo (*Ictiobus bubalus*), white sucker (*Catostomus commersoni*), the quillback or carp sucker (*Carpoides cyprinus*), longnose gar (*Lepisosteus osseus*), spotted gar (*L. oculatus*), and bowfin (*Amia calva*) (Walden 1964). In addition to fish, the waters of the region would also have held a variety of turtles, reptiles and amphibians, and freshwater mussels, many species of which were exploited by Native American populations.

Climate

The modern climate in western Kentucky and Tennessee is characterized as continental, with warm humid summers and moderately cold winters. Rainfall is heavy and well-distributed throughout the year. Snow falls nearly every winter, but generally the snow cover lasts for only a few days (Humphrey 1981:2). The prevailing winds blow from the west, and most of the storm systems move from west to east across the area. Warm humid air drawn up from the Gulf of Mexico dominates during the summers, but brief cold or cool periods often follow the passage of storm systems as cooler air is drawn into the region from the north and northwest. Temperature ranges and precipitation amounts can fluctuate greatly from year to year. In general, the spring and fall months are characterized by less extreme variation in temperature and precipitation than the summer or winter months, when more intense storm systems may cross the region.

Climatic changes characteristic of much of the midcontinent most probably impacted the Fort Campbell region and would have affected vegetation patterns, habitat distribution, and drainage. The mid-Holocene Hypsithermal Interval (Deevey and Flint 1957), between about 8500 and 4500 B.P., is characterized by the onset of warmer and drier condition across much of the mid-continent. Such changes in climate may have led to a reduction in forest mast production in the uplands as conditions became more xeric. Decreases in available mast resources in the uplands may have had significant impacts on the nature of prehistoric subsistence and settlement behaviors. With the onset of the late Holocene about 4000 B.P., the climate within the region is believed to have moderated in temperature and available moisture and to have become essentially the same as that experienced and described by the early historic settlers of the region.

CHAPTER 3.
CULTURAL OVERVIEW

This chapter presents a general outline of the prehistoric and historic periods in the southern Midwest and Midsouth regions, providing a cultural context within which sites identified during the current project can be evaluated for inclusion in the NRHP. This discussion is divided into sections on previous archaeological research at Fort Campbell and a prehistoric cultural overview. These sections are based on earlier reports (Ahler et al. 1999; Albertson and Buchner 1999; Bradbury 1999); regional archaeological syntheses, especially Broster and Norton (1996), Faulkner (1988), Lewis (1996), Nance (1987), Pollack (1990), and Smith (1992); and the Fort Campbell prehistoric (Moffat and Ahler 2001) and historic (Andrews and Ahler 2002) context statements. The reader is referred to these documents for more detailed discussion of the cultural context of Kentucky and Tennessee in general and Fort Campbell in particular.

Previous Archaeological Research

It was not until 1980 that professional archaeological investigations at Fort Campbell began in earnest. The accelerated pace of investigation was due to the implementation of federally mandated cultural resource management laws and regulations. The first investigation undertaken during this period was conducted by the University of Kentucky during 1980 and 1981 (O'Malley et al. 1983). The University of Kentucky project resulted in the survey of more than 30,000 acres, recordation of more than 400 sites, the creation of an initial cultural-historical framework for the region, the development of a site location model and cultural resource management strategy for the installation, and the Phase II NRHP evaluation of sites 40MT29 and 40MT226. After the University of Kentucky project, archaeological investigations did not resume at Fort Campbell until the middle 1990s. Since that time numerous Phase I archaeological surveys have been conducted, including numerous survey projects conducted by Panamerican Consultants, Inc. (PCI) (see Chapter 5). In contrast to the increased number of Phase I investigations, relatively few Phase II NRHP evaluations have been conducted at Fort Campbell. To date, Phase II investigations have been reported at 43 prehistoric sites (Ahler et al. 1999; Bradbury 1999; Bradbury et al. 1999; Ezell 2002; Jones and DuVall 1996; Kreisa et al. 2002; McNutt et al. 2002) and three historic sites (Ahler et al. 2002). Additional archaeological site survey and NRHP assessment projects are ongoing.

Cultural Overview

The prehistoric cultural-historical sequence for Kentucky and Tennessee is divided into five major periods (Figure 3), a number of which are subdivided into early, middle, and late subperiods. The prehistory of the area appears to have experienced a number of developments similar to those identified in other areas of eastern North America including population increase, focalization on locally abundant and seasonal foodstuffs, the eventual adoption of cultivated plant foods, and increasing social and political complexity. Expressions of these developments differ in the Fort Campbell region, though, since it borders both the southern Midwest and Midsouth regions.

Years B.P.	Period	Sub Period	Phase: West Tennessee	Phase: Western Kentucky
Present–500	HISTORIC			
500–1000	MISSISSIPPI		Thruston Dowd	Tinsley Hill Jonathan Creek
1000–1500	WOODLAND	Late		
1500–2100	WOODLAND	Middle	Owl Hollow McFarland	Crab Orchard
2100–3000	WOODLAND	Early	Long Branch Watts Bar	Early Crab Orchard Baumer
3000–5000	ARCHAIC	Late		
5000–7000	ARCHAIC	Middle		
7000–10,000	ARCHAIC	Early		
10,000–13,000	PALEOINDIAN	Late	Dalton Complex	
	PALEOINDIAN	Middle		
	PALEOINDIAN	Early		

Figure 3. Chronological sequence of the Fort Campbell area.

Because of the lack of archaeological research in the Fort Campbell region, and perhaps as importantly, a lack of synthesis of the results of work that has been conducted, most previous archaeologists have relied on cultural-historical syntheses from other regions. Most informative, or perhaps most complete, is the framework established for southeast Tennessee. Also appropriate to the Fort Campbell area are data from investigations to the northwest conducted in the lower Tennessee–Cumberland Rivers region, also know as the Land Between The Lakes.

Paleoindian Period (14,000 to 10,500 years ago)

The Paleoindian period marks the earliest known occupation of the North American midcontinent by Native Americans and is well-documented by a series of distinct lanceolate hafted bifaces. These bifaces have long, narrow flakes removed from the base, forming a characteristic channel or flute to facilitate hafting onto bone or wood handles. Many of the more refined specimens, made from high-quality nonlocal chert, indicate a high degree of mobility and participation in exchange networks.

Tankersley (1990) divides the Paleoindian period into early (ca. 11,500–10,500 B.P.) and late (10,500–10,000 B.P.) subperiods. During this period the Eastern Highland Rim has been characterized as covered by a cool-temperate mixed mesophytic forest (Delcourt 1979), although plant communities present in the Western Highland Rim are poorly known. The early Paleoindian subperiod is characterized by fluted points such as Clovis and Cumberland (although Tankersley [1996] has recently suggested a middle Paleoindian period [11,000–10,500 B.P.] characterized by Cumberland and Gainey points). The late Paleoindian subperiod is characterized by unfluted lanceolate points including Plainview, Agate Basin, Beaver Lake, Quad, and Dalton, the latter of which is discussed in greater detail below. Importantly, Anderson and Sassaman (1996) have suggested that the Middle Cumberland and Nashville Basin regions might have been an initial colonization or staging area for Paleoindian populations.

The transition from the late Pleistocene to Holocene environment brought about extinctions of megafauna across North America and the development of modern biotic regimes. Archaeologically, this transition is associated with the Dalton culture (Goodyear 1982). This manifestation originally was defined in northern Arkansas and southern Missouri (Goodyear 1974; Morse 1973; Morse and Goodyear 1973; Price and Krakker 1975) and is characterized by a chipped-stone tool assemblage that includes the distinctive lanceolate, unfluted Dalton projectile point and its variants, chipped-stone adzes, and spurred end scrapers. Settlement includes a variety of site types consisting of base camps occupied for long periods of time, resource-extraction camps, smaller generalized residential camps, and special-purpose cemetery sites (Goodyear 1974), suggesting a logistically organized system oriented toward the exploitation of seasonally abundant aquatic resources by larger population aggregates.

Paleoindian sites in western Kentucky and west Tennessee tend to be located on terrace and floodplain formations near confluences of streams, adjacent to bogs, ponds, and saline springs, and along game trails (Broster and Norton 1996; Freeman et al. 1996; Tankersley 1990, 1996). Several important Paleoindian sites are located near Fort Campbell. The Adams and Ledford sites in Christian County, Kentucky, both contain early subperiod components that evidence all stages of fluted-point manufacture. Paleoindian occupation continues into the late subperiod at Ledford and is also present at the Roach site in Trigg County, Kentucky. Recent investigations along the Cumberland River have identified a number of Paleoindian sites, both early and late period, some of which have intact deposits (Broster and Norton 1996; Freeman et al. 1996).

Early Archaic Period (10,000 to 7,000 years ago)

During the Early Archaic period, small, highly mobile hunter-gatherer groups gradually became more geographically restricted. Although hunting white-tailed deer, cottontail rabbit, elk, bear, and turkey was a major subsistence activity to Early Archaic peoples, such a strategy appears to have been much more diverse and structured around the seasonal availability of resources in different environmental zones (Chapman 1975:232–233). There was apparently little specialized exploitation of the floral and faunal resources. Chapman (1975, 1977) suggests that the Early Archaic peoples practiced a "central-based wandering" foraging scheme, which has been posited for early Holocene bands in the Little Tennessee River Valley. According to this model, a seasonally occupied central base camp would have been established in a strategic location to serve as a node for numerous, smaller hunting-and-gathering resource-extraction locales. In contrast, Brown (1985:215) has proposed that Early Archaic camps are the primary settlements within a residentially mobile system since substantial permanent structures are absent.

In the Land Between The Lakes area, Early Archaic period sites are usually small, with relatively few artifacts, suggesting that populations were composed of small, highly mobile residential groups organized into egalitarian bands (based on little variability between artifact assemblages and few site types). Local populations, typically resident in small, temporary camps (Jefferies 1996; Nance 1986), may have coalesced periodically into larger population aggregates to take advantage of seasonally abundant resources, but these were probably episodic events of short duration. Data from eastern Tennessee indicate that these base camps contain hearths, pits, rock concentrations, basins, and cremation burials (Chapman 1975). Closer to Fort Campbell, the Lawrence site in Trigg County, Kentucky, appears to represent an example of smaller Early Archaic period sites. The Lawrence site is interpreted as a camp locale at which a series of repeated, brief occupations occurred. Even given this interpretation, an Early Archaic burial feature, containing two adult males with a cache of flaked-stone tools, was found at the site (Mocas 1977). Habitation levels that have yielded radiocarbon dates have also been investigated at the Morrisroe site in Livingston County, Kentucky, along the Tennessee River (Nance 1986) and the Puckett site in Stewart County, Tennessee, along the Cumberland River (Norton and Broster 1993).

Early Archaic period sites are characterized by a variety of projectile point types. These include types such as Palmer Corner Notched, Lost Lake, Kirk Corner Notched, Kirk Stemmed, Kirk Serrated, Cache River, Decatur, and Pine Tree, and bifurcate base points including LeCroy and MacCorkle (Albertson and Buchner 1999; Justice 1987; Moffat and Ahler 2001). Based on a survey conducted in uplands in the Land Between The Lakes region, Nance (1975) suggests uplands were used as hunting areas, and given the physiographic nature of Fort Campbell, many of the Early Archaic sites found to date may be hunting-related as well.

Middle Archaic Period (7,000 to 5,000 years ago)

At the end of the Early Archaic period in the Midwest, the effects of the Hypsithermal Interval were felt. The Hypsithermal Interval is probably related to the replacement of the retreating Arctic air masses by warmer and drier Pacific air masses prior to 6000 B.P. (Bartlein et al. 1984:372; Wendland 1978:278–280). Mean temperatures were higher and mean precipitation lower than at any time during the Holocene, resulting in the progressive eastward expansion of prairie communities from the Plains region. Increased sedentism appears to have been associated with these climatic and environmental changes as Middle Archaic peoples replaced a residentially mobile foraging system with a logistically organized collecting system in which task groups were deployed from a central settlement or base camp (Brown 1985). The desiccation of the uplands and the environmental benefits offered by abundant, diverse floodplain resources of major river valleys affected settlement patterns.

In the southern Midwest and Midsouth this cultural period is marked by a shift in settlement toward major river valley margins and increased use of aquatic resources by larger population aggregates (Ahler 1984; Brown and Vierra 1983; Jefferies and Butler 1982; Styles 1986). The shifts in settlement include the intensive occupation, perhaps year-round, of some sites, in addition to smaller, short-term occupation camps (Nance 1985). Regional examples of intensively occupied sites include Eva on the Tennessee River and the Anderson site in the Nashville Basin (Dowd 1989). Both sites evidence thick midden deposits and burials. Nance (1987) suggests that Middle Archaic populations aggregated in floodplain settings along the lower Tennessee–Cumberland region, whereas Sanders and Maynard (1979) indicate that the Pennyroyal region, due to the spread of grasslands at the expense of forests during the Hypsithermal Interval, may have had a low population density.

Hafted bifaces characteristic of this period include Eva, Cypress Creek II, Stanly, Morrow Mountain, Benton, Sykes, and White Springs (Albertson and Buchner 1999; Justice 1987; Moffat and Ahler 2001). In addition, new tool types such as the fully grooved axe and ground-stone celt were added to the technological assemblage during this period.

Late Archaic Period (5,000 to 3,000 years ago)

The Late Archaic was a period of increasing cultural complexity and sedentism that marks the transition from the hunting-gathering lifeway of the Middle Archaic to an incipient dependence on horticulture characteristic of the later Woodland periods. The increased archaeological visibility of Late Archaic sites is a phenomenon that occurs throughout the midcontinent as a result of population growth, increased occupational intensity of sites, and cultural elaboration associated with a more broadly based subsistence pattern that includes the earliest evidence of seed-plant cultivation (Fitting 1975:68; Griffin 1978:231; Stoltman 1978:715).

The Late Archaic period in the southern Midwest and Midsouth is marked by the continuation of late Middle Archaic period trends toward greater regional specialization and adaptation and increases in social complexity. Large Late Archaic sites with thick midden deposits suggest a combination of population increase, changes in social organization, and more efficient adaptation to local environments. Burials, including those from the Green River Shell Mound Late Archaic culture of Kentucky, are indicative of the trend toward increased social complexity (Jefferies 1990, 1996). Excavation of these mounds revealed Late Archaic participation in long-distance trade networks through the presence of nonlocal materials such as copper and marine shell, among others, and differential burial treatment which, while still indicative of an egalitarian social organization, does exhibit incipient hierarchical organization. Settlements appear to be organized within a seasonal-round pattern, with winter villages, also thought to perhaps represent year-round occupations, located on major streams. Structures have been found at similar sites on the Duck River in Tennessee. Smaller sites are located in the uplands as well as stream floodplains. Morse (1963) has noted high Late Archaic site density in the Cumberland River–Lake Barkley floodplain, while Nance (1975) interprets upland Late Archaic sites as being predominantly hunting-related. Nance (1980) notes that the Land Between The Lakes Late Archaic occupation lacks the shell mounds that are common to the north and east in Kentucky.

The Late Archaic period in the southern Midwest and Midsouth is identified by large straight, expanding, contracting-stemmed, smaller stemmed, and side-notched projectile point types such as Saratoga, Ledbetter, Elora, Plevna, Rowlett, Gary, Matanzas, Benton, Savannah River, Wade, McIntire, Pickwick, Kays, and Adena, a number of which continue in use into the Early Woodland period. A greater variety of ground-stone tools, including soapstone and sandstone vessels, 3/4-grooved axes, celts, pestles, manos, bannerstones, and plummets, also is present in Late Archaic assemblages. Many of these tools are associated with plant processing. Increased reliance on plants is supported by recovery of some of the earliest domesticated squash and gourd remains in the eastern United States from Late Archaic contexts.

Early Woodland Period (3,000 to 2,100 years ago)

Traditionally, the beginning of the Woodland period is marked by the appearance of pottery in archaeological assemblages. The introduction of pottery gave populations the technological means to exploit their environment in new ways. The period also shows evidence of elaboration of mortuary ceremonialism, continuation of complex interregional exchange networks, and possible beginnings of significant cultivation of native domesticates as part of a seasonal, small-garden-plot cultivation strategy (Railey 1996). The earliest ceramics in the Fort Campbell area, which Railey (1996) associates with a southeastern-oriented pottery tradition, are typically conoidal vessels with narrow, flat bases. Exterior surfaces are cordmarked, fabric-impressed, or cord-wrapped dowel impressed, some with interior surface marking as well. In many areas, subsistence, settlement, and social organization remain essentially unchanged from Late Archaic patterns (e.g., Railey 1990; Walling and McNutt 1989), although Railey (1990) suggests that plant domestication may have intensified during this period. Settlement systems are thought to have been organized within a seasonal-round pattern, with winter villages, also thought to perhaps represent year-round occupations, located on major streams and smaller sites located in the uplands as well as stream floodplains. Railey (1990), though, indicates that Early Woodland ritual space is typically separated from habitation areas.

Two Early Woodland phases have been defined for southeast Tennessee (Faulkner 1992). The first, Watts Bar (700–400 B.C.), is characterized by quartz-tempered, fabric-marked ceramics and

Adena points. The following phase, Long Branch (400–150 B.C.), is defined by the presence of limestone-tempered fabric-marked sherds. Prior to both phases is the poorly defined aceramic terminal Archaic/Early Woodland Wade phase. This phase is characterized by Motley, Pontchartrain, and Wade projectile points (Faulkner and McCollough 1982).

Railey (1990) indicates that Early Woodland ceramics are rare in the Pennyroyal region. The earliest known ceramics in the Fort Campbell area are from the Lawrence site in Trigg County, Kentucky, and date between 400 and 100 B.C. (Mocas 1991). These ceramics are chert-, limestone-, and quartz-tempered with cordmarked exterior surfaces. Alexander Pinched ceramics, typically a sandy-textured Early Woodland type found in northern Alabama, have been identified at the Roach site, also in Trigg County (Rolingson and Schwartz 1966). Finally, a single fiber-tempered sherd has been reported from Savage Cave in Logan County, Kentucky (Lawrence 1985). Baumer and Crab Orchard ceramics are the common Early Woodland series to the north toward the Ohio River (Railey 1990, 1996). Projectile point types are less chronologically distinctive, with particular types representing either a carry-over from the Late Archaic period or a continued use into the Middle Woodland period. Characteristic types associated with the Early Woodland period include Adena, Turkey Tail, Motley, Wade, Kramer, Savannah River, Gary, Greenville, and Camp Creek.

Middle Woodland Period (2,100 to 1,500 years ago)

The Middle Woodland period is characterized by the inception and expansion of the Hopewell cultural phenomenon in the Midwest and the Copena culture in the Midsouth. Many of the trends of the preceding periods continue and include increasing sedentism, population growth, horticultural intensification, and investment in mortuary ceremonialism involving mound construction and a diverse assemblage of exotic ceremonial artifacts (Brose and Greber 1979). Other changes include increase in community size, possible increase in the number of subterranean storage facilities at village sites, population aggregation in the larger river and main tributary valleys, and production of thinner-walled pottery vessels.

Regional phases defined for the Middle Woodland period are once again based on research conducted in southeastern Tennessee and consist of the McFarland and Owl Hollow phases (Faulkner 1988). McFarland dates between 200 B.C. and A.D. 200 and is thought to be represented by populations resident in frequently shifting villages. Limestone-tempered ceramics, representing tetrapoidal vessels with fabric-marked, check-stamped, and simple-stamped exteriors, and medium-sized McFarland or Copena triangular projectile points, are characteristic of this phase. The ceramics have been classified as Wright Check Stamped, Bluff Creek Simple Stamped, Pickwick Complicated Stamped, Long Branch Fabric Marked, and Mulberry Creek Plain and are thought to have affinities with Copena culture ceramics. McFarland phase sites on the Upper Elk River have recently been redefined as the Neel phase (Bentz and McIlvenna 1992). This phase, dating from 350 B.C. to A.D. 150, is thought to be oriented more toward the Hopewell than the Copena culture, as evidenced by the higher frequency of cordmarked ceramics. Following McFarland is the Owl Hollow phase, dating from A.D. 200 to 600. Owl Hollow phase populations inhabited large permanent villages and evidence an increased use of floodplain zones. Paired structures and deep middens are often found at Owl Hollow phase village sites. Ceramics consist of subconoidal jars with simple-stamped and plain surfaces, notched rims, and limestone temper (Faulkner 1988). These ceramics have been classified as Mulberry Creek Plain, Bluff Creek Simple Stamped, and Flint River Cordmarked. Typical projectile point types include Bradley Spike, Steuben Stemmed, Lowe Flared base, Chesser Notched, and Bakers Creek.

Closer to Fort Campbell, Railey (1996) suggests that Middle Woodland settlement in the Pennyroyal region consists of central base camps with thick midden deposits and smaller outlying sites. These central base camps decrease in number through the Middle Woodland period, while in contrast, most burial mounds, which are found in or near the villages, date to late in the period. In certain parts of the Pennyroyal, Middle Woodland populations preferred Archaic shell mounds as locations for sites. Railey (1996) suggests that late Crab Orchard and a few Hopewell ceramics dominate early Middle Woodland assemblages in the Pennyroyal. These include conoidal and barrel-shaped jars with cordmarked, cordwrapped dowel, fabric-impressed, check-stamped, and simple-stamped exteriors. By late in the Middle Woodland, ceramic assemblages consist of cordmarked jars with a few check-stamped, simple-stamped, and Hopewellian sherds. Most are limestone tempered, suggesting a similarity to the Owl Hollow phase (Railey 1990).

Late Woodland Period (1,500 to 1,000 years ago)

Late Woodland groups have been termed the “good gray cultures” because they were supposedly overshadowed by the earlier Hopewellian and later Mississippian cultural climaxes (Williams 1963). However, the Late Woodland period is now understood as a time of important innovation in technology and settlement-subsistence strategies. Significant cultural transformations occurred with the abandonment of elaborate mortuary ceremonialism, long-distance trade in “exotic” goods, and ceramic decoration characteristic of Middle Woodland societies. The lack of stylistic complexity and variation in Late Woodland ceramic vessels has led Braun (1988) to propose that there was increased regional integration during the Middle Woodland–Late Woodland transition. Advances in cooking vessel technology (i.e., thinner walls) for preparing food (increasing the digestibility and palatability of starchy seeds) appear to be associated with a rapid increase in the economic importance of native-annual seeds that, in turn, may have led to increased population growth.

Late Woodland culture is poorly documented in the study region (Railey 1990). Across much of Southeast, though, data suggest that population increases, political and social decentralization, and the adaptation of agriculture to riverine environments characterized this period (Smith 1986). Equally characteristic of this period is the adoption of bow-and-arrow technologies during a relatively short time span, ca. A.D. 700 to 800, and a concomitant use of a suite of distinctive projectile point forms (Railey 1996).

Given the remarks above, few phases have been defined in the general study area for the Late Woodland period as would be expected. The Mason phase, dating between A.D. 650 and 950, has been defined to the southeast along the Upper Duck River. This phase is characterized by the Elk River ceramic series, consisting of chert-tempered pottery (Duggan 1982). Limestone-tempered pottery has also been found at Mason phase sites. In general, Late Woodland populations have been characterized as low density and highly mobile in the Middle Tennessee region. While few

Late Woodland sites have been investigated in the Pennyroyal region, Carstens (1980) has speculated that the pottery should consist of cordmarked, probably grog-tempered, jars. Indeed, at the Driskoll site in Lyon County and the Dedmon site in Marshall County, Kentucky, grog-tempered sherds dominated the undated Late Woodland components. Both sites evidence Late Woodland assemblages that contain Baytown Plain and Mulberry Creek Cordmarked ceramics (Allen 1976; Clay 1963; Schwartz 1962). It has been suggested that terminal Late Woodland ceramic assemblages at both sites include—in addition to Baytown Plain and Mulberry Creek Cordmarked—Larto Red, Yankeetown Incised, and Dillinger-like ceramics (Railey 1990). Projectile points characteristic of this period include Steuben, Jack's Reef Pentagonal, Jack's Reef Corner Notched, Raccoon Notched, and triangular including Hamilton Incurvate (Albertson and Buchner 1999; Justice 1987; Moffat and Ahler 2001).

Mississippi Period (1,000 to 500 years ago)

The Mississippi period is associated with an increase in cultural complexity and population density in the Southeast. Maize became a staple of the diet, and a hierarchical settlement system emerged that included mound and temple town sites and dispersed agricultural hamlets that supported a chieftainship sociopolitical system. Long-distance exchange networks again became important, especially with regard to the acquisition and production of status goods. In many regions, a shift toward the manufacture of shell-tempered ceramics and rectilinear structures is also associated with the emergence of Mississippian culture. An added hallmark of Mississippian in the Fort Campbell area is the use of stone-box graves.

Autry and Hinshaw (1981) have proposed that two spheres of cultural influence were present during the Mississippi period in the study area. One, to the north centered on the lower Tennessee–Cumberland Rivers region, was influenced by the Kincaid mound center in southern Illinois, while the other, comprising the middle Tennessee River valley to the south, was influenced by the Shiloh mound center in Tennessee. Two Mississippian phases have been defined for this southern region: Dowd and Thruston. Dowd (A.D. 1000–1250), is a phase associated with platform mound construction, although most of the population resided in hamlets and farmsteads. Ceramics characteristic of this phase are overwhelmingly plain-surfaced with shell or mixed shell tempers. Other surface treatments, all a minor component of Dowd phase ceramic assemblages, include cordmarked, fabric-impressed, and decorated (incised, punctated, and painted) (Smith and Moore 1994). Vessel forms include jars, bowls, bottles, and pans. The following phase, Thruston (A.D. 1250–1450), appears to be a time when populations aggregated into large fortified villages and mound construction ceased.

A somewhat less precise chronology has been posited for the northern, lower Tennessee–Cumberland Rivers, Mississippian sphere. The initial phase defined for this region is Jonathan Creek (A.D. 1000–1100) and has a settlement hierarchy of small mound centers, some of which are fortified, and outlying hamlets and farmsteads. A possibly similar site, McRay, is a palisaded village located in Christian County and excavated by a local amateur (Dossett 1966). Ceramic types, generally shell-tempered, that dominate Jonathan Creek phase assemblages include Mississippi Plain, Bell Plain, and Kimmswick Fabric Impressed, with smaller amounts of Old Town Red and McKee Island Cordmarked also present (Lewis 1990). Clay (1979) argues for a hiatus between the Jonathan Creek phase and the following Tinsley Hill phase. Unfortunately, Tinsley Hill remains poorly dated, but most researchers suggest a post-A.D. 1300 time period for this phase. Ceramic assemblages are similar to Jonathan Creek but with the addition of low numbers of Matthews Incised and O'Byam Incised var. Stewart decorated types (Lewis 1990). Apparently, the Tinsley Hill settlement system was similar to that of the Jonathan Creek phase.

By the period of between A.D. 1450 and 1500, much of the Midsouth and southern Midwest regions appear to have undergone a process of depopulation that has been termed by Williams (1990) the Vacant Quarter. Williams (1990) includes the Fort Campbell area within his so-called Vacant Quarter. While the causal mechanism of this depopulation remains unknown, most researchers have found little evidence for a continuation of Mississippian culture past A.D. 1500 in this region.

Protohistoric/Historic Native American (ca. 500 to 200 years ago)

The period perhaps most poorly known archaeologically in the Fort Campbell area is that between the collapse of the Mississippian cultures (ca. A.D. 1450–1500) and the region's colonization by Euroamericans after ca. 1775. Fortunately, some information on the populations of this area has been recorded by various European explorers. The first such mention comes from the chroniclers of the DeSoto entrada that took place between 1539 and 1543. In these documents the Chisca are described as occupying highlands north of what is now known as the middle portion of the Tennessee River. The Chisca were also mentioned by chroniclers of the Juan Pardo expedition, dating between 1566 and 1567, and were described as warlike mountain chiefs. Swanton (1979) interprets the Chisca to be the Yuchi, who split into two bands late in the sixteenth century. One band remained in the north while the other moved southeast and merged with the Overhill Cherokee. The next documentation of Native Americans in the general study area is from the late seventeenth century. In 1685 the French established a trading post in the vicinity of modern Nashville and indicated that the area was occupied by the Shawnee. Because of frequent warfare, the Shawnee were driven from the region in the early 1700s (Satz 1979). It is thought that few Native American groups occupied the region after that. For the most part, with the Cherokee sale of the region to the English in 1775, Native American occupation of the Fort Campbell area ended.

Historic Period (200 years ago to present)

Both Bradbury (1998) and O'Malley et al. (1983) have presented comprehensive historic overviews of the Fort Campbell area; the following summary draws from their work. The reader is referred to those works for more detailed information.

Euroamerican settlement in the Fort Campbell area did not begin until about 1800. Before that time, use of the area had been limited mainly to fur trappers and long hunters who exploited its fur-bearing resources. France was the first European country to control the area, establishing a trading post at French Lick (later Nashville, Tennessee) on the Cumberland River in 1710. By 1744, however, the English were making inroads into French control of the region, culminating in the Seven Years War. Following the Treaty of Paris in 1763 at the conclusion of the war, control of the region was awarded to England (Bradbury 1998:46; O'Malley et al. 1983:401).

Despite a ban on settlement after the Seven Years War by the English government, speculators and long hunters continued to explore the area, and a few settlements were established prior to the Revolutionary War. Settlement continued even during the war, especially in the Cumberland Valley, but on a limited scale. Following the war, however, settlement increased significantly as the new federal government offered land bounties to veterans in lieu of cash for their military services. Clarksville was established as a town in 1785, but settlement in Kentucky was mainly centered east of present-day Fort Campbell. The first settler in what would become Hopkinsville, Kentucky, arrived in the 1790s (Bradbury 1998:46; O'Malley et al. 1983:401–407). The 1798 tax list of Montgomery County, Tennessee, shows several families were living along Piney Fork, Saline Creek, and Little West Fork, all of which are located within the boundaries of Fort Campbell (Beach and Alley 1969). Christian County, Kentucky, tax records indicate a John Scott was living on Saline Creek, and Joel Harvey and Jesse and Micajah Fort settled Flat Lick in 1799 or 1800. It appears that settlement in the Fort Campbell area occurred mainly between 1800 and 1820, based on the 1820 federal census for the counties that comprise the modern installation (Kentucky State Historical Society 1926; O'Malley et al. 1983; Perrin 1884).

Early settlers in the area focused on mixed agricultural production, raising livestock such as cattle, sheep, and swine, and growing crops such as corn, wheat, and tobacco. It soon became apparent that the climate and soil were ideal for tobacco, and it quickly became the dominant cash crop despite the risks of the market and the limitations of early transportation systems. Iron ore had been discovered between the Cumberland and Tennessee Rivers in 1793, and more than 20 furnaces were producing iron on the eve of the Civil War, comprising another important part of the local economy. Transportation was limited in the early nineteenth century around the Fort Campbell region given the lack of improved roads and the concentration of population on the larger navigable rivers (O'Malley et al. 1983:410–414). Transportation of goods was still limited on the larger rivers by the need to travel from the Cumberland River to the Ohio and then the Mississippi down to New Orleans in order to sell goods (Bradbury 1998:46). Once steamboats began operating in 1815, the travel time from New Orleans to Louisville dropped to 8 days from 90, and upstream costs were reduced by 90 percent (Bradbury 1998:47; Davidson 1990:344–345). These developments in river transportation allowed the settlers in the area to move towards a more market-oriented economy from their previously more subsistence-oriented practices. By 1819 there was a stagecoach route to Nashville that ran through Hopkinsville and Clarksville, and turnpikes from Hopkinsville to Russellville and Clarksville were established in 1830 and 1838, respectively (Bradbury 1998:47–48).

The increasing prosperity of the region was interrupted, however, as the inhabitants and economy of the Fort Campbell area were impacted significantly by the outbreak of the Civil War in 1861. Sympathies generally ran with the Confederacy, but with the fall of Forts Henry and Donelson in 1862, the area was occupied by Union forces who took control of Clarksville for the duration of the war. Although the area saw no major battles, the local economy was effectively shut down by the closure of the iron works, confiscation of agricultural produce by military troops and raiders, and conscription of local men into the Union army. Recovery after the Civil

War went slowly, and the Panic of 1873 further slowed the economic and social recovery of the region. The area never did again reach its former levels of prosperity in the nineteenth century (O'Malley et al. 1983:417–420).

During the twentieth century the area was brought into greater contact with the rest of the nation as the railroad system was expanded, which facilitated better communications and transportation of goods. As in the previous century, tobacco continued to be the most important cash crop, but price manipulation by tobacco-company trusts led to economic hardship and violence as tobacco growers tried to protect their livelihood. The pressure was finally eased with the formation of the Tobacco Board of Trade in 1915. Although tobacco was the dominant generator of revenue, manufacturing was present in the area, with shoe, boot, and rubber companies operating in Clarksville. The most significant twentieth-century development in the area, however, occurred during World War II, when the federal government purchased more than 101,755 acres of land for the creation of Camp Campbell, later renamed Fort Campbell when it became a permanent base in 1950. During World War II the facility operated mainly as a training center for armor divisions but also served as a redeployment center after the war. The fort has remained in operation since that time, with the 101st Airborne Division assigned to it in 1956 and continuing to be based there today (Bradbury 1998:49–52; O'Malley et al. 1983:421–422).

CHAPTER 4.
DATA COLLECTION, FIELD, AND LABORATORY METHODS

This chapter describes the data collection and field and laboratory analysis methods used in the assessment of previous archaeological survey projects at Fort Campbell. The objectives of the archaeological survey assessment project were to assemble all pertinent information sources concerning previous archaeological surveys conducted at Fort Campbell, to tabulate that survey data pertaining to variables defined by ERDC/CERL, including the inspection of artifacts from selected sites identified during previous surveys to assess the reliability of categorization and tabulation, and to conduct a baseline archaeological field survey. The methods employed to meet these objectives can be categorized under two headings; data collection methods and field methods. Since artifacts were recovered during the baseline archaeological survey conducted as part of this project, pertinent laboratory methods are also presented.

Data Collection

The initial step in data collection involved an inventory and inspection of information sources regarding all previous archaeological survey projects conducted at Fort Campbell. In all, 20 archaeological survey projects were identified as having been undertaken at Fort Campbell. Of these, 18 were sponsored by Fort Campbell and two by outside federal and state agencies (i.e., Tennessee Valley Authority and Tennessee Department of Transportation). In discussions with the Fort Campbell CRM staff, it was decided that the two projects sponsored by outside agencies would not be included in this project. An initial level of data for the remaining 18 projects was collected, including the year in which the project was conducted, the reported acreage surveyed, identification of the contractor that undertook the work, final report reference, the presence of a Statement of Work, and an inventory of field maps, photographs, field notes, artifact analysis forms, artifacts, site forms, project correspondence, and any other information that was deemed pertinent and was present at Fort Campbell. A data base was developed with this information that was then submitted to Dr. Michael Hargrave, the ERDC/CERL COTR.

Next, the ERDC/CERL COTR, in consultation with the Fort Campbell CRM staff, developed a two-step sequence of data collection. The first step was designed to collect data pertinent to the overall survey project for each of the 18 surveys conducted at Fort Campbell. The second step was designed to collect more specific data from a sample of 11 sites for each of the 21 surveys.

The first step of data collection can be broken down into three parts. The first group of data collected was overview-type information pertinent to each project: project report reference, location of survey tracts, total acreage surveyed, and field conditions encountered (i.e., acreage in agricultural fields, pasture, developed, or other). The second group of data that was collected included field methods employed by each project: transect spacing, orientation, discovery method (i.e., pedestrian or shovel testing), criteria for omitting shovel tests, shovel-test spacing within defined site areas, depth of excavation, screening of soils, whether soils were excavated by level, the presence of shovel test profiles, shovel test documentation, artifact collection strategies, and any other information deemed pertinent. Information from both the Statement of Work requirements, when available, and the methods employed during the survey, when stated, was collected. The third group of data collected pertained to the results of the survey: predicted number of shovel tests, actual number of shovel tests, acres omitted from the survey, number of prehistoric and historic sites and isolates identified, average site areas for prehistoric and historic sites, and any other information deemed pertinent.

The second step of data collection, concerning more specific data from a sample of 11 sites from each of the 18 surveys conducted at Fort Campbell, can also be broken down into three parts. The first group of data measures reporting consistency: number of shovel tests excavated at the selected site as mentioned in the text and as depicted on the site map, number of artifacts recovered from the selected site as mentioned in the text and as presented in accompanying tables, and any other information deemed pertinent. This last part also included an examination of the artifacts recovered from the selected sites. The second group of data measures accuracy of site locations: comparison of site locations on maps and as presented in the text, accuracy of UTM coordinates for the site, and whether areas omitted from the survey are depicted in the report. The third group of data centers on the NRHP evaluations offered for each selected site: the discussion of site condition or integrity, the evaluation of the site under Criterion D, whether an evaluative context is provided, and finally, the NRHP finding. Consistency of findings arguments presented, both within a project report and between project reports, can also be assessed based on the data collected here.

For each of the two steps of data collection (e.g., survey overview data and specific site data), a data base was developed to record the information. The information recorded in this data base represents the primary documentation that has been used to evaluate each previous archaeological survey conducted at Fort Campbell, to identify problem areas, and to suggest a strategy for remedial measures, if needed. Specifics regarding the definition of the variables collected are discussed in Chapter 6.

Field Methods

The field methods used during the baseline archaeological survey at Fort Campbell were based on project goals and the ERDC/CERL Statement of Work. The ERDC/CERL Statement of Work indicated that 300 shovel tests were to be excavated at a chosen location(s). A shovel-testing grid was to be established and a map made of the location. Prior to the initiation of fieldwork, the ERDC/CERL COTR and Fort Campbell CRM staff identified both the transect spacing to be employed while conducting the baseline survey and two areas for survey. The baseline survey was to be conducted using 10-m intervals, both between and within transects, and was to be undertaken at two locations along Piney Fork in Training Area 4. The survey tracts were the location of two previously identified sites, 40MT302 and 40MT303. Both sites had been identified as prehistoric lithic scatters found along a road to the north of Piney Fork by O’Malley et al. (1983). Actual site sizes and density of material present at the two sites was considered largely unknown based on the results of the O’Malley/University of Kentucky survey.

Screened shovel tests were excavated in a 10-m grid pattern in both areas. All tests were dug with a pointed-end shovel and had 30-x-30-cm dimensions. Each test was excavated in 10-cm levels, and sediments were screened through 6.35-mm (¼-inch) mesh hardware cloth. These tests removed a 30-cm or larger column of soil and minimally were excavated to either 75 cm below surface, refusal, or to 10 cm below B horizon soils, as based on descriptions provided in Lampley et al. (1975). All test locations were backfilled upon completion. Positive tests were recorded on standard forms that include soil color, soil texture, and depth of cultural materials. Materials recovered from these tests, unless determined to be modern, were collected.

Recovery of artifacts resulted in additional documentation. Upon the discovery of an artifact, the location was assigned either a temporary field number (area of scatter [AOS]) or the appropriate site number. The next task was to record the location of the positive tests on USGS 7.5' quadrangle maps. All subsurface materials and surface materials discovered within the AOS were collected in reference to their specific provenience (e.g., surface, shovel test, depth of recovery). A scaled, field sketch map of the shovel test grid and positive shovel tests was drawn. Maps include topographic or other natural features, man-made features, approximate site boundaries, and location of the site datum. As specified in the Statement of Work, all sites, except those in agricultural fields, were to be marked with a permanent datum marker (a metal pipe). Digital and 35-mm black-and-white photographs documenting each site and isolate were taken. Field notes were also recorded for each site. Specific observations made at each include a general location description, an evaluation of subsurface disturbance, documentation of features, and, if possible, temporal affiliation. Sufficient data were collected to complete site forms and to provide preliminary NRHP evaluations. Specifics regarding the implementation of these field methods are discussed in Chapter 7.

Laboratory Methods

All recovered materials were transported to the laboratory facilities at the University of Illinois at Urbana–Champaign where they were washed, labeled, inventoried, analyzed, and packaged for curation. Inventory forms document artifact types, counts, and weights for each provenience. Since no historic artifacts were recovered, the discussion below details the methods used in the analysis of prehistoric artifacts. All prehistoric material was counted and weighed, with the data entered on an inventory form where artifacts are divided into major material classes (lithic, ceramic, bone, plant, etc.). Fire-cracked rock (Taggart 1981; Zurel 1979, 1982) also was segregated as a major material class. Only prehistoric lithic artifacts were recovered during the field investigations.

Debitage (flaking debris) categories comprise a majority of all the chipped-stone remains. These categories include block shatter, broken flakes, and whole flakes. The whole-flake classification was used for items characterized by the presence of a bulb of percussion on the ventral surface and a striking platform. The whole flakes were further divided into primary, secondary, and tertiary flake types based on the amount of visible cortex present: ≥ 50 percent, < 50 percent and > 0 percent, and 0 percent, respectively. Secondary characteristics also were assessed. Primary flakes tend to have a pronounced bulb of percussion, secondary flakes have a less pronounced bulb, and tertiary flakes are generally smaller than the other two flake types and often have a reduced or no bulb of percussion. Broken flakes are debris items that lack a platform or bulb of percussion, or are too small to place accurately within the whole flake category. Block shatter has irregular shapes that lack flake and core characteristics. Bifacial thinning flakes have a distinct lip on their bulb of percussion, an angled striking platform, and distinctive negative flake scars on their dorsal surface. Related to debitage are cores, the parent stones from which flakes are removed.

Formally flaked stone tools initially were divided into unifacial and bifacial categories. Unifaces show evidence for retouch only on one surface. Bifaces demonstrate retouch on both their dorsal and ventral surfaces. When possible, each tool is assigned to a more detailed morphological-functional use category. Unifaces are most commonly classified as scrapers; the particular type is determined by the placement of the edge modification. Bifaces can be placed into a number of distinct categories. Among these are such items as projectile points, drills, knives, scrapers, and thick and thin bifaces. The most recognizable of the chipped-stone tools are projectile points. Projectile points are symmetrically thinned bifaces that show evidence of hafting. These items have been examined in detail for comparison with projectile point types known from the Midwest and Midsouth and are particularly important for the placement of sites within a cultural and temporal context (see Bell 1958, 1960; Cambron and Hulse 1986; Justice 1987; May 1982).

The other tool types are largely descriptive in nature. Perforators are typically small, narrow, often bifacial tools. Knives are larger, thin bifaces with a low edge angle to facilitate cutting, and scrapers have a higher edge angle to facilitate scraping. Thick and thin bifaces are not finished tools but represent stages in tool manufacture. A thick biface is one that has been modified, is not a finished implement, and is in need of further modification. Typically, the thick biface can be modified into a number of different tool types (Bradley 1975). Thin bifaces are the result of further modification of thick bifaces. They also are not finished implements, but their morphology indicates that they can be further modified into only a single tool category (Bradley 1975). Thin and thick bifaces were differentiated based on flake morphology.

In analyzing the chipped-stone tools and lithic debris, both core-reduction and bipolar models were followed (Collins 1975; see also Bradley 1975; Hayden 1980). Collins (1975) defines five stages of chipped-stone manufacture and use for the core-reduction model. These stages consist of acquisition of raw materials, core preparation-initial reduction, primary trimming, secondary trimming, and use-maintenance-modification. Each of these categories, called activity sets (except for raw material acquisition), is associated with waste by-products and objects that are further used or modified. Core preparation-initial reduction is a stage in which the core is shaped and flakes are detached. Suitable flakes may be retained and further used with the core being discarded, or both can be retained for additional modification. End products of this stage are primary flakes, block shatter, discarded cores, and thick bifaces. The next stage, primary trimming, is used to shape the object. Flakes can be retouched into usable tools, or thick bifaces can be flaked into a thin biface. These activities result in the production of secondary flakes, retouched flakes, thin bifaces, and items broken during manufacture. Following primary trimming is the secondary trimming of thin bifaces. This stage produces tertiary flakes, finished tools, and items broken during processing. Finally, the tools are used, maintained, and perhaps modified. Bifacial thinning flakes are the most important waste by-product of tool maintenance activities, although they also could be produced while thinning thick bifaces.

Following this model, the following inferences have been made in the analysis of lithics. Cores, primary flakes, and block shatter are classified as evidence of initial-stage reduction activities. Secondary flakes, tertiary flakes, and thick and thin bifaces evidence later-stage reduction activities. Bifacial thinning flakes are indicative of tool-maintenance activities. Since broken flakes can be produced by a number of prehistoric and modern processes, they were not considered when characterizing the lithic tool production activities at the site.

Less common, or perhaps less well-recognized, at Fort Campbell is the use of a bipolar technique. In this technique, small cobbles are generally not well-suited for use in the direct hammer or core reduction technique described above, although a bipolar technique can be used to manipulate these items. When using a bipolar technique, the cobble is placed on an anvil and struck. This action yields bipolar debris and, eventually, a spent core. The flakes can be discarded, used as is, or further modified into tools. The bipolar technique also produces pitting in anvil stones due to the striking force used.

The other class of lithic artifacts, ground-stone tools, consists of pecked and ground items generally made from metamorphic or igneous rock. Included in this category are items that are intentionally formed, such as celts and axes, and unintentionally formed, such as hammerstones, grinding stones, and pitted stones. Intentionally formed artifacts consist of items that were modified for a specific use. Unintentionally formed items have areas of pitting, battering, or smoothing that were caused through use. Definitions of the individual artifact categories are based on those used by other researchers in the Midwest (e.g., Brose 1970; McElrath 1986; McGimsey and Conner 1985).

A chert type analysis of the lithic artifacts recovered during field investigations was also conducted. Previous investigations have used two different typological constructs, which can be roughly characterized as lumping and splitting approaches. Albertson and Buchner (1999:57–61) and other Pan-American Consultants, Inc., (PCI) projects have employed a splitting approach to chert typology. These authors identify 15 different chert categories differentiated by color and texture, among other qualities. Ahler et al. (1999:23) lump the chert types into five categories. While some overlap in color and texture descriptions between types is present in both typological schemes, it was believed that the simplicity of the Ahler et al. (1999:23) classification would be more readily replicable while at the same time allowing for comparisons between local and nonlocal chert and low- and high-quality chert. Because of these factors, the Ahler et al. (1999:23) chert typology was employed. In this typology, Type 1 is St. Louis chert, a translucent, fine-grained chert with a thick, chalky cortex. St. Louis chert is macroscopically fossil-free and varies in color from light gray to bluish-gray to dark gray. Few mottles or crystalline inclusions are present (Ahler et al. 1999:23). Type 2 chert is a local high-grade chert that is opaque, fine- to medium-gained with a thick, chalky cortex. This chert may contain crystalline inclusions but is largely fossil-free. The color of Type 2 chert varies from light gray to bluish gray to very dark gray and may overlap with lower-grade varieties of St. Louis chert (Ahler et al. 1999:23). Type 3 chert is a local, low-grade chert that is opaque, medium- to coarse-grained, and found in both nodular and tabular forms. Reddish staining on internal fracture planes may be present, but this chert should be macroscopically fossil-free. The color ranges from white to gray to brownish gray and dark gray (Ahler et al. 1999:23). This chert may be Ste. Genevieve as described by

O'Malley et al. (1983). Type 4 chert is Dover chert, an opaque, fine- to medium-grained chert that contains distinctive lenticular swirls and mottles. The color varies from light tan with gray mottles to dark brownish black with lighter mottles (Ahler et al. 1999:23). The probable source area for this chert is to the west of Fort Campbell (Gramly 1992). Type 5 chert is a fossiliferous, opaque, fine- to medium-grained chert. White macroscopic fossils are common, and color varies from gray-white to tan to dark brown to brownish black (Ahler et al. 1999:23). This chert may correspond with Ft. Payne or Salem chert described by O'Malley et al. (1983). Finally, Type 6 cherts are those pieces that cannot be accommodated in the above categories and are essentially unidentifiable.

Curation

All cultural material recovered during this project and all documents relating to the fieldwork and laboratory analysis of these materials are the property of the federal government. University of Illinois personnel have compiled lists of the artifacts recovered from each site (Appendix A). In addition, copies of all photographs, analysis forms, and field forms pertaining to these sites have been submitted to Fort Campbell. Qualified researchers interested in access to these collections should contact Fort Campbell.

CHAPTER 5.
RESULTS OF ARCHAEOLOGICAL SURVEY DATA COLLECTION

Data collection centering on 18 Fort Campbell archaeological survey projects was conducted during two trips to the installation in April and May 2004. Data collection also took place at PSAP using electronic copies of various reports supplied by the Fort Campbell CRM staff. The ERDC/CERL COTR, in consultation with the Fort Campbell CRM staff, developed a two-step sequence of data collection. The first step was designed to collect data pertinent to overall project parameters and results for each of the 18 surveys conducted at Fort Campbell. The second step was designed to collect more specific data from a sample of 11 sites from each of the 18 surveys, when possible. A 30-site subsample of artifact collections curated at Fort Campbell was also examined. First, an overview of each of the 18 surveys will be presented. Following the overviews, the results of the data collection are discussed.

Survey Title: University of Kentucky
Dates: 1980–1981
Number of Acres: 30,063
Sites/Isolates Located: 424
Citation: O'Malley et al. 1983

The University of Kentucky survey represents the initial archaeological site survey project conducted at Fort Campbell. The survey was conceived of as both exploratory in nature as well as providing a significant sample of the entire installation. As such, it is best to view this project not as an inadequate intensive site survey but rather, as a very useful reconnaissance-level survey. Training areas were divided into quadrants, and one quadrant was randomly selected for investigation. This resulted in approximately 25-percent coverage of the base. Additional areas were also targeted for subsequent investigation. Areas of poor visibility were inspected at 30-m to 35-m intervals while areas of good visibility were inspected at 45-m to 50-m intervals. The report does not operationalize "good" and "poor" visibility as a percentage of surface visibility. O'Malley et al. (1983:7) state that shovel tests were excavated where vegetation obscured the ground surface. The tests were said to have been excavated every 15 to 20 paces, yet numerous site dimensions to date remain undetermined since "dense vegetation prevented further assessment of site boundaries," a phrase often used in the project report. Primary field documentation is lacking for this project, and the final report does not provide sufficient information with which to differentiate the areas surveyed by the different field methods and spacing intervals used. It is suspected that areas considered "surveyed" were in fact not investigated due to the presence of dense vegetation. Unfortunately, this has also resulted in the recordation of numerous sites lacking reliable, or any, site dimensions.

The University of Kentucky project provided Fort Campbell with a good baseline of information concerning both the prehistoric and historic occupation of the installation. As such, it accomplished its goal as a reconnaissance survey. Not surprisingly, the field methods employed do not meet modern standards for an intensive survey. The lack of field documentation also makes it uncertain whether the entire area reported to have been included in the survey was systematically investigated. Finally, many sites lack adequate definition of boundaries. Overall, the University of Kentucky survey accomplished its reconnaissance-level objectives and provided a substantial amount of useful information in a cost-effective manner. It cannot be viewed, however, as a fully reliable intensive survey.

Survey Title: DuVall 2500
Dates: Unknown
Number of Acres: 2,500
Sites/Isolates Located: 7
Citation: Yates and DuVall 1994

This project was conducted in portions of Training Areas 9, 19, 31, 33, and 34. The field documentation, laboratory analysis forms, and artifacts associated with this project have never been submitted to Fort Campbell, making the final report the only form of documentation available for review. Based on the Statement of Work and final report, it must be assumed that all of the 2,500 acres surveyed were investigated by excavating shovel tests. The lack of supporting documentation and the deficits in the project report have led to an inability to adequately assess the reliability of this survey. The Fort Campbell cultural resources management staff and the Tennessee SHPO have agreed that this survey and reporting effort was inadequate to meet current information needs and that another intensive survey of the 2,500 acres will be conducted.

Survey Title: DuVall 2254
Dates: Unknown
Number of Acres: 2,254
Sites/Isolates Located: 25
Citation: DuVall and Yates 1995

This project was conducted in portions of Training Areas 19, 27, 28, 31, 46, and 50. The field documentation, laboratory analysis forms, and artifacts associated with this project have never been submitted to Fort Campbell, making the final report the only form of documentation available for review. Once again, based on the Statement of Work and final report, it must be assumed that the entire 2,254-acre areas surveyed were investigated by excavating shovel tests. The lack of supporting documentation and the deficits in the project report have led to an inability to adequately assess the reliability of this survey. The Fort Campbell cultural resources management staff and the Tennessee SHPO have agreed that this survey and reporting effort was inadequate and that another intensive survey of the 2,254 acres will be conducted.

Survey Title: DuVall 34
Dates: Unknown
Number of Acres: 34

Sites/Isolates Located: 0
Citation: Yates and DuVall 1997

This report was found after data collection had been completed. Survey information has been added to the data base, but the report itself was not reviewed. The Fort Campbell cultural resources management staff and the Tennessee SHPO have agreed that this survey and reporting effort was inadequate to meet current needs and that another intensive survey of the 34 acres will be conducted.

Survey Title: DuVall 6624
Dates: Unknown
Number of Acres: 6,624
Sites/Isolates Located: 22
Citation: Yates and Jones 2000

This project appears to have changed in total area through time. An initial draft report documents investigations in Training Areas 43 and 44, while a later report incorporates that project with results of investigations in Training Areas 3, 4, 18, 24, 42, 44, 48, and 49 and the Clarksville Post. Characteristically of the DuVall projects, the field documentation, laboratory analysis forms, and artifacts have never been submitted to Fort Campbell, making the final report the only form of documentation available for review. The final report chosen for data collection is Yates and Jones (2000). Based on the Statement of Work and final report, it must be assumed that all of the 6,624 acres surveyed were investigated by excavating shovel tests. As is often the case with the DuVall reports, field methods discussed in following sections were found in the project Statement of Work and are assumed to have been followed in the field. The lack of supporting documentation and the deficits in the project report make it impossible to adequately assess the reliability of this survey. The Fort Campbell cultural resources management staff and the Tennessee SHPO have agreed that this survey and reporting effort was inadequate for current management needs and that another intensive survey of the 6,624 acres will be conducted.

Survey Title: DuVall 10A
Dates: Unknown
Number of Acres: 10
Sites/Isolates Located: 0
Citation: DuVall and Yates 1996a

Little can be said concerning this survey. Ostensibly, the project entailed the survey of a 10-acre parcel in the cantonment, conducted prior to the construction of an elementary school. No sites were found. No field documentation was ever submitted to Fort Campbell concerning this project. At this point school construction likely has impacted the entire survey tract. The Fort Campbell cultural resources management staff and the Tennessee SHPO have agreed that this survey and reporting effort was inadequate.

Survey Title: DuVall 10B
Dates: Unknown
Number of Acres: 10
Sites/Isolates Located: 0
Citation: DuVall and Yates 1996b

Similar to the previous project, little can be said concerning this survey. The project entailed the survey of a 10-acre parcel in the cantonment, conducted prior to the construction of a high school. No sites were found. No field documentation was ever submitted to Fort Campbell concerning this project. At this point school construction likely has impacted the entire survey tract. The Fort Campbell cultural resources management staff and the Tennessee SHPO have agreed that this survey and reporting effort was inadequate.

Survey Title: Greenhorne
Dates: 1995–1996
Number of Acres: 2,094
Sites/Isolates Located: 29
Citation: Brown 1996

The Greenhorne & O'Mara, Inc., project consisted of the investigation of approximately one-half of Training Area 23 and a large (but not complete) portion of Training Area 25. Three different field methods appear to have been used: pedestrian, controlled surface collections, and shovel testing, with both a controlled surface collection and shovel testing conducted in one part of Training Area 25. "High probability" areas were identified in the field during the pedestrian survey of the tracts and selected for subsequent shovel testing. Discussion of field methods is generally lacking in this report (although note that the report reviewed includes "Draft" in the title). No statement of transect intervals for the pedestrian survey, controlled surface collection, or shovel tests is given in the report. A 20-m interval for shovel tests is stipulated in the Statement of Work. No acreage is stated in the report for each of the three survey methods, nor is ground surface visibility discussed for the tracts investigated by pedestrian survey. Figures do differentiate between areas investigated by shovel tests, controlled surface collection, and pedestrian survey. Acreage figures for shovel testing cited in this report are based on calculations using an acreage estimator. This estimate suggests that 485 acres were surveyed by shovel testing, or 23 percent of the survey tract. In contrast, the Greenhorne report suggests that 0.018 percent of the survey tract, or about 38 acres, were surveyed by shovel testing. The report also states that 5,268 shovel tests were excavated. At a 20-m interval, this would suggest that about 521 acres were surveyed by shovel testing. Unfortunately, field documentation for this project that could be used to solve this issue has not been submitted to Fort Campbell. While the use of different field methods is a potentially interesting experiment in the efficacy of various survey methods for locating sites, the absence of documentation of field conditions and the lack of discussion of the results of the investigations based on the different field conditions make such an evaluation impossible. It should also be noted that the scales used in survey tract figures, based on USGS quadrangles, are incorrect.

Survey Title: CRA
Dates: 1996
Number of Acres: 5,135
Sites/Isolates Located: 59
Citation: Bradbury 1998

The Cultural Resource Analysts, Inc. (CRA) survey comprised portions of Training Areas 31, 32, 33, 34, and 40. Similar to the Greenhorne project discussed above, this project was conducted using three different field methods: pedestrian, controlled surface collections, and shovel testing. Unfortunately, the acreage investigated by each of the three methods is never stated in the report. Instead, two figures of the survey tracts are presented, as unbound maps, which depict the areas investigated by the different techniques. It is left to the intrepid reviewer to attempt to estimate the different acreages investigated using each of the three techniques. Unfortunately, the acreage estimate based on these figures was vastly different from one obtained by multiplying the number of shovel tests excavated (presented in Bradbury 1998:Table 4) by the area covered by a single test. The acreage estimate based on the report maps is 350 acres, or almost 7 percent of the survey tract. The CRA archaeologists used a multistage approach to investigations. Initially, low-probability areas, including slopes and swampy areas, were shovel tested. The results confirmed the expectation of these landforms as low-probability areas for sites. Subsequent survey concentrated on high-probability areas. All areas, including low-probability areas, were investigated by pedestrian survey, whereas high-probability areas were also shovel tested. Figures 2 and 3 in Bradbury (1998) depict the shovel-test transects as being oriented to intercept topographically high points. No statement of transect intervals for either the pedestrian survey or controlled surface collections is given in the report, nor is ground-surface visibility discussed for the areas investigated by pedestrian walkover. The CRA report, however, is one of only two projects that explicitly identify areas within survey tracts not investigated due to either swampy conditions or prior disturbance. These areas are both plotted on a map as well as presented in a table. Field documentation and artifacts for this project are curated at Fort Campbell.

Survey Title: PCI 5180 (Delivery Order 1)
Dates: 1997–1998
Number of Acres: 5,180
Sites/Isolates Located: 184
Citation: Albertson and Buchner 1999

This survey initiates the first of nine delivery orders for archaeological site surveys conducted by Pan-American Consultants, Inc., (PCI) at Fort Campbell. Similar field and laboratory methods were generally used throughout the nine delivery orders. This represents a large and standardized data base of archaeological information for Fort Campbell. The survey techniques used appear to be rather straight forward: shovel tests excavated at 20-m intervals (both between transects and between tests), generally excavated to between 20 cm and 40 cm below surface. While the report does not document the use of pedestrian survey, the description of particular tracts indicates that areas were mechanically cleared prior to survey. The report does not discuss whether these mechanically cleared areas were investigated by pedestrian walkover or shovel tests. Site definition strategies, artifact collection, and evaluation strategies should all be more consistent between the nine PCI projects than between the other Fort Campbell archaeological site survey projects. Five training areas were investigated under this project, most of which were located in Tennessee. In all, 99 previously unidentified sites, 79 isolates, and 6 previously identified sites were located. Ten sites were found to be potentially eligible for listing in the NRHP.

Survey Title: PCI 100 (Delivery Order 2)
Dates: 1998
Number of Acres: 100
Sites/Isolates Located: 7
Citation: Albertson and Buchner 1998

The second PCI delivery order constituted the smallest tract investigated as well as the only tract to specifically target an area (National Guard area) prior to development. The field methods, laboratory analyses, and reporting format used are similar to the other PCI projects. The survey tract is located within the former Clarksville Base area in Montgomery County, Tennessee. Seven isolates were recovered, none of which was found to be eligible for listing in the NRHP.

Survey Title: PCI 4068 (Delivery Order 3)
Dates: 1998–1999
Number of Acres: 4,068
Sites/Isolates Located: 264
Citation: Albertson et al. 1999

With the third delivery order PCI once again surveyed a large acreage. In this instance, the areas investigated consisted of portions of 13 training areas in the eastern, middle, and western parts of the installation. Both field and laboratory methods used during this project are similar to those employed during earlier PCI projects. One inconsistency with regards to field methods is a statement in the introductory chapter that some unspecified amount of the acres surveyed were part of an agricultural lease program, most likely a plowed agricultural field. The report does not document whether these areas in the agricultural lease program were investigated by pedestrian walkover or shovel tests. Other unspecified areas were investigated by pedestrian survey, including old roads, vehicle tracts, and tree falls. Survey tracts were located in both Tennessee and Kentucky. Investigations resulted in the identification of 150 newly recorded sites, 110 isolates, and four previously identified sites. The investigators found 16 sites to be potentially eligible for listing in the NRHP.

Survey Title: PCI 1270 (Delivery Order 4)
Dates: 1999
Number of Acres: 1,270
Sites/Isolates Located: 47
Citation: Buchner et al. 1999

Delivery Order 4 consisted of the survey of Training Area 20 located near the center of the installation. Both field and laboratory methods used during this project are similar to those employed during earlier PCI projects. Unspecified areas may have been investigated by pedestrian survey, including old roads, vehicle tracts, and tree falls. The survey was conducted in Montgomery County, Tennessee, and resulted in the identification of 35 newly recorded sites and 11 isolates. Five of the sites were found to be potentially eligible for listing in the NRHP.

Survey Title: PCI 1307 (Delivery Order 5)
Dates: 1999–2000
Number of Acres: 1,307
Sites/Isolates Located: 47
Citation: Albertson and Buchner 2000

This delivery order consisted of the survey of Training Area 23, also located in the center of the installation. Both field and laboratory methods used during this project are similar to those employed during earlier PCI projects. Once again, unspecified areas appear to have been investigated by pedestrian survey, including old roads, vehicle tracts, and tree falls. The survey tracts are located in Tennessee. Results of the survey consisted of the identification of 32 previously unrecorded sites, 3 previously recorded sites, 4 cemeteries, and 8 isolates. Of this total, two sites were found to be potentially eligible for listing in the NRHP.

Survey Title: PCI 4836 (Delivery Order 6)
Dates: 1999–2000
Number of Acres: 4,836
Sites/Isolates Located: 224
Citation: Albertson and Buchner 2001

Delivery Order 6, comprising a large total acreage, was conducted in training areas located in the eastern, central, and western parts of the installation. Both field and laboratory methods used during this project are similar to those employed during earlier PCI projects. Project field maps curated at Fort Campbell appear to indicate that larger areas were surveyed by pedestrian walkover. The use of pedestrian survey across larger tracts is not discussed in the report methods chapter or in the subsequent survey results chapters. Survey tracts were located both in Kentucky and Tennessee. The survey resulted in the recordation of 135 newly identified sites, 11 previously identified sites, and 38 isolates. The investigators found that 40 sites were potentially eligible for listing in the NRHP.

Survey Title: PCI 4952 (Delivery Order 7)
Dates: 2000–2001
Number of Acres: 4,952
Sites/Isolates Located: 323
Citation: Buchner and Albertson 2003

This delivery order was designed to investigate portions of 18 training areas located throughout the installation. The survey covered 3,587 acres (1,451.6 ha) in Tennessee and 1,365 acres (552.4 ha) in Kentucky. Both field and laboratory methods used during this project are similar to those employed during earlier PCI projects. The report methods chapter indicates that pedestrian survey was employed as part of the field methods for this project. Pedestrian-survey intervals conformed to those used for shovel testing, and pedestrian survey was employed when surface visibility was 50 percent or greater. Unfortunately, the areas surveyed by pedestrian walkover are not depicted in the report maps, nor is a total acreage surveyed in this manner presented in the report. As well, sites located by pedestrian walkover are not identified as such. In all, 323 archeological loci are described in the report including 18 previously recorded sites, 167 newly recorded sites, and 138 isolated finds. Forty-one of the recorded sites were found to be potentially eligible for listing in the NRHP by the investigators.

Survey Title: PCI 4128 (Delivery Order 8)
Dates: 2001
Number of Acres: 4,128
Sites/Isolates Located: 176
Citation: Albertson and Buchner 2003

This delivery order consisted of the survey of training areas located in the eastern, central, and western portions of Fort Campbell. Both field and laboratory methods used during this project are similar to those employed during earlier PCI projects. Similar to the previous PCI delivery order, this report indicates that pedestrian survey was employed as part of the field methods for this project. Pedestrian-survey intervals conformed to those used for shovel testing, and pedestrian survey was employed when surface visibility was 50 percent or greater. Unfortunately, the areas surveyed by pedestrian walkover are not depicted in the report maps, nor is a total acreage surveyed in this manner presented in the report. As well, sites located by pedestrian walkover are not identified as such. All of the survey was conducted in Tennessee. A total of 96 previously unrecorded sites was documented, additional work was conducted at 7 previously identified sites, and 73 isolated finds were recovered as well. Six of the sites were found to be potentially eligible for listing in the NRHP by the investigators.

Survey Title: PCI 3715 (Delivery Order 9)
Dates: 2001–2002
Number of Acres: 3,715
Sites/Isolates Located: 211
Citation: Gray and Buchner 2003

Delivery Order 9 represents the final archaeological survey conducted at Fort Campbell by PCI to date. Training areas surveyed were located in the western portion of the installation. Field and laboratory methods used were generally similar to the previous eight PCI projects, except that areas omitted from survey were identified and approved by Fort Campbell personnel, and that a higher number of shovel tests was excavated per acre during this project than was excavated for the other PCI projects. Once again, unspecified areas appear to have been investigated by pedestrian survey, including old roads, vehicle tracts, and tree falls. A total of 934 acres was surveyed in Tennessee and 2,781 in Kentucky. In all, 211 loci were identified including 101 newly recorded sites, 3 previously recorded sites, and 107 isolated finds. Eleven of the documented sites were found to be potentially eligible for listing in the NRHP by the investigators.

Survey–Level Data

This section presents the results of the review of three general types of survey-level data obtained from various documents associated with each of the 18 archaeological survey projects conducted at Fort Campbell. The first set of data includes location of survey tracts, total acreage surveyed, and field conditions encountered (i.e., acreage in agricultural fields, pasture, developed, or other) and acres omitted from survey. The second set provides specifics on field methods employed during each project including transect spacing, orientation, discovery method (i.e., pedestrian or shovel testing), criteria for omitting shovel tests, shovel-test spacing within defined site areas, depth of excavation, screening of soils, whether soils were excavated by level, the presence of shovel-test profiles, shovel-test documentation, and artifact collection strategies. The third set of data, centering on the results of the survey, includes predicted number of shovel tests, actual number of shovel tests, number of prehistoric and historic sites and isolates identified, and average site size for prehistoric and historic sites.

Locational Information

Table 1 presents selected aspects of locational information concerning the 18 Fort Campbell archaeological survey projects that comprise the data base. Along with the final report citation, the location of the survey tract(s), usually in terms of training area, total acreage surveyed, acres omitted from survey, and field conditions comprise the selected information presented. The first four variables were taken from information in the final report. ERDC/CERL requested that data on field conditions, in terms of acreage forested, in pasture, in row crops, or other, be collected. As can be seen in Table 1, these types of data were not presented in any of the project reports. Somewhat similarly, acreage omitted from survey was only presented for two projects. The CRA report discusses the omission of 602 acres from four survey tracts. This acreage is divided between swampy areas and areas previously disturbed. The PCI 3715 project report discussed the omission of 175 acres due to disturbance and the concurrence of that decision by Fort Campbell personnel. For the PCI projects, shovel-transect logs also indicate that individual shovel tests were omitted due to conditions such as slope, standing water, and previous disturbance.

Summary. The Fort Campbell archaeological site survey reports typically include only the most basic locational information: the location and total acreage of the survey tract. Ancillary information, often necessary from a management and research perspective, is seldom included. None of the 18 reports divides the acreage by the type of vegetation encountered (e.g., forest, grass, row crop). This information is necessary to determine whether the investigative methods used were adequate to permit the identification of cultural resources within the survey tract. This type of information is also needed if analyses of the efficacy of the different field methods (e.g., shovel testing, pedestrian) are to be evaluated. Only 2 of the 18 reports discuss acres omitted from the

Table 1. Overview of archaeological survey projects at Fort Campbell.

Survey	Citation	Location	Total Acres	Acres Omitted	Field Conditions
U Kentucky	*O'Malley et al. 1983*	*TA 1-51, TAAB3 Rec Area, Son Drop, Clarksville Base*	*30,063*	*Not reported*	*Not reported*
DuVall 2500	*Yates and DuVall 1994*	*TA 9, 19, 31, 33, 34*	*2,500*	*Not reported*	*Not reported*
DuVall 2254	*DuVall and Yates 1995*	*TA27, 28, 19, 50, 46, 31*	*2,254*	*Not reported*	*Not reported*
DuVall 34	*Yates and DuVall 1997*	*Family Housing in Gardner Hills*	*34*	*Not reported*	*Not reported*
DuVall 6624	*Yates 1998; Yates and Jones 2000*	*TA 42, 43, 44, 48, 49, 24, 18, 4, 3, Clarksville, Post*	*6,624*	*Not reported*	*Not reported*
DuVall 10A	*DuVall and Yates 1996a*	*Elementary School–Main Post*	*10*	*Not reported*	*Not reported*
DuVall 10B	*DuVall and Yates 1996b*	*High School*	*10*	*Not reported*	*Not reported*
Greenhorne	*Brown 1996*	*TA 23 & 25*	*2,094*[a]	*Not reported*	*Not reported*
CRA	*Bradbury 1998*	*TA 31, 32, 33, 34, 40*	*5,135*	*602*	*Not reported*
PCI 5180	*Albertson and Buchner*	*TA 4, 11, 13, 17, 19*	*5,180*	*Not reported*	*Not reported*
PCI 100	*Albertson and Buchner*	*National Guard Area*	*100*	*Not reported*	*Not reported*
PCI 4068	*Albertson et al. 1999*	*TAs AB3, 1, 8A, 8B, 20, 21, 22, 24, 25, 26, 41, 43B, 44*	*4,068*	*Not reported*	*Not reported*
PCI 1270	*Buchner et al. 1999*	*TA 20*	*1,270*	*Not reported*	*Not reported*
PCI 1307	*Albertson and Buchner*	*TA 23*	*1,307*	*Not reported*	*Not reported*
PCI 4836	*Albertson and Buchner*	*TAs AB3, 2, 3, 5, 6, 9A, 24, 25, 26,*	*4,836*	*Not reported*	*Not reported*
PCI 4952	*Buchner and Albertson 2003*	*TAs 00, 1, 8A, 9A, 9B, 19, 21, 24, 28, 30, 33, 35, 40, 41, 44, 49 Airfield, SonDZ*	*4,952*	*Not reported*	*Not reported*
PCI 4128	*Albertson and Buchner 2003*	*TAs 8A, 8B, 9A, 9B, 21, 31, 47, 48*	*4,128*	*Not reported*	*Not reported*
PCI 3715	*Gray and Buchner 2003*	*TAs 30, 42A, 42B, 46, 50, 51*	*3,715*	*175*	*Not reported*

[a] Of the 2,094 acres surveyed, 456 acres were surveyed by shovel testing, 29 acres by controlled surface collection, and 1,609 by pedestrian walkover.

survey tract, due to either swampy conditions or prior disturbance. Once again, such information should be not only reported but also identified on accompanying figures for management purposes. Although swampy or wet conditions may indeed preclude settlement, areas with such conditions may also harbor needed resources. The a priori assumption that swampy conditions precluded intensive settlement or limited use of an area should be viewed as a hypothesis and not a demonstrated fact. Deletion of such areas from survey not only precludes the testing of this hypothesis, but if such areas are not identified in the report as having been omitted from survey, could lead to the conclusion that no cultural resources are present, when in fact the status of the area is unknown. It is recommended that future Statements of Work request a breakdown of survey tract by vegetation, survey method, and average subsurface visibility, as well as areas omitted from investigation, and that the location of these areas be plotted on a USGS quadrangle or similar map.

Methodological Information

Table 2 presents selected variables concerned with the survey methods employed by the 18 Fort Campbell archaeological inventory survey projects that comprise the data base. Included are transect spacing, within-site shovel-test spacing, shovel-test depths, soil screening, shovel-test documentation, and artifact collection strategy. *Transect spacing* is concerned with both spacing between transects and spacing between test locations within transects. The data collected concerns shovel-test transect spacing. While it is known that the University of Kentucky, Greenhorne, CRA, and PCI projects conducted pedestrian survey, little information on the transect spacing used, total acreage surveyed by pedestrian walkover, or ground conditions, including surface visibility, is presented in the reports. *Within site shovel-test spacing* refers to tests excavated once a scatter of artifacts has been located. Typically, additional shovel tests are excavated at closer intervals than the original tests that yielded artifacts. These additional tests are used to better define the site boundaries, collect additional artifacts with which to characterize the site occupation, and to better understand site subsurface integrity. *Shovel-test depth* refers to the depth below surface (typically in cm) to which the tests were excavated. *Soil screening* refers to whether the soils removed from the shovel test were subsequently screened through mesh hardware cloth, and if so, the size of the mesh that was used. It has been demonstrated that a relationship exists between size of mesh and the number and sizes of artifacts recovered. *Documentation* is a listing of sources of information concerning shovel testing associated with each project. Of concern is whether a Munsell color guide was used to describe soil colors, whether soil profiles were documented in the field, and whether forms denoting number of tests excavated in each transect were kept. *Artifact collection strategy* refers to whether all artifacts found were collected or whether some sampling strategy was employed. ERDC/CERL requested that one additional variable be collected: that of whether the shovel tests were excavated by level. It appears that no shovel tests have been excavated by level during the 18 projects under consideration here. PCI did excavate one or two 50-x-50-cm units at many of the sites located during archaeological inventory survey projects, and these appear to have been excavated by level.

The investigation of survey tracts by pedestrian walkover at Fort Campbell has to be the single most poorly documented investigation strategy employed on the installation. It appears that pedestrian survey was a major component of the University of Kentucky, Greenhorne, CRA, and

Table 2. Methodological summary concerning archaeological survey projects at Fort Campbell.

Survey	Transect Spacing	Within Site Spacing	Shovel Test Depth	Soil Screen-ing	Documentation	Artifact Collection Strategy
UK	*15–20 paces*	*Not re-ported*	*Not reported*	*Not reported*	*Not reported*	*Selective*
DuVall 2500	*20 m*	*“Closer”*	*Not reported*	*Yes*	*Munsell, test forms*	*Not reported*
DuVall 2254	*20 m*	*Not re-ported*	*Not reported*	*Yes*	*Munsell, test forms*	*Total*
DuVall 34	*15 m*	*Not re-ported*	*Not reported*	*Not reported*	*Not reported*	*Not applicable*
DuVall 6624	*20 m*	*10 m*	*Not reported*	*¼-inch*	*Representative profile per site*	*Not reported*
DuVall 10A	*15 m*	*Not re-ported*	*Not reported*	*Not reported*	*Not reported*	*Not applicable*
DuVall 10B	*15 m*	*Not re-ported*	*Not reported*	*Not reported*	*Not reported*	*Not applicable*
Greenhorne	*20 m*	*Not re-ported*	*35 cm mini-mum*	*¼-inch*	*Munsell, representative profile, test forms*	*Selective*
CRA	*Variable*[a]	*5 m*	*10–40 cm*	*¼-inch*	*Munsell, representative profile, test forms*	*Total*
PCI 5180	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*
PCI 100	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*
PCI 4068	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*
PCI 1270	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*
PCI 1307	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*
PCI 4836	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*
PCI 4952	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*
PCI 4128	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*
PCI 3715	*20 m*	*10 & 20 m*	*20–40 cm*	*¼-inch*	*Representative profile, test forms*	*Total*

[a] Transect spacing was 17 m between rows and 20 m between tests within a row in Kentucky survey tracts; in Tennessee survey tracts, spacing was 20 m between rows and tests in “high” probability areas, 50 m between rows and tests in “moderate” probability areas, and 150 m between rows and tests in “low” probability areas.

possibly some of the PCI and DuVall surveys. The Greenhorne and CRA reports document areas surveyed by pedestrian walkover by figures, although in both instances no discussion of surface visibility is presented. The final reports of the University of Kentucky project and various PCI projects do not identify areas surveyed by pedestrian walkover, nor does the University of Kentucky report provide information on the ground surface visibility encountered. The University of Kentucky report indicates that 30-m to 35-m intervals were employed in areas of poor visibility while areas of good visibility were inspected at 45-m to 50-m intervals, although a definition of poor and good is not given. The Greenhorne report indicates that the survey was done according to specifications in the Statement of Work, while no mention of transect intervals is presented in the CRA report. Two PCI reports (delivery orders 7 and 8) specifically indicate that 20-m intervals were used in areas with 50 percent or greater surface visibility; (pedestrian survey was presumably used to some extent in most PCI projects). No transect intervals are discussed in the DuVall reports, although surface visibility for Training Areas 43 and 44 is stated to be about 25 percent. Once again, a division between areas surveyed by pedestrian walkover and shovel testing is not discussed in the DuVall reports.

As a subset of pedestrian survey, controlled surface collections were also conducted during the Greenhorne and CRA projects. The areas investigated by controlled surface collections are also presented on report figures, but only the CRA report indicates that the area of investigation was gridded into 10-m square units. Neither report discusses ground surface visibility.

Shovel-test transect spacing, both between transects and between tests within transects, has for the most part been standardized at 20 m (Table 2). There are a few exceptions to this pattern. University of Kentucky spacing was at 15 to 20 “paces,” while three of the DuVall surveys were conducted at 15-m intervals (DuVall 34, DuVall 10A, DuVall 10B). The CRA project employed variable spacing. Transect spacing was 17 m between rows and 20 m between tests within a row in Kentucky survey tracts, whereas in Tennessee survey tracts, spacing was 20 m between rows and tests in “high” probability areas, 50 m between rows and tests in “moderate” probability areas, and 150 m between rows and tests in “low” probability areas. These spacing intervals were not differentiated on maps accompanying the final report (see Bradbury 1998:Figures 2 and 3) nor in any field documentation present at Fort Campbell.

Within-site shovel-test spacing was poorly reported prior to the PCI surveys (Table 2). Six of the pre-PCI surveys did not discuss the method to be followed if or when an archaeological site was found. The Statement of Work for the DuVall 2254 project indicated that additional shovel tests be added as needed to identify intact deposits and features and to aid in the determination of NRHP eligibility. Three of the pre-PCI reports did discuss this topic to some extent; DuVall 2500 reports unspecified “closer” tests, DuVall 6624 reports closing to a 10-m interval, while CRA reports using a 5-m interval within located sites. When shovel tests within site limits were measured on several CRA sketch maps, the distance between tests was always 10 m. Greenhorne indicates that such tests were done and that a total of 242 within-site tests were excavated during the survey. Unfortunately, these are not illustrated on any site maps, and a distance between tests is not discussed. The PCI surveys have consistently used a 10-m and 20-m strategy. When a “smaller” site is located, the testing interval is closed to 10 m, whereas when a “larger” site is found, the interval remains at 20 m. It appears that the definition of larger and smaller sites was left to the discretion of project archaeologists.

The reporting of shovel-test depths is also quite variable (Table 2). No minimum, maximum, or range of depths is recorded or available from associated documentation for seven of the pre-PCI survey projects. The Greenhorne and CRA projects provide this information; shovel tests were excavated to a minimum of 35 cm during the Greenhorne project, while tests varied from 10 cm to 40 cm below surface during the CRA project. For the PCI projects, shovel-test data were obtained by reviewing individual shovel-test forms associated with each project. Across the PCI projects individual shovel tests were generally excavated to between 20 cm and 40 cm below surface. It should be noted that the PCI Statement of Work requested that tests be excavated to 75 cm below surface.

When reported as being done, soil was screened through ¼-inch mesh hardware cloth (Table 2). Soil screening was not reported for four projects: University of Kentucky, DuVall 34, DuVall 10A, and DuVall 10B. For two projects, DuVall 2500 and DuVall 2254, soil was reported as having been screened but mesh size was not indicated.

Shovel-test documentation consists primarily of forms curated from each particular project but also, to a lesser extent, information presented in the project reports. Primary documentary information is not available for the University of Kentucky or any of the DuVall projects (Table 2). Primary documentation is present for the remainder of the projects and includes transect forms and/or shovel-test forms. Transect forms record the number and nature of tests within each transect (often recording the location as excavated, disturbed, wet, etc.) while shovel-test forms record soils information and often include color, texture, and at times, location of recovered artifacts. Representative profiles are provided in the Greenhorne and PCI survey reports. The reports present a soil color but not the Munsell color code. The DuVall 2500, DuVall 2254, and DuVall 6624 either use Munsell colors when describing soil colors or provide representative soil profiles in the report.

Artifact collection strategy, when discussed, typically varies along a continuum from selective sampling to total recovery (Table 2). Collection strategy is not applicable for three of the projects, DuVall 10A, DuVall 10B, and DuVall 34, as no sites or isolates were found. Collection strategy was not reported for two other projects (DuVall 2500 and DuVall 6624) even though artifacts were recovered. The University of Kentucky and Greenhorne projects indicate that a selective strategy was used. For the University of Kentucky the term selective was operationalized by collecting all material from "light" density sites and a representative sample at "high" density sites, although these terms are not defined in the report. The Greenhorne project collected all material from shovel tests but only a representative sample from the site surface. The remainder, consisting of the PCI surveys and the CRA project, employed what appear to be similar strategies. All material was collected except for common twentieth-century artifacts such as glass, brick, metal, and nails.

Summary. The presentation of most methodological information follows a similar trend throughout the Fort Campbell archaeological site survey reports. In general, such information is incomplete or lacking in the initial reports (e.g., University of Kentucky and the DuVall reports) and is increasingly incorporated into the Greenhorne, CRA, and PCI reports. The use of pedestrian survey is very poorly documented across all projects. Few projects identify where pedestrian walkover or controlled surface collections were conducted or discuss ground-surface conditions, including an estimate of surface visibility. This is especially troubling concerning the University of Kentucky, Greenhorne, and CRA projects, in that all surveyed rather large areas. As such, it is difficult to establish the reliability of investigation across these large survey tracts at Fort Campbell.

Documentation of shovel-test spacing is poor prior to the PCI reports. There is little to no documentation of precise spacing intervals in the University of Kentucky and most DuVall reports, and there is no documentation as to where the tests were conducted in the University of Kentucky and DuVall reports. CRA evidently used different spacing intervals, but this is not differentiated as such in the report or on accompanying figures. For the present analysis, total shovel-test acreage surveyed by Greenhorne and CRA was estimated from the accompanying maps, but, given the large scale of the maps, this was difficult and appears to have been inaccurate. The discussion of survey coverage in the PCI reports assumes total survey by shovel testing. Shovel-test spacing within sites for boundary definition follows a similar trend. In general, documentation of spacing is nonexistent for the University of Kentucky and DuVall projects. While the Greenhorne report indicates that within-site testing was done, supplemental tests are not illustrated on site sketch maps. The report does indicate that a total of 242 tests was excavated within sites. Sketch maps examined in the CRA report suggest that within-site testing was not done in a standardized manner or at the 5-m intervals claimed in a field methods section of the project report. Similar patterns are present for reporting of shovel-test depths, use of Munsell color charts to describe soil colors, soil description, and screening of soils. Regarding artifact collection strategies, the DuVall reports do not discuss this topic, whereas the others discuss implementing some measure of collection selectivity.

The trends in reporting discussed above makes the estimation of survey reliability at Fort Campbell problematic. Key components when assessing survey reliability include shovel-test intervals and percentage of surface visibility in areas investigated by pedestrian walkover. For both, little to no information is available for several large survey tracts (e.g., University of Kentucky, Greenhorne, and CRA). The lack of such information further presents problems with regard to site definition, when methods used are either not discussed or poorly implemented in the field, or both. Similarly, the lack of shovel-test information from many of the early projects precludes an assessment of site integrity. One positive note, though, is that many projects followed generally similar artifact collection strategies, theoretically allowing for valid comparisons of site assemblages. It is recommended that future Statements of Work include explicit discussion of shovel-test spacing, screening of soils, appropriate descriptions of soils, and artifact collection strategies. It is also suggested that these be discussed in the project reports, along with a presentation of acreage by survey type and ground surface visibility if pedestrian walkover is used.

Survey Results

Table 3 presents selected survey results data from the 18 Fort Campbell archaeological inventory survey projects that comprise the data base. Included is the predicted number of shovel tests, the number of shovel tests reported, counts of number of prehistoric and historic sites, as well as isolated finds located, and finally the average sizes of prehistoric and historic sites. The *predicted number of shovel tests* was calculated using the acreage surveyed, as reported, and the shovel-test interval, as reported. The shovel-test interval was squared to determine the area, in square meters, investigated by a single shovel test, and the total area surveyed, once again converted to square meters, was divided by the area investigated by a single test. The resultant figure provides an estimate of the predicted number of shovel tests for an area if no acreage is omitted from the survey. The *number of shovel tests reported* was taken from final reports. *Number of sites and isolates* were totaled as presented in final reports and hence is dependent on definitions used in Tennessee and Kentucky, as well as by the principal investigators of each project. Multicomponent sites (e.g., sites with both historic and prehistoric occupations) were given separate tallies for the historic and prehistoric occupations. *Site size* was based on figures presented in the final survey reports. Size presented as an area was used without any modification. Size presented as maximal dimensions, e.g., length x width, was multiplied to yield an estimate of site area. This estimate inflates site areas given the typically irregular nature of site boundaries. For multicomponent sites, the same area was used for both the historic and prehistoric components present. Once again, this estimate most likely inflates site size for one or both of the components since it is unlikely that both utilized the exact same area(s). Average site size was calculated by totaling all site area estimates for a given category (historic or prehistoric sites) and dividing by the total number of sites in the sample.

Predicted number of shovel tests range from a low of 180 (two 10-acre surveys) to over 67,000 tests (Table 3). The predicted number of shovel tests could not be determined for three surveys. One is the University of Kentucky survey. This survey employed a mixed shovel-test and pedestrian-survey strategy, but the total acreage investigated by each separate technique is not presented in O'Malley et al. (1983). Additionally, no field documentation associated with this survey is present at Fort Campbell that could, theoretically, provide such information. The second is the CRA survey. Several different spacing intervals were used during that project. Transect spacing was 17 m between rows and 20 m between tests within a row in Kentucky survey tracts; in Tennessee survey tracts, spacing was 20 m between rows and tests in "high" probability areas, 50 m between rows and tests in "moderate" probability areas, and 150 m between rows and tests in "low" probability areas. Once again, the total acreage investigated by each separate spacing category is not presented in the final report (Bradbury 1998). An acreage estimate based on maps in the CRA report is 350 acres or 7 percent of the survey tract. This would suggest that at most 3,500 tests were excavated, whereas the CRA report suggests that almost 5,200 tests were excavated. These differences indicate that the present attempt to calculate the acreage surveyed by shovel testing proved unsuccessful. Third is the Greenhorne survey. Once again, no distinction is made in the report between acreage surveyed by pedestrian walkover and shovel testing, although the report does state that 0.018 percent of the surveyed area was investigated by shovel tests, suggesting that only 38 acres were shovel tested. Based on accompanying figures, an estimate of 485 acres (23 percent of the survey tract) was obtained.

Table 3. Selected results of archaeological survey projects at Fort Campbell.

Survey	Predicted No. of Shovel Tests	No. of Shovel Tests Reported	No. of Prehistoric Sites	No. of Historic Sites	No. of Isolates	Average Prehistoric Site Size	Average Historic Site Size
UK	*Unknown*[a]	*Not reported*	*337*	*90*	*239*	*6,939*	*4,438*
DuVall 2500	*25,294*	*Not reported*	*1*	*6*	*0*	*Not reported*	*Not reported*
DuVall 2254	*22,805*	*21,270*	*3*	*22*	*0*	*Not reported*	*Not reported*
DuVall 34	*612*	*Not reported*	*0*	*0*	*0*	*Not applicable*	*Not applicable*
DuVall 6624	*67,018*	*Not reported*	*16*	*6*	*0*	*3,452*	*2,041*
DuVall 10A	*180*	*30*	*0*	*0*	*0*	*Not applicable*	*Not applicable*
DuVall 10B	*180*	*10*	*0*	*0*	*0*	*Not applicable*	*Not applicable*
Greenhorne	*Unknown*	*5,510*	*12*	*8*	*0*	*13,717*	*13,971*
CRA	*Unknown*	*5,198*	*29*	*24*	*12*	*1,190*	*1,314*
PCI 5180	*52,409*	*15,633*	*71*	*36*	*96*	*8,624*	*4,449*
PCI 100	*1,012*	*545*	*0*	*0*	*7*	*Not applicable*	*Not applicable*
PCI 4068	*41,158*	*20,734*	*107*	*64*	*144*	*5,835*	*4,710*
PCI 1270	*12,849*	*6,767*	*19*	*26*	*13*	*3,191*	*2,349*
PCI 1307	*13,224*	*6,908*	*25*	*25*	*13*	*7,009*	*3,820*
PCI 4836	*48,928*	*20,870*	*114*	*65*	*63*	*6,105*	*7,860*
PCI 4952	*50,102*	*29,752*	*156*	*87*	*177*	*6,942*	*6,236*
PCI 4128	*41,765*	*20,449*	*77*	*48*	*93*	*3,232*	*2,573*
PCI 3715	*35,816*[b]	*27,805*	*64*	*53*	*122*	*3,865*	*4,292*

[a] Shovel-test spacing is described as 15 to 20 paces, but total acreage investigated by shovel testing is not presented in O'Malley et al. (1983)
[b] 175 acres were omitted from this survey, predicted number of shovel tests does not include this acreage

In contrast, the Greenhorne report states that almost 5,300 tests were excavated, suggesting that 521 acres were surveyed by shovel testing. Given that three different estimates were obtained, it is concluded that the attempt to estimate acreage surveyed by shovel testing during the Greenhorne project has been unsuccessful. For both the CRA and Greenhorne estimates, the results suggested that more shovel tests were excavated during the projects than predicted by the estimated acreage. Finally, the PCI 3175 project total of predicted number of shovel tests was calculated without 175 acres that were reported as being omitted due to widespread disturbance.

The number of shovel-test locations investigated is reported from 14 of the 18 projects. Projects not reporting this statistic include University of Kentucky, DuVall 2500, DuVall 34, and DuVall 6624. Two of the 14 projects for which the number of shovel tests is available do present interpretative problems, as discussed above. Both the Greenhorne and CRA project reports do not explicitly present figures for acreage investigated by shovel testing, and attempts to estimate acreage suggested that well over 100 percent of the predicted shovel tests had been excavated. Due to these problems, neither project is used in this analysis. When these two projects are subtracted, 12 of 18 survey projects remain available for a comparison between predicted number and actual number of shovel tests excavated. This comparison can be performed in two different manners: as a percentage of predicted number of tests and as the number of tests excavated per acre.

The actual number of shovel-test locations investigated as a percentage of predicted number of shovel tests varies from a high of 93 percent (DuVall 2254) to a low of 6 percent (DuVall 10B). The two surveys with the lowest ratio of actual to predicted number of shovel tests each comprised 10 acres at two separate building sites. The initial PCI 5180 survey evidences a slightly increased rate of effort (30 percent), whereas the latter PCI surveys evidence a greater and generally similar effort (between 50 percent and 60 percent) except for the last survey (PCI 3715), during which the level of effort showed a significant increase (over 70 percent). Finally, the DuVall 2254 survey evidences the greatest level of effort and may indicate a completely surveyed area (over 90 percent), although, once again, because of a lack of field documentation available for review, this interpretation cannot be assessed.

When translated into shovel-test locations investigated per acre, the trends discussed above as percentage of potential tests actually excavated are, not surprisingly, mirrored. The surveys with the lowest number of tests per acre (less than four) include DuVall 10A, DuVall 10B, and PCI 5180 projects. Most of the remaining PCI surveys average from over four to six tests per acre except the final survey (PCI 3715), which averages almost eight tests per acre. DuVall 2254 has the highest tests per acre average at over nine. To place these figures into context, 10 tests per acre are predicted based on 20-m intervals (between rows and between tests in a row). No surveys that utilized 15-m intervals are available for comparison.

Three caveats should be noted when discussing this data. First, total number of shovel tests excavated includes both locations excavated within the survey grid as well as locations excavated within site areas during attempts to define site boundaries. Because of this, the total number of tests excavated figure inflates the actual number of tests excavated in the attempt to locate sites and thus inflates the average number of tests excavated per acre during site location activities (as opposed to site-definition activities).

Second, the operationalization of total number of tests excavated was not discussed in the survey reports. It appears that small-scale omissions, such as skipping tests that would have fallen within a road, in ditches, or in drainages, were generally not tallied and counted, although this may be less true for the PCI surveys. Personal experience suggests that such small-scale omissions can account for hundreds of test locations across large survey tracts. It is possible that these two factors cancel each other out and that the averages of tests per acre excavated presented here fairly well represents the level of effort expended during each of the surveys.

Third, the phrase “shovel test locations investigated” has been purposefully used. This is to denote that shovel tests were not excavated at all locations. Instead, some locations were investigated by pedestrian survey, and others were noted as disturbed or lacking soil. Unfortunately, only the PCI reports quantify the number of test locations investigated and the number of those locations at which a shovel test was excavated. Three PCI projects, DO 4, DO 5, and DO 6, excavated shovel tests at between 50 percent and 59 percent of the locations investigated. Two projects, DO 7 and DO 8, excavated between 60 percent and 69 percent of the locations investigated. Two others, DO 1 and DO 2, excavated between 70 and 79 percent of the locations investigated. Finally, two projects, DO 3 and DO 9, excavated between 80 percent and 90 percent of the locations investigated.

Based on these results, this overview indicates that of the 12 surveys, three can be viewed as expending a low level of effort (less that 40 percent of test locations investigated), two a high level of effort (greater than 75 percent of test locations investigated), and the remaining seven as a moderate level of effort (between 40 percent and 75 percent of the test locations investigated). These impressions were then further checked against available field documentation. The only available field documentation that allowed such a cross-check was that associated with the PCI projects, whereas similar documentation is unavailable for all earlier projects conducted at Fort Campbell. Two measures were made from a random selection of PCI field maps, with samples taken from each delivery order. First, transects were randomly selected and measured to determine transect length. Transect length divided by test interval provides an estimate of number of expected tests for the transect. This figure was then compared with transect logs, on which the actual number of tests excavated within the transect were recorded. Second, the width of randomly selected areas was measured. Tract width divided by transect interval provides an estimate of the expected number of transects within the randomly selected area. The actual number of transects recorded on the survey map was then counted.

Tables 4 and 5 present the results of this data collection, with the predicted and actual number of transects or tests presented as an aggregate sampled total for each project. For each project except PCI 100, the actual number of tests excavated is less than the number predicted. This appears to substantiate the conclusion of level of effort based on reported number of tests compared with predicted number of tests; fewer tests were being excavated than predicted based on total area surveyed and test interval. Similarly, except for PCI 5180 and PCI 100, fewer transects were being surveyed than was predicted. This would also lead to fewer actual tests excavated than the number predicted for each project.

Two cautionary notes should be stated. First, wide differences between number of predicted and actual tests may simply reflect a bookkeeping error, either that the transect on the survey map was incorrectly numbered or placed or that the transect logs were incorrectly numbered. Second, the small samples examined in this analysis may not be truly representative of the overall surveys.

Table 4. Comparison of predicted to actual number of tests based on selected transects.

PCI Survey	No. of Transects Sampled	Predicted No. of Tests	Actual No. of Tests	Differential Range[a]
PCI 5180	*8*	*182*	*161*	*–8 to +4*
PCI 100	*4*	*78*	*81*	*–4 to +4*
PCI 4068	*5*	*53*	*26*	*–9 to –5*
PCI 1270	*6*	*152*	*133*	*–8 to +11*
PCI 1307	*8*	*131*	*109*	*–6 to –2*
PCI 4836	*8*	*162*	*107*	*–15 to –5*
PCI 4952	*8*	*178*	*138*	*–12 to +1*
PCI 4128	*8*	*128*	*82*	*–10 to –1*
PCI 3715	*8*	*142*	*128*	*–6 to +11*

[a] The term *differential range* is a measure of the maximal difference between the predicted number of tests and the actual number of tests in the sampled set of individual transects.

Table 5. Comparison of predicted to actual number of transects based on selected survey areas.

PCI Survey	No. of Areas Sampled	Predicted No of Transects	Actual No. of Transects	Differential Range[a]
PCI 5180	*2*	*47*	*47*	*–1 to +1*
PCI 100	*1*	*22*	*22*	*0*
PCI 4068	*2*	*22*	*12*	*–6 to –4*
PCI 1270	*2*	*119*	*88*	*–21 to –10*
PCI 1307	*2*	*145*	*111*	*–18 to –16*
PCI 4836	*2*	*135*	*99*	*–28 to –8*
PCI 4952	*2*	*33*	*19*	*–3 to –1*
PCI 4128	*2*	*40*	*30*	*–7 to –3*
PCI 3715	*2*	*99*	*86*	*–7 to –6*

[a] The term *differential range* is a measure of the maximal difference between the predicted number of transects and the actual number of transects in the sampled survey tracts.

It is the senior author’s opinion that the overly precise nature of the PCI field maps makes them open to interpretation. The maps do not appear to have been drawn in the field but rather may have been used as a projection of fieldwork. A comparison of the PCI field maps to sketch maps presented in the reports also suggests that the field maps do not accurately represent actual field-work. The maps all illustrate transects as linear, whereas the site sketch maps illustrated in the project reports often show transects curving through site areas.

The field maps suggest one explanation for the discrepancy between the predicted and actual number of shovel tests. When reviewing the maps, the senior author noted that small (some estimated up to 10 acres), oddly shaped areas near the edges of survey tracts were often not marked with a survey transect. Areas around some small drainages were not crossed by survey transects. Finally, there is little indication that roads and ditches within survey tracts were systematically counted as surveyed, in the sense that shovel tests located within the road or drainage should have been counted as "disturbed." All of these exclusions would reduce the total number of shovel tests and suggest that some areas were simply not surveyed. Figure 4, a portion of a PCI field map for a survey conducted in Training Area AB03, illustrates these points. Areas around previously surveyed tracts are not depicted as having been surveyed including an area around a drainage. A disturbed area at the south end of the tract is not discussed within the report as being disturbed (see EPA area). Finally, an agricultural food plot is present in the area. This food plot is not discussed as being surveyed in the report nor is it so indicated on the field map.

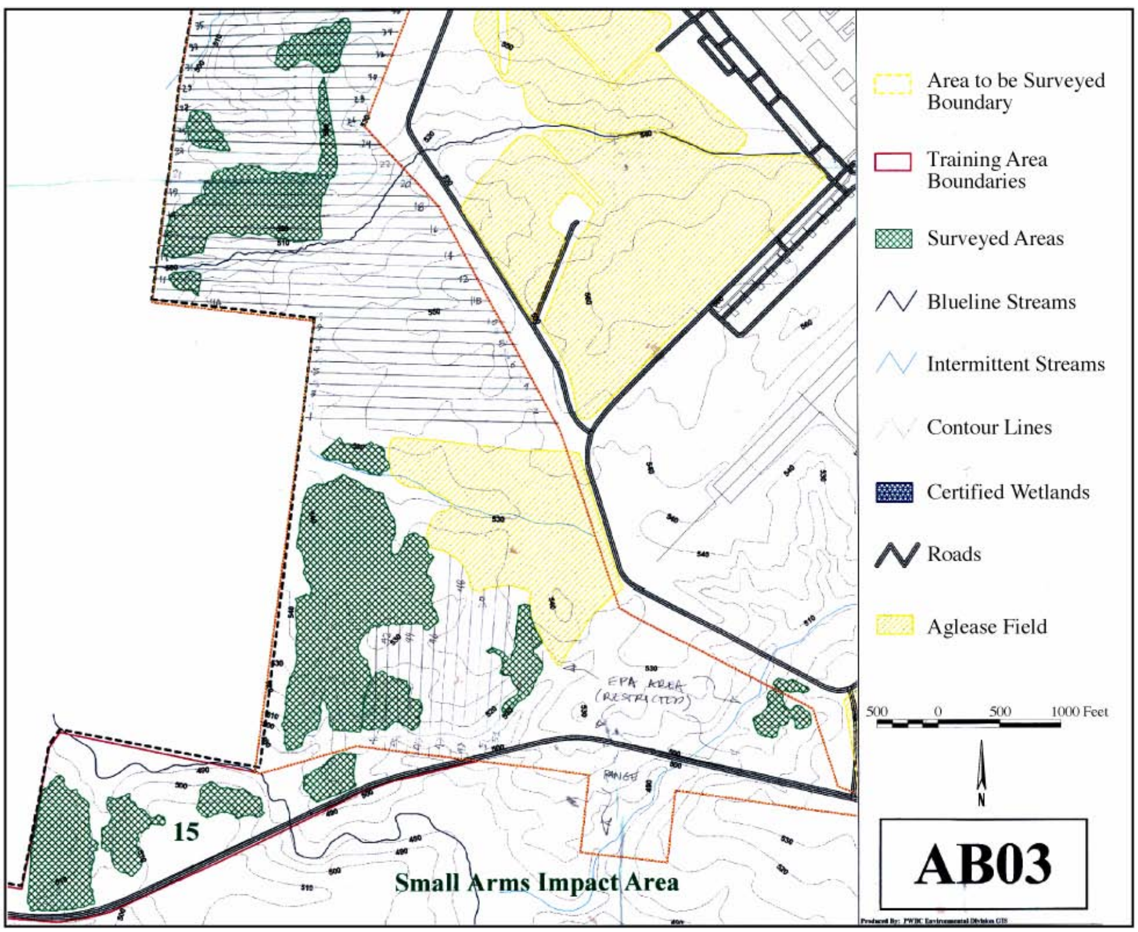

Figure 4. Portion of a PCI field map for a survey conducted in Training Area AB03. The numbered horizontal lines denote the PCI survey transect number.

Turning to another variable, site density should be minimally a factor of three different variables: level of effort expended in locating sites, survey methods employed, and cultural and environmental characteristics of the survey tract that influenced the probability of past peoples inhabiting and utilizing an area. For present purposes, site is here defined to mean a prehistoric site, a historic site, and isolates. One measure of the effectiveness of an archaeological site inventory project is whether it accomplished its goal of locating sites. Given an equal weighting to tract attractiveness (i.e., the likelihood that prehistoric populations would equally value all possible locations for occupation, clearly an unreasonable assumption), survey projects with greater effort expended or closer spacing intervals should yield higher numbers of sites. Sites per 100 acres range from a low of 0 (the two small 10-acre DuVall projects) to 8.5 (PCI 4952). A scatterplot of level of effort (expressed as the average number of tests excavated per acre) by the number of sites per 100 acres does indeed support the above statement (Figure 5). In general, as level of effort increases, the number of sites per 100 acres also increases. One obvious exception to this statement is the DuVall 2254 project, during which a high rate of tests per acre were excavated but few sites located. A Pearson's Correlation Coefficient ($r = -0.250$) of these data is not significant. But if the DuVall 2254 data is dropped, a significant positive correlation ($r = +0.578$) is obtained. This suggests both that the DuVall 2254 data are anomalous and that the more tests per acre are excavated, the higher the number of sites that will be located. Based on this, it is likely that the DuVall 2254 project did not locate all sites within the survey tract.

Prehistoric and historic site size could be calculated for 12 of the Fort Campbell projects (Table 3). No sites were located during four projects (DuVall 34, DuVall 10A, DuVall 10B, and PCI 100), while these data were not reported for two projects (DuVall 2500 and DuVall 2254). Average site sizes vary considerably, from a low of just under 1,200 square meters (CRA prehistoric sites) to a high of 13,971 square meters (Greenhorne historic sites). If survey effort and techniques were similar, site size should vary by intensity of prehistoric or historic use. To test this supposition, average site sizes were compared against intensity of effort. Scatter plots of level of survey effort, operationalized as average number of tests per acre, by prehistoric site size and historic site size both suggest that there is little relationship between the two variables in the Fort Campbell data examined here (Figures 6 and 7). Both have weakly negative correlations between the two variables that are not statistically significant. If two outliers are eliminated (DuVall 2254, high level of effort and low number of sites and PCI 5180, low level of effort and high number of sites), little variability in average site size is present. This suggests that most surveys are encountering and identifying the same universe of site sizes.

No survey thus far conducted at Fort Campbell has documented that the shovel-test or pedestrian-walkover strategies employed were done to specifications in the Statement of Work. Similarly, none of the reports provide a fully adequate description of the field methods that were actually used. Several surveys provide no documentation of the shovel tests excavated, such as where the tests were excavated, transect intervals, or numbers excavated. Two project surveys do not adequately document areas surveyed by shovel testing, leading to an inability to evaluate the effort put forth. The PCI project surveys, while doing a better job of recording areas surveyed by shovel testing and the number of test locations investigated, all appear to have investigated too few locations and hence to have excavated too few shovel tests given the Statement of Work specifications. The projects range from a low of 30 percent of expected shovel-test locations that

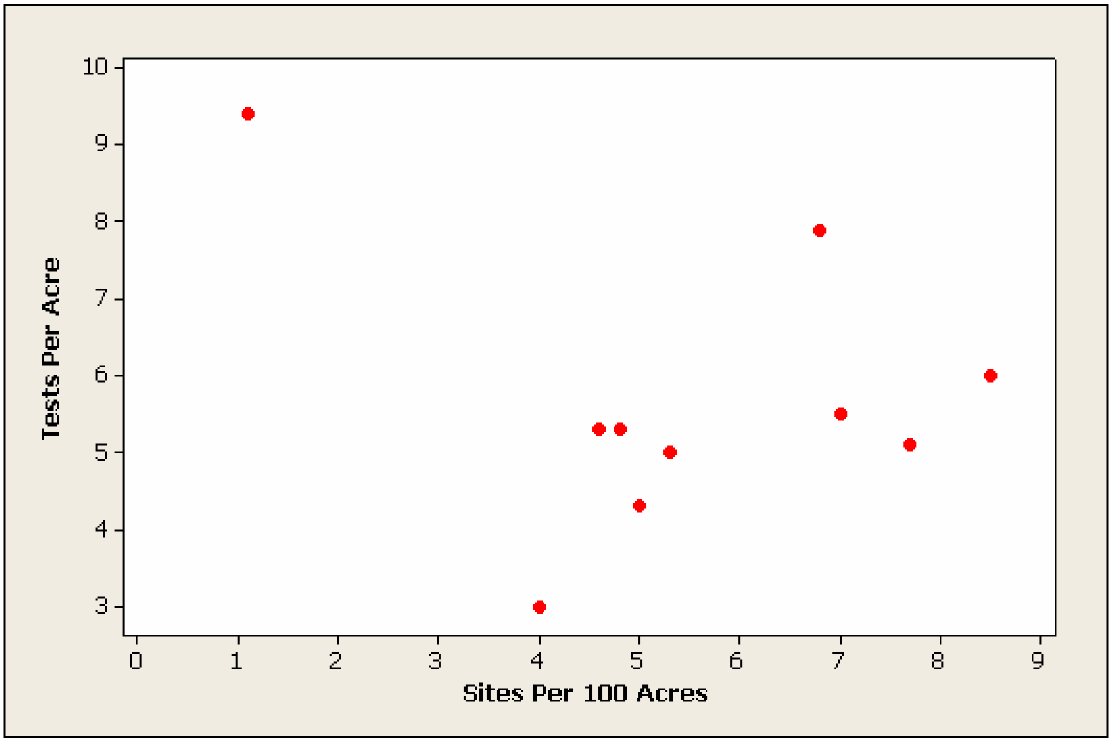

Figure 5. Comparison of number of tests per acre and number of sites per 100 acres.

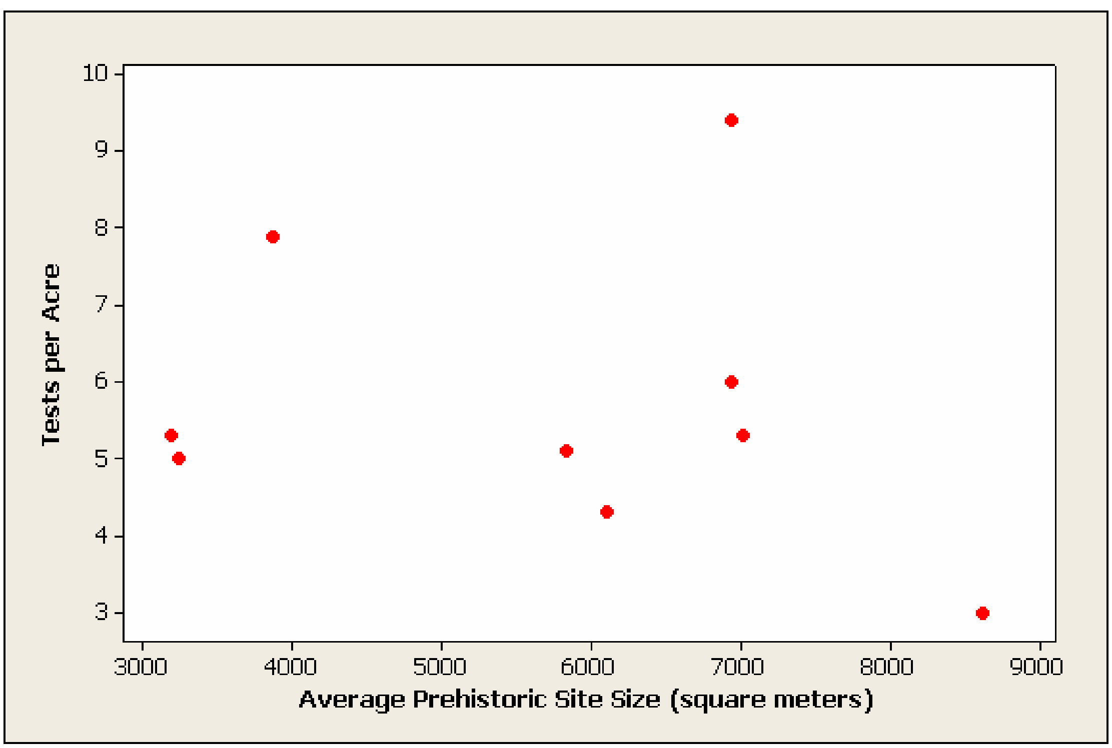

Figure 6. Comparison of number of tests per acre and average prehistoric site size.

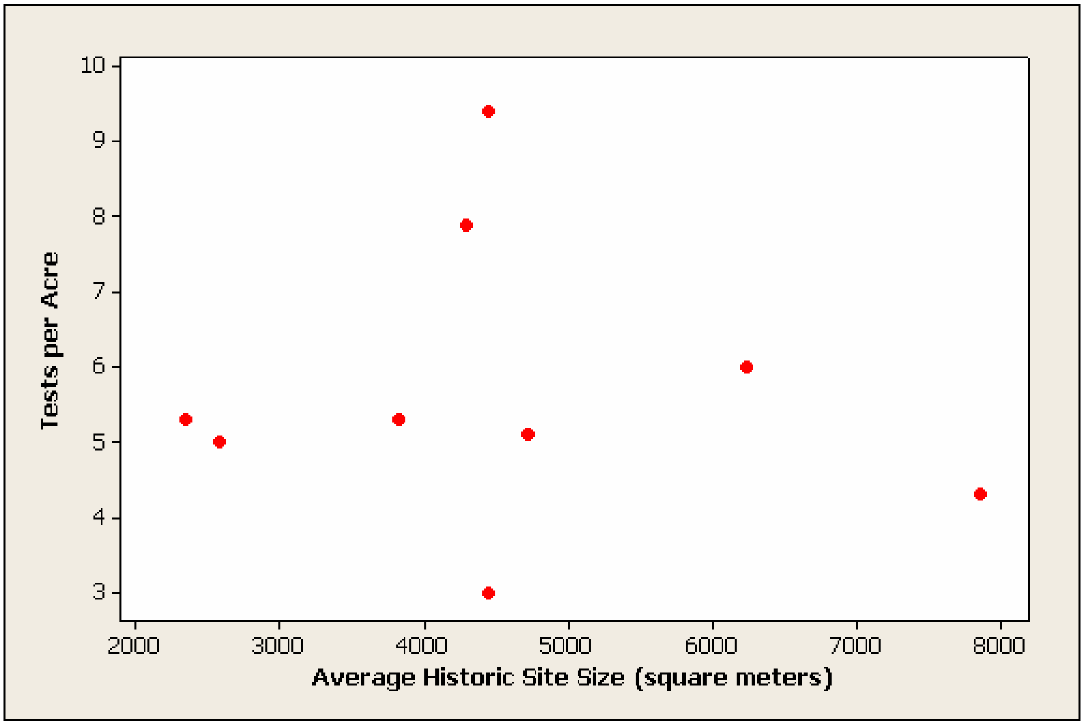

Figure 7. Comparison of number of tests per acre and average historic site size.

were actually investigated to a high of 78 percent. Most are in the 50 percent range. For the three surveys that evidently employed pedestrian walkover, no discussions of ground-surface conditions were provided in the reports, and for the University of Kentucky survey, no maps that illustrate areas surveyed by pedestrian walkover were included in the report. Based on these observations, it is concluded that the reliability of all areas surveyed at Fort Campbell can, at some level, be questioned.

Decreasing levels of effort do have a negative impact on achieving the basic goals of an archaeological site survey: finding archaeological sites and accurately defining those sites. It has been shown that as the percent of expected shovel tests actually excavated decreases, fewer sites are found. It is likely that some sites are not being identified because either larger transect intervals are being employed or areas are not being surveyed. If site-definition tests are not being excavated, or are being excavated in a haphazard manner, several smaller sites could be combined to form a single larger site. In either case, the survey results are less reliable with regard to making informed land management decisions.

But this discussion is not to suggest that all Fort Campbell surveys have the same degree of reliability. Survey reliability can be viewed as a continuum of low to high. This discussion emphasizes that, with regard to shovel tests excavated as a function of shovel tests requested in the Statement of Work, projects are likely to be more reliable when higher percentages of shovel tests expected are actually excavated.

Site–Specific Data

This section presents the results concerning site-specific data based on a sample of 11 sites from each of the 18 surveys conducted at Fort Campbell. Site selection was random. It was thought that targeting sites could lead to an unfair characterization of the project results, report, or investigators. Selecting all "problem" sites, while uncovering the weaknesses of the Fort Campbell data base, may lead to the conclusion that all archaeological data have inherent weaknesses (while no doubt true, it is the degree to which the data are problematic along with the purpose for which the data was collected that leads to a conclusion as to its usefulness). Selecting all "good" sites would not identify typical problems with the site-level data at Fort Campbell and could stymie examination of the usefulness of the data. One condition for site selection was that the Statement of Work requested a further review of artifacts curated at Fort Campbell from 30 sites that had yielded between approximately 40 and 80 artifacts. Sites were also selected to comprise a mix of prehistoric, historic, and multicomponent occupations. Because of the amount of data collected, site-specific data are presented in three lengthy tables found in Appendix A.

The first set of data, measuring *reporting consistency*, includes the number of shovel tests excavated at the selected site as mentioned in the text and as depicted on the site map, the number of artifacts recovered from the selected site as mentioned in the text and as presented in accompanying tables, and the accuracy of artifact classification based on a review of the curated artifacts, if the site was chosen for such a review. The second data set measures *accuracy of site locations* and consists of comparisons of site locations on maps and as presented in the text. The final set of data centers on the *NRHP evaluations* offered for each selected site, including whether a discussion of site condition or integrity is present, whether the site is evaluated under Criterion D and an evaluative context is provided, and finally, the NRHP finding.

Reporting Consistency

This section discusses the accuracy of data presentation with regard to two variables: numbers of shovel tests excavated within site boundaries and artifact analysis. For shovel-test accuracy, the number of tests excavated within site boundaries as mentioned in the text was compared with that depicted on accompanying sketch maps (see Appendix A, Table 1 [Table A-1]). For artifact analysis, three sources of information were reviewed. First, numbers of artifacts (or artifact types) discussed in the report text were compared with those presented in accompanying tables (if present). Second, in a smaller sample of sites, these sources of information were compared to the actual artifacts themselves, which are curated at Fort Campbell.

Shovel–Test Accuracy. This comparison could only be made using the PCI projects. For the University of Kentucky, DuVall, Greenhorne, and CRA projects, one or both sources of information (e.g., shovel test numbers mentioned in the report text and depicted on sketch maps) were unavailable for review. For the PCI projects, only the number of positive tests is discussed in the text. In three of the PCI reports, one or two sites selected for review did not contain a discussion of the number of positive shovel tests excavated. But, for the remainder of the sites across all of the PCI projects, there was little difference between the number of positive tests discussed in the text and that depicted on accompanying sketch maps. A few sites do have a difference of one shovel test between the two counts. At some sites PCI expanded a shovel test into a 50-x-50-cm unit. This is likely the cause of the differences between the two counts for these sites.

Artifact–Analysis Accuracy. Prior to a discussion of the results, it should be mentioned that this analysis has two goals. The first is to determine if the Fort Campbell archaeological survey reports accurately report the number and types of artifacts found. In essence, do the numbers and types discussed in the text and enumerated in tables match those that have been curated at Fort Campbell? The second goal is an evaluation of the accuracy and usefulness of the artifact-analysis methods used by the various investigators. This latter goal entails an admittedly subjective review, the standards of which are based on the senior author's preference, past education, and experience.

The ERDC/CERL Statement of Work indicates that artifacts from a total of 30 sites (each having 40 to 80 artifacts) were to be reviewed. Of the 11 sites selected for text and map review per project, either two or three sites were selected for review of the artifacts curated at Fort Campbell. Both prehistoric and historic sites were included in the subsample.

University of Kentucky: No site-specific tables are presented in the text; instead, a single listing of artifacts recovered is included with the site description. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the three sites selected for review. All three sites reviewed consisted of prehistoric lithic scatters. The University of Kentucky analyses used what has been termed a core-reduction model. This model, and the terminology employed, is a typical analytical construct used throughout the eastern United States. As such, the results have broad comparability with other lithic analyses. For the most part, the categories to which the artifacts have been attributed appear reasonable. A few pieces of noncultural material have been classified as artifacts, but this is not uncommon for a chert-rich area such as Fort Campbell. For one site reviewed, 40MT159, most pieces of lithic debris have been curated only as "flakes" and not as specific flake categories as was the case for the other two sites reviewed.

DuVall 2500: No discussion of numbers of artifacts recovered from specific sites is presented either in the report text or in tables. The artifacts from identified sites have never been submitted to Fort Campbell for curation. As such, it is impossible to evaluate the accuracy and usefulness of the artifact-analysis methods used by the archaeologists that conducted this project.

DuVall 2254: No discussion of numbers of artifacts recovered from specific sites is presented either in the report text or in tables. The artifacts from identified sites have never been submitted to Fort Campbell for curation. As such, it is impossible to evaluate the accuracy and usefulness of the artifact-analysis methods used by the archaeologists that conducted this project.

DuVall 6624: Either discussions of artifacts or tables are absent for 10 of the 11 selected sites. For the remaining site, which both discussed artifact counts in the report text and presents those counts in a table, the numbers do not agree. The artifacts from identified sites have never been submitted to Fort Campbell for curation. As such, it is impossible to evaluate the accuracy and usefulness of the artifact-analysis methods used by the archaeologists that conducted this project.

Greenhorne: Of the 11 sites reviewed, there is a disagreement in numbers between the text and table in three instances. One of the errors is by 502 artifacts. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report for the two sites selected for review. The two sites selected for review from this project were both prehistoric lithic scatters. It appears that the Greenhorne analysis is of a minimalist variety, concentrating on temporally identifiable artifacts to the exclusion of the remainder of the assemblage. Lithic debitage is classified as flakes and considered no further, when such material could have been placed into some analytical framework. The projectile point identifications appear to be justified, although one unidentified point from 40MT417 could be an example of the Kirk Corner Notched type.

CRA: The number of artifacts collected at particular sites is not discussed in the report text but is presented in accompanying tables. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the tables for the three sites selected for review. The sites selected for review include a prehistoric lithic scatter, a historic site, and a multicomponent site. CRA used a modified core-reduction model, in which flakes are classified by size categories with weight, portion, platform configuration, and cortex also considered. Using these data, the flakes were divided into early-, middle-, and late-reduction categories as well as bifacial thinning flakes. The artifacts reviewed appear consistent both internally as well as with generally accepted definitions of the various flake types. While CRA used a modification of the core-reduction model, they provide a section on analysis methods in the report that allows for an easy interpretation of the results and comparison with other projects that use a different analytical model. The analysis of materials from the prehistoric site appears to be adequate. That for the historic site presages problems with the PCI historic analyses. CRA identifies all ceramics from the historic site as whiteware when they are technologically better classified as ironstone. Whiteware purchase and manufacture began to wane by the 1860s, whereas ironstone purchase and manufacture began to increase in the 1850s. A similar problem is associated with the multicomponent site, which also has a piece of naturally occurring rock identified as lithic debitage.

PCI 5180: Only 3 of the 11 sites have artifact numbers discussed in the report text as well as being presented in tables. For one of these sites, 40MT497, the text and table numbers differ by six artifacts (see Appendix A). Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the three sites selected for review. Throughout the nine PCI projects, lithic analysis was conducted using what can be termed the “Sullivan and Rozen” model. This model rejects the categories used in the core-reduction model and instead classifies flakes as complete, broken, fragmented, or debris. Utilizing a model created by analyzing a series of prehistoric sites from east-central Arizona, Sullivan and Rozen (1985) go on to characterize typical lithic assemblages associated with distinct site types. The comments made here refer to the PCI use of this model and not the original study by Sullivan and Rozen (1985). The use of this model by PCI at Fort Campbell is problematic in two ways. First, few investigators in the eastern United States use this model, and no other investigators at Fort Campbell have employed this model. It is difficult, if not impossible, to compare the PCI Fort Campbell lithic data to other studies from the installation or the region. Second, PCI did not undertake to replicate the study using lithic assemblages and site types from the study region. It is more than likely that prehistoric populations in the Midsouth approached settlement, chert acquisition, manipulation, and use differently from those in Arizona. The imposition of patterns of prehistoric Arizona chert use and settlement on the Fort Campbell region is both inappropriate and an unwarranted assumption of similarity. That being said, the comments regarding PCI lithic analyses are limited to opinions on tool types and noncultural materials. It is assumed that the PCI investigators assigned the flakes correctly to the Sullivan and Rozen categories.

The three PCI sites reviewed from this project includes one prehistoric lithic scatter, one site with both prehistoric and historic components, and one historic site. Regarding the multicomponent site, 15 of 40 artifacts are most likely natural. This rate, 38 percent, appears to be quite high. Similarly, of seven historic ceramic sherds identified as whiteware, four are in fact pearlware. Pearlware was produced by a somewhat different combination of substances used to produce the surface glaze and generally predates whiteware, although the two form both a technological and temporal gradient. The historic site reviewed evidences similar analytical problems. For this site, seven pieces of whiteware are in fact ironstone. Ironstone has a much harder paste than whiteware and generally dates later. It forms the end of a pearlware-whiteware-ironstone technological and temporal continuum. Other misidentifications include screw-top jar rims termed molded rims, pink lusterware (dating to the first half of the nineteenth century) termed decal ware (dating to the twentieth century), and sponge-decorated whiteware identified as flow blue, the two being different technological processes that potentially date to different periods. For the prehistoric sites, 22 pieces (of 46 total) appear to be noncultural, or almost 48 percent of the assemblage may be naturally occurring chert pieces.

PCI 4068: Only 2 of the 11 sites have artifact numbers discussed in the report text and presented in tables, and both are in agreement. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the three sites selected for review. The three sites reviewed include two prehistoric lithic scatters and one historic site. The presence of noncultural materials is problematic at only one of the two prehistoric sites. At that site, out of a total of 45 artifacts, 13 appear to be noncultural (29 percent of assemblage). Identification of the historic artifacts revealed few problems. The only problems identified were with five pieces described as curved glass that actually include lamp glass and window glass.

PCI 1270: Four of the 11 sites have artifact numbers discussed in the report text as well as presented in tables, and all are in agreement. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the two sites selected for review. The two sites selected for review included a prehistoric lithic scatter and a historic site. The analysis of artifacts from both sites appears to be adequate. Only two noncultural artifacts were noted in the prehistoric site assemblage.

PCI 1307: Over half of the sites (6 of 11) have artifact numbers discussed in the report text and presented in tables. One of these has differences between the text and table. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the two sites selected for review. The two sites included a prehistoric lithic scatter and a historic site. Twenty of the prehistoric lithics appears to be noncultural rocks. Based upon 33 lithics reviewed, this is 61 percent of the assemblage. Included in the curation box for this site is an empty artifact bag. For the historic site, an ironstone chamber pot rim was identified as whiteware (no vessel identification) while metal fragments are the remains of a zinc canning jar lid.

PCI 4836: Seven of 11 sites have artifact numbers discussed in the report text and in tables. Of these seven, one site has differences between the text and table. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the three sites selected for review. The three sites selected for review include a multicomponent site, a prehistoric lithic scatter, and a historic site. For the prehistoric site, six noncultural items were identified in the assemblage, or 12 percent of the assemblage. The prehistoric artifacts from the multicomponent site were less well-analyzed. It appears that all nine prehistoric "artifacts" could have been discarded as natural. Among the historic artifacts, all three examples of whiteware from the collection are better identified as pearlware. The historic site evidences similar problems. Five pieces of semiporcelain are identified as whiteware, six pieces of ironstone are identified as whiteware, one piece of cream-colored ironstone is described as creamware (a technological term correctly applied only to late eighteenth-century English ceramics due to the coloration of the glaze), one piece of Albany-glazed stoneware is described as whiteware, and a noncultural rock is classified as a brick.

PCI 4952: For all 11 sites the artifact data are presented in both the report text and in tables. Three sites have differences between the text and tables. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the three sites selected for review. Once again, the three sites selected for review include a historic site, a prehistoric lithic scatter, and a multicomponent site. The historic site assemblage evidences many of the problems already identified: ironstone identified as whiteware, semiporcelain identified as whiteware, and misidentified glass (lamp glass as bottle glass, curved glass as window glass). The same problems are present in the historic portion of the multicomponent site assemblage. Of the two prehistoric artifacts at that site, one is likely noncultural. Regarding the prehistoric site, 14 artifacts of 45 (31 percent of assemblage) are noncultural, and one chipped-stone end scraper was identified as a piece of flaking debris.

PCI 4128: For all 11 sites the artifact data are presented in both the report text and in tables, and all are in agreement. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the two of the three sites selected for review. For 40MT398, the text indicates that 58 artifacts were found, whereas only three artifacts from this site could be located in the Fort Campbell collections. Of the three sites selected for review, one is a prehistoric lithic scatter, one is a historic site, and the final is a multicomponent site. For the prehistoric site, 22 of 73 artifacts are noncultural (30 percent); for the multicomponent site, only one noncultural item was present in the collection. Historic artifacts from the site suffer from problems already discussed; all pearlware sherds had been identified as whiteware. In fact, it appears that no whiteware was collected at this site, perhaps suggesting a somewhat earlier occupation. Finally, as mentioned above, only three artifacts were found labeled as from 40MT398, whereas the report specifies that 58 artifacts were collected and analyzed.

PCI 3715: For all 11 sites the artifact data are presented in both the report text and in tables, and all are in agreement. Artifact numbers present at Fort Campbell are in agreement with the numbers given in the report text for the three sites selected for review. Once again, of the three sites selected for review, one is a prehistoric lithic scatter, one is a historic site, and the final is a multicomponent site. Regarding the historic site, ironstone is misidentified as whiteware, plaster as concrete, lamp glass as bottle glass, and coal is not identified. Similar problems are present with the historic portion of the multicomponent assemblage. Both “flakes” attributed to the multicomponent site are more likely natural rock fragments. For the prehistoric site assemblage, 8 lithics items are natural out of a total of 42 items (19 percent).

Summary. In this section two different sources of site information were reviewed: shovel tests and artifacts. For both sets, the textual discussion was compared with other information sources, either a site map or a table. For artifacts, the counts were also compared with numbers present in the Fort Campbell curation facility. Also reviewed for the artifacts was whether the artifact analyses were appropriate and adequate. In general, the reporting of shovel tests, when this was done, has been accurate. The caveat to keep in mind is that only the PCI projects both reported the number of tests (albeit only positive tests) excavated at a site as well as illustrated the tests on a map. CRA included tests on site maps but did not discuss numbers excavated, whether positive or negative. Shovel tests were not illustrated on maps for any of the other projects conducted at Fort Campbell.

The results of the review regarding the reporting of artifacts in text and tables are similar to that regarding shovel tests. Some reports present the number of artifacts only in text, some only in tables, some not at all, and in a few instances, in both text and tables. For those projects that report artifact numbers in both text and tables, few errors were noted, and those that were could be explained as typographic errors. In only one instance did the number of artifacts listed in a report differ from the number counted while reviewing the actual artifacts curated at Fort Riley.

In contrast, the accuracy and adequacy of the artifact analyses conducted on collections from Fort Campbell sites can be called into question. At least two, and perhaps three, different lithic analysis methods have been used by the different researchers contracted to perform archaeological survey investigations at Fort Campbell. This has made the comparison of all but the simplest measures of lithics between sites difficult to impossible. Particularly problematic is the use by PCI of an Arizona site model to identify site types based on lithic categories at Fort Campbell. Also problematic is the high rate of noncultural rock identified as artifacts, especially regarding the PCI projects. This has led to two sites originally identified as multicomponent being more accurately interpreted as single component Historic period sites. A rigorous analysis of material, and exclusion of natural rock, could lead to changes in site configurations, site areas, site numbers, and views on site NRHP eligibility.

Likewise, problems have been identified regarding the analysis of historic artifacts. While not solely confined to ceramics, the most glaring issue is the failure of researchers to identify different historic ceramic wares. The pearlware-whiteware-ironstone nineteenth-century ceramic continuum is based on both technological and temporal factors. Such artifacts can be separated by a combined analysis of paste and surface/glaze characteristics. By identifying all such ceramics as whiteware, the analysts have masked an important temporal source of information, perhaps the only source of such information at sites lacking archival resources. Accurate dating of an historic site could lead to different NRHP evaluation findings and a more meaningful measure of site significance.

In sum, numbers and counts of artifacts and shovel tests excavated within site boundaries are on the whole quite accurately reported within the Fort Campbell archaeological survey reports. There is also a high level of accuracy regarding counts of artifacts presented in reports and the number of artifacts curated at Fort Campbell. The Fort Campbell reports, though, suffer from nonsystematic and at times inaccurate artifact analyses. The problems discussed above could have an impact on NRHP evaluation findings. The most logical solution to this problem is to include in future Statements of Work a suggested analytical model(s) to be used. Such a suggestion should not be meant to preclude the use of other analytical models, but instead to ensure that comparable base-line of data is collected for each project.

Locational Accuracy

Two sets of maps and text descriptions were analyzed in an attempt to characterize the accuracy of site locations as reported by the previous archaeological surveys conducted at Fort Campbell (See Appendix A, Table 2 [Table A-2]). Text descriptions of the sites, including areal estimates or maximal (typically east-west and north-south) dimensions, as well as locational descriptions, were cross-checked first against the accompanying site sketch map, if provided, and second, the site as placed on the appropriate USGS topographic quadrangle. A second cross-check involved comparing the accompanying site sketch map with the site as placed on the USGS topographic quadrangle. Cross-checking was accomplished by measuring dimensions on USGS quadrangles using the 1:24,000 rule on a Forestry Suppliers, Inc., UTM coordinate grid and using a standard ruler for sketch maps and USGS quadrangle figures that had either been reduced or enlarged. Generally, maximal dimensions or areal estimates given for sites in the report text are considered accurate if differences between the two are one unit of measure or less. Most maps analyzed for this project were set at different scales, with, as usual, the scales subdivided into subunits. For instance, a 20-m to 1-inch scale might be divided into four 5-m units. To follow this example, if a site area differed from maximal dimensions listed in the report text by less than 1 unit, in other words by less than 5 m, the map was considered accurate. But, if site size differed from the text by more than 1 unit, or more than 5 m in this example, it was counted as inaccurate.

A second set of data available to characterize reporting accuracy of site locations is often provided in the textual description of the sites. This type of information includes such statements as site shape, location of site in regard to topographic features such as ridges, drainages, slopes, and the like, and distance to relatively permanent features including roads and streams, among others. These types of data have been termed *relational information*. Those projects during which no sites were found are not discussed. Other potential locational data are UTM coordinates for each site. The UTM coordinates were not reviewed because Fort Campbell is conducting an ongoing internal review of these data.

University of Kentucky. Sketch maps were not evaluated for this project, as these maps are not included in the final report. A review of selected sketch maps attached to site forms indicates that the maps were not drawn to scale. For 9 of 11 sites, the site size mentioned in the text is not the same as that presented on the USGS quadrangle. Relational errors were found with 4 of 11 sites, three sites in relation to roads and one in relation to a stream.

DuVall 2500. Site locational data are not presented in the text, nor are sketch maps included. Therefore, it was impossible to review the selected sites.

DuVall 2254. Site locational data are not presented in the text, nor are sketch maps included. Therefore, it was impossible to review the selected sites.

DuVall 6624. Once again, sketch maps were not available for review. All 11 sites are larger on the accompanying quadrangle maps than as stated in the text. Most site areas are depicted as circles or ovals on the quadrangle maps. It is unlikely that these reflect the true shape or dimensions of the sites, and instead appear to represent generalized site locations. Relational information is inaccurate for 3 of 11 sites.

Greenhorne. Many of the site shapes depicted on sketch maps differ from those on the quadrangle maps. Differences between the text and sketch map occur in seven instances, and in all instances the sites are smaller on the sketch maps than described in the text. The scales included on the quadrangle maps appear to be inaccurate, making a comparison to text measures or sketch measures meaningless. The text includes very generalized relational information, once again making comparisons somewhat meaningless. One obvious error is that 40MT426 is described as being in the southern part of Training Area 25, when in fact it is along its northern border.

CRA. For 9 of 11 sites the sketch maps illustrate a larger area than is discussed in the text. For five sites the sketch maps illustrate an area larger than that depicted on quadrangle maps. In two instances, the sketch map and quadrangle map site shapes are dissimilar.

PCI 5180. For 3 of 11 sites, the site area depicted on the sketch map differs from that discussed in the report text.

PCI 4068. For 3 of 11 sites, the site area depicted on the sketch map differs from that discussed in the report text.

PCI 1270. For 3 of 11 sites, the site area depicted on the sketch map differs from that discussed in the report text. Two sites are oddly shaped, and the method used to determine dimensions could not be duplicated. No scale was present on one quadrangle map presented in the final report.

PCI 1307. For 8 of 11 sites the area depicted on sketch maps differs from the measurements presented in the report text. One instance appears to be a typographic error (15 m N/S instead of 150 m N/S).

PCI 4836. For 9 of 11 sites the report text dimensions differ from those depicted on accompanying sketch maps. For 8 of 11 sites the dimensions depicted on sketch maps and in the text differ from that presented on quadrangle maps. One site is oddly shaped, and the method used to calculate dimensions could not be duplicated.

PCI 4952. For 6 of 11 sites the dimensions depicted on the sketch maps differ from those discussed in the report text. Similarly, for 6 of 11 sites the dimensions shown on the quadrangle maps differ from either those on the sketch maps or those presented in the report text. The orientation of the site area was reversed for one site on the quadrangle map. No dimensions were given in the text for one site, and another site was mapped as two separate loci but depicted as one continuous site on a quadrangle map.

PCI 4128. For 8 of 11 sites the sketch map and report text are in disagreement regarding site dimensions. Similarly, for 8 of 11 sites the site dimensions as depicted on quadrangle maps are dissimilar to those reported in the text or depicted on sketch maps.

PCI 3715. Sketch maps and report text site dimensions differ for 7 of 11 sites. The quadrangle map site dimensions differ from either the report text or sketch maps in 8 of 11 instances.

Summary. This portion of the review consisted of comparisons between site areas or maximal dimensions as stated in the text of the reports with site areas or maximal dimensions as depicted on both sketch maps and USGS quadrangle maps. When possible, areas and dimensions depicted on sketch maps were compared with those on the USGS quadrangle maps as well. Other locational data mentioned in the report text, such as landform and distance to roads and waterways, among others, were checked against USGS quadrangle maps.

In general, there is rarely agreement between dimensions or site size presented in the report text and the size as depicted on either sketch maps or USGS quadrangle maps. This is true for 8 of the 12 projects that contained all three sets of data (e.g., text description, sketch maps, and quadrangle maps). In a number of instances, scales on maps do not appear to be correct. Site shapes often change between sketch maps and quadrangle maps. And in some instances, sites have been mapped as uniform symbols rather than as true areas. Finally, a number of relational type errors were also noted. But such cases tend to be less common as relational information is less often discussed in the site descriptions presented in the reports. These errors are common throughout the project documentation and have implications for management of archaeological sites at Fort Campbell. It would appear to be difficult for program managers to accurately identify site areas, for archaeologists to easily locate previously identified sites, and for areas of no concern regarding training or development to be identified. At present the best recommendation may be to place wide buffers around sites that are eligible for listing in the NRHP or have yet to be evaluated.

NRHP Evaluations

The NRHP eligibility criteria for archaeological sites are described in 36 CFR 60. All cultural resources, to be eligible, must possess integrity of location, design, setting, materials, feeling, workmanship, and association, when applicable. Typically, archaeological sites are evaluated under Criterion D, which indicates that to be eligible, a site must have yielded, or may be likely to yield, information important to prehistory or history. Historic sites can also be evaluated under Criteria A and B, which indicate that a site could be eligible based on its association with a significant event, pattern, or person, or Criterion C, for its design or construction value as a representative of a particular technology or culture. Sites can be evaluated under these criteria at the local, regional, or national level of significance. Eligible sites, because of their significance, are managed so as to protect their integrity and preserve their information content for the future.

The results of archaeological surveys most often produce one of two possible evaluations for particular sites: not eligible or potentially eligible for listing in the NRHP. Seldom is enough information obtained during an inventory-level survey to yield a determination of eligibility for the NRHP. Sites can often be determined as not eligible for listing in the NRHP due to a lack of integrity of archaeological deposits or the inability of associated data to address significant research issues. A determination of not eligible indicates that no further work need be done at the site; while an evaluation of potentially eligible indicates that further work is needed, most often in the form of NRHP assessment of the site.

In making NRHP assessments, sites are evaluated against two sets of loosely defined criteria. The first set of criteria is used to evaluate the preservation, or integrity, and cultural characteristics of the site. Integrity is an indication of the degree of preservation of archaeological deposits or structural remains. Although in many cases it is true that sites containing intact deposits would be eligible for the NRHP, it is also true that, in some instances, sites lacking those qualities also may be eligible. In many cases agricultural impacts, such as plowing and subsequent erosion, or other uses of the landscape, destroy intact cultural deposits (and hence impair site integrity), thereby rendering the site ineligible for listing in the NRHP. Butler (1987) discusses the second criterion by which a site needs to be evaluated. The second criterion is that the information, or potential information, from a site can be used to address significant research questions.

With this brief discussion of NRHP eligibility as a foundation, data collection for this variable consisted of the review of reports for all 11 selected sites from each archaeological survey conducted at Fort Campbell (See Appendix A, Table 3 [Table A-3]). Surveys that located no sites are not considered here. All sites were reviewed for surveys with fewer than 11 sites located. The first variable considered was site integrity and whether an explicit discussion of impacts was presented. Phrases considered key included “disturbed” and “well preserved.” If a site was characterized as disturbed, a well-reasoned discussion of site integrity was viewed as including the cause of the impact, its nature, and its intensity across the site area. The second variable considered was context. National Register Bulletin 15 describes a context as “…those patterns, themes, or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within prehistory or history is made clear” (U.S. Department of the Interior, National Park Service [USDI, NPS] 1991:7). Contexts, often termed prehistoric overviews, are a common chapter in most archaeological survey reports. For this variable, having provided a context is interpreted to mean not only presenting a prehistoric or historic overview chapter, but to identify potential research issues as well. In some cases, this is provided in a separate chapter, in other instances it is treated in a site-by-site manner. Either was accepted as providing an appropriate context for site NRHP evaluation. The third variable is the treatment of NRHP findings. The authors should not simply provide an NRHP finding for a particular site, but should also justify that finding based on site integrity and the research significance of various site characteristics.

University of Kentucky. Site integrity is not discussed for 6 of the 11 sites reviewed. Unidentified impacts are cited at 4 of the 11 sites, while the eleventh site is described as being severely eroded. No soil profiles are described to justify this statement. The University of Kentucky report presents a context for site evaluation including the identification of numerous potential research issues. The reasoning behind the NRHP findings is explicitly stated in an overview chapter, which links Not Eligible findings to disturbance and Potentially Eligible findings to sites that can yield data to address specific research issues.

DuVall 2500. Of the six sites located, no discussion of site integrity is presented for five, while the remaining site is described as disturbed with no additional details provided. No context for site evaluation is discussed, nor are reasons explicitly stated for particular NRHP findings.

DuVall 2254. Site integrity is not discussed for 1 of the 11 sites reviewed. Seven of the sites are described as disturbed, but no details are provided. Disturbances at three sites are attributed to unspecified military impacts (two sites) and bulldozing (one site). No context for site evaluation is discussed, nor are reasons explicitly stated for particular NRHP findings.

DuVall 6624. For all 11 sites reviewed, site integrity is described as disturbed. Particular impacts are discussed for nine sites, while no details on disturbances are provided for the remaining two sites. No context for site evaluation is discussed, but for 9 of 11 sites an explicit reason for the stated NRHP finding is presented.

Greenhorne. Site integrity is discussed with regard to 10 of the 11 sites reviewed. Five are disturbed with specific causes discussed, and five are described as lacking impacts. Site-by-site contexts are provided, and 10 of 11 site discussions contain the reasoning behind particular NRHP findings. No reasoning was provided for one site that was found not to be NRHP eligible.

CRA. Site integrity for all 11 sites reviewed is characterized as disturbed. Specific disturbances are noted for eight sites, while disturbances at the remaining three sites are unidentified. Site-by-site contexts are provided, and all 11 site discussions contain the reasoning behind particular NRHP findings.

PCI 5180. Appropriate discussions of site integrity, including causes of impacts, are included in the report for all 11 sites reviewed. The PCI report presents a context for site evaluation including the identification of numerous potential research issues. The reasoning behind the NRHP findings is presented for 10 of 11 sites. The remaining site is characterized as "ugly" and therefore found to be not eligible. No direct statement explaining this finding was presented.

PCI 4068. Appropriate discussions of site integrity, including causes of impacts, are included in the report for all 11 sites reviewed. The report presents a context for site evaluation, including the identification of numerous potential research issues. The reasoning behind the NRHP findings is presented for all 11 sites reviewed. In many instances sites found to be not eligible for listing in the NRHP are characterized as not having the ability to yield significant data. Often these sites are discussed as having the ability to yield only locational and component information. These characterizations are used in the subsequent PCI reports as well.

PCI 1270. Appropriate discussions of site integrity, including causes of impacts, are included in the report for all 11 sites reviewed. The report presents a context for site evaluation including the identification of numerous potential research issues. The reasoning behind the NRHP findings is presented for all 11 sites reviewed.

PCI 1307. Appropriate discussions of site integrity, including causes of impacts, are included in the report for all 11 sites reviewed. The report presents a context for site evaluation including the identification of numerous potential research issues. The reasoning behind the NRHP findings is presented for all 11 sites reviewed.

PCI 4836. Appropriate discussions of site integrity, including causes of impacts, are included in the report for all 11 sites reviewed. The report presents a context for site evaluation including the identification of numerous potential research issues. The reasoning behind the NRHP findings is presented for all 11 sites reviewed.

PCI 4952. Site integrity is discussed for 9 of the 11 sites reviewed, with causes of impacts identified. The other two sites are described as lacking preservation, but the cause of this condition is not identified. The report presents a context for site evaluation including the identification of numerous potential research issues. The reasoning behind the NRHP findings is presented for all 11 sites reviewed.

PCI 4128. Appropriate discussions of site integrity, including causes of impacts, are included in the report for all 11 sites reviewed. The report presents a context for site evaluation including the identification of numerous potential research issues. The reasoning behind the NRHP findings is presented for all 11 sites reviewed.

PCI 3715. Only 7 of 11 sites have explicit discussions of site integrity that identify causes of disturbance. No direct mention of disturbance is made with regard to the other four sites, although the sites are described as lacking subsurface integrity. The report presents a context for site evaluation including the identification of numerous potential research issues. The reasoning behind the NRHP findings is presented for all 11 sites reviewed.

Summary. For the initial archaeological survey projects conducted at Fort Campbell, site integrity is generally either not discussed or only generally so, such as a statement that a site is disturbed, but with no evidence or discussion of the particular disturbance presented. This is especially true of the University of Kentucky and the DuVall projects. Beginning with the Greenhorne project, it is much more common for the reports to note the presence of disturbance, describe the disturbance, and discuss its implications with regard to site integrity. Examples of sites lacking such a discussion are still present in the reports, although such sites are a minority in each of the reports reviewed. Context chapters, typically cultural overviews, are present in all archaeological survey project reports. The DuVall survey reports typically include no arguments linking their NRHP finding for a specific site to either the context or site integrity. The University of Kentucky and PCI reports present lists of proposed research questions derived from the cultural context chapters. Potential research questions are proposed for sites found potentially eligible. Lack of site integrity is often one reason, among others, cited for those sites found not eligible. The Greenhorne and CRA project reports similarly present rationale for NRHP findings but on a site-by-site basis (as opposed to presenting research questions in a separate chapter).

It appears that, through time, the archaeological survey reports have achieved an increasing level of thoroughness with regard to discussing site integrity and identifying impacts, as well as linking NRHP findings to site integrity and the potential to address significant research questions. Given the increased specificity of discussions in reports concerning site integrity, contexts, and NRHP findings, little can be suggested in terms of recommendations for future work.

CHAPTER 6. RESULTS OF BASELINE ARCHAEOLOGICAL SURVEY

The baseline archaeological survey at Fort Campbell, Kentucky/Tennessee, was conducted during a field trip in May 2004. The ERDC/CERL Statement of Work indicated that 300 shovel tests were to be excavated at a chosen location(s). A shovel-testing grid was to be established and a map made of the location. Shovel tests were specified as 30-x-30 cm with excavation to either a depth of 75 cm or to culturally sterile subsoil, with all soils screened through 6.35-mm mesh hardware cloth. Shovel tests were excavated in 10-cm levels, and soils data on each test were recorded on a standardized form. A detailed log of shovel tests for each transect was maintained. Finally, an expanded 50-x-50-cm test was to be excavated at each site. Similar to the shovel tests, this unit was to be excavated in 10-cm levels and all soils screened through 6.35-mm mesh hardware cloth.

Prior to the initiation of fieldwork, the ERDC/CERL COTR and Fort Campbell CRM staff determined the transect spacing to be employed while conducting the baseline survey and identified two areas for survey. The baseline survey was to be conducted using 10-m intervals, both between transects and within transects between test locations, and was to be undertaken at two locations along Piney Fork in Training Area 4 (Figure 8). The survey tracts were the location of two previously identified sites, 40MT302 and 40MT303. Both sites had been identified as prehistoric lithic scatters found along a road to the north of Piney Fork by O’Malley et al. (1983). Actual site sizes and density of material present at the two sites were considered largely unknown based on the results of the University of Kentucky survey. The results of the archaeological survey conducted at these two locations are discussed below.

40MT302 Tract

The first tract investigated was centered on 40MT302. Site 40MT302 had been described by O’Malley et al. (1983:638–639) as being located on the floodplain, 50 m north of Piney Fork. The accompanying University of Kentucky site sketch map shows a somewhat linear east/west-oriented road north of a linear east/west-oriented Piney Fork (Figure 9). Artifacts were found along the road and along an informal extension north of the road. Finally, a stream is illustrated at the western edge of the sketch. Unfortunately, the sketch is not scaled. The site form reports that a moderate lithic scatter had been found along a road, with items in a road cut found to 70 cm below surface. Soils along this road cut were described as homogenous, and at least a portion of the deposits was thought to be deeply buried. A total of 43 artifacts was collected consisting of 35 flakes (seven of which were modified), 5 biface fragments (minimally one of which is a fragment of a projectile point), and 3 “chunks.” Temporal affiliation is listed as undetermined prehistoric. Dense scrub and secondary forest vegetation adjacent to the scatter precluded additional investigation, including definition of site boundaries, by the University of Kentucky crew. Based on the possibility of buried deposits, 40MT302 was found to be potentially eligible for listing in the NRHP.

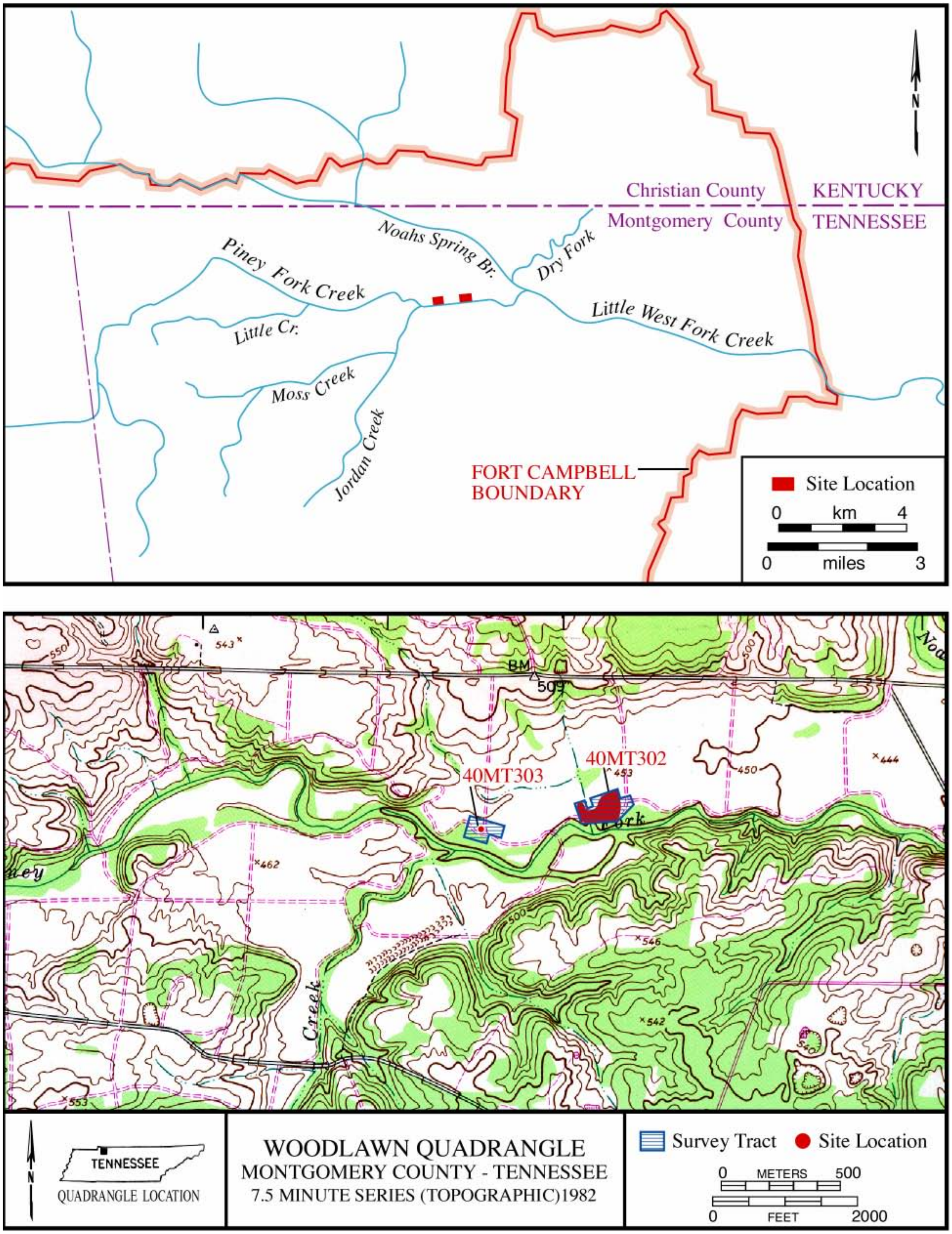

Figure 8. Location of baseline archaeological survey at Fort Campbell.

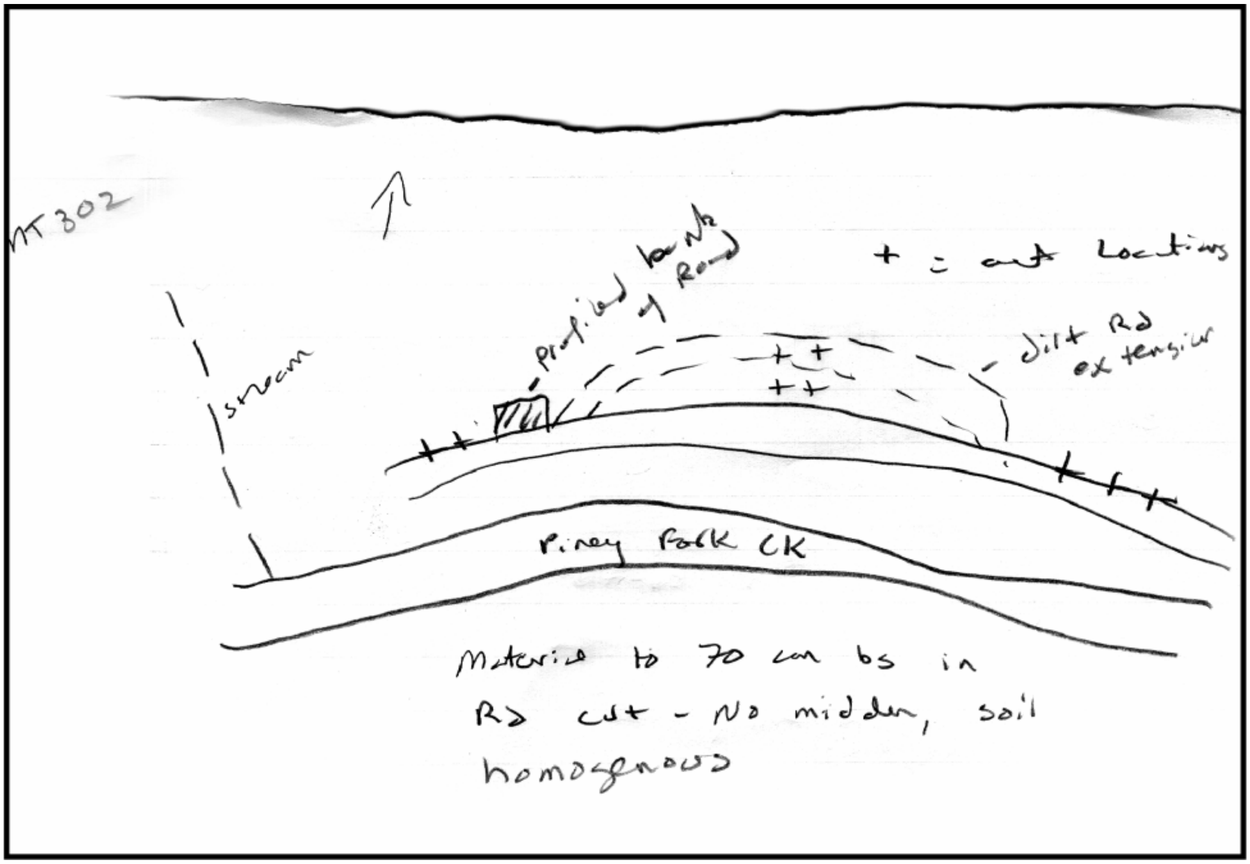

Figure 9. University of Kentucky sketch map of 40MT302.

Mr. Richard Williamson of the Fort Campbell CRM staff identified the location of 40MT302 prior to the onset of fieldwork, based on UTM coordinates and correlation with a site sketch map. The survey area consisted of a former agricultural field north of a dry creek bed and between a firebreak to the east and a tree line to the west. The area appears to be located either in a floodplain or on a terrace formation. Piney Fork is approximately 100 m to the south. The former agricultural field had reverted to a cover of dense secondary brush and small trees and saplings. Ground surface visibility was totally obscured by dense grasses and forbs. An abandoned road parallels the dry creek bed. To the west are a more-mature secondary forest and a drainage ditch (approximately 15 m west of the tree line). To the east of the firebreak is a mature second growth forest. It is likely that the stream illustrated in the University of Kentucky sketch map is defined here as a drainage ditch. The lack of the firebreak on the University of Kentucky map may suggest that the site area as defined in 1980–1981 was to its west.

10-m Interval Survey Results

Initially an east-west baseline was established, and 20 transects spaced 10 m apart were flagged (Figure 10). Crew members were oriented along a cardinal direction (north-south) and were instructed to excavate a ca. 30-x-30-cm shovel test every 10 m along the transect. Compasses were

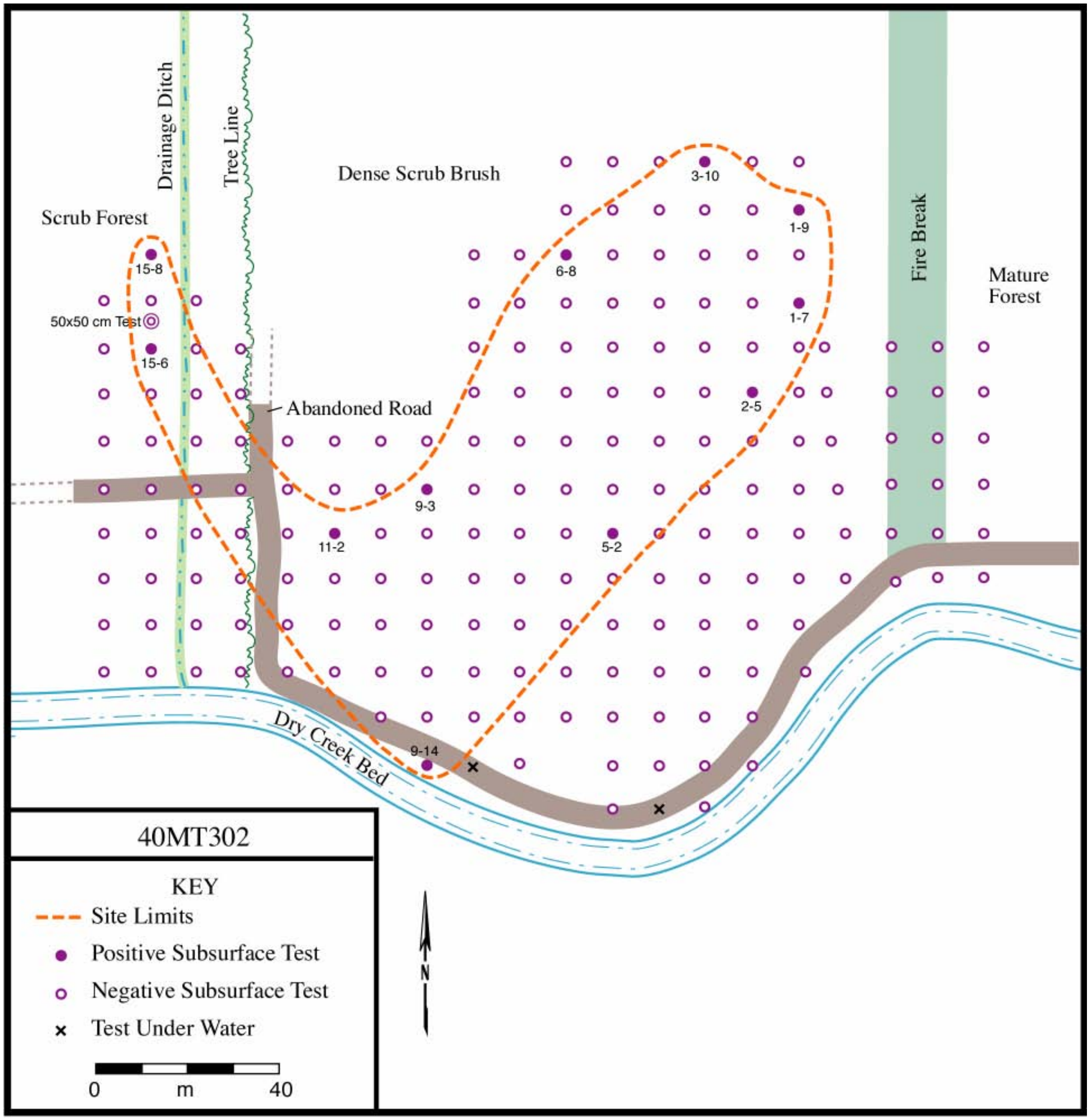

Figure 10. Baseline archaeological survey sketch map of 40MT302 tract.

used to orient the crew along the transects, and the crew then paced 10 m to each test location. The number of individual shovel tests excavated in each row varied, but 192 tests were excavated in this tract.

Shovel-test transects began approximately 10 m east of the intersection of a firebreak with an abandoned road (Figure 10). A dry creek bed was approximately 10 m to the south at this location. The first four transects contained six tests each. No positive tests were excavated in these rows. Beginning with the fifth transect, additional tests were added both to the north and south of the baseline. Tests were added to the south of the baseline as the dry creek bed had swung to the south, necessitating the additional locations in order to investigate the area between the creek bed, the road, and the baseline. As the creek bed meandered both north and south, the number of tests excavated south of the baseline varied with distance to the creek. Positive tests in the next seven rows also prompted extending the transects northward. Decisions on the number of tests to excavate northward was always a compromise between the number of positive tests in a row and the total number to be excavated (n=300) as stipulated in the ERDC/CERL Statement of Work. The result was that these seven rows had between 11 and 14 tests each. The last four rows before a tree line had only six tests each, whereas the four rows west of the tree line had 8 to 10 tests each. The result was that the transects investigated an area between the dry creek bed to the south, 40 m to the west of a tree line, 10 m east of a firebreak-road intersection, and varying distances to the north of the dry creek bed.

Of the 192 tests excavated, 11 yielded artifacts, representing slightly less than 6 percent of the number of tests excavated. All of the positive tests were located west of the firebreak-road intersection and continued to 20 m west of the tree line (Figure 10). Positive tests were located near the edge of the dry creek bed in the south to at maximum 140 m north of the creek. This distribution of positive tests maximally measures 140 m east-west by 140 m north-south. Within this area positive tests are separated by 15 m to 55 m gaps. It is possible that, because of the spacing of these gaps, one or more sites or isolates could be defined based on the spatial distribution of the positive tests. Instead, the authors prefer to view this as a single scatter whose distribution is imperfectly understood due to a lack of surface visibility and recent soil exposure, the use of subsurface testing, and a lack of data on the distribution of materials to the north of the northernmost positive shovel tests.

Artifacts recovered from the shovel tests are listed in Table 6. A total of 13 artifacts was recovered from the 11 positive tests for an average of almost 1.2 artifacts per test. Of the 11 positive tests, 10 yielded a single artifact and only one, Shovel Test 15-8, yielded three artifacts. Over one-half of the artifacts (n=7, 54 percent) were found between 20 cm and 30 cm below surface. Fewer were found from 10 cm to 20 cm below surface (n=4, 31 percent), with only two (15 percent) found from 0 cm to 10 cm below surface. No artifacts were recovered from below 30 cm below surface. Broken flakes are most common (n=7), with single examples of a secondary flake, tertiary flake, bifacial thinning flake, block shatter, fire-cracked rock, and biface also recovered. The secondary flake evidences retouch while the biface is the broken tip of a projectile point. Chert types present include Dover (n=3), St. Louis (n=2), local low grade (n=4) and local high grade (n=4).

Table 6. Artifacts recovered from shovel tests at 40MT302.

Provenience	Biface	Secondary Flake	Tertiary Flake	Bifacial Thinning Flake	Broken Flake	Block Shatter	Fire-cracked Rock
ST 1-7, 20–30 cm	*0*	*0*	*0*	*0*	*1*	*0*	*0*
ST 1-9, 20–30 cm	*0*	*0*	*0*	*0*	*1*	*0*	*0*
ST 2-5, 20–30 cm	*0*	*1*	*0*	*0*	*0*	*0*	*0*
ST 3-10, 20–30	*0*	*0*	*0*	*0*	*0*	*0*	*1*
ST 5-2, 20–30 cm	*0*	*0*	*1*	*0*	*0*	*0*	*0*
ST 6-8, 10–20 cm	*0*	*0*	*0*	*0*	*1*	*0*	*0*
ST 9-3, 10–20 cm	*0*	*0*	*0*	*0*	*1*	*0*	*0*
ST 9-13, 20–30	*0*	*0*	*0*	*1*	*0*	*0*	*0*
ST 11-2, 20–30	*0*	*0*	*0*	*0*	*1*	*0*	*0*
ST 15-6, 0–10 cm	*0*	*0*	*0*	*0*	*0*	*1*	*0*
ST 15-8, 0–10 cm	*1*	*0*	*0*	*0*	*0*	*0*	*0*
ST 15-8, 10–20	*0*	*0*	*0*	*0*	*2*	*0*	*0*
Total	*1*	*1*	*1*	*1*	*7*	*1*	*1*

Key: ST = Shovel Test.

Local soils within the project area were not mapped as part of the Lampley et al. (1975) soil survey, as it was considered part of the firing range at that time. The south side of the Piney Fork was mapped as Arrington silt loam, which has alternating layers of A and B horizons to below 81 cm below surface. Soils profiles differed somewhat across the survey tract. Tests to the east of the firebreak tended to evidence initial dark brown (10YR3/3) to very dark grayish brown (10YR3/2) silt loam to between 10 cm and 25 cm below surface. This was followed by strong brown (10YR5/6) to yellowish brown (10YR5/4) silty clay loam. Tests between the firebreak and the tree line to the west had strong brown (7.5YR5/8) silt loam to between 15 cm and 40 cm, followed by either yellowish brown (10YR5/4) or yellowish red (5YR5/6) silty clay loam. In some tests this lower horizon contained gravel. In the final area, from the tree line to the west, the soils consisted of very dark grayish brown (10YR3/2) to dark brown (10YR3/3) silt loam, 10 cm to 25 cm thick, followed by yellowish brown (10YR5/4) silty clay loam. These descriptions are not similar to the Arrington soils mapped south of Piney Fork. It is possible that the soils in the project area are a different type, perhaps a soil associated with terrace formations. One possibility is the Statler series, which is present on low terraces and evidences a transition of 10YR series colors to 7.5YR series colors between the A and B horizons (Lampley et al. 1975:31).

A 50-x-50-cm test was also excavated near two positive tests in Row 15 and the western edge of the survey tract (Figure 10). This area was selected because two positive tests were excavated quite near each other (20 m apart), and one had yielded three artifacts including a biface tip. This represents the only positive test to yield more than one artifact and the only formally made stone tool found. It was hoped that this location might yield a denser concentration of materials, perhaps including stone tools that could be used to date the assemblage. Artifacts were only found to 20 cm below surface in these two tests, suggesting a somewhat more shallow deposition of material than in the tests to the east where artifacts were recovered to 30 cm below surface. The 50-x-50-cm unit was excavated in eight levels and yielded artifacts to 85 cm below surface. The initial five levels were 10 cm each, while the final levels were 20 cm, 15 cm, and 15 cm each. These were accidentally excavated as thicker levels due to the difficulty of excavating in the confined space of a 50-x-50-cm unit. Three soil horizons were defined in this unit. The first, from 0 cm to 20 cm below surface, consisted of dark yellowish brown (10YR4/4) silt loam. From 20 cm below surface to 60 cm below surface soil coloration remained the same but gravel became common. From 60 cm to 1 m below surface, dark reddish brown (5YR3/4) silty clay loam was present. A total of 25 artifacts was recovered from the initial horizon (0–20 cm below surface) while 30 artifacts were found in the 20-cm to 50-cm portion of the second horizon. Unfortunately, the 50-cm to 70-cm level, from which 14 artifacts were recovered, cross-cuts the bottom of the second and the top of the third soil horizon. The final level, associated with the third horizon, yielded only four artifacts. It is tempting to conclude that most material is associated with the initial two soil strata, to 60 cm below surface. Artifacts found below this horizon could have been dispersed due to bioturbation, although at this point this conclusion is speculative.

Artifacts from the 50-x-50-cm unit consist entirely of prehistoric chipping debris (including a core) and fire-cracked rock (Table 7). The chipping debris includes initial-stage and late-stage reduction items. Initial-stage reduction artifacts include cores, primary flakes, secondary flakes, and block shatter. These categories total 35 items or 51 percent of the chipping debris. One of the primary flakes has a retouched edge. Late-stage reduction debris totals 17 artifacts (25 percent of chipping debris) and includes tertiary flakes and bifacial thinning flakes. Broken flakes could represent either initial- or late-stage artifacts, and as such, have not been included in either category. Finally, four pieces of fire-cracked rock were recovered. One piece may evidence pitting, suggesting its use as an anvil prior to its final use and deposition. Given the predominance of initial-stage over late-stage chipping debris, it is likely that, for at least a portion of the 40MT302 site area, chert acquisition and initial reduction of cores was a common activity. Later-stage reduction did occur, but apparently to a lesser extent. The most common chert type in the 50-x-50-cm assemblage is local high-grade chert (n=32, 54 percent), followed by local low-grade chert (n=15, 25 percent). Dover chert (n=7, 12 percent) and St. Louis chert (n=5, 8 percent) were also found.

Table 7. Artifacts recovered from 50-x-50-cm unit at 40MT302.

Artifact Category	0–10 cm	10–20 cm	20–30 cm	30–40 cm	40–50 cm	50–70 cm	70–85 cm	Total
Core	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***1***
Primary flake	***0***	***2***	***1***	***0***	***0***	***0***	***0***	***3***
Secondary flake	***3***	***2***	***2***	***0***	***0***	***1***	***1***	***9***
Tertiary flake	***4***	***2***	***4***	***0***	***1***	***0***	***1***	***12***
Bifacial thinning flake	***1***	***0***	***2***	***1***	***0***	***1***	***0***	***5***
Broken flake	***1***	***2***	***3***	***5***	***2***	***4***	***1***	***18***
Block shatter	***4***	***2***	***3***	***4***	***1***	***6***	***1***	***21***
Fire-cracked rock	***1***	***0***	***0***	***1***	***0***	***2***	***0***	***4***
Total	***15***	***10***	***15***	***11***	***4***	***14***	***4***	***73***

40MT303 Tract

The second tract investigated was centered on 40MT303. Site 40MT303 had been described by O'Malley et al. (1983:630–640) as also being located on a level floodplain 50 m north of Piney Fork (Figure 8). The site was characterized as an extensive (500 m east-west, undetermined north-south) buried site that had been detected along a road cut. An accompanying sketch map illustrates Piney Fork to the south, a dirt road paralleling the creek to the north, and another dirt road intersecting the first at a right angle near the middle of the scatter (Figure 11). Like the 40MT302 sketch, this one also lacks a scale. The site form indicates that artifacts were associated with a dark brown soil horizon beginning at 40 cm below surface in the road cut. Dense vegetation adjacent to the scatter precluded additional investigation by the University of Kentucky crew. In all, 49 artifacts were collected consisting of 41 flakes (11 of which evidenced retouched edges), three cores, one "chunk," one ovate scraper, and three bifaces. The bifaces include two unidentified projectile point fragments. Because of this, the temporal affiliation of the site is listed as undetermined prehistoric. Based on the possibility of buried deposits, the large spatial extent of the scatter, and the "high" artifact density, 40MT303 was found to be potentially eligible for listing in the NRHP.

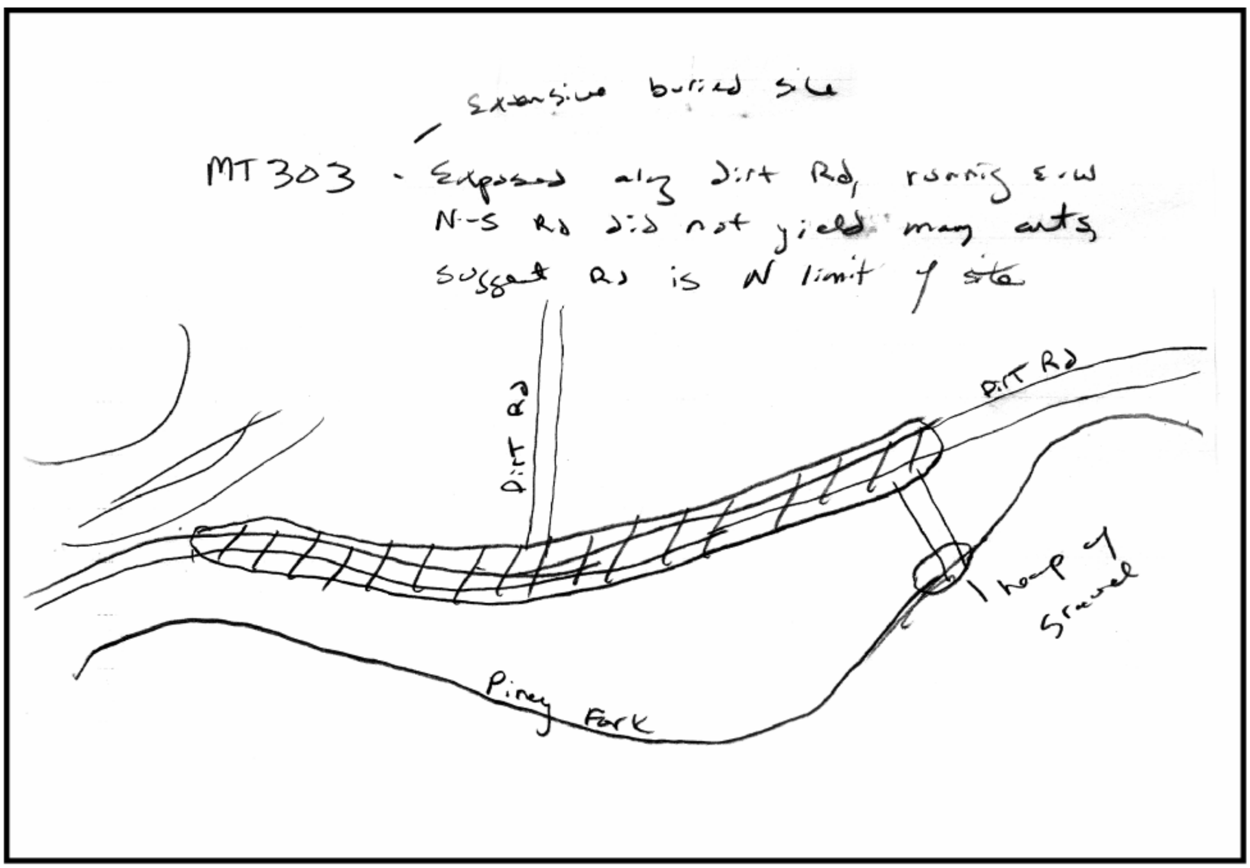

Figure 11. University of Kentucky sketch map of 40MT303.

Mr. Richard Williamson of the Fort Campbell CRM staff identified the location of 40MT303 prior to the onset of fieldwork, based on UTM coordinates, the location of one flake in the road, and correlation with the University of Kentucky site sketch map. The survey area is set within a mature second-growth forest north of Piney Fork (located approximately 100 m to the south), on either a floodplain or terrace formation. Ground surface was almost totally obscured by leaf litter, grasses, and forbs. An east/west-oriented abandoned road cuts through the area and is intersected by a road or firebreak, oriented north-south, that continues to the north. This T-intersection of the firebreak and road matches that illustrated on the University of Kentucky sketch map and should represent the approximate center of the linear scatter as previously defined.

10-m Interval Survey Results

Initially an east-west baseline was established and 16 transects north of the road and 10 transects south of the road were flagged (Figure 12). Once again, crew members were oriented along a cardinal direction (north-south) and were instructed to excavate a ca. 30-x-30-cm shovel test every 10 m along the transect. The number of individual shovel tests excavated in each row varied, but 108 tests were excavated in this tract.

Nine transects were established north of the road and east of the firebreak. Each transect contained four test locations (Figure 12). West of the firebreak and north of the road an additional seven transects were established, each also with four test locations. South of the road the easternmost transect was positioned south of the T-intersection formed by the firebreak and road. Ten transects continuing to the west were designated for excavation south of the road, with each having four test locations.

Of the total of 108 tests, only one positive test was excavated. The positive test was located near the intersection of the road with a firebreak, the initial test in the second transect west of the firebreak and north of the road. This test was designated as Shovel Test 26-1 and is near the center of the site area as defined by O'Malley et al. (1983) on a sketch map that accompanies the site form (reproduced here as Figure 11). Found in Shovel Test 26-1 was a large secondary flake that evidenced a retouched edge. The flake is made of local low-grade chert, and was found at between 0 cm and 10 cm below surface. The soil profile for this test indicates very dark grayish brown (10YR3/2) silt loam followed by termination of the test due to root obstruction. As there was only one positive test at 40MT303, a 50-x-50-cm test was not excavated at this location.

Soils recorded for the other (negative) shovel tests indicate a general similarity of deposition across the survey tract. An initial layer of brown (10YR5/3 to 4/3) to very dark grayish brown (10YR3/2) silt loam, 15 cm to 20 cm thick, was encountered in most of the tests. This was followed by yellowish brown (10YR5/4 to 5/6) or strong brown (7.5YR5/6 to 5/8) silty clay loam continuing to below 50 cm below surface, at which point most tests were terminated due to lack of artifacts or root obstruction. In a few instances (many near the firebreak or road) the initial layer was absent, suggesting that the test was in an eroded or disturbed area. Unfortunately, the

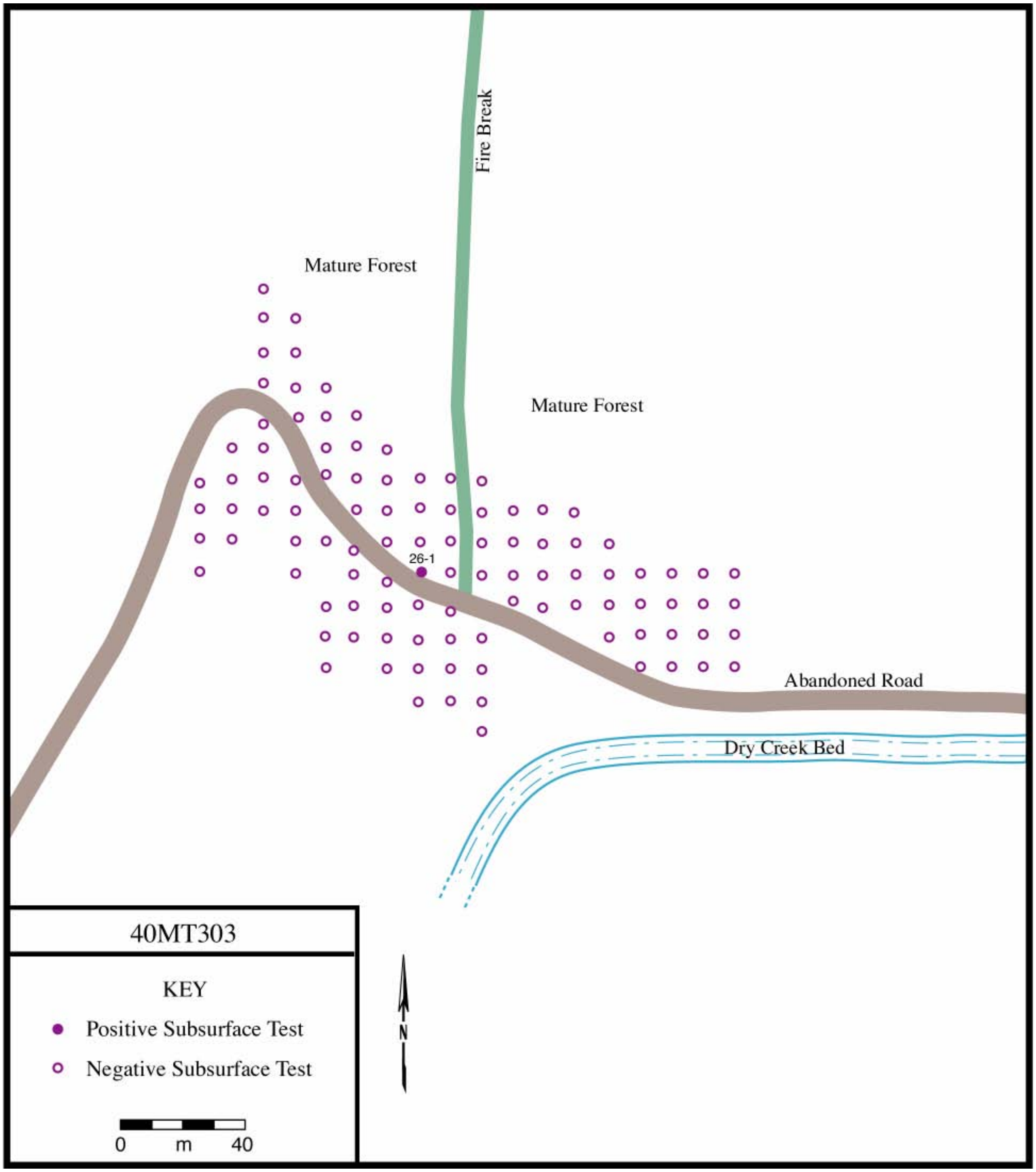

Figure 12. Baseline archaeological survey sketch map of 40MT303 tract.

40MT303 survey tract was not included in the Lampley et al. (1975) soil survey, as it was considered part of the firing range at that time. The south side of Piney Fork was mapped as Arrington silt loam, which has alternating layers of A and B horizons to below 81 cm below surface and without additional information, appears to agree with the description provided in the University of Kentucky site form. The soils are described as dark brown silt loams with varying degrees of friability. While this description is somewhat similar to the initial horizon encountered, it is a more complex profile with darker soils than that observed while conducting the present survey. The soils described during the present survey appear to be more similar to the Statler series soils often found on low terrace formations (Lampley et al. 1975:31). The buried horizon described in the University of Kentucky site form as being at 40 cm below surface was not observed in any of the shovel test profiles recorded during the current project.

Discussion

One goal of conducting the 10-m interval baseline archaeological survey at the two locations discussed above was to examine the effects that differential transect spacing has on survey results and site interpretation. Only the 40MT302 area is considered here, as only a single positive shovel test was recorded in the 40MT303 area. The survey of the 40MT302 area was conducted at 10-m intervals. This allows for the examination of the effects of survey results and site interpretation based on 20-m and 30-m transect intervals. To accomplish this, it is assumed that the survey transects would always have started with the easternmost row and the southernmost test location. The initial test location for each transect is also assumed to be the southernmost test location. Because a curving dry creek bed formed the base of the 40MT302 survey area, the initial test location of transects located in the middle of the grid are to the south of those located at either end of the grid. In some cases this produces a staggered grid. While reconstructing the surveys in this manner might appear arbitrary, it does yield an approach, using a physical boundary such as the dry creek bed at which to initiate transect rows, that is quite in keeping with actual field practices.

Two different site definitions appear to be used, or have been used, in Tennessee. One definition used is that sites require the presence of five or more artifacts. More recently, the decision to assign a site number is based on factors such as landform, physiographic regions, size of site relative to number and type of artifacts, level of survey and conditions, and previous disturbance. While no less valid than any other site definition, the factors evaluated by the Division of Archaeology personnel are qualitative, and hence requires a decision by Division of Archaeology personnel as to whether a location “meets” the “criteria” to be called a site. One typical definition of a site used in many states is a set number of artifacts within 20 m of one another. Hence, gaps of greater than 20 m in artifact distributions could be used to designate separate sites. The site definition used here will be that of loci of five or more artifacts separated by gaps of greater than 20 m in artifact distributions to define separate sites, a definition typically employed in ERDC/CERL Statements of Work.

20-m Interval Survey Results

With these assumptions in mind, Figure 13 illustrates the results if the survey had been conducted at 20-m intervals. To re-emphasize, based on the 10-m interval survey, 40MT302 was defined with maximal dimensions measuring 140 m east-west by 140 m north-south. If surveyed at 20-m intervals, only 6 of the 11 positive tests would have been encountered, or 55 percent of the actual total. Including the appropriate 10-m interval tests initially excluded as part of the 20-m interval survey as site definition bracketing tests, no additional positive tests were encountered. Using the site definition of material within 20 m, the results would have suggested not a single site recorded as 40MT302, but five separate isolates. The six positive tests are separated by minimum distances of between 20 m and 60 m from one another. All six positive tests also yielded only a single artifact, further suggesting that the loci should be viewed as prehistoric isolates. Because isolates are seldom determined eligible for listing in the NRHP, no additional work would have been recommended at the five isolates.

Alternatively, a looser interpretation of the spatial distribution of the positive tests might lead one to conclude that the survey encountered an area of a light-density prehistoric lithic scatter. At a 20-m survey interval a site area would have been defined, measuring approximately 140 m north-south by 40 m east-west. Six artifacts were found: three broken flakes, one bifacial thinning flake, one tertiary flake, and one piece of fire-cracked rock. All material was confined to the upper 30 cm below surface. It should also be noted that no positive shovel tests would have been encountered to the west of the drainage ditch. With no positive tests in that area, it is unlikely that the 50-x-50-cm unit that yielded material to 85 cm below surface would have been excavated. Given that this area had been farmed, it is most likely that the artifacts would have been interpreted as being restricted to the former plow zone, and hence disturbed by previous use of the area. This interpretation then could have been used as rationale for recommending no additional work at the site due to a lack of intact subsurface deposits. In essence, it is conceivable that given either interpretation of site definition, the survey results could have been used to argue that the locus of positive shovel tests did not require additional investigation nor warrant protection from training activities or development.

30-m Interval Survey Results

The same assumptions were applied to the spatial data with the result based on 30-m transect intervals (Figure 14). Once again, based on the 10-m interval survey, 40MT302 was defined with maximal dimensions measuring 140 m east-west by 140 m north-south. If surveyed at 30-m intervals, only 3 of 11 positive tests would have been encountered, or 27 percent of the actual total. Figure 14 indicates that the easternmost four positive tests encountered at 20-m intervals would not have been found, whereas one of the westernmost positive tests would be added. Including the appropriate 10-m interval tests initially excluded as part of the 30-m interval survey as site definition bracketing tests, no additional positive tests were encountered. Distances between the three positive tests range from 60 m to 80 m, suggesting that all three could be considered prehistoric isolates. The three tests yielded a total of four artifacts. The items recovered from Shovel Test 15-8 included a biface tip and two broken flakes, while a broken flake and a bifacial thinning flake were recovered from the other two positive tests. This material was found

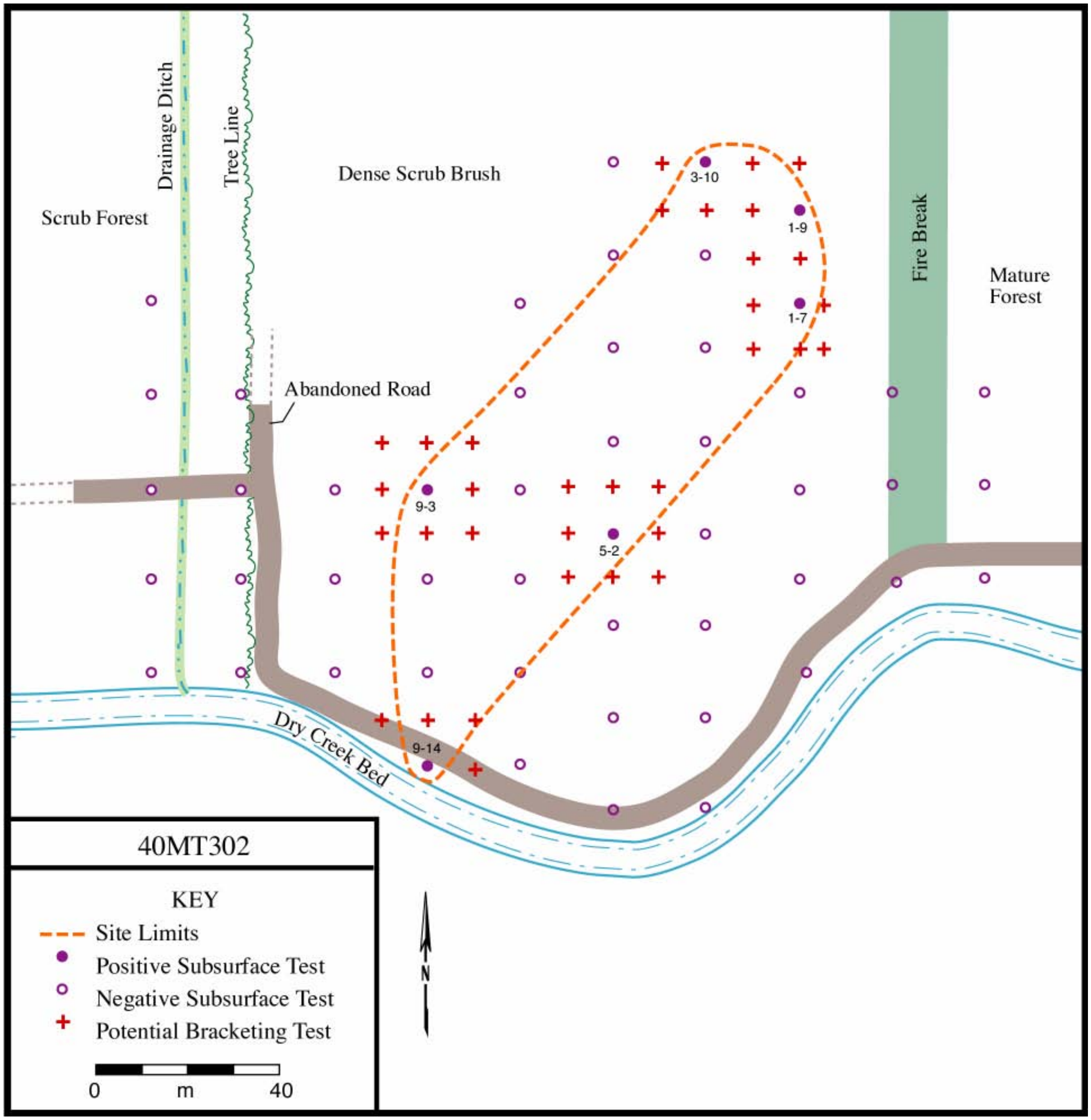

Figure 13. Hypothetical results of survey conducted at 20-m intervals in 40MT302 tract.

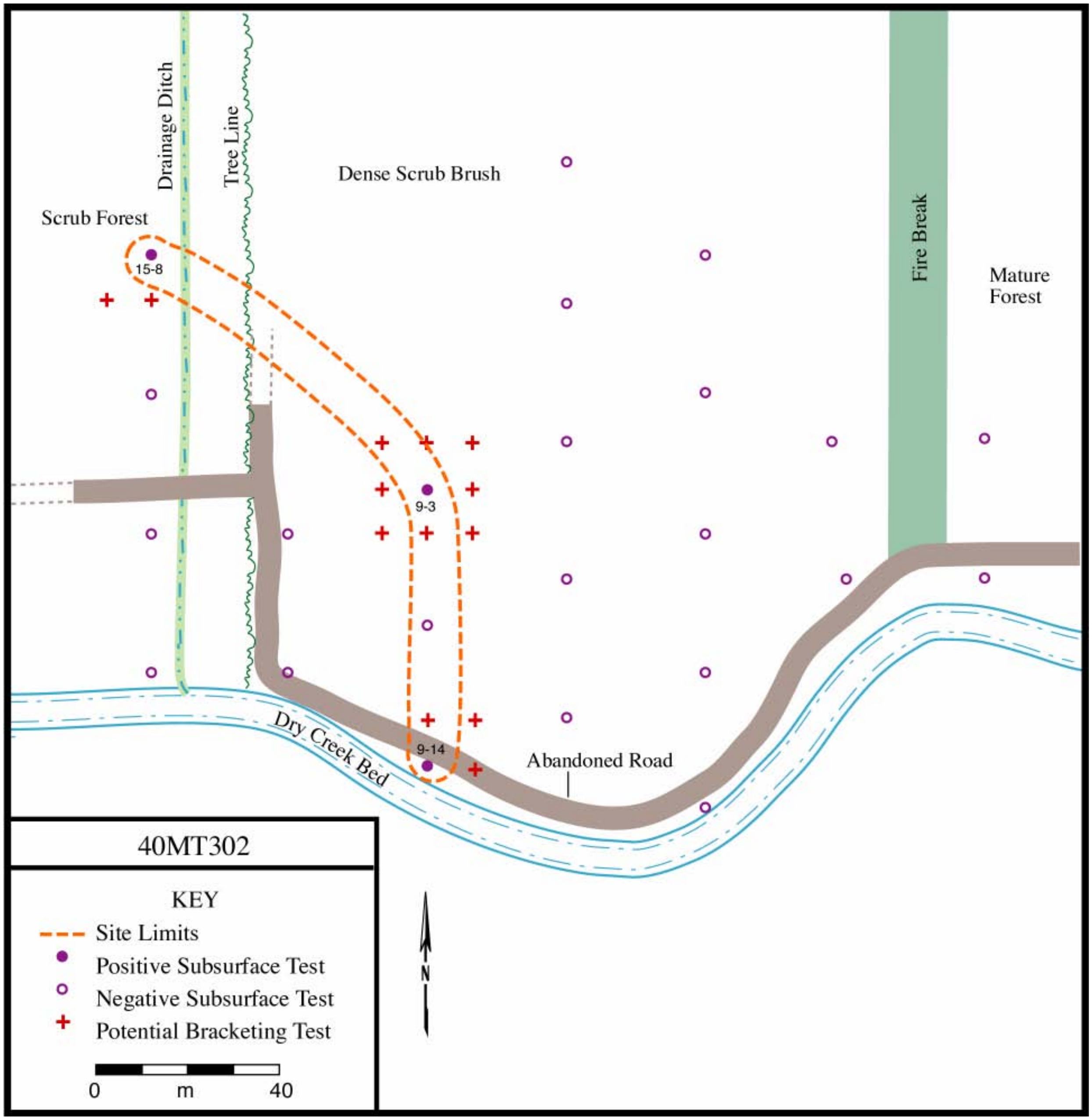

Figure 14. Hypothetical results of survey conducted at 30-m intervals in 40MT302 tract.

in the initial 30 cm below surface. Distance and paucity of material could suggest that the loci should be viewed as prehistoric isolates. Once again, because isolates are seldom determined eligible for listing in the NRHP, no additional work would have been recommended.

Similar to the 20-m interval survey results discussed above, a looser interpretation of the spatial distribution of the positive tests might lead one to conclude that the survey encountered a very light-density prehistoric lithic scatter, in this instance perhaps associated with hunting activities due to the presence of the biface tip. A site area would have been defined, measuring approximately 130 m northwest-southeast by 30 m northeast-southwest. It should also be noted that the 20-m interval and 30-m interval site areas only minimally overlap. As well, with only three artifacts found during the 30-m interval survey, it is unlikely that the 50-x-50-cm unit that yielded material to 85 cm below surface would have been excavated. And similar to the interpretation of the results based on 20-m intervals, given that this area had been farmed, it is most likely that the artifacts would have been interpreted as being restricted to the former plow zone and hence disturbed by previous use of the area. This interpretation could have then been used as rationale for recommending no additional work at the site due to a lack of intact subsurface deposits. Once again, it is conceivable that given either interpretation of site definition, the survey results could have been used to argue that the locus of positive shovel tests did not require additional investigation nor warrant protection from training activities or development.

Summary

The survey of two tracts at Fort Campbell was intended to accomplish two goals: to evaluate the nature of University of Kentucky sites for which little documentation exists, and to evaluate the effects of the use of different transect-spacing intervals. Actual site sizes and density of material present at the two sites were considered largely unknown based on the results of the University of Kentucky survey; this is a quite common condition for the many sites located during that survey. Based on the results of the survey conducted during this project, it should be concluded that additional work is needed to fully define the boundaries of both 40MT302 and 40MT303. It does appear that intact deposits are likely present at 40MT302, and as such, features or stratified midden deposits may be present. While similar deposits were not found at 40MT303, the description by O'Malley et al. (1983) of the roadside soil profile suggests that intact deposits may be present. If present at either or both sites, numerous questions related to the nature and spatial patterning of prehistoric activities could be addressed. Fieldwork specifically designed to address the NRHP eligibility of the two sites is recommended. These results also suggest that proportionately more work should be expected during NRHP evaluation of the sites located by the University of Kentucky. The additional work will be necessary to define site boundaries accurately and to characterize site conditions such as the potential of the site to yield intact deposits and whether artifact patterning within the site area is present, among others.

The results of the exercise on differential spacing of transects, while not ground-breaking, are informative. Computer-simulation models have shown that a relationship exists between intensity of survey effort, site size, density of artifacts, distribution of artifacts, and the probability of locating a site (e.g., Kintigh 1988). To simplify, decreased transect intervals, larger site sizes, higher artifact densities, and an even distribution of artifacts will all tend to increase the likelihood of both intersecting and locating a site. In contrast, increased transect intervals, smaller site sizes, low artifact densities, and uneven artifact distributions will decrease the likelihood of site intersection and location. The field testing conducted at 40MT302 and 40MT303 supports these generalizations. Not only does a variable such as site size change with transect interval but also factors such as the nature of occupation, intensity of occupation, and NRHP eligibility potentially change. But, in the end, it is beyond the scope of this project to determine which transect-interval strategy constitutes the best balance of cost and responsible management of cultural resources.

CHAPTER 7.
SUMMARY AND RECOMMENDATIONS

The primary objective of this study was to evaluate the reliability of previous archaeological surveys at Fort Campbell. Large-scale Phase I cultural resource inventories conducted at Fort Campbell by the University of Kentucky and a number of private firms since 1980 have identified more than 1,000 prehistoric and historic sites. Field and laboratory methods as well as reporting standards varied among those surveys, and professional standards and CRM objectives have changed over the last 25 years. Fort Campbell's Cultural Resources Management program believes that, for a variety of reasons, some of the previous surveys do not provide the type and quality of information required by current regulations, standards of professional practice, and installation management objectives. Because of the variability in survey methods, objectives, and personnel, it was necessary for this project to evaluate each previous survey, to identify problem areas, and to suggest strategies for remedial measures. This chapter summarizes project results and our evaluation of "survey reliability" and offers recommendations for future work. A project by project summary of problem areas is presented in Table 8.

The survey evaluation project was conceived by Fort Campbell, planned by ERDC/CERL with input from Fort Campbell and PSAP, and executed by PSAP with input from ERDC/CERL and Fort Campbell. The project required the completion of a number of tasks: a) All available information sources concerning previous archaeological site surveys conducted at Fort Campbell were identified; b) Variables deemed most relevant to the evaluation were identified and tabulated; c) Artifacts from selected sites were inspected to determine if they had been properly categorized, counted, and reported in the text, tables, and project records; d) A baseline archaeological field survey was conducted to assess the effects of sampling (i.e., shovel-test spacing) on site identification; and e) Results of the evaluation were documented in this report. Fieldwork and documentary research took place between October 2003 and June 2004.

This project was designed to identify and, where possible, recommend solutions for problems in Fort Campbell's archaeological survey data. It is very likely, however, that similar problems confront CRM personnel at other federal installations where diverse contractors have conducted archaeological surveys over a long period of time. We hope that our methods and recommendations will help CRM managers at other installations identify and resolve their own problems.

Survey Reliability

Survey reliability can be thought of and measured in several ways. A reliable survey could be viewed in a somewhat legalistic sense as one in which the contractor attempted to comply with the Statement of Work (SOW). Some readers might argue that such compliance is moot if a SOW written 20 years ago did not require work that would meet current standards. However, SOWs from previous projects should provide a summary of the field and laboratory methods used, and such summaries are particularly important if methods were not adequately described in project reports. Additionally, a pattern of apparent noncompliance with the SOWs associated with federal contracts would suggest the need for a review of contract management practices.

Table 8. Adequacy of selected field, laboratory, and reporting methods.

Survey	Pedestrian Survey Documentation	Shovel Test and Transect Spacing[a]	Within Site Testing Spacing	Soil Screening	Artifact Analysis Accuracy[c]	Site Location Accuracy[d]	Adequacy of NRHP Evaluation[e]
U Kentucky	***Undocumented***	***Undocumented***	***Undocumented***	***Undocumented***	***Inadequate***	***Discrepancies***	***Inadequate***
DuVall 2500	***Undocumented***	***Undocumented***	***Undocumented***	***Undocumented***	***Undocumented***	***Undocumented***	***Inadequate***
DuVall 2254	***Undocumented***	***Adequate***	***Undocumented***	***Undocumented***	***Undocumented***	***Undocumented***	***Inadequate***
DuVall 34	***Not Applicable***	***Undocumented***	***Not applicable***	***Undocumented***	***Not applicable***	***Not applicable***	***Not applicable***
DuVall 6624	***Undocumented***	***Undocumented***	***Undocumented***	***Adequate***	***Undocumented***	***Undocumented***	***Inadequate***
DuVall 10A	***Not Applicable***	***Undocumented***	***Not Applicable***	***Undocumented***	***Not applicable***	***Not applicable***	***Not applicable***
DuVall 10B	***Not Applicable***	***Undocumented***	***Not Applicable***	***Undocumented***	***Not applicable***	***Not applicable***	***Not applicable***
Greenehorne	***Undocumented***	***Undocumented***	***Undocumented***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
CRA	***Undocumented***	***Undocumented***	***Inflated***[b]	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
PCI 5180	***Undocumented***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
PCI 100	***Not Applicable***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Not applicable***
PCI 4068	***Undocumented***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
PCI 1270	***Undocumented***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
PCI 1307	***Undocumented***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
PCI 4836	***Undocumented***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
PCI 4952	***Undocumented***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
PCI 4128	***Undocumented***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***
PCI 3715	***Undocumented***	***Inflated***	***Adequate***	***Adequate***	***Inadequate***	***Discrepancies***	***Adequate***

Notes: a) Documentary evidence indicates a probable between-shovel-test and between-transect interval of 25 m to 30 m for all PCI projects. b) Within-site spacing was 10 m and not the 5 m as specified in the Statement of Work for this project. c) All projects characterized as inadequate failed to distinguish between temporally-sensitive ceramic variants. In addition, the University of Kentucky project failed to analyze lithic debris, and the PCI projects employed an analysis scheme that is not compatible with others typically employed in the Midsouth. d) Numerous discrepancies between site sketch maps, written site descriptions, and site locations or depictions on quadrangle maps exist in the samples examined for these projects. e) Inadequate projects did not justify site NRHP evaluations.

Here we view reliability from a pragmatic perspective. A reliable survey is one that thoroughly investigated the designated area and adequately documented survey results. Adequacy refers to whether or not the information provided by the report meets current management needs. Of particular concern is whether the entire survey area was investigated, sites were consistently detected and accurately mapped, and the likelihood that undetected sites could be present in the surveyed area. Clearly, no survey can be absolutely reliable. The percentage of sites in an area that can be detected depends on many factors (site size, depth, artifact density, etc.) and is strongly correlated with the level of survey effort and cost. It is rarely, if ever, feasible to be 100 percent certain that no sites are present within an area, or that all sites that are present have been detected. Thus, the present study did not expect any survey to be "absolutely reliable."

It is not a goal of this study to assign a single "grade" to each survey or to characterize entire projects as good or bad. Based on the multiple variables discussed in Chapter 5, a single survey may be found to be reliable in some ways and unreliable in others. Similarly, results of this evaluation of past surveys should *not* be used as a basis for characterizing the current or likely future performance of the individuals or entities that conducted them. Finally, one should keep in mind that—unlike the other surveys—the University of Kentucky effort was conceived and executed as a reconnaissance-level survey. As such, it was cost-effective and provided useful information. Describing the University of Kentucky survey as inadequate (as an intensive survey) should not be viewed as a criticism of those who commissioned and conducted the work.

Survey Reliability at Fort Campbell

A logical place to begin this summary is with the reliability of survey coverage, i.e., whether the entire survey tract was actually investigated and whether documentation to that effect was provided to Fort Campbell. Variables relevant to this issue (discussed in Chapter 5) include the omission of acreage, pedestrian survey documentation, and shovel test documentation.

Omission of acreage due to prior disturbance, slope, wet surface conditions, or other reasons has generally been poorly documented in previous surveys. Only 2 of 18 reports discuss this variable (CRA and PCI 3715), although it is certain (based on factors discussed below) that other surveys also omitted acreage but did not identify or justify the omissions. For instance, examination of PCI project field maps suggests that some areas may have been omitted, especially irregularly shaped areas, areas near watercourses, disturbed areas, and perhaps agricultural food plots. The University of Kentucky surveyed large portions of Fort Campbell, but many of the sites located along roads have incompletely defined boundaries. This pattern suggests that relatively clear areas on or near unpaved roads were surveyed but contiguous areas where vegetation precluded pedestrian survey were not adequately examined. Yet the University of Kentucky project report identifies entire tracts (not just the road-ways) as having been surveyed. The baseline survey conducted at 40MT302 (see Chapter 6) is one example of this problem. Shovel-test survey of the vegetated areas contiguous to the recorded site revealed that the site is actually much larger than that defined during the University of Kentucky project.

Pedestrian walkover is the preferred means of identifying archaeological sites, *if* survey conditions are adequate. Relevant conditions include the percentage of surface visibility and whether the surface received adequate rainfall prior to inspection. Pedestrian walkover was the single most important survey technique used by three projects (University of Kentucky, Greenhorne, CRA) and perhaps others (e.g., the DuVall and certain PCI projects). Unfortunately, very little data on surface conditions are presented in the project reports. Current Kentucky state guidelines indicate that pedestrian walkover can be used in areas of 50 percent or greater surface visibility. The Tennessee SHPO guidelines do not set minimum requirements for pedestrian survey, but instead rely on the judgment of the archaeologist to conduct an investigation that will identify sites and their approximate boundaries within the survey tract. Given both the Kentucky and Tennessee SHPO guidance, it is difficult to determine whether the pedestrian surveys conducted at Fort Campbell resulted in a reliable survey. The University of Kentucky, certain PCI, and DuVall survey projects lack a clear definition of areas investigated by pedestrian walkover. Problems with site definition associated with many University of Kentucky sites have been noted above. This pattern also suggests that some portion of the University of Kentucky tracts have not been investigated by any survey method. While depiction of areas surveyed by pedestrian walkover is present in the CRA and Greenhorne project reports, these reports, along with the University of Kentucky report and certain PCI reports, lack a discussion of surface visibility. In the end, the reviewer must simply assume that surface conditions were adequate. The reliability of previous pedestrian surveys (in terms of site detection) could only be quantified by resurveying a representative sample of the previous survey areas. (Note that our frequent reference to "certain PCI reports" simply reflects the difficulty of ascertaining for particular reports exactly which areas were inspected by pedestrian survey).

Shovel testing has become the most important site survey technique used at Fort Campbell. The installation now requires that shovel tests be excavated at 20-m intervals both along and between transects. Earlier Fort Campbell projects employed 15-m intervals along transects. Variable distances were used between transects, depending upon the perceived likelihood of locating a site. Incorporating this kind of variation in a survey introduces a self-fulfilling prophecy. If one uses very widely spaced transects to investigate areas where one assumes that sites are unlikely to be found, sites are indeed unlikely to be found. Fortunately, only the CRA survey reports having used excessive transect intervals (up to 150 m in low probability areas in Tennessee); all other surveys report transect intervals of 15–20 m (Table 2).

One of the key questions addressed by the survey evaluation project was whether the shovel tests were actually excavated at the reported intervals (see Tables 1 and 3). This issue was evaluated by comparing the predicted number of shovel tests (based on the required intervals and the total survey area) with the number of tests reported to have been excavated (Table 3). Results for those surveys where adequate data were available indicate that less than one-half the number of predicted shovel tests was excavated. Only one PCI project (PCI 3715) and one DuVall project (DuVall 2254) excavated more than half the predicted number of shovel tests. A second level of analysis was conducted by examining PCI field maps**.** These maps suggested that, for most projects, the spacing between shovel tests and shovel-test transects was greater than 20 m. In fact, it is appropriate to estimate spacing used during the PCI projects at 25 to 30 m, both between shovel tests and between transects.

Overall, surveys conducted at Fort Campbell suffer from a deficit in the number of shovel tests actually excavated. This deficit appears to result in some cases from a failure to comply with the required shovel-test and transect intervals. The exclusion from survey of areas viewed as unsuitable for habitation represents a second factor. We assume that both factors play a role in most of the surveys, since it seems highly unlikely that in any of the projects, more than 50 percent of the survey area did not require shovel testing.

No survey of any size should be expected to excavate the total number of shovel tests predicted based simply on the required shovel-test interval and survey area. Most large survey tracts will include some areas where survey is genuinely not needed based on slope, poor drainage, ground disturbance, etc. When participating in competitive bids for proposed surveys, contractors attempt to estimate the number or percentage of shovel tests that will not need to be excavated. Often this factor plays a significant role in estimated cost and thus, in which firm will win the contract. When conducting a survey in the field, project directors may be tempted to underestimate the distance between paced shovel tests. This is perhaps particularly likely to happen when the project is running behind schedule and at a cost deficit, and in areas where it is assumed that few sites will be present. Suggestions as to how such situations can be avoided in future surveys are provided in a subsequent section.

This study has also demonstrated that, as expected, excavating fewer shovel tests has adversely affected site recovery rates at Fort Campbell. If one survey with outlying values is excluded, there is a significant positive correlation (Pearson's $r = .578$) between average number of shovel tests per acre and the number of sites identified per 100 acres. The DuVall 2254 survey is excluded because it is clearly anomalous (Figure 5). In that survey over 90 percent of the predicted number of shovel tests were reportedly excavated yet few sites were located. We assume here that either the number of shovel tests excavated was inaccurately reported (a proposition that cannot be checked as no field documentation was ever submitted to Fort Campbell), or the area surveyed was poorly suited for occupation in the past. In fact, several of the areas have been resurveyed and additional sites have been located, suggesting that the number of shovel tests excavated was inaccurately reported (Rich Williamson, personal communication 2005).

It is intuitively obvious that there is an inverse relationship between the shovel-test and transect intervals and the number of sites that will be identified. For example, a survey that excavated shovel tests at 100-m intervals would be expected to identify far fewer sites than would a survey that used 20-m intervals. It may be, however, that the relationship between shovel-test interval and number of sites identified per unit area is not linear. There may be a threshold at which further reduction in shovel-test interval will not result in an increased number of sites.

Several of the PCI reports suggest that the use of 30-m shovel-test intervals would locate as many sites as would 20-m intervals. However, an increase in intervals would obviously reduce the number of shovel tests per acre. The significant positive correlation referred to above would not support PCI's proposition.

One concern about the use of large shovel-test and transect intervals is the decreased likelihood that small sites will be detected. In a pedestrian survey of a plowed field with good visibility, the surveyor has some opportunity to see artifacts located midway between his/her own transect and the neighboring transect. In a shovel-test survey, however, one typically has no chance of detecting a site unless a shovel test is actually excavated. One might expect surveys that used a larger shovel-test interval to find fewer small sites, and thus, mean site size would be larger. Surprisingly, the data used here exhibit no significant correlation between the mean number of shovel tests per acre and the mean size of prehistoric and historic sites (Figures 6 and 7, respectively). In both cases, the correlation coefficients are weakly negative and not significant.

We suspect that the lack of significant correlation between the two variables is related to the composition of the sample analyzed as well as some of the survey deficiencies discussed in Chapter 5. Both sites and isolates were included in the sample, and isolates were assumed to have an area of 1 m^2. The inclusion of a large number of isolates led to, of course, a reduction in mean site size. The discrepancy between the survey intervals actually used in the field (assumed here to be 25 to 30 m) and those recorded in the reports (20 m) also contributes to the lack of a significant correlation. Here we assume that survey intervals were, to some extent, used as a basis for estimating site size. If so, site dimensions (length, width, and area) were probably underestimated. Use of inaccurate survey intervals would also introduce many errors into the reported spatial relationships between sites and relative to topographic features, roads, and other landmarks. Later attempts to correct one such distortion would likely increase others. On balance, the inclusion of numerous isolates and the under-estimation of site size have the effect of reducing mean site size, and this probably accounts for the lack of a relationship between shovel-test and transect intervals and site size.

In this study, we accept the intuitive logic of an inverse relationship between shovel-test interval and the likelihood of site detection. For example, the mean size of sites discovered in eight PCI surveys is 5,600 m^2 (Table 3). If, for the sake of simplicity, one assumes that sites are circular, the average site has a diameter of 84.4 m. If shovel-test transects are spaced strictly at 20-m intervals, a site will generally be intersected by 4.2 transects, and ca. 14 shovel tests will be located within the site's area. If 30-m shovel-test intervals are used, only 2.8 transects will intersect the average site, and only 6.2 shovel tests will fall within the site's area.

One must keep in mind that factors other than shovel-test interval also affect the likelihood of site detection. For example, most sites are comprised of low to moderate densities of artifacts, and not all shovel tests located within a site will be positive. Larger shovel-test intervals decrease the number of tests that will fall within the average site, and also decrease the chances that at least one test will encounter artifacts. The results of the baseline archaeological survey (see Chapter 6) serve to underscore many of the points made above. In the baseline survey, changes in shovel-test intervals were shown to impact variables such as site size, site shape, number of sites identified, and the character of the site occupation. In general, more widely spaced transects were less likely to identify sites, and when sites were identified, it is more likely that a single large site would be documented as several small sites.

This study also has evaluated survey reliability on the basis of site documentation. Aspects of site documentation that were investigated (see Chapter 5) include shovel-test spacing within sites, accuracy of site mapping, and accuracy of artifact analyses.

Once a site has been located, current standards require field personnel to excavate additional shovel tests to better define site boundaries, document artifact distribution and density, and obtain a larger sample of artifacts. The spacing of these additional shovel tests has, in most previous reports, either not been discussed or not documented on site sketch maps. The CRA project excavated additional within-site tests, but appears to have deviated from the 5-m intervals stated in the report's section on field methods, instead using a 10-m interval. The PCI projects implemented a more rigorous approach to excavating additional within-site shovel tests. All such tests are mapped at either 10-m or 20-m intervals, depending on whether a site was considered small or large. Given the uncertainty about the shovel-test intervals used by PCI to identify sites, however, it may be reasonable to also question whether the within-site or boundary definition shovel tests were actually excavated at the reported intervals.

Site-mapping accuracy is also a problem in most of the previous surveys at Fort Campbell, regardless of when and by whom they were conducted. In general, site dimensions as described in the report text differ from the dimensions plotted on both scaled site plans and USGS quadrangle maps. Site plan maps and USGS maps often differ in terms of site shape. Finally, differences exist between relational information (such as distance to roads, streams, etc.) presented in the report text and the information shown on scaled site plans and USGS quadrangle maps. On balance, inaccuracies in site location, size, and shape as mapped on site plans and USGS maps appear to characterize most previous surveys.

We suspect that many of these mapping problems are related to the differences between the actual survey intervals used by contractors and the interval stipulated in the project SOW. If site attributes are reported as if a 20-m testing interval was used when in fact the interval was 25 to 30 m, not only could the mapped site location be inaccurate, but the site itself will likely be reported as having smaller dimensions (and hence total area) than is actually the case.

Most of the previous surveys appear to have used roughly similar protocol for artifact collection. Artifact collection strategy, when discussed in project reports, was typically a variant of selective collection. Where dense concentrations of artifacts were encountered, only a sample was collected. There appears to have been a bias against the collection of twentieth-century artifacts. This broad similarity of approaches to collecting artifacts should enhance assemblage comparability, especially if survey technique is taken into account.

With one major exception, most of the previous surveys also seem to have used roughly similar approaches to artifact analysis. Variants of a core-reduction lithic-analysis model were used in most of the surveys (e.g., Collins 1975). PCI used an analytical system imported from the Southwest (Sullivan and Rozen 1985) and based on the lithic technology employed by Puebloan cultures. The appropriateness of this approach for lithic assemblages from the Midsouth is a relevant question, although not one that can be addressed here. PCI's use of this "southwestern" approach clearly does complicate efforts to compare their lithic analyses with those of the other contractors.

Artifacts curated at Fort Campbell were examined for a sample of sites from most of the previous surveys. For the most part, artifacts enumerated in the project reports appear to be present at Fort Campbell, with the exception of the DuVall projects. Artifacts and project documents from the

DuVall surveys were never submitted to Fort Campbell. With two exceptions, the artifact analyses from previous surveys appear to be acceptable. First, many PCI lithic "artifacts" are actually unmodified (and presumably unused) pieces of chert. Second, analysts, regardless of organization, did not differentiate the temporal and technological variants of "whiteware." Both of these problems are serious in that they could impact site interpretations. Treating unmodified pieces of chert as artifacts is likely to have inflated site size and artifact density values. Failure to recognize pearlware and simply categorizing it as whiteware (a term generally applied to later ceramics) is likely to have caused some early nineteenth-century components to go unidentified. Early nineteenth-century occupations at Fort Campbell are relatively rare, and some are likely to have important research potential.

An important component of any archaeological survey report is a discussion of NRHP eligibility. In most cases, survey does not provide sufficient data to indicate that a particular site is eligible. However, a lack of integrity or an extreme paucity of artifacts often indicates that a site is clearly not eligible. Other sites are typically characterized as potentially eligible, and these are treated as NRHP-eligible sites until their status can be better evaluated through additional investigation. In this study, previous surveys were evaluated on the basis of their discussions of site integrity and inclusion of explicit reference to a historic context to evaluate the sites.

Through the years, discussions of site integrity in the Fort Campbell survey reports have become increasingly sophisticated. The discussions have evolved from statements that a site is disturbed without further elaboration to discussions that identify the nature of the disturbances and, in some cases, estimates of the depth of impacts or the percentage of the site area that has been affected.

While all of the project reports include a historic context chapter, the reports differ in the thoroughness of their context statements. The University of Kentucky and PCI projects presented comprehensive context statements that included the identification of potential research questions for sites dating to different time periods and for different site types. Sites exhibiting integrity and having deposits that would enable researchers to address the specified research questions were generally found to be potentially eligible for listing in the NRHP. The CRA and Greenhorne projects generally did the same but discussed research questions using a site-by-site approach. In general, these projects integrated the historic context statement with the results of the field survey. In contrast, the DuVall project reports typically provide no justification for their recommendations about NRHP eligibility. An evaluation of NRHP recommendations would require one to review all relevant project material (most of which was never submitted to Fort Campbell) and to generally repeat the process that should have been properly documented in the original report.

Results of this project have been summarized here in a fairly sequential manner, progressing from methods for site detection and documentation through mapping and artifact analysis to NRHP eligibility assessments. Unfortunately, the previous surveys conducted at Fort Campbell exhibit a number of deficiencies at each stage. Poor documentation as to how (and even if) particular areas were surveyed, surface visibility and the appropriateness of using pedestrian walkover, and accurate reporting of shovel-test and transect spacing all present serious problems for the current Fort Campbell CRM staff. It is difficult to have confidence in the reported size, shape, and precise location of many sites. Similarly, it is difficult to be confident that no sites are located in areas where none were reported. In some cases, sites may simply have been missed in areas where pedestrian survey was used under conditions of inadequate surface visibility, where inappropriately large shovel-test and/or transect intervals were used, or in areas that were improperly omitted from any field inspection. The problems in field methods that caused errors in site size, shape, and location are also likely to have resulted in inaccurate estimates of artifact density, diversity, and cultural-historical affiliation. Such problems are likely to have led to inappropriate assessments of potential NRHP eligibility.

Remediation Efforts

A second major goal of this project is to provide Fort Campbell with recommendations concerning how to make the best use of data from the previous archaeological surveys and how to improve the quality of future surveys. A number of problems have been identified in the previous surveys, some more prevalent and serious than others. These problems vary in terms of the degree to which they impact the usefulness of survey results. The projects differ in terms of the degree to which they are characterized by these problems.

Pedestrian Site Surveys

The results of previous pedestrian site surveys at Fort Campbell must be viewed with great caution. This is due to the lack of documentation about field conditions and, in some cases, a lack of information as to where such survey was conducted. This is especially true for the University of Kentucky and certain PCI projects, and all of the DuVall projects. Prior to the initiation of this project, Fort Campbell had independently determined that the DuVall projects, based on the lack of basic documentation on the conduct of the surveys and their results, were not in compliance with Sections 106 and 110. As the opportunity arises, the tracts originally investigated as part of the DuVall surveys have been and will continue to be resurveyed in a manner consistent with current standards. Based on our assessment of the DuVall projects, we concur with this effort.

We also suggest that selected portions of the University of Kentucky project area be resurveyed in conformance with Fort Campbell's current guidelines. Areas located near roads as well as areas remote from roads should be included in the sample. Areas for resurvey should be based on a thoughtful stratified random sample wherein the original University of Kentucky project area is subdivided into strata based on factors relevant to prehistoric occupation, e.g., soil type, distance to water, and slope. Additional sampling strata should be based on vegetation cover, e.g., forested, agricultural fields, and pasture. It might also be useful for Fort Campbell to define major strata based on the installation's need to use particular areas, and the potential impact of that use on archaeological sites. One approach might define the sampling strata using aerial photographs that date to the time of the University of Kentucky fieldwork. This could provide data that would be most suitable for evaluating the reliability of the original survey results. An alternate approach (recommended here) would be to simply use the best environmental data currently available to define strata relevant to past land use patterns. Results of the resurvey should be compared with the original results in terms of site density, mean site size, etc. This comparison could provide a baseline for determining the degree of confidence that can be placed in the University of Kentucky project results. If a portion of the University of Kentucky project area happens to have been included in a recent survey, this comparison could be made without additional fieldwork.

Shovel-Testing Surveys

The University of Kentucky, DuVall, Greenhorne, and CRA projects pose a variety of interpretive problems that prevent the implementation of remedial measures. Detailed information is not available as to the field methods used in particular areas, and this absence presents a problem that would be difficult or impossible to overcome. Together, these surveys included ca. 48,724 acres, about 62 percent of the total for surveys considered in this study. Viewing all of these surveys as entirely unreliable would pose a serious setback for Fort Campbell's effort to inventory its cultural resources. Thus, we recommend that all of these project areas be included in the resurvey of a carefully selected stratified random sample. We emphasize, however, that the resurvey must be carefully planned if it is to provide the basis for quantifying the reliability of previous survey results. Numerous tracts representing each major stratum need to be resurveyed within each of the previous survey areas.

The PCI projects present a different set of problems that could potentially be resolved. Our assessment suggests that most PCI survey was done using shovel-test transects spaced at 25-m to 30-m intervals. A thorough analysis of PCI field transect maps (which were sampled in this study) and shovel-test and transect forms could be undertaken to determine whether areas were not investigated. It is possible that if transect spacing is calculated at 25-m to 30-m intervals, the areas that appear to have been ignored were actually surveyed, albeit at wider intervals. If, on the other hand, the proposed analysis suggests that some areas were not surveyed, those areas could be identified and investigated.

Fort Campbell could conceivably conduct a supplemental survey to increase the density of shovel tests within areas previously surveyed by PCI using 25-m to 30-m transect intervals, but it is unlikely that such supplemental work would be satisfactory. The excavation of supplemental shovel tests would either need to be done along transects spaced between the previously excavated transects or would need to be excavated at randomly selected locations. Both approaches would require very careful (and therefore, time-consuming and expensive) locating of either the old shovel tests or the proper locations for new, randomly selected tests. Such work would not appear to be an optimal use of the limited CRM funds available at Fort Campbell.

It would be useful, however, to include the PCI surveys in the resurvey of a representative stratified sample, as described above. This would provide an opportunity to quantify the effects on rates of site detection of using 25-m to 30-m vs. 20-m shovel-test and transect intervals.

The result of PCI's use of 25-m to 30-m shovel-test and transect intervals is that small sites and those with low artifact density are more likely to have been missed. Large low-density sites are less likely to have been missed since they would have been intersected by more shovel tests. Archaeologists generally assume (often with little firm data) that small, low-density sites have little research value and are thus very unlikely to be found eligible for the NRHP under Criterion D. Unfortunately, in most regions the size of Fort Campbell, archaeologists have never excavated a sample of such sites to verify the reasonableness of these assumptions. We advocate such a study as one approach to ameliorating the effects of having surveyed relatively large areas using wide shovel-test intervals.

Site Documentation

The reliability of information about site location and dimensions is particularly difficult to address. Problems include the absence of basic information as well as conflicts between alternative information sources. General information about site locations appears to be valid, but details of site size and shape are highly suspect. Fort Campbell is already placing buffers around site areas, and there appears to be little more that can be done prior to NRHP evaluation of the sites.

NRHP Evaluations

In recent surveys, most investigators appear to have evaluated sites in a consistent manner and to have provided adequate support for their recommendations. Fort Campbell could systematically review NRHP eligibility recommendations and identify sites where the recommendations are not well supported by reference to a historic context and information about integrity and research potential. If such information cannot be gleaned from the project report, the site should be considered eligible and awaiting additional investigation. The Historic period sites may prove especially problematic, as it appears that all investigators failed to distinguish between time-sensitive variants of “whiteware” ceramics. “Whiteware” from a sample of sites should be reanalyzed to determine if more accurate temporal ranges of site occupation can be determined and if they would change the site NRHP evaluation.

Prediction of Archaeological Site Locations

In general terms, many of the previous archaeological surveys conducted at Fort Campbell are inadequate, at least in reference to the installation’s current guidelines. The projects vary in terms of the nature of their flaws. They also vary in terms of the implications of their flaws for effective management of the cultural resources at Fort Campbell. Ideally, all projects undertaken with Government funds to manage nonrenewable resources on public lands should be conducted in a manner that is both professionally responsible and cost-effective. But it is clear that poorly executed surveys in areas of high site density are far more likely to cause future problems for Fort Campbell than are similar surveys of areas where few sites are present. We have recommended the resurvey of a carefully selected stratified random sample as one approach to ascertaining the actual occurrence of sites in previously surveyed areas. This would be a fairly expensive undertaking.

An alternative approach would be to develop a predictive model. Archaeological site locations are typically correlated with environmental variables such as distance to water, geomorphic setting, soil type, slope, and aspect. A predictive model uses information about actual site locations to predict the likelihood of sites being present at loci with similar environmental characteristics. The reliability of a model’s predictions depend on a number of factors, including the strength of the correlations between site locations and environmental factors, an adequate sample of known site locations, and—most relevant here—reliable information about site location. Typically, some of the research area's sites are used in developing the model, and the remainder provides a basis for evaluating the model's performance.

Since much of Fort Campbell's existing survey data are problematic, a predictive model based on those data would necessarily be less reliable than a model based on higher quality data. Since some sites have undoubtedly been missed in the previous surveys, it is likely that a model based on data from those surveys would fail to predict some sites. Despite this problem, a predictive model would provide a basis for identifying areas of high site density. Fort Campbell could then focus supplemental surveys and monitoring efforts on the portions of those areas most likely to be impacted by military training and related activities.

Future Surveys

Most of the problems that limit the usefulness of previous survey reports can be avoided in the future by two actions: 1) Increase the specificity of Statements of Work (SOWs) to ensure that all basic requirements are stipulated, not simply assumed to be aspects of professional practice, and 2) Monitor contractor conformance with the SOW while fieldwork is underway and immediately after deliverables have been submitted (and prior to final payment).

One of the most pervasive problems in archaeological site survey in the eastern U.S. is the tendency to excavate fewer shovel tests than needed to adequately investigate a given area. This is most likely to occur where the survey area is characterized by heterogeneous field conditions. A given area can obviously be surveyed much more quickly by pedestrian walkover than shovel testing. In situations of competitive bidding, potential contractors generally estimate the portion of the project area that will not require shovel testing. Often this component of the overall project cost will determine which firm is awarded the contract. Contractors eager for work or profit may be tempted to assume that an unrealistically large percentage of the project area can be inspected using pedestrian survey. Once a fixed-price contract has been awarded, the excavation of significantly more shovel tests than planned is likely to mean a financial loss for the firm.

To avoid this situation, the SOW should specify the number of shovel tests to be excavated in the overall project area or in particular parcels. The number of shovel tests should be based on the required shovel-test and transect intervals and the size of the area in question. The SOW should specify that, if the required number of tests is genuinely not needed due to unexpectedly favorable field conditions, the remaining tests will be excavated in a nearby tract characterized by similar terrain and anticipated site density. This approach ensures that differences in cost estimates are based on factors other than the amount of work that will be accomplished.

The SOW should require the report to include a discussion (supported by maps) of vegetation and surface visibility encountered if pedestrian walkover was employed and acres surveyed by different field techniques. In areas where pedestrian survey may be feasible if surface visibility is adequate, the Contractor can be required to provide representative photographs that document adequate surface visibility.

Installation CRM personnel should monitor the field activities of their contractors on a frequent basis. For example, the CRM staff should ensure that surface visibility and moisture conditions are indeed adequate for pedestrian survey immediately before the Contractor commences surveys of large tracts. To help installation personnel verify that the required shovel-test and transect intervals are being used, the SOW should require the contractor to use flagging tape to mark and label the starting and ending points for each transect.

The SOW should also require the Contractor to secure the CRM staff's permission prior to omitting any areas from the survey. If a significant acreage genuinely warrants omission due to prior disturbance, excessive slopes, extremely dense vegetation, or other reasons, the SOW should require the Contractor to survey an equivalent and comparable area nearby.

All relevant details of proper shovel-test excavation should be specified in the SOW. These should include minimal horizontal dimensions, depth, and the use of ¼-inch or ½-inch mesh screens. Some written record of every shovel test should be required, even if it is simply a standardized profile form wherein the excavator records the approximate depth of each stratum and the presence or absence of artifacts.

Field protocol for defining site boundaries should be specified by the SOW. Intervals between shovel tests excavated to determine site boundaries and to sample artifact distributions within sites should not simply be left to the discretion of the contractor.

The SOW should also provide explicit guidance as to how artifacts will be described and reported. Ideally, the installation should provide a list of analytical categories and their operational definitions that must be used in the analysis. This will ensure some level of comparability between reports conducted by different individuals or firms. Contractors should be encouraged to use alternative analytical approaches so long as they also employ the installation's protocol.

Artifact analysis generally has a subjective or idiosyncratic component. It is unlikely that any two experienced archaeologists would sort a large group of artifacts in exactly the same manner. Proper use of artifact type collections and standardized tabulation forms can help ensure replicability among experienced analysts and avoid many errors by those with less experience. Fort Campbell should assemble and require contractors to use a type collection with specimens that exemplify the range of variation in chert types, prehistoric pottery and lithic tools, and important historic artifact categories (e.g., creamware, pearlware, ironstone, porcelain, milk glass).

The SOW might also require the contractor to visit Fort Campbell after the artifact analysis has been completed in order to show and discuss diagnostic materials whose presence will play an important role in recommendations about NRHP eligibility. Such a visit would encourage the contractor's project director to personally verify the proper categorization of important artifacts. Note, however, that this provision would not prevent inexperienced lab personnel from failing to recognize such important distinctions as pearlware vs. late nineteenth-century whiteware.

The SOW should require the contractor to ensure that all site plan maps are cross-checked with USGS quadrangles, installation maps, and other relevant maps to ensure that sites are consistently plotted in terms of location, size, and shape. Finally, the SOW should specify and describe the minimal content requirements for each section of the report. It is often particularly necessary to specify (if so desired by the installation) that the historic context include a list of important research topics and that recommendations about NRHP eligibility make explicit reference to each site's integrity, research value (i.e., NRHP eligibility Criterion D), or relevance to Criteria A, B, and C.

One approach to standardizing NRHP findings would be to use the existing context documentation to create a multiple listing-like document. Such a document would entail the identification of property types (e.g., site types) for each time period, potential research issues that investigation of each of the property types could address, and guidance for each property type concerning either NRHP findings or, more generally, recommendations for additional investigation of the site. Exceptional sites could always be evaluated outside of this framework.

Finally, previous surveys have seldom addressed the potential for deeply buried deposits at Fort Campbell. One exception is the CRA report, which concludes that no buried deposits are likely in stream valley settings as such landforms constitute areas of low site probability (Bradbury 1998:62). Ironically, the results of the CRA survey appear to contradict this generalization. Indeed, much of Fort Campbell is located in upland settings where deeply buried deposits are likely absent. In contrast, constricted areas that comprise stream valleys could have the potential to contain deeply buried deposits. Surveys have identified numerous sites in floodplain and terrace contexts. A comprehensive geomorphological project focusing on the issue of site burial in stream-valley contexts could provide guidance for future archaeological surveys as well as the investigation of identified sites located on floodplain or terrace formations. Such a project could identify formations where sites are likely present, formations where sites are likely absent, and depths to which materials could be expected. Such information could then be used when preparing SOWs for projects that include such landforms. Without such information, Fort Campbell should probably assume that buried sites may well be present in many floodplain and terrace settings. Such sites are in little danger of adverse impact by installation activities such as vehicle traffic and agriculture. Buried deposits could be impacted by mechanized excavations associated with road construction or maintenance, installation of subsurface utilities, and some types of military training.

Conclusions

Previous surveys conducted at Fort Campbell by a number of CRM firms and the University of Kentucky are characterized by a wide variety of limitations. Prevalent problems include reports that provide inadequate information about field methods and conditions, inconsistent mapping, the use of unacceptably large shovel-test and transect intervals, and failure to recognize potentially important artifact categories. Most of the past surveys provide some useful information, although several (e.g., those by DuVall) should simply be redone.

There is no practical way to conduct additional fieldwork that would bring the past surveys into conformance with current requirements. Instead, we recommend the resurvey of areas selected using a carefully developed stratified random sampling design. This would provide the data needed to quantify the limitations of the previous surveys. We have also offered a number of recommendations concerning the content of Statements of Work for future surveys, as well as suggestions concerning monitoring of contractor performance by installation CRM personnel.

Bias Assessment and Metadata

The federal government has long been involved in conducting archaeological research to protect and preserve the heritage of the United States. Over time the process of procuring archaeological research services has become more structured, with defined expectations on how the research should be done, what data should be collected, and what the expected outcome of the research will be. However, the variable nature of the archaeological record makes highly rigid contract specifications impractical. Contracts need to provide researchers with flexibility to adjust to variable field conditions in order to adequately address, evaluate, and document the cultural resource base. The need for flexibility and for control of the overall research process has created a paradox of how to identify and manage significant sites in a cost effective manner. To address this question the Department of the Army sponsored a study through the Legacy Resource Management Program with the U.S. Army Corps of Engineers Construction Engineering Research Laboratories (now ERDC/CERL) to examine survey standards and develop improved cost-estimation procedures. One outcome of the study was a set of recommendations directed at standardizing the approach, reporting, and contracting procedures for archaeological surveys (Zeidler 1995). Central to this report was the call for reporting of data about data or metadata.

The underlying concept behind metadata is to provide relevant information on physical variables and levels of effort needed to complete the data collection and reporting tasks. These metadata document how the data were obtained. Areas specified as important to federal managers include the need for explicit site definitions, discussions of methodological biases, the impact of biases on results, and the level of effort needed to accomplish project tasks. The ultimate goal is to provide managers with tools to better evaluate and compare results and to develop future statements of work. This section provides a bias assessment and metadata for the current assessment and baseline survey project conducted at Fort Campbell.

Project Parameters

The research project involved the collection of data to assess the reliability of archaeological site surveys conducted at Fort Campbell, Kentucky/Tennessee, and conducting a baseline archaeological site survey totaling the excavation of 300 shovel tests. Research conducted included archival, field, and laboratory components. Archival research included the construction of data bases based on variables obtained from Dr. Michael Hargrave, ERDC/CERL, and review of project reports, field documentation, Statements of Work, and artifact assemblages. The principal field techniques used for the baseline archaeological site survey were the excavation of screened shovel tests at 10-m intervals and the excavation of a single 50-x-50-cm test unit. Laboratory research consisted of the identification of lithic artifacts obtained from the baseline archaeological site survey and their preparation for curation.

Level of Field Effort

The Fort Campbell archaeological survey assessment and baseline archaeological survey included a five-step process from project initiation to project conclusion. The first step in the project was to become familiar with the nature of the project and the archival materials available at Fort Campbell. This step of the project consisted of a review of Fort Campbell records and the submission of this information to ERDC/CERL. The second step was to collect data generated by previous archaeological site surveys conducted at Fort Campbell for variables identified by Dr. Michael Hargrave of ERDC/CERL. The third step was to conduct the baseline archaeological site survey, which took place during May 2004. The fourth step was to process and analyze the field materials and to analyze the archival data that was collected. The final step was to prepare a report of the project findings. The five steps were generally sequential, but some activities were done concurrently by different project personnel. The level of effort for these activities has been tabulated by person-hours (P.H.), and these data are presented in Table 9.

One comment should be made concerning the level of effort associated with the baseline archaeological site survey. Given the excavation of 300 tests and the 50-x-50-cm test unit and the 84 hours expended to conduct the survey, approximately four tests per person per hour were excavated. This would suggest that over the course of an 8-hour day, one fieldworker would be expected to complete between 28 and 32 locations, if all were excavated. At 10-m intervals, this is approximately 0.8 acres per person per day. A few points should be kept in mind concerning the survey. The survey tracts were generally heavily vegetated and most likely the survey was conducted at the worst period during the year. Vegetation slowed the progress of excavations in terms of walking from one test location to another and in clearing vegetation to both excavate the test and to set baselines. The survey tracts were also likely located on terrace formations. This led to deeper tests being excavated, deeper no doubt than need be excavated in upland formations. But the depths, often to 50 cm or 60 cm below surface, do suggest the effort needed when investigating locations where buried deposits may be present.

Table 9. Summary of person-hours expended in project.

Task	*Person–Hours Expended*	*Comments*
Administration	33	Logistics, monthly reports, meetings etc.
Graphics	40	
Travel	86	
Database creation	5	
Data collection	91	
Archaeological survey	84	300 shovel tests, 1 50-x-50-cm unit
Manager’s report	10	Includes site forms
Report preparation	171	Writing, editing, and production
Artifact processing and analysis	15	
Curation	7	
Total	542	

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APPENDIX A

SITE-SPECIFIC DATA FOR 11 SITES PER SURVEY SAMPLE

Table A-1. Site-specific shovel test and artifact data.

Description	*Site No.*	*No. of Shovel Tests in Text*	*No. of Shovel Tests on Map*	*No. of Artifacts in Text*	*No. of Artifacts in Table*
30063 Univ of Ky	40MT292	np	np	66	np
	15CH412	np	np	22	np
	15CH387	np	np	33	np
	40MT155	np	np	51	np
	40MT306	np	np	7	np
	40MT314	np	np	46	np
	40MT322	np	np	14	np
	40MT326	np	np	10	np
	40MT178	np	np	32	np
	40MT159	np	np	57	np
	40MT209	np	np	22	np
2500 DuVall	40MT399	np	np	np	np
	40MT398	np	np	np	np
	40SW106	np	np	np	np
	B42	np	np	np	np
	40SW282	np	np	np	np
	40SW283	np	np	np	np
2254 DuVall	40SW284	np	np	np	np
	40SW292	np	np	np	np
	40SW293	np	np	np	np
	40SW298	np	np	np	np
	40SW287	np	np	np	np
	40SW290	np	np	np	np
	40MT401	np	np	np	np
	40MT406	np	np	np	np
	40SW299	np	np	np	np
	40MT403	np	np	np	np
	40SW289	np	np	np	np

Table A-1. Site-specific shovel test and artifact data.

Description	*Site No.*	*No. of Shovel Tests in Text*	*No. of Shovel Tests on Map*	*No. of Artifacts in Text*	*No. of Artifacts in Table*
6624 DuVall	40MT567	np	np	np	np
	40MT569	np	np	np	np
	40MT469	np	np	np	np
	40MT571	np	np	np	np
	40MT441	np	np	np	np
	15TR212	np	np	np	np
	15TR214	np	np	np	np
	15TR211	np	np	np	np
	40SW383	np	np	10	np
	40SW385	np	np	8	12
	40MT479	np	np	np	np
10 DuVall	no sites reported				
10 DuVall	no sites reported				
2094 Greenhorne	40MT412	48	np	36	36
	40MT414	40	np	20	20
	40MT415	31	np	25	25
	40MT416	21	np	20	522
	40MT417	28	np	53	53
	40MT419	36	np	62	60
	40MT420	19	np	7	7
	40MT423	4	np	1	1
	40MT424	9	np	3	3
	40MT425	32	np	23	16
	40MT426	23	np	64	64

Table A-1. Site-specific shovel test and artifact data.

Description	*Site No.*	*No. of Shovel Tests in Text*	*No. of Shovel Tests on Map*	*No. of Artifacts in Text*	*No. of Artifacts in Table*
5135 CRA	15CH522	np	11	np	7
	15CH527	np	67	np	9
	40SW345	np	73	np	19
	40SW349	np	15	np	10
	40SW356	np	32	np	14
	40SW362	np	5	np	9
	40SW123	np	88	np	0
	40SW358	np	12	np	10
	15CH525	np	18	np	2
	40SW370	np	32	np	3
	40SW365	np	3	np	0
5181 PCI	40MT470	np/16 [a]	28 – 17 [b]	59	59
	40MT526	np/16	25 – 16	np	74
	40MT495	np/19	28 – 20	np	114
	40MT474	np	27 – 18	np	112
	40MT487	np	6 – 6	np	6
	40MT497	np/21	41 – 21	69	63
	40MT507	np/7	9 – 7	np	42
	40MT521	np/21	34 – 20	np	115
	40MT547	np/37	47 – 37	478	478
	40MT562	np/0	6 – 0	np	12
	40MT564	np/6	9 – 6	np	10
100 PCI	no sites reported				

Table A-1. Site-specific shovel test and artifact data.

Description	*Site No.*	*No. of Shovel Tests in Text*	*No. of Shovel Tests on Map*	*No. of Artifacts in Text*	*No. of Artifacts in Table*
4068 PCI	40MT573	np/12 [a]	15 – 12 [b]	np	60
	40SW393	np/9	13 – 9	np	50
	15TR100	np/24	38 – 24	np	80
	15CH540	np/10	12 – 9	np	46
	40MT584	np/1	6 – 1	np	21
	40SW400	np/7	7 – 7	62	62
	40SW418	np/16	24 – 16	np	44
	40SW424	np/7	8 – 7	np	36
	15TR229	np/4	9 – 4	np	9
	15TR249	np/8	12 – 8	np	18
	15CH570	np/6	6 – 6	99	99
1270 PCI	40MT610	np/12 [a]	15 – 12 [b]	45	45
	40MT626	np/18	28 – 18	np	46
	40MT600	np/17	20 – 17	98	98
	40MT606	np/19	22 – 19	np	56
	40MT611	np/5	6 – 5	np	14
	40MT623	np/20	33 – 20	np	200
	40MT627	np/1	2 – 1	np	12
	40MT613	np/4	6 – 4	np	23
	40MT631	np/3	3 – 3	np	14
	40MT612	np/19	20 – 19	143	143
	40MT602	np/18	24 – 18	78	78

Table A-1. Site-specific shovel test and artifact data.

Description	*Site No.*	*No. of Shovel Tests in Text*	*No. of Shovel Tests on Map*	*No. of Artifacts in Text*	*No. of Artifacts in Table*
1307 PCI	40MT632	np/9 [a]	14 – 9 [b]	43	51
	40SW449	np/5	5 – 5	np	73
	40MT414	np	11 – 8	37	37
	40MT636	np/12	14 – 12	41	41
	40SW439	np/13	13 – 13	111	111
	40SW443	np/4	5 – 4	17	17
	40SW451	np/2	3 – 2	np	42
	40SW459	np/3	7 – 3	np	112
	40SW456	np/5	5 – 5	np	10
	40SW445	np/8	14 – 8	np	66
	40SW453	np/0	8 – 0	63	63
4836 PCI	40MT647	np/12 [a]	16 – 12 [b]	65	65
	40MT658	np/16	25 – 16	np	56
	40MT677	np/16	16 – 16	72	72
	15CH578	np/9	9 – 9	np	283
	40MT715	np/1	3 – 1	8	8
	40MT648	np/0	0 – 0	28 (typo)	18
	40MT668	np/10	14 – 10	np	64
	40MT447	np/1	15 – 1	5	5
	40MT703	np/6	6 – 6	17	17
	40MT711	np/9	12 – 9	30	30
	40MT752	np/3	6 – 3	51	51

Table A-1. Site-specific shovel test and artifact data.

Description	*Site No.*	*No. of Shovel Tests in Text*	*No. of Shovel Tests on Map*	*No. of Artifacts in Text*	*No. of Artifacts in Table*
4952 PCI	15TR267	np/19 [a]	33 – 19 [b]	66	66
	40SW110	np/8	10 – 8	73	73
	40SW464	np/14	16 – 14	74	74
	40MT762	np/13	19 – 13	127	127
	40MT854	np/2	2 – 2	10	10
	40MT786	np/1	3 – 1	45	47
	40SW470	np/np	26 – 7	120	117
	15CH612	np/16	25 – 16	45	45
	15TR265	np/19	25 – 19	100	100
	15CH610	np/14	17 – 14	44	44
	40SW514	np/5	6 – 5	38	36
4128 PCI	40MT815	np/5 [a]	5 – 5 [b]	76	76
	40MT398	np/10	17 – 10	58	58
	40MT853	np/24	31 – 24	47	47
	40MT806	np/6	9 – 6	40	40
	40MT831	np/6	6 – 6	41	41
	40MT816	np/4	4 – 4	143	143
	40MT869	np/5	6 – 5	52	52
	40MT870	np/6	6 – 6	64	64
	40SW543	np/8	8 – 8	27	27
	40SW552	np/5	7 – 5	9	9
	40MT847	np/3	3 – 3	15	15

Table A-1. Site-specific shovel test and artifact data.

Description	*Site No.*	*No. of Shovel Tests in Text*	*No. of Shovel Tests on Map*	*No. of Artifacts in Text*	*No. of Artifacts in Table*
3715 PCI	15TR298	np/10 [a]	18 – 10 [b]	np	74
	15TR317	np/31	84 – 31	82	82
	15TR323	np/7	14 – 7	66	66
	40SW86	np/24	60 – 24	76	76
	40SW572	np/0	2 – 0	1	1
	15TR290	np/3	3 – 3	3	3
	15CH632	np/8	17 – 8	68	68
	15TR349	np/10	37 – 10	30	39
	15TR324	np/15	23 – 15	103	103
	15TR329	np/7	16 – 7	34	34
	40SW562	np/12	14 – 12	125	125

np = not presented in report

15TR324: text header indicates 120 artifacts

a = In PCI reports, only number of positive tests stated, not total number of tests excavated at a particular site.

b = See comment a above. These data are based on a count of total number of shovel tests illustrated on the sketch map followed by the number of positive shovel tests illustrated on the sketch map.

Table A-2. Site-specific locational data.

Description	Site No.	Maps vs. Text
30063 Univ of Ky	40MT292	No sketch map; text & quad site dimensions differ
	15CH412	No sketch map; text & quad site dimensions differ
	15CH387	No sketch map; text & quad site dimensions differ
	40MT155	No sketch map; text & quad site dimensions differ
	40MT306	No sketch map; relation of site to road differs between text & quad
	40MT314	No sketch map; text & quad site dimensions differ; relation of site to road differs between text & quad
	40MT322	No sketch map; no site size in text
	40MT326	No sketch map; text & quad site dimensions differ; site mapped on slope, not crest, as in text
	40MT178	No sketch map; text & quad site dimensions differ
	40MT159	No sketch map; text & quad site dimensions differ; text states Noah's Spring Branch 1km N, mapped @ 400 m
	40MT209	No sketch map; text & quad site dimensions differ
2500 DuVall	40MT399	No locational information presented in text
	40MT398	No locational information presented in text
	40SW106	No locational information presented in text
	B42	No locational information presented in text
	40SW282	No locational information presented in text
	40SW283	No locational information presented in text
2254 DuVall	40SW284	No locational information presented in text
	40SW292	No locational information presented in text
	40SW293	No locational information presented in text
	40SW298	No locational information presented in text
	40SW287	No locational information presented in text
	40SW290	No locational information presented in text
	40MT401	No locational information presented in text
	40MT406	No locational information presented in text
	40SW299	No locational information presented in text
	40MT403	No locational information presented in text
	40SW289	No locational information presented in text

Table A-2. Site-specific locational data.

Description	*Site No.*	*Maps vs. Text*
34 DuVall		no sites reported
6624 DuVall	40MT567	Site drawn as circle on quad is too big; sketch is 800 m^2 larger than text area
	40MT569	Site drawn as oval on quad too small; sketch is 500 m^2 smaller than text area
	40MT469	Site drawn as oval on quad too small; sketch is 500 m^2 smaller than text area
	40MT571	Site drawn as circle on quad too small; sketch is 5,300 m^2 larger than text area
	40MT441	Site drawn on quad is larger than text area; sketch is 10,500 m^2 smaller than text area
	15TR212	Text indicates site is 250 m S of Perimeter Rd, quad shows 475 m south; Site drawn as circle on quad is too small
	15TR214	Site drawn as oval on quad shaped wrong, sketch is 2,100 m^2 larger than text area
	15TR211	Text indicates site is 250 m N of Skinner Creek, quad shows near 500 m; site drawn as circle is too small on quad; sketch 250 m larger than text area
	40SW383	Site drawn on sketch is 2,150 m^2 larger than text area
	40SW385	Site drawn on sketch is 1,300 m^2 larger than text area
	40MT479	Site location is closer to Piney Fork on quad than in text; site drawn as oval on quad is too small; sketch is 1,300 m^2 larger than text
10 DuVall		no sites reported
10 DuVall		no sites reported

Table A-2. Site-specific locational data.

Description	*Site No.*	*Maps vs. Text*
2094 Greenhorne	40MT412	Site is too oddly shaped to get reliable area estimates from maps
	40MT414	Site drawn on quad is smaller than text dimensions; site on sketch and quad differently shaped
	40MT415	Site on quad is ca 300 m^2 larger than text area; site on sketch & quad differently shaped
	40MT416	Site drawn on quad is smaller than text area; scale on sketch incorrect?
	40MT417	Site drawn on quad is 1,150 m^2 larger than text area; scale on sketch incorrect?
	40MT419	Site drawn on quad is 31,000 m^2 larger than text area; Site is shaped differently on sketch and quad
	40MT420	Site drawn on quad is 6,100 m^2 smaller than text area
	40MT423	Site drawn as dot on quad too small is too small by 1,400 m^2; sketch scale incorrect?
	40MT424	Site drawn as dot on quad too small by 400 m^2; sketch scale incorrect?
	40MT425	Site drawn on quad is 800 m^2 smaller than text area; sketch scale incorrect?
	40MT426	Site not in southern portion of TA25 as stated in text; site drawn on quad is 4,000 m^2 smaller than text; sketch scale incorrect?
5135 CRA	15CH522	Sketch and quad site areas appear dissimilar
	15CH527	Site drawn on sketch is 500 m^2 larger than text area
	40SW345	Site drawn on sketch is 250 m^2 larger than text area; site drawn on quad is to small
	40SW349	Site drawn on sketch is 250 m^2 larger than text area; site drawn on quad is to small
	40SW356	Site drawn on sketch is 600 m^2 larger than text area
	40SW362	Site drawn on sketch is 800 m^2 larger than quad area
	40SW123	Site drawn on sketch is 550 m^2 larger than text area
	40SW358	No problems noted
	15CH525	Site drawn on sketch is 375 m^2 larger than text area; sketch and quad site areas appear dissimilar
	40SW370	Site drawn on sketch is 300 m^2 larger than text; site drawn on quad is to small
	40SW365	Site drawn on sketch is 550 m^2 larger than text area

Table A-2. Site-specific locational data.

Description	*Site No.*	*Maps vs. Text*
5181 PCI	40MT470	No scale on electronic map version
	40MT526	Site drawn on sketch is smaller than text description
	40MT495	Sketch not present in electronic version of report
	40MT474	No problems noted
	40MT487	Site drawn on sketch is larger than text description
	40MT497	Site oddly shaped, cannot determine dimensions accurately
	40MT507	No problems noted
	40MT521	No problems noted
	40MT547	No problems noted
	40MT562	No problems noted
	40MT564	Site drawn on sketch is larger than text description
100 PCI		no sites reported
4068 PCI	40MT573	No problems noted
	40SW393	No problems noted
	15TR100	No problems noted
	15CH540	Site drawn on sketch is smaller than text area
	40MT584	Electronic image is corrupted
	40SW400	Site drawn on sketch is smaller than text area
	40SW418	Site drawn on sketch is larger than text area
	40SW424	No problems noted
	15TR229	No problems noted
	15TR249	No problems noted
	15CH570	No problems noted

Table A-2. Site-specific locational data.

Description	*Site No.*	*Maps vs. Text*
1270 PCI	40MT610	Site oddly shaped, difficult to understand PCI text dimensions
	40MT626	E-W dimensions smaller in sketch than in text
	40MT600	Site drawn on sketch is larger than text; No scale on quad map
	40MT606	Site divided into 3 separate loci, difficult to reconstruct PCI text dimensions
	40MT611	No problems noted
	40MT623	No problems noted
	40MT627	No problems noted
	40MT613	No problems noted
	40MT631	No problems noted
	40MT612	Site drawn on sketch is larger than text area; no scale on quad map
	40MT602	No problems noted
1307 PCI	40MT632	Site drawn on sketch is larger than text area
	40SW449	Site drawn on sketch is larger than text area
	40MT414	Typo: text says 15 n/s, should be 150 n/s
	40MT636	Site is longer E-W in sketch than in text
	40SW439	Site drawn on sketch is larger than text area
	40SW443	Dimensions stated in text as n/s & e/w are ne/sw & nw/se
	40SW451	Site drawn on sketch is larger than text area
	40SW459	Site drawn on sketch is larger than text area
	40SW456	Site drawn on sketch is larger than text area
	40SW445	Site drawn on sketch is larger than text area
	40SW453	N-S dimension on sketch is larger than in text

Table A-2. Site-specific locational data.

Description	*Site No.*	*Maps vs. Text*
4836 PCI	40MT647	Site drawn on sketch is larger than text area; site drawn on quad is larger than sketch and text area
	40MT658	Site drawn on quad is larger than text area
	40MT677	Site is oddly shaped, difficult to determine PCI dimensions
	15CH578	Sketch and quad drawn larger than text area
	40MT715	Site drawn on sketch is larger than text area; site drawn on quad is larger than sketch and text area
	40MT648	Site drawn on sketch has e/w smaller than text and n/s larger than text
	40MT668	Site drawn on sketch is larger than text area
	40MT447	Sketch and quad drawn larger than text area
	40MT703	Site drawn on sketch has n/s smaller than text and e/w larger than text; site drawn on quad is smaller than text or sketch areas
	40MT711	Site drawn on sketch is larger than text; site drawn on quad has n/s dimensions larger than text or sketch
	40MT752	Sketch and quad drawn larger than text area
4952 PCI	15TR267	Site dimensions oriented opposite on quad as in text
	40SW110	No site dimensions given in text
	40SW464	Site drawn on sketch is larger n/s than text dimension
	40MT762	Site drawn on quad is smaller than text area
	40MT854	Site drawn on sketch is larger than text area
	40MT786	Site drawn on quad is smaller e/w than text dimension
	40SW470	Site drawn on sketch is larger than text area; site drawn on quad is smaller than text area
	15CH612	N/S dimension on sketch is larger than text dimension
	15TR265	Site represented as 2 loci, difficult to determine PCI dimensions; quad shows as a single site
	15CH610	Site drawn on sketch is larger than text area; Different dimensions (larger & smaller) on quad than text
	40SW514	E/W dimension larger on sketch than in text; site drawn larger on quad than text area or in sketch

Table A-2. Site-specific locational data.

Description	*Site No.*	*Maps vs. Text*
4128 PCI	40MT815	N/S dimension too large & e/w dimension too small on sketch; n/s dimension too large on quad
	40MT398	Site drawn larger on sketch than text area
	40MT853	Sketch and quad drawn larger than text area
	40MT806	Sketch and quad drawn larger than text area
	40MT831	No problems noted
	40MT816	Sketch and quad drawn larger than text area
	40MT869	Sketch and quad drawn larger than text area
	40MT870	Sketch and quad drawn larger than text area
	40SW543	No problems noted
	40SW552	Site drawn larger on sketch than text area; e/w dimension larger on quad than in text
	40MT847	Sketch and quad drawn larger than text area
3715 PCI	15TR298	Quad dimensions too large e/w & too small n/s compared with text
	15TR317	Site drawn on sketch and quad is too small e/w & too large n/s compared with text
	15TR323	Sketch and quad drawn smaller than text area
	40SW86	Sketch dimension e/w drawn too small; quad dimension n/s drawn too small compared with text
	40SW572	Site drawn larger on sketch than in text
	15TR290	Site as drawn on sketch too smaller than text area
	15CH632	N/S dimension too small on sketch compared with text; site dimensions on quad too large n/s, too small e/w, compared with text
	15TR349	N/S dimension too large on sketch compared with text; n/s dimension too large, e/w too small on quad compared with text
	15TR324	No problems noted
	15TR329	Quad dimensions too small e/w and too large n/s compared with text
	40SW562	E/W dimension too small on sketch compared with text; site area too large on quad compared with text

Table A-3. Site-specific NRHP evaluation data.

Description	*Site No.*	*Condition/Integrity*	*Criterion D Reasoning*
30063 Univ of Ky	40MT292	Integrity minimally discussed	PE, intact midden, dense artifacts present
	15CH412	Integrity not discussed	NE, no intact deposits, sparse, nondiagnostics
	15CH387	Integrity not discussed	NE, sparse, nondiagnostic
	40MT155	Cites severe erosion (no profiles)	NE, nondiagnostic, eroded
	40MT306	Cites unidentified destructive impact	NE, prior impact
	40MT314	Integrity not discussed	PE, possible intact subsurface deposits, larger site area
	40MT322	Cites structure demolition, unidentified prior impact	NE, sparse, nondiagnostic; prior impact
	40MT326	Cites structure demolition	PE, possible intact subsurface deposits, features, association w/cemetery, pre-Civil War
	40MT178	Integrity not discussed	NE, sparse, nondiagnostic
	40MT159	Integrity not discussed	NE, nondiagnostic, common site type
	40MT209	Cites structure demolition, unidentified prior impact	NE, prior impact
2500 DuVall	40MT399	Integrity not discussed	PE, no reason presented
	40MT398	Integrity not discussed	PE, no reason presented
	40SW106	Integrity not discussed	PE, no reason presented
	B42	Integrity not discussed	PE, no reason presented
	40SW282	Integrity minimally discussed	PE, minimal disturbance
	40SW283	Integrity not discussed	PE, no reason presented
2254 DuVall	40SW284	Integrity not discussed	PE, no reason presented
	40SW292	Cites erosion and military impacts	NE, no reason presented
	40SW293	Cites erosion and military impacts	NE, no reason presented
	40SW298	Cites disturbance but not described	PE, no reason presented
	40SW287	Cites disturbance but not described	PE, no reason presented
	40SW290	Cites disturbance but not described	NE, no reason presented
	40MT401	Cites disturbance but not described	PE, no reason presented
	40MT406	Cites disturbance but not described	PE, no reason presented
	40SW299	Cites heavy disturbance but not described	NE, no reason presented
	40MT403	Cites bulldozer disturbance	NE, disturbance
	40SW289	Cites disturbance but not described	PE, no reason presented

Table A-3. Site-specific NRHP evaluation data.

Description	*Site No.*	*Condition/Integrity*	*Criterion D Reasoning*
34 DuVall		no sites reported	
6624 DuVall	40MT567	Cites disturbance but not described	PE, probable intact buried deposits
	40MT569	Cites bulldozer disturbance	NE, sparse, nondiagnostic, disturbance
	40MT469	Cites heavy erosion	NE, disturbance, nondiagnostic
	40MT571	Cites bulldozing, Craig Village construction	NE, heavily disturbed
	40MT441	Cites logging disturbance	NE, heavily disturbed
	15TR212	Cites military training disturbance	NE, disturbance
	15TR214	Cites military training disturbance	NE, disturbance
	15TR211	Cites soils as deflated, no A horizon present	NE, disturbance
	40SW383	Cites military training disturbance	NE, disturbance
	40SW385	Cites disturbance but not described	PE, no reason presented
	40MT479	Cites road bisecting site	PE, no reason presented
10 DuVall		no sites reported	
10 DuVall		no sites reported	
2094 Greenhorne	40MT412	Cites integrity as good	PE, information on settlement, subsistence, lithics, historic adaptations
	40MT414	Cites integrity as good	PE, information on settlement, subsistence, lithics, historic adaptations
	40MT415	Cites integrity as good	PE, information on settlement, subsistence, lithics
	40MT416	Cites site as eroded	NE, does not meet NRHP Criterion 1
	40MT417	Cites integrity as good	PE, information on settlement, subsistence, lithics, culture change
	40MT419	Integrity not discussed	PE, information on settlement, subsistence, lithics
	40MT420	Cites area as partially disturbed by firebreak	PE, no reason presented
	40MT423	Cites structure demolition	NE, limited potential to yield information
	40MT424	Cites logging and erosion	NE, no reason presented
	40MT425	Cites military and "natural" disturbance	NE, lacks integrity
	40MT426	Cites military and "natural" disturbance	PE, no reason presented

Table A-3. Site-specific NRHP evaluation data.

Description	*Site No.*	*Condition/Integrity*	*Criterion D Reasoning*
5135 CRA	15CH522	Cites bulldozer impacts and foxholes	NE, paucity of artifacts, no diagnostics
	15CH527	Cites bulldozer piles	PE, no reason presented
	40MT345	Cites bulldozer impacts	NE, paucity of artifacts, no diagnostics, disturbance
	40SW349	Cites bulldozer impacts	NE, paucity of artifacts, no diagnostics, disturbance
	40SW356	Cites plowing	PE, undisturbed, possible intact subsurface deposits, features
	40SW362	Cites unidentified disturbance	PE, possible intact deposits
	40SW123	Cites subsoil visible on surface	NE, greatly disturbed
	40SW358	Cites bulldozer impacts and erosion	NE, paucity of artifacts, no diagnostics, disturbance
	15CH525	Cites unidentified disturbance	NE, paucity of artifacts, no diagnostics, disturbance
	40SW370	Cites bulldozer impacts, highly disturbed	NE, paucity of artifacts, no diagnostics, disturbance
	40SW365	Site is undisturbed	NE, paucity of artifacts, no diagnostics, disturbance
5181 PCI	40MT470	Cites erosion and training	NE, erosion, lack of diagnostics
	40MT526	Cites erosion, logging, and military	NE, very heavy disturbance
	40MT495	Cites road, bulldozing, and clearing	NE, no overt discussion – an "ugly" site
	40MT474	Cites military training, bulldozing, and firebreak	NE, razed; late occupation, few ceramics, disturbed, no archival evidence
	40MT487	Cites erosion and military use	NE, eroded, few artifacts, no diagnostics
	40MT497	Cites erosion and military use	NE, low recovery rate, no diagnostics
	40MT507	Cites erosions and bulldozer impacts	NE, heavy disturbance, low artifact recovery rate, no archival data
	40MT521	Cite bulldozing, military training, and erosion	PE, high artifact density, surface features present, intact subsurface/spatial, archival data
	40MT547	Cites bulldozing and military training	PE, high artifact density, surface features present, intact subsurface/spatial, archival data
	40MT562	Cites cultivation and erosion	NE, low recovery rate, no intact subsurface deposits
	40MT564	Cites clearing, erosion, and vehicle ruts	NE, heavy disturbance, low recovery rate, no diagnostics
100 PCI			no sites located

Table A-3. Site-specific NRHP evaluation data.

Description	*Site No.*	*Condition/Integrity*	*Criterion D Reasoning*
4068 PCI	40MT573	Cites erosion, logging, and military use	NE, few artifacts, few positive shovel tests, no diagnostics
	40SW393	Cites structure demolition and logging	NE, few artifacts, few positive shovel tests, disturbed
	15TR100	Cites logging	PE, surface features, spatial patterning, archival data
	15CH540	Cites erosion and logging	NE, few artifacts, few positive shovel tests, no diagnostics
	40MT584	Cites cultivation and military use	NE, low recovery rate, disturbance
	40SW400	Cites military use and logging	NE, no diagnostics, disturbance
	40SW418	Cites structure demolition	NE, few artifacts, disturbed
	40SW424	Cites structure demolition	NE, few positive shovel tests, recent occupation, disturbed
	15TR229	Cites military use and logging	NE, few artifacts, few positive shovel tests, disturbed
	15TR249	Cites structure demolition and logging	NE, few artifacts, few positive shovel tests, disturbed
	15CH570	Cites vehicular use and bulldozer impacts	NE, redeposited fill
1270 PCI	40MT610	Cites logging, military use, and road construction	NE, few artifacts, no diagnostics, disturbed, common site type
	40MT626	Cites presence of push piles and ruts	PE, surface features and spatial patterning present, intact subsurface deposits, associated w/Bryant family
	40MT600	Cites military use and logging	NE, no diagnostics, disturbed
	40MT606	Cites firebreak construction , logging, and military use	PE, surface features & spatial patterning present, archival data, associated with cemetery & outbuildings
	40MT611	Electronic file impaired	NE, few artifacts, no diagnostics, disturbed
	40MT623	Cites firebreak construction , logging, and military use	PE, many positive shovel tests, moderate number artifacts, good surface feature patterning, intact subsurface deposits
	40MT627	Cites erosion, logging, and military use	NE, disturbed, limited to a few surface collected artifacts
	40MT613	Cites erosion, logging, and military use	NE, disturbed
	40MT631	Cites military use and vehicle ruts	NE, disturbed, few subsurface artifacts found
	40MT612	Cites structure demolition and erosion	NE, no subsurface deposits, no prehistoric diagnostics, recent historic occupation
	40MT602	Cites logging	NE, minimal disturbances

Table A-3. Site-specific NRHP evaluation data.

Description	*Site No.*	*Condition/Integrity*	*Criterion D Reasoning*
1307 PCI	40MT632	Cites firebreak construction , logging, and military use	NE, disturbed, mostly surface artifacts
	40SW449	Cites structure demolition	NE, shallow deposits, low density of artifacts
	40MT414	Cites push piles, military use, and firebreak construction	NE, no diagnostics, common site type, few artifacts
	40MT636	Cites erosion	NE, few artifacts, no diagnostics, disturbed, common site type
	40SW439	Cites structure demolition	NE, disturbed, recent occupation, few prehistoric artifacts, no prehistoric diagnostics
	40SW443	Cites firebreak construction and military use	NE, few artifacts, no diagnostics, common site type
	40SW451	Cites clearing, military use, firebreak construction, and cultivation	NE, extreme disturbance by military
	40SW459	Cites structure demolition	NE, low artifact density, disturbed
	40SW456	Cites structure demolition, road construction, military use, and push piles	NE, heavy disturbance
	40SW445	Cites firebreak construction, cultivation, and structure demolition	NE, few artifacts, disturbed
	40SW453	Cites structure demolition and firebreak construction	NE, deflated, surface scatter, little subsurface potential

Table A-3. Site-specific NRHP evaluation data.

Description	*Site No.*	*Condition/Integrity*	*Criterion D Reasoning*
4836 PCI	40MT647	Cites structure demolition and cultivation	NE, disturbed, few artifacts, shallow deposits, no structural remains
	40MT658	Cites structure demolition	NE, few artifacts, no archival data, not outstanding, others better
	40MT677	Cites military pits	SHPO said PE, PCI says NE (low artifact density & non-diagnostic artifacts)
	15CH578	Cites structure demolition, firebreak and road construction, and logging	Pg. 172 says PE, but goes on to note all negative attributes
	40MT715	Cites cultivation	NE, few artifacts, no diagnostics, heavily disturbed
	40MT648	Cites vehicle ruts	NE, erosion, common site type, few artifacts, unknown historic occupation
	40MT668	Cites structure demolition	PE, well preserved, layout intact, subsurface patterning, archival data
	40MT447	Cites structure demolition and military use	NE, heavy disturbance
	40MT703	Cites erosion and logging	NE, low density of artifacts, non-diagnostic artifacts
	40MT711	Cites firebreak construction	NE, low density of artifacts, non-diagnostic artifacts
	40MT752	Site is undisturbed	PE, not razed, one of few sites w/standing structures

Table A-3. Site-specific NRHP evaluation data.

Description	*Site No.*	*Condition/Integrity*	*Criterion D Reasoning*
4952 PCI	15TR267	Integrity not discussed	NE, poorly preserved, small, light density scatter, no interest, better sites nearby
	40SW110	Cites structure demolition	NE, poorly preserved, small, light density scatter, no interest
	40SW464	Cites vehicle ruts, trenching, and push piles	NE, razed, low artifact density, small, poorly preserved, no interest
	40MT762	Cites structure demolition and vehicle ruts	NE, heavy disturbed, essentially destroyed
	40MT854	Cites soil deflation	NE, low density scatter, non-diagnostic artifacts
	40MT786	Integrity not discussed	NE, low artifact density, small, nothing of special interest
	40SW470	Cites push piles and bulldozer impacts	NE, razed, poorly preserved, small, light density scatter, no interest
	15CH612	Integrity not discussed	NE, low artifact density, small, undifferentiated, poor preservation, no interest
	15TR265	Cites soil deflation	NE, low artifact density, small, undifferentiated, poor preservation, no interest
	15CH610	Cites cultivation	NE, small, light artifact density, poor preservation, no interest
	40SW514	Cites structure demolition and firebreak construction	NE, small, light artifact density, poor preservation, no interest
4128 PCI	40MT815	Observes that little disturbance was noted	PE, good preservation, deep, intact deposits
	40MT398	Cites structure demolition and firebreak construction	NE, disturbed
	40MT853	Cites logging and cultivation	NE, very poor condition, low artifact density, shallow deposits
	40MT806	Cites cultivation, military use, and vehicle ruts	NE, all artifacts from plow zone context
	40MT831	Cites road construction and vehicle ruts	NE, low artifact density, non-diagnostic artifacts
	40MT816	Cites logging, soil erosions, and vehicle ruts	PE, camp, artifact concentrations present
	40MT869	Cites structure demolition and vehicle ruts	NE, disturbed
	40MT870	Cites structure demolition and soil erosion	NE, low artifact density, non-diagnostic artifacts
	40SW543	Cites structure demolition and road construction	NE, very poor condition
	40SW552	Cites logging and cultivation	NE, poor condition, low density of artifacts
	40MT847	Cites structure demolition	NE, poor condition, low density of artifacts

Table A-3. Site-specific NRHP evaluation data.

Description	*Site No.*	*Condition/Integrity*	*Criterion D Reasoning*
3715 PCI	15TR298	Cites vehicle ruts, large depression	NE, no structural features, disturbed, no intact subsurface or spatial patterning,
	15TR323	Integrity not discussed	NE, few positive shovel tests, no intact subsurface deposits or spatial patterning
	15TR317	Cites push piles, depressions, and vehicle ruts	NE, heavily disturbed, low artifact density, no intact subsurface deposits
	40SW86	Cites soil erosion	NE, low artifact density and diversity, disturbed, no diagnostics, no intact subsurface deposits
	40SW572	Integrity not discussed	NE, no intact subsurface deposits or spatial patterning
	15TR290	Integrity not discussed	NE, no intact subsurface deposits or spatial patterning
	15CH632	Integrity not discussed	NE, small, low artifact density and diversity, no spatial patterning, no intact subsurface deposits
	15TR349	Cites soil erosion and road construction	NE, heavily disturbed, razed, low artifact density, no intact subsurface or spatial patterning
	15TR324	Cites soil erosion	NE, few positive shovel tests, no intact subsurface or spatial patterning
	15TR329	Cites soil erosion	NE, few positive shovel tests, no intact subsurface or spatial patterning
	40SW562	Cites structure demolition	NE, razed, artifacts confined to A horizon

NE = Not Eligible
PE = Potentially Eligible

APPENDIX B

ARTIFACT INVENTORY

Site No.	*Provenience*	*Catalog No.*	*Artifact Description*	*N*	*Weight (g)*	*Comments*
40MT302	ST 1-7, 20–30 cm	15-1.1	Flake, broken	1	0.2	St. Louis chert
40MT302	ST 1-9, 20–30 cm	15-2.1	Block shatter	1	0.8	low-grade local chert
40MT302	ST 2-5, 20–30 cm	15-3.1	Flake, secondary retouched	1	7.6	low-grade local chert
40MT302	ST 3-10, 20–30 cm	15-4.1	Fire-cracked rock	1	9.5	
40MT302	ST 5-2, 20–30 cm	15-5.1	Flake, tertiary	1	0.1	low-grade local chert
40MT302	ST 6-8, 10–20 cm	15-6.1	Flake, broken	1	0.4	low-grade local chert
40MT302	ST 9-3, 10–20 cm	15-7.1	Flake, broken	1	0.5	Dover chert
40MT302	ST 9-13, 20–30 cm	15-8.1	Flake, bifacial thinning	1	0.8	Dover chert
40MT302	ST 11-2, 20–30 cm	15.9-1	Flake, broken	1	0.4	high-grade local chert
40MT302	ST 15-6, 0–10 cm	15-10.1	Block shatter	1	1.2	high-grade local chert
40MT302	ST 15-8, 0–10 cm	15-11.1	Biface tip	1	3.0	Dover chert
40MT302	ST 15-8, 10–20 cm	15-12.1	Broken flake	1	0.7	Dover chert
40MT302	ST 15-8, 10–20 cm	15-12.2	Broken flake	1	0.1	St. Louis chert
40MT302	50-x-50 TU, 0–10 cm	15-13.1	Core	1	285.1	Dover chert
40MT302	50-x-50 TU, 0–10 cm	15-13.2	Fire-cracked rock	1	5.5	
40MT302	50-x-50 TU, 0–10 cm	15-13.3	Flake, tertiary	1	6.3	low-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.4	Flake, tertiary	1	0.8	low-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.5	Flake, tertiary	1	1.1	high-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.6	Flake, tertiary	1	0.2	high-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.7	Flake, secondary	1	2.9	low-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.8	Flake, secondary	1	2.2	high-grade local chert

Site No.	*Provenience*	*Catalog No.*	*Artifact Description*	*N*	*Weight (g)*	*Comments*
40MT302	50-x-50 TU, 0–10 cm	15-13.9	Flake, secondary	1	1.4	high-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.10	Block shatter	1	1.2	low-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.11	Block shatter	1	0.4	low-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.12	Block shatter	1	3.0	high-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.13	Block shatter	1	1.2	high-grade local chert
40MT302	50-x-50 TU, 0–10 cm	15-13.14	Flake, broken	1	0.9	St. Louis chert
40MT302	50-x-50 TU, 0–10 cm	15-13.15	Flake, bifacial thinning	1	0.2	St. Louis chert
40MT302	50-x-50 TU, 10–20 cm	15-14.1	Flake, primary	1	10.6	Dover chert
40MT302	50-x-50 TU, 10–20 cm	15-14.2	Flake, primary	1	8.5	low-grade local chert
40MT302	50-x-50 TU, 10–20 cm	15-14.3	Block shatter	1	1.2	low-grade local chert
40MT302	50-x-50 TU, 10–20 cm	15-14.4	Block shatter	1	0.6	low-grade local chert
40MT302	50-x-50 TU, 10–20 cm	15-14.5	Flake, secondary	1	2.4	high-grade local chert
40MT302	50-x-50 TU, 10–20 cm	15-14.6	Flake, secondary	1	2.8	high-grade local chert
40MT302	50-x-50 TU, 10–20 cm	15-14.7	Flake, tertiary	1	2.8	high-grade local chert
40MT302	50-x-50 TU, 10–20 cm	15-14.8	Flake, tertiary	1	0.4	high-grade local chert
40MT302	50-x-50 TU, 10–20 cm	15-14.9	Flake, broken	1	5.2	Dover chert
40MT302	50-x-50 TU, 10–20 cm	15-14.10	Flake, broken	1	0.6	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.1	Flake, primary retouched	1	25.0	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.2	Block shatter	1	1.0	Dover chert
40MT302	50-x-50 TU, 20–30 cm	15-15.3	Block shatter	1	1.4	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.4	Block shatter	1	0.4	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.5	Flake, bifacial thinning	1	1.4	Dover chert
40MT302	50-x-50 TU, 20–30 cm	15-15.6	Flake, bifacial thinning	1	0.5	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.7	Flake, broken	1	0.2	St. Louis chert
40MT302	50-x-50 TU, 20–30 cm	15-15.8	Flake, broken	1	0.5	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.9	Flake, broken	1	0.2	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.10	Flake, secondary	1	0.6	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.11	Flake, secondary	1	0.1	high-grade local chert
40MT302	50-x-50 TU, 20–30 cm	15-15.12	Flake, tertiary	1	0.6	Dover chert
40MT302	50-x-50 TU, 20–30 cm	15-15.13	Flake, tertiary	1	0.4	Dover chert
40MT302	50-x-50 TU, 20–30 cm	15-15.14	Flake, tertiary	1	0.3	high-grade local chert

Site No.	*Provenience*	*Catalog No.*	*Artifact Description*	*N*	*Weight (g)*	*Comments*
40MT302	50-x-50 TU, 20–30 cm	15-15.15	Flake, tertiary	1	0.3	high-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.1	Fire-cracked rock	1	75.3	possibly pitted
40MT302	50-x-50 TU, 30–40 cm	15-16.2	Block shatter	1	2.7	high-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.3	Block shatter	1	3.0	low-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.4	Block shatter	1	0.2	low-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.5	Block shatter	1	0.2	low-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.6	Flake, bifacial thinning	1	0.3	high-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.7	Flake, broken	1	0.2	St. Louis chert
40MT302	50-x-50 TU, 30–40 cm	15-16.8	Flake, broken	1	1.7	high-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.9	Flake, broken	1	0.2	high-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.10	Flake, broken	1	0.2	high-grade local chert
40MT302	50-x-50 TU, 30–40 cm	15-16.11	Flake, broken	1	0.1	high-grade local chert
40MT302	50-x-50 TU, 40–50 cm	15-17.1	Flake, broken	1	1.8	high-grade local chert
40MT302	50-x-50 TU, 40–50 cm	15-17.2	Flake, broken	1	6.3	Purchase gravel
40MT302	50-x-50 TU, 40–50 cm	15-17.3	Flake, tertiary	1	0.6	low-grade local chert
40MT302	50-x-50 TU, 40–50 cm	15-17.4	Block shatter	1	0.8	unidentified chert
40MT302	50-x-50 TU 50–70 cm	15-18.1	Fire-cracked rock	1	19.3	
40MT302	50-x-50 TU 50–70 cm	15-18.2	Fire-cracked rock	1	10.9	
40MT302	50-x-50 TU 50–70 cm	15-18.3	Flake, broken	1	1.4	Dover chert
40MT302	50-x-50 TU 50–70 cm	15-18.4	Flake, broken	1	0.5	high-grade local chert
40MT302	50-x-50 TU 50–70 cm	15-18.5	Flake, broken	1	0.1	high-grade local chert
40MT302	50-x-50 TU 50–70 cm	15-18.6	Flake, broken	1	1.4	low-grade local chert
40MT302	50-x-50 TU 50–70 cm	15-18.7	Block shatter	1	12.2	Dover chert
40MT302	50-x-50 TU 50–70 cm	15-18.8	Block shatter	1	6.5	high-grade local chert
40MT302	50-x-50 TU 50–70 cm	15-18.9	Block shatter	1	1.8	low-grade local chert
40MT302	50-x-50 TU 50–70 cm	15-18.10	Block shatter	1	4.5	low-grade local chert
40MT302	50-x-50 TU 50–70 cm	15-18.11	Block shatter	1	7.5	low-grade local chert
40MT302	50-x-50 TU 50–70 cm	15-18.12	Block shatter	1	6.1	unidentified chert
40MT302	50-x-50 TU 50–70 cm	15-18.13	Flake, bifacial thinning	1	0.3	St. Louis chert
40MT302	50-x-50 TU 50–70 cm	15-18.14	Flake, secondary	1	2.0	low-grade local chert

Site No.	*Provenience*	*Catalog No.*	*Artifact Description*	*N*	*Weight (g)*	*Comments*
40MT302	50-x-50 TU 70–85 cm	15-19.1	Block shatter	1	0.6	unidentified chert
40MT302	50-x-50 TU 70–85 cm	15-19.2	Flake, broken	1	0.5	high-grade local chert
40MT302	50-x-50 TU 70–85 cm	15-19.3	Flake, secondary	1	3.3	high-grade local chert
40MT302	50-x-50 TU 70–85 cm	15-19.4	Flake, tertiary	1	2.2	high-grade local chert
40MT303	ST 26-1, 0–10 cm	21-1.1	Flake, secondary retouched	1	13.7	low-grade local chert or Ste. Genevieve chert

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14. ABSTRACT

From September 2003 through June 2004 the Public Service Archaeology Program (PSAP) of the University of Illinois at Urbana–Champaign and ERDC/CERL conducted an assessment of archaeological site surveys previously conducted at Fort Campbell, Kentucky/Tennessee. The Fort Campbell cultural resource management (CRM) program had reason to believe that the archaeological site surveys conducted over the past 25 years do not provide the quality of information required to meet current Army cultural resource regulations and land management objectives.

Overall, this project identified numerous deficiencies in previous archaeological site surveys at Fort Campbell. Suggested remedial and proactive measures include resurvey of a stratified random sample of previously surveyed areas to quantify the reliability of extant site data, a detailed analysis of field maps from previous projects to identify areas that may not have been surveyed, a greater specificity in future Scopes of Work, and frequent monitoring of ongoing fieldwork. Some of these recommendations had already been implemented by the current Fort Campbell CRM staff prior to this project.

15. SUBJECT TERMS
Fort Campbell; archaeological research; cultural resources management; cultural resources management (CRM) program; archaeological site surveys

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