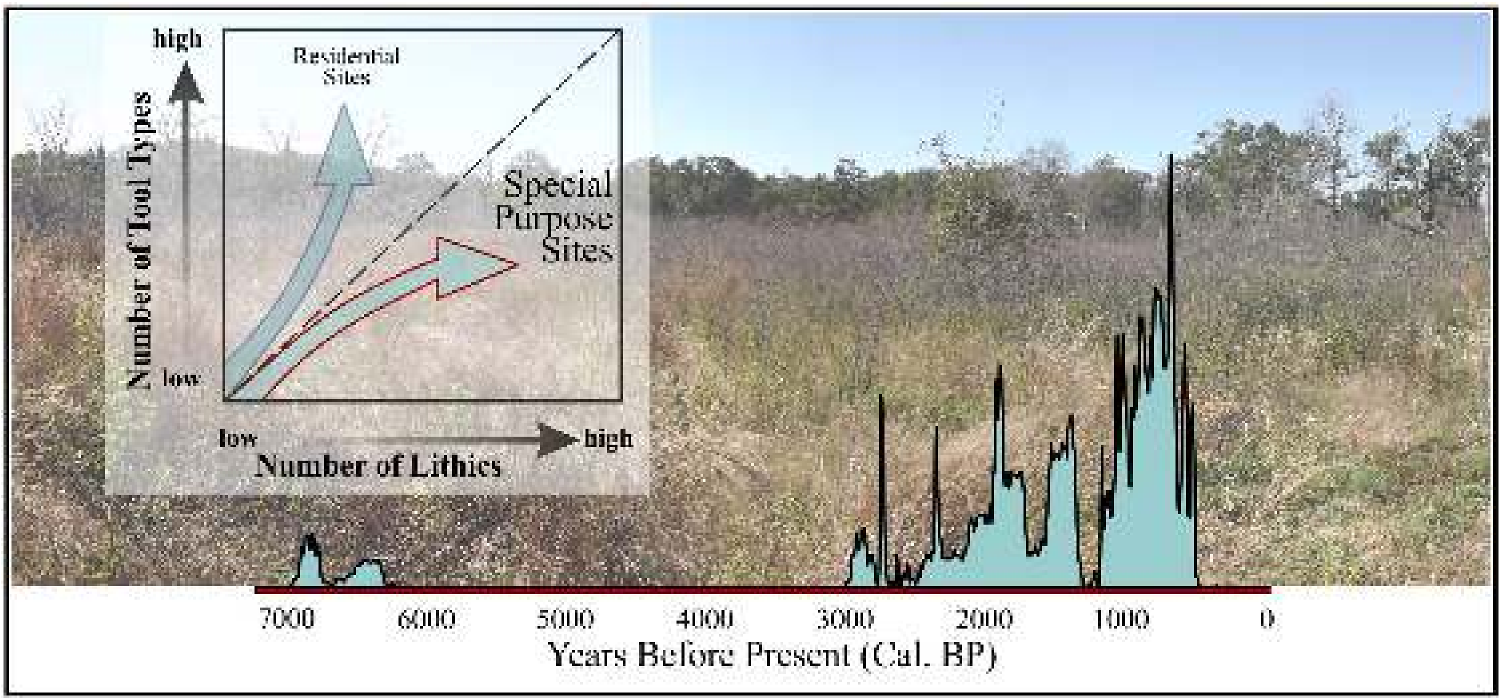
National Register Eligibility Testing of Three Archaeological Sites on Camp Swift, Bastrop County, Texas

by

Leonard Kemp, Raymond Mauldin, and Cynthia Munoz



Interagency Cooperation Agreement
No. TMD17-2053-ENV

REDACTED

Principal Investigator
Paul Shawn Marceaux

Prepared for:
Texas Military Department
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Archaeological Report, No. 465

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Abstract:

In October and November of 2017, the Center for Archaeological Research (CAR) at The University of Texas at San Antonio conducted fieldwork associated with National Register of Historic Places (NRHP) eligibility testing of three archaeological sites located on Camp Swift, a facility operated by the Texas Military Department (TMD) in Bastrop County, Texas. Under the direction of the TMD, CAR carried out the work in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended. The three sites, 41BP528, 41BP859, and 41BP865, are located in an area that is under study as a future drop zone for airborne training. The property is licensed to the TMD for use by the U.S. Army Corps of Engineers. The creation of the drop zone requires an Environmental Assessment under section 102 of the National Environmental Policy Act to assist in determining whether this action will have significant impacts on "the natural and physical environment and the relationship of people with that environment (40 CFR 1508.14)." The testing was performed under Interagency Cooperation Agreement TMD17-2053-ENV, with Dr. Paul Shawn Marceaux serving as Principal Investigator and Leonard Kemp serving as the Project Archaeologist.

During these investigations, CAR excavated 11 1-x-1 m test units, three 1-x-0.5 m test units, and screened approximately 10.26 m^3 of deposits. CAR identified one feature at 41BP859 and two features at 41BP865. These three thermal features were AMS radiocarbon dated to the Late Prehistoric period. CAR recovered three projectile points, 16 lithic tools/cores, 414 pieces of debitage and 18.8 kg of burned rock. Following the analyses and quantification of these collected artifacts, those possessing little scientific value were discarded pursuant to Chapter 26.27(g)(2) of the Antiquities Code of Texas and in consultation with both the TMD and the Texas Historical Commission (THC). The only discarded artifact class was non-feature burned rock. It was documented, and counts were included in curation documentation. All remaining cultural materials, as well as records obtained and/or generated during the project, were prepared in accordance with federal regulation 36 CFR part 79 and THC requirements for State Held-in-Trust collections at CAR.

CAR relied on three interrelated criteria to determine site eligibility: 1) the integrity of a site, 2) the chronological potential of a site, and 3) the site content. CAR recommends that 41BP528 should be considered not eligible for NRHP listing due to poor integrity, the lack of chronological potential, and minimal site content. CAR recommends the remaining two sites, 41BP859 and 41BP865, should be considered as eligible for listing on the NRHP. These two sites have site integrity, chronological potential, and site content that could potentially contribute to understanding the prehistory in the region. Consequently, impacts to sites 41BP859 and 41BP865 should be avoided. If avoidance is not possible, then CAR recommends that a plan for mitigation of adverse effects from proposed impacts be developed and implemented.

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Acknowledgements:

Dr. Paul Shawn Marceaux, the Principal Investigator, and Leonard Kemp, the Project Archaeologist, would like to acknowledge the following who have contributed their valued expertise: the field crew consisting of Jason Brian Perez, Megan Brown, Antonia Figueroa, and Sarah Wigley, with special thanks to Jason for his insight, dedication, and hard work. Thanks to Dr. Jessica Nowlin for TDS and GIS data collection and maps on this project, as well as to Dr. Raymond Mauldin and Cynthia Munoz for their help in shooting in that last faraway site. Thanks to the lab crew consisting of Megan Brown and Lindy Martinez under the direction of the Lab Director, Cynthia Munoz. Ms. Brown also curated the artifacts and records of this project, again under the direction of Ms. Munoz. The production of this document would not have been possible without the input of Dr. Kelly Harris who edited and formatted the document. Thanks are due to Kristen Mt. Joy of the Texas Military Department for her support and her review and comments on the initial draft of this report. Thanks also to Lieutenant Colonel Philip Kost for his assistance and to SFC James Rambikur and SGT Mario Benavidez at Camp Swift Range Control for keeping us safe.

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Chapter 1: Introduction and Project Orientation

Leonard Kemp

The Center for Archaeological Research (CAR) at The University of Texas at San Antonio conducted National Register of Historic Places (NRHP) eligibility testing of three archaeological sites located on Camp Swift, a facility operated by the Texas Military Department (TMD) in Bastrop County, Texas. The three sites, 41BP528, 41BP859, and 41BP865, are located in an area that is under study for future use as a drop zone for airborne training. The property is federally licensed to the TMD for use by the U.S. Army Corps of Engineers. The creation of the drop zone requires an Environmental Assessment (EA) under section 102 of the National Environmental Policy Act (NEPA) to assist in determining whether this action will have significant impacts on the "the natural and physical environment and the relationship of people with that environment (40 CFR 1508.14)." CAR, under the direction of the TMD, carried out the work in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. The NHPA review will be incorporated into the EA as agreed upon by the State Historic Preservation Officer (SHPO) at the Texas Historical Commission (THC) and the Federally Recognized Tribal Historic Preservation Officers (THPO), as well as designated cultural preservation and tribal representatives (Kristin Mt. Joy, personal communication 2018). This report is designed to provide sufficient information for the decision making process of the SHPO and THPO with regard to the cultural resources within the proposed training area (Kristin Mt. Joy, personal communication 2018). While the project was not conducted under a Texas Antiquities Permit, it was conducted in a manner consistent with the requirements of the Antiquities Code of Texas. The testing was performed under Interagency Cooperation Agreement TMD17-2053-ENV, with Dr. Paul Shawn Marceaux serving as Principal Investigator and Leonard Kemp serving as Project Archaeologist.

Camp Swift is an 11,500-acre military training facility located in Bastrop County in the southeastern portion of central Texas. It is roughly 7 km south of the City of Elgin and 14 km north of the City of Bastrop (Figure 1-1). The facility is located on the Lake Bastrop and Elgin East Texas USGS 7.5-minute quadrangle maps. A component of the military activity is to train airborne personnel and practice equipment drops in the area known as the Blackwell Drop Zone (DZ). The DZ is located in the southeast portion of Camp Swift in Training

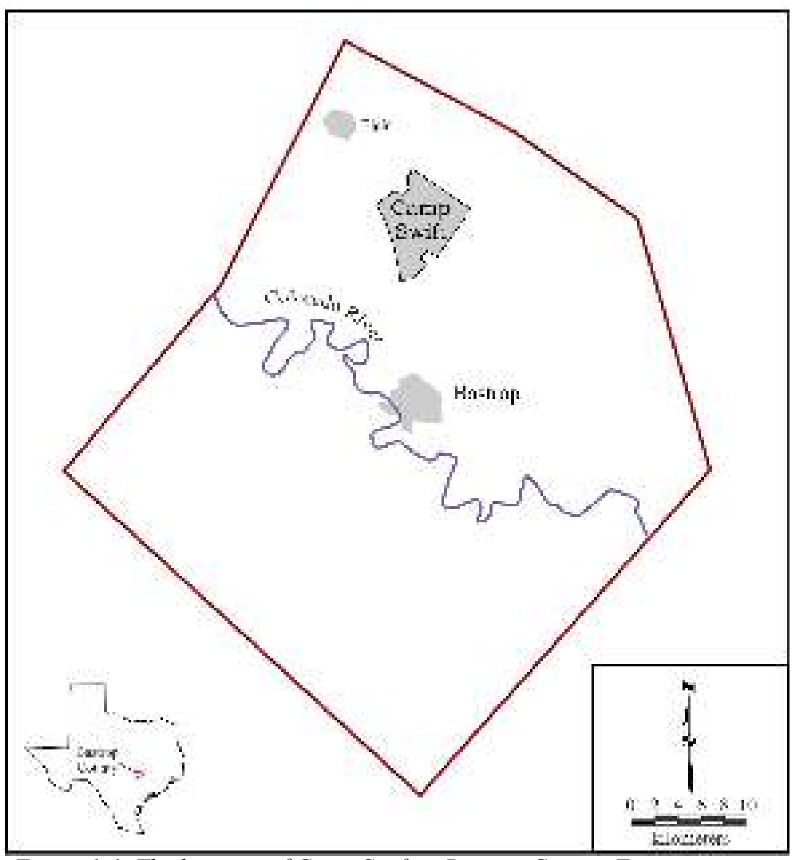

Figure 1-1. The location of Camp Swift in Bastrop County, Texas.

Area II. The current DZ is approximately 147 acres, and the proposed plan is to expand it an additional 684 acres to facilitate battalion-size airborne training. The primary user of the proposed facility will be the Texas Army National Guard (TXARNG) 1/143rd Airborne Battalion with additional units likely to use the facility upon completion.

There are 11 recognized archaeological sites within the proposed DZ. One site, 41BP854, is eligible to the NRHP, and seven sites have been determined ineligible (TMD 2018). The status of three sites investigated here is undetermined (TMD 2018). Determining the eligibility status of these three sites is necessary to complement the decision-making process regarding the DZ expansion (Kristin Mt. Joy, personal communication 2018).

The archaeological testing of the three sites was conducted in October and November of 2017. CAR excavated 11 1-x-1 m and three 1-x-0.5 m test units and screened approximately 10.26 m^3 of deposits. CAR recovered three projectile points, 16 lithic tools/cores, 414 pieces of debitage and 18.8 kg of burned rock. CAR identified one burned rock feature at 41BP859 and two burned rock features at 41BP865. Ultimately, CAR recommends that sites 41BP859 and 41BP865 are eligible for listing on the NRHP. Site 41BP528 is recommended as not eligible for NRHP listing.

Following laboratory processing and analysis, and in consultation with the TMD, selected items that had no remaining scientific value were discarded. Discarded artifacts included non-feature burned rock, heat spalls, and soil samples. This discard conformed to THC guidelines. All remaining archaeological samples, associated artifacts, documents, notes, and photographs were prepared for curation according to THC guidelines and are permanently curated at CAR at UTSA.

Research Perspective

The current project involves NRHP testing of three sites to determine their eligibility status. The National Register is maintained by the National Parks Service (NPS), and criteria for eligibility determination are identified in Title 36, Code of Federal Regulations (CFR) 60.4 (NPS 2016). There are four criteria, A-D, that were developed to assess "the quality of significance" in a variety of areas, including archaeology (NPS 2016). Generally, Criterion D is the most relevant to archaeological sites as it states sites that possess integrity and that "have yielded, or may be likely to yield, information important in prehistory or history" are eligible for inclusion on the NRHP (NPS 2016). Mauldin et al. (2018) previously used three research criteria to address the question of whether several prehistoric sites on Camp Swift were eligible to the National Register. These criteria were site integrity, site chronology, and the content of a site (Mauldin et al. 2018). This report will use these same criteria and evaluation methods to determine the NRHP status of the three sites discussed in this report. CAR will couple information on the vertical distribution of artifacts with data on magnetic soil susceptibility (MSS) values to evaluate whether a site maintains sufficient integrity for further research. There is a lack of dated components on Camp Swift (see Bousman et al. 2010; Mauldin et al. 2018; Nickels 2008). Developing an understanding of what happened in the past requires placing artifacts in a temporal framework. Consequently, the focus is on chronological placement of artifacts and features using both temporally diagnostic artifacts and radiocarbon dating. The last research criterion concerns analyzing the content of a site assemblage to try to understand the range of behaviors that generated the assemblages.

Report Organization

This report contains eleven chapters and five appendices. Following this introduction, Chapter 2 provides an overview of the modern and paleoenvironment of Camp Swift. Chapter 3 presents the cultural history of Camp Swift and archaeological background coupled with research questions focused on the archaeological record of Camp Swift. Chapter 4 explores emerging archaeological patterns found at Camp Swift sites based upon previous testing by Nickels (2008) and Mauldin et al. 2018. This chapter is framed to provide current information of sites on Camp Swift and what might frame future archaeological investigations. Chapter 5 describes the field and laboratory methods used on the project, while Chapter 6 provides a detailed account of each site, including information on the work accomplished and a summary of the materials recovered. Chapter 7 is the first of three chapters that summarize the three criteria to determine eligibility. Chapter 7 reports on bioturbation evident at each site, the distributional patterns of debitage, and magnetic susceptibility patterning to quantify site integrity. Chapter 8 assesses the chronological potential of each site. Chapter 9 presents information on site content, including data on lithic assemblage characteristics as well as the presence of features. The chapter focuses on content sample size and variety, suggesting that assemblages with greater variety are potentially more useful for assessing general research questions. Chapter 10 reports on the results of analysis of the three tested sites to characterize site occupation. Chapter 11 provides a summary of the project, including recommendations for the NRHP eligibility of the three sites. Five appendices are included in this volume. Appendix A presents details on the radiocarbon dates. The magnetic susceptibility data is presented in Appendix B. Appendix C provides details on the chipped stone assemblage. Appendix D lists attributes of raw lithic material available on Camp Swift, while images of lithic tools recovered on the project are shown in Appendix E.

Chapter 2: Project Environment

Leonard Kemp, Cynthia Munoz, and Raymond Mauldin

This chapter presents an overview of the modern natural environment in the Camp Swift area and includes a brief discussion of its topography, geology, and soils. This overview is followed by a discussion of the modern climate, paleoenvironment, and the modern flora and fauna. Additional information on the Camp Swift area can be found in recent summaries by Mauldin et al. (2018), Haefner et al. (2012), Munoz (2012a), and Yelacic and Lohse (2011).

Topography

The topography of Camp Swift is characterized by rolling uplands and flat bottomlands moderately dissected by drainages (Skelton and Freeman 1979). Figure 2-1 is a LiDAR-based image showing elevations on Camp Swift, along with major drainages. Elevations generally range from 112 to 175 meters above mean sea level (m AMSL). The principal drainage is the perineal Big Sandy Creek, a tributary of the Colorado River. Minor drainages include McLaughlin Creek, Dogwood Creek, Dogwood Branch, and Harris Creek all of which drain into Big Sandy Creek. The project area (Figure 2-1, inset) lies within the uplands located in the southeastern portion of the facility with elevations ranging from 141 to 149 m AMSL. Two sites, 41BP859 and 41BP865, are separated by an unnamed, intermittent drainage with the third site, 41BP528, lying adjacent to another unnamed, intermittent drainage (Figure 2-1, inset).

Geology and Soils

The Calvert Bluff Formation of the Wilcox Group underlies Camp Swift (Avakian and Wermund 1993; Baker 1979). The Calvert Bluff Formation is composed of weakly to moderately consolidated, massive to thin-bedded, clayey, and fine-grained to very fine-grained sandstone, siltstone, and claystone (Barnes 1974). The Uvalde Gravels overlie the

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Figure 2-1. LiDAR map showing elevations of Camp Swift and major drainages. Inset shows the project area.

Calvert Bluff Formation (Robinson et al. 2001). The Uvalde Gravels are a lag deposit of chert, quartz, quartzite, jasper, limestone, and silicified wood pebbles, cobbles, and boulders derived from the Ogallala Formation of Llano Estacado in west Texas and southeastern New Mexico (Byrd 1971; Robinson et al. 2001). The Uvalde deposits are found along the lower reaches of the Big Sandy Creek as well as ridges and summits within Camp Swift (Robinson et al. 2001). Multiple authors note the poor quality of this local lithic material for knapping (see Kay and Tomka 2001; Kelly and Roemer 1981; Skeleton and Freeman 1979).

On Camp Swift itself there are two major soil associations, the Patillo-Demona-Silstid (P-D-S) and the Axtell-Tabior (A-T) associations. These soils consist of patches of deep sandy soils, patches of sandy loam, and patches of sandy-clay/sandy clay loam (Camp Swift Integrated Natural Resources Management Plan [INRMP], TMD 2010). The soils of the project area are all alfisoils consisting of O-A-B-C horizons.

There are four soils series within the P-D-S association within the project area. The first two soils are the Edge fine sandy loam, 1 to 5 percent (AfC), and Edge fine sandy loam, 2 to 5 percent (AfC2). The Edge group is derived from loamy and clayey residuum and clayey residuum (Baker 1979). Silstid loamy fine sand, 1 to 5 percent (SkC), is the third soil and is derived from weathered sandy and loamy sediment interbedded with sandstone (Baker 1979). The Tabor fine sandy loam, 1 to 3 percent (TfB), is the final soil. It derives from loamy and clayey alluvium from sandstone and shale (Baker 1979). These soil groups are typically composed of sandy loam over a sandy clay or clay subsoil. Within the project area, all units contained an upper level of sand/sandy loam over a sandy clay/clay horizon.

The northern portion of the 41BP528 lies within the Silstid loamy fine sand, 1 to 5 percent slopes series. The southern portion of the site and the portion tested lies within the Edge fine sandy loam, 1 to 5 percent slopes. Site 41BP859 is divided between three soils groups (Figure 2-2): the Tabor fine sandy loam, 1 to 3 percent (approximately 70 percent of the site), the Silstid loamy fine sand, 1 to 5 percent slopes series (approximately 20 percent of the site), and the Edge fine sandy loam, 2 to 5 percent slopes (approximately 10 percent of the site). Site 41BP865 lies exclusively within the Edge fine sandy loam, 2 to 5 percent slope soil group.

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Figure 2-2. Detailed soil map of project area with sites. Inset shows the two major soil associations and series found on Camp Swift.

Modern Climate

The climate of Bastrop County is characterized as humid and subtropical with hot summers and cool winters (Baker 1979; Marks 2010). The following is a summation of the 30-year (1981-2010) climate monthly normal from the Elgin weather station located 14.4 km northwest of Camp Swift (NOAA 2018). The average yearly precipitation is 87.452 cm (34.43 in.). Rainfall is bimodal with a major peak in May (10.896 cm; 4.49 in) and a secondary peak in October (10.337 cm; 4.07 in.). The summer months of July and August are the driest with mean rainfall totals of 50.8 mm (2.0 in.) and 52.07 mm (2.05 in.), respectively. The summer months of July and August are the hottest months of the year with average monthly of 29.05°C (84.3°F) and 29.33°C (84.8°F), respectively. The coldest month is January with an average monthly low of 4.05°C (39.3°F).

Paleoenvironment

Paleoenvironmental studies aid in understanding of how human behavior responds and adapts to changing environments over time. Much of the current knowledge about paleoenvironmental conditions in Central Texas in the Late Holocene is derived from climate studies using various proxy measures (see Thompson et al. 2012). The following section uses methods explored by Munoz (2012b) to investigate the location specific Macrophysical Climate Model (MCM) for Camp Swift. MCMs were developed by Bryson and Bryson as a complement to more general climate simulation models (1997; see also Bryson 1989, 1992, 1994; Bryson and DeWall 2007; Bryson and Goodman 1986). The model developed by Munoz (2012b) uses the 30-year (1961-1990) averages of monthly temperature, precipitation, and other weather data in conjunction with factors effecting atmospheric transparency and solar radiation absorption (volcanic eruptions, ice, snow volumes, etc.), coupled to what is termed "centers of actions" (Munoz 2012b). These centers involve elements of atmospheric circulation and are framed for different parts of the world. Detailed information and instruction concerning the model construction can be found in Bryson and DeWall (2007).

Munoz (2012b:Figure 2-10), using the MCM methodology, created the Camp Swift/Elgin Model (CSEM) using data from the Elgin, Texas, weather station (Figure 2-3). The CSEM provides a 100-year resolution for an 18,000-year period of annual precipitation and potential evapotranspiration (PET) to infer vegetation regimes. This temporal frame was chosen to allow for comparisons with arboreal pollen data from the Boriack and Weakley Bogs (Figure 2-4), synthesized by Bousman (1998). The CSEM suggests that prior to about 12,200 BP, the area was likely forested. After this date, the area shifted to grasslands with short periods of woodland/savannah vegetation early (ca. 10,000-12,000) and late (ca. post 600). Extreme dry periods are shown around 8800 BP and 5300 BP. The comparison of this model to the pollen data shows an overall similarity but with some important differences. These differences are in the timing of shifts as well as the approximately 6,000-year period of forests

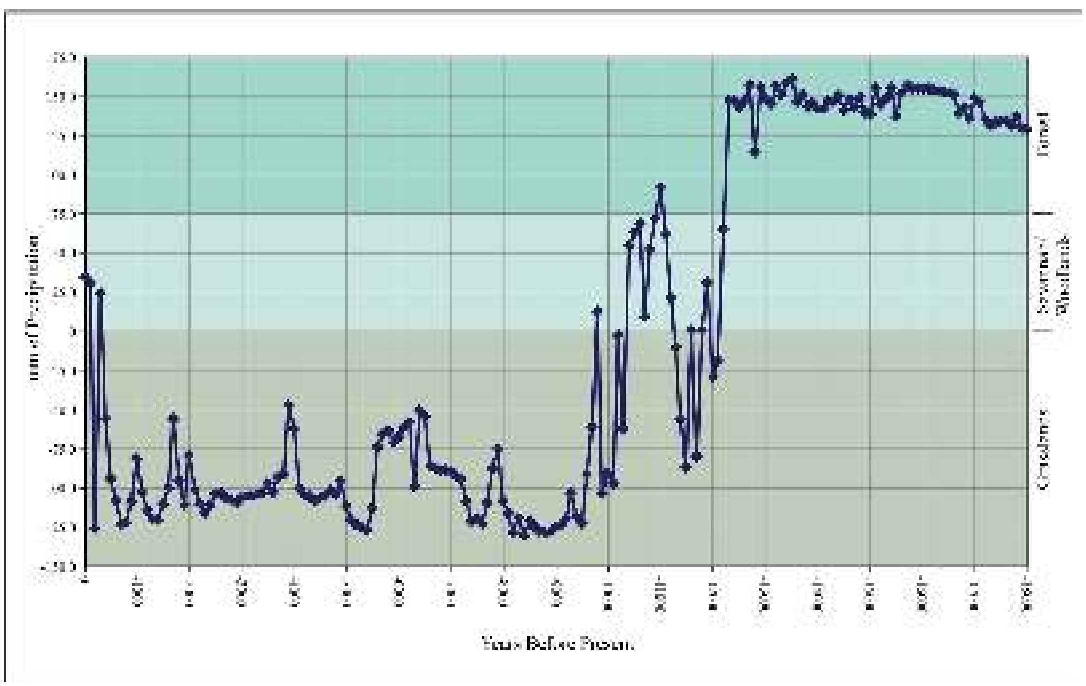

Figure 2-3. A Macrophysical Climate Model for Camp Swift/Elgin of vegetation regimes (0-18,000 BP) at 100-year resolution (Munoz 2012b:Figure 2-10).

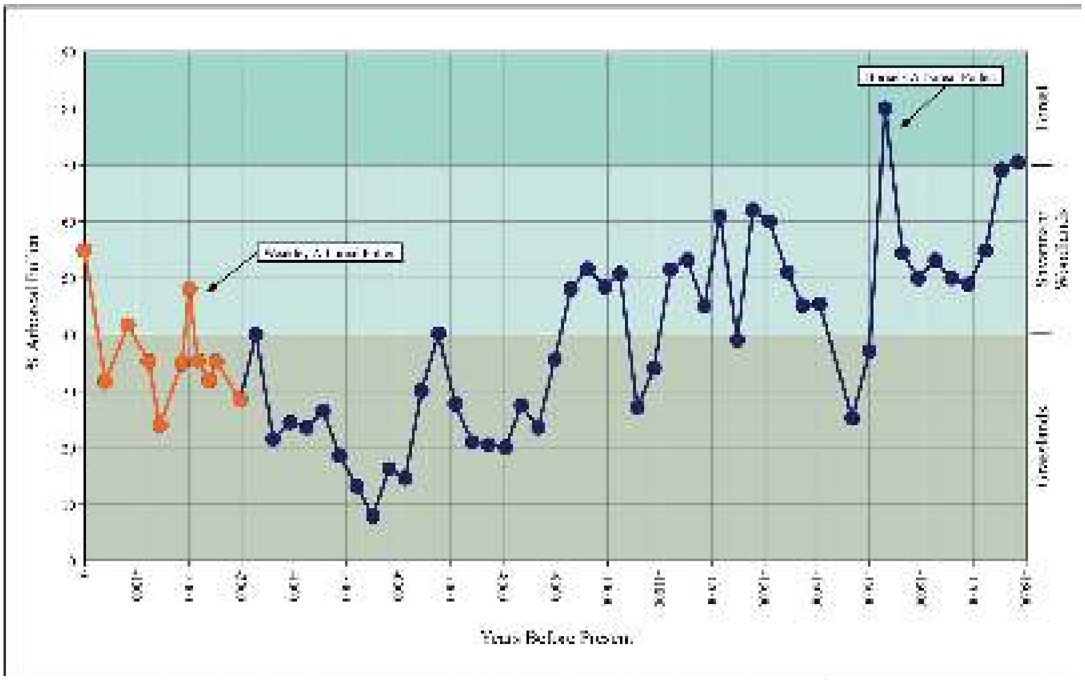

Figure 2-4. Arboreal pollen data at Boriack (blue) and Weakley (orange) Bogs for 18,000-year period with vegetation regimes (Bousman 1998; from Munoz 2012b:Figure 2-11).

shown in the model prior to 12,000 BP. The pollen data are interpreted as reflecting a savannah/woodlands regime. While the CSEM is generally consistent, at least with the pollen data set, Munoz (2012b) notes that its future may lie in its utility to provide testable details that can then be compared to the archaeological record.

Flora and Fauna of the Post Oak Savannah

Bastrop County falls within the southern portion of the Post Oak Savannah region of Texas (Figure 2-5). The native vegetation of the Camp Swift project area is best described as an oak savannah with inter-digitated grasslands (TMD 2010). Prior to the formation of Camp Swift at the beginning of World War II, farming, ranching, and the suppression of natural fire regimes impacted native vegetation on the facility (TMD 2010). The introduction of fire regimes in 1999 have resulted in the increase of tall grasses and the reduction of Eastern Red Cedar resulting in a shift towards a more "natural" environment (TMD 2010).

The Camp Swift INRMP (TMD 2010) lists four major plant communities on Camp Swift. The Oak-Eastern Red Cedar Forest encompasses approximately 74 percent of the facility. Dominant species include Eastern Red Cedar (*Juniperus virginiana*), Blackjack Oak (*Quercus marilandica*), Post Oak (*Quercus stellata*), and Yaupon (*Ilex vomitoria*). The Little Blue Stem-Indiangrass Grassland is approximately 15 percent of the base. Dominant species include little bluestem (*Schizachyrium scoparium*) and Indiangrass (*Sorghastrum nutans*). Honey mesquite (*Prosopis glandusa*) and prickly pear (*Oppuntia* sp.) are found in former cultivated and/or disturbed areas. The third community is the Green Ash-American Elm Forest located along the major drainages and in floodplains, and it covers approximately 4 percent of the facility. It is characterized by Green ash (*Fraxinus pensylvanica*), American elm (*Ulmus americana*), box elder (*Acer negundo*), sugar hackberry (*Celtis laegigata*), possumhaw (*Ilex decidua*), and cedar elm (*Ulmus crassifolia*). The final community is the Lobolly Pine Forest with lobololly pine (*Pinus taeda*) covering just 1 percent in the northern and eastern portions of Camp Swift. The remaining 6 percent of land is unaccounted for but may consist of base infrastructure such as buildings, roads, and ranges.

Blair (1950) places the Camp Swift area within the Texas province (Figure 2-6). He lists 49 species of mammal. A list of fauna identified on Camp Swift is shown in Table 2-1. It shows 29 mammal species with the feral hog being the only invasive species. Note that there are a variety of gophers and mice listed as present in Table 2-1, including pocket gophers (*Geomys attwateri*). As discussed in Chapter 7, pocket gophers commonly burrow to depths of from 15-30 cm, and they can significantly degrade the integrity of archaeological deposits (Bocek 1986; see also Mauldin et al. 2018).

Based upon prior studies undertaken by CAR (see Thompson et al. 2012) and reported in Mauldin et al. (2018), the diversity of plants and animals of the Post Oak Savannah is

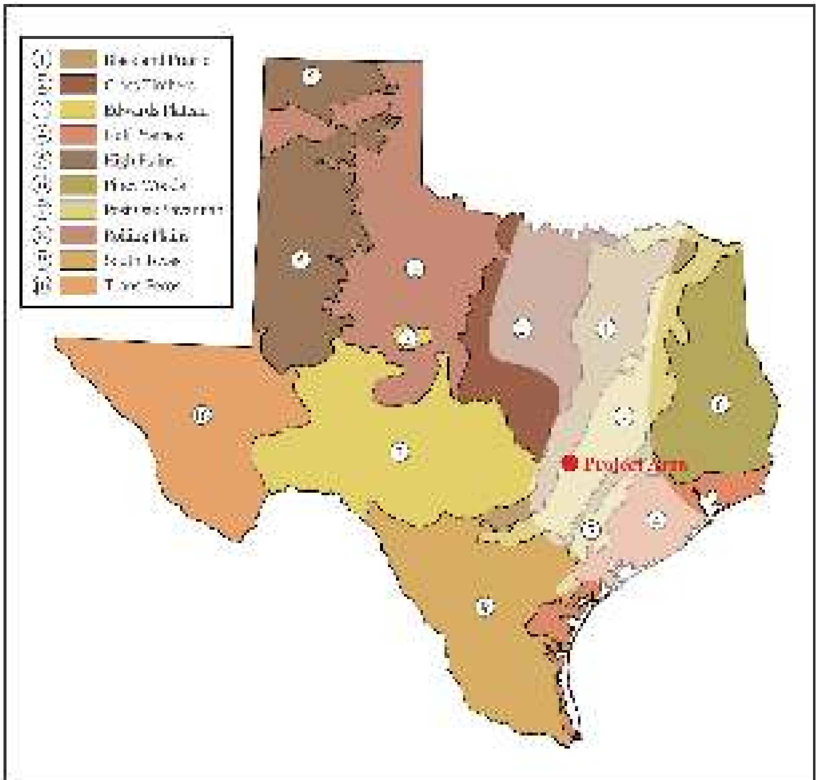

Figure 2-5. Natural regions of Texas showing the location of Camp Swift within the Post Oak Savannah region. The Texas province is shaded in white.

limited. There are 1,390 plant species listed by Hatch et al. (1990) within the Post Oak Savannah region. At a state level, Thompson et al. (2012) compared each of these plant species to the Native American Ethnobotany database (Moerman 2005). Thompson et al. (2012) found that the Post Oak region, while having high net above ground productivity, had fewer edible plant resources. The comparison between the two databases found that there were at least 149 plants, used by ethnographic groups, which may also have been used by prehistoric groups in the Post Oak Savannah. Each component of the utilized plant was classified as greens, seeds, nuts, fruits, roots and tubers, or other (e.g., bark, stalks, sap) with some of the 149 plants having multiple components. There are 179 different plant components with greens accounting for 24.0 percent, seeds 21.7 percent, nuts 5.5 percent, roots and tubers 21.2 percent and “other” 6.4 percent (Thompson et al. 2012:Figure 9-13). The seasonal availability of these resources suggests that late summer and fall would be the peak period for the harvest of seeds and nuts, with greens likely harvested from spring to fall. Roots and tubers could be harvested at any time with the qualification that after the plant dies back it would be harder to locate.

The final consideration is the availability of mammals for hunter-gatherers. As referenced earlier, the relatively limited plant diversity in the Post Oak Savannah also expresses itself in a reduced mammalian diversity. Thompson et al. (2012) looked at distribution patterns for 101 Texas mammals likely used for food. Mammals were categorized by weight into small (0.005-0.95 kg, n=73), medium (1.25-19.0 kg, n=21), and large (46.7-275.0 kg, n=7) size groups. One species, bison, is extirpated and not included in this analysis. Bison were available at various times during the prehistoric period. Contour maps were created using species distributional maps (see Davis and Schmidly 1997) overlaid on 189 quadrates, each roughly 64 km^2 (see Owen and Schmidly 1986). The quadrates that cover the Camp Swift region have, on average, only 18 small and 12 medium mammals classified as likely prey items. This is among the lowest in the state. Of the seven mammals classified as large, only three were thought to be available on Camp Swift based on the distribution maps created by Thompson et al. (2012).

Summary

The Camp Swift area has a moderate amount of rainfall that occurs in a bimodal pattern. During the summer months, rainfall is variable spatially and temporally. Throughout much of its prehistory, the region may have been a grassland, based upon the macrophysical climate model and a regional pollen record. This type of environment has a generally low diversity and availability of plants and animals, which Mauldin et al. (2018) suggest would limit food acquisition strategies for hunter-gatherers.

Table 2-1. Modern Mammals Found on Camp Swift (TMD 2015)

Class/Order	**Family**	**Scientific Name**	**Common**
Artiodactyla: Deer and Allies			
	Cervidae	*Odocoileus virginianus*	White-tailed deer
	Suidae	*Sus scrofa*	Feral hog
	Tayassuidae	*Pecari tajacu*	Collared peccary
Carnivora: Carnivores			
	Canidae	*Canis latrans*	Coyote
	Felidae	*Lynx rufus*	Bobcat
		Puma concolor	Mountain lion
	Mustelidae	*Mephitis mephitis*	Striped skunk
	Procyonidae	*Procyon lotor*	Raccoon
Chiroptera: Bats			
	Molossidae	Tadarida brasiliensis	Brazilian free-tail bat
	Vespertilionidae	*Lasiurus borealis*	Eastern red bat
		Myotis species	Mouse-eared bats
		Pipistrellus subflavus	Eastern pipistrelle
Didelphimorphia			
	Didelphidae	*Didelphis virginiana*	Opossum
Insectivora: Shrews and Allies			
	Soricidae	*Blarina carolinensis*	Southern short-tailed shrew
		Cryptotis parva	Least shrew
Lagomorpha: Rabbits and Allies			
	Leporidae	*Sylvilagus floridanus*	Eastern cottontail
Rodentia: Rodents			
	Castoridae	*Castor canadensis*	American beaver
	Geomyidae	*Geomys attwateri*	Attwater's pocket gopher
	Heteromyidae	*Chaetodipus hispidus*	Hispid pocket mouse
	Muridae	*Baiomys taylori*	Northern pygmy mouse
		Neotoma floridana	Eastern woodrat
		Peromyscus leucopus	White-footed mouse
		Peromyscus maniculatus	Deer mouse
		Reithrodontomys fulvescens	Fulvous harvest mouse
		Sigmodon hispidus	Hispid cotton rat
	Sciuridae	*Sciurus carolinensis*	Eastern gray squirrel
		Sciurus niger	Fox squirrel
	Talpidae	*Scalopus aquaticus*	Eastern mole
Xenarthra: Armadillos			
	Dasypodidae	*Dasypus novemcinctus*	Nine-banded armadillo

Chapter 3: Archaeological Investigations and Cultural History for Camp Swift Region

Leonard Kemp, Raymond Mauldin, and Cynthia Munoz

This chapter begins with a brief account of previous archaeological investigations in Bastrop County. It is followed by the brief description of the culture history for the Camp Swift area. The second section provides context for the following chapter, which discusses the emerging archaeological patterns of the Camp Swift data.

Archaeological Background

The first archaeological survey of Bastrop County was conducted in the 1930s, with survey and excavations undertaken in the 1960s by the University of Texas Anthropological Society and then mandated cultural resource investigations beginning in the mid-1970s (Bement 1989). The two major drivers of cultural resource investigations were the development of mining in the northern portion of Bastrop County and the construction of power and road infrastructure throughout the county. At present, the Texas Historic Sites Atlas (THC 2018) lists 956 archaeological sites in Bastrop County.

Unfortunately, there have been only a small number of excavations in Bastrop County. Significant archaeological sites in Bastrop County include the Shoppa Site (Bement 1984), the Kennedy Bluffs site (Bement 1989), the Bull Pen site (Ensor and Mueller-Wille 1988), the McKinney Roughs site (Carpenter et al. 2006), and 41BP594 (Sherman et al. 2015).

Skelton and Freeman (1979) reported on the first large scale survey in the county that encompassed approximately 4,000 acres at Camp Swift. By 2010, the entirety of Camp Swift had been surveyed to some degree (Munoz 2012a:Table 3-1). There are 209 sites on Camp Swift that have a prehistoric component based on the TMD's cultural database (TMD 2018). The majority of prehistoric components (n=152) have small number of artifacts, no features, and lack diagnostics or charcoal. These have been determined ineligible for listing on the NRHP. Eleven of the sites are eligible for NRHP listing with 46 sites listed as having unknown eligibility (Mauldin et al. 2018). This number includes the three sites from the current investigation (see Munoz 2012a).

Culture History

The region incorporating Camp Swift is described as a transition zone (Goode 1989; Robinson et al. 2001) that incorporates cultural aspects of the Upper Gulf Coast and Central Texas region merging into what Fields (1995, 2004) calls the Post Oak Savannah of East-Central Texas. Fields (2004) divides the Post Oak into northern and southern regions with different cultural influences. The northern portion was more sedentary with a mixed economy of hunter-gatherers and horticulturalists (Fields 2004). The southern portion of the region encompassing Camp Swift had lower populations, especially prior to the Late Archaic (Fields 2004; Mauldin et al. 2018). Hunter-gatherers occupied the southern portion more intensively during the Late Prehistoric, which also appears to have occurred at Camp Swift with an increase of site dating to the Late Prehistoric (Fields 2004; Mauldin et al. 2018). Table 3-1 (modified from Nickels 2008:Figure 3-1) lists the chronology of the region as defined by Fields (1995, 2004) based upon point styles and other temporal diagnostics to the Central Texas (Collins 1995, 2004) and Southeast Texas regions (Patterson 1995; Ricklis 2004). The dates for the Paleoindian/Early Archaic and Early/Middle Archaic periods for East-Central Texas are not given due to the lack of radiocarbon dates and context for those early periods (Fields 1995; 2004). This point is discussed in this chapter and Chapter 4.

The southern region of East-Central Texas appears to be strongly influenced by Central Texas as reflected by projectile point styles and in the use of Edward's chert. Southeast Texas also had some influence as reflected in ceramics and point styles (Fields 2004). The following discussion will frame the study area within the Central Texas cultural region as developed by Collins (1995, 2004). The region is divided into three periods: the Paleoindian, the Archaic, and the Late Prehistoric. These are based on point styles.

The Paleoindian period (11,500 to 8800 Radiocarbon Years Before Present [RCYBP]) is divided into two sub-periods by time. Clovis points, a lanceolate-shaped, fluted projectile point, define the initial occupation in the Early Paleoindian sub-period. The point is found across the continent with an age range of 11,500 to 10,900 BP and coincides with the end of Pleistocene period (Collins 1995:381). Collins (1995, 2004) states that the concept of Paleoindian as exclusively big game hunters (Krieger 1947; Sellards and Evans 1960; Suhm et al. 1954; Wormington 1957) is qualified by remains recovered from sites, such as Gault in Bell County, that contain remains of small mammals, reptiles, fish, and plant food remains (Collins et al. 1989). Clovis material is followed by Folsom remains. Defined by a smaller, lanceolate-shaped, fluted point with a similar continental-wide distribution, Folsom material may reflect a specialized adaptation focused on bison hunting. Sites with Folsom material include Pavo Real in Bexar County (Collins et al. 2003) and Wilson-

Table 3-1. Chronologies of Central Texas, East-Central Texas, and Southeast Texas Based on Collins (1995, 2004), Fields (1995, 2004), Patterson (1995), and Ricklis (2004); Derived in Part from Nickels (2008:Figure 3-1)

Central Texas (Collins 1995, 2004)		**East-Central Texas (Fields 1995, 2004)**		**Southeast Texas (Patterson 1995; Ricklis 2004)**	
Period (RCYBP)*	**Style**	**Period (RCYBP)**	**Style**	**Period (RCYBP)**	**Style**
Late Prehistoric (1300/1200 to 350 BP)	Perdiz, Scallorn, Edwards, bone-tempered ceramics	Late Prehistoric (1150 to 350 BP)	Perdiz, Scallorn, Steiner, Dawson, Gary, Kent, Neches River, untyped parallel stem and expanding stem arrow point, grog or bone tempered ceramics	Late Prehistoric (1400 to 500 BP)	Alba, Catahoula, Scallorn, Perdiz, small Gary, small Kent, unifacial and bifacial arrow points, bone or grog tempered ceramics
Late Archaic (4000 to 1300/1200 BP)	Darl, Ensor, Frio, Fairland, Marcos, Montell, Castroville, Lange, Marshall, Williams, Pedernales, Kinney, Bulverde	Late Archaic/ Woodland (3950 to 1150 BP)	Axtell, Dawson, Gary, Godley, Kent, Neches River, Yarbrough, sandy-paste, bone or grog tempered ceramics	Late Archaic/ Early Ceramic (3500 to 1400 BP)	large Kent, large Gary, Ensor, Godley, Yarbrough, Travis, Pedernales, Williams, Travis, small Gary, small Kent, Morhiss, Darl, Ellis, Fairland, Palmillas, Marcos, Pontchartrain, unifacial and bifacial arrow points, bone tempered ceramics, sandy-paste ceramics
Middle Archaic (6000 to 4000)	Nolan, Travis, Taylor, Bell-Andice, Calf Creek	Early/Middle Archaic (insufficient data)	untyped expanding stem, untyped parallel stem	Middle Archaic (5000 to 3500 BP)	Trinity, Wells, Carrolton, Morill, Yarbrough, Bulverde, Pedernales, Lange, Williams, Travis, Large Gary, Large Kent, Morhiss
Early Archaic (8800 to 6000)	Martindale, Uvalde, Early Split Stem, Angostura	Paleoindian/ Early Archaic (insufficient data)	Golondrina, Hoxie, Woden, untyped lanceolates	Early Archaic (5000 to 7000 BP)	Keithville, Neches River, Tortugas, Trinity, Bell/ Calf Creek, Wells, Carrolton, Morill, Early Stemmed
Paleoindian (11,500 to 8800 BP)	St. Mary Hall, Golondrina, Barber, Wilson, Dalton/ San Patrice/ Plainview, Folsom, Clovis			Paleoindian (12,000 to 7000 BP)	Clovis, Folsom, Midland, Dalton, Big Sandy, San Patrice, Plainview, Scottsbluff, Angostura, Meserve, Early side notched, Early corner notched

*RCYBP=radiocarbon years before present

Leonard site in Williamson County (Collins 1998). The Late Paleoindian period (10,000 to 8800 BP) is marked by multiple point styles including Wilson, St. Mary's Hall, and the Golondrina/Barber form (Collins 1995:382). The Wilson point is a stemmed, corner-notched point, while the St. Mary's and Golondrina/Barber are lanceolate-shaped points. Collins (1995, 2004) views the Late Paleoindian period as a transitional period having aspects of the forthcoming Archaic period with the distinctive feature, the burned rock midden, appearing at the end of the Paleoindian period. Only one Paleoindian artifact has been found on Camp Swift. A Clovis preform was recovered from 41BP495; however, it was found in association with a hearth that dates to 930 BP, suggesting it is not evidence of an actual Paleoindian occupation (Nickels et al. 2005:E-1, Beta-183903).

The Archaic period is divided into three sub-periods: Early, Middle, and Late Archaic. Projectile points associated with the Early Archaic (8800 to 6000 RCYBP) include Angostura and Early Split Stem, in addition to Guadalupe and Clear Fork tools (Collins 1995, 2004). The regional climate of Central Texas is thought to have fluctuated from mesic to xeric conditions and back again during the 2000-year-period (Collins 1995). Subsistence practices include the hunting of deer and small mammals, fishing, and cooking of geophytes (Collins 1995, 2004). The evidence of Early Archaic occupation at Camp Swift is found at three sites. The base of what appears to be an Angostura point was collected at 41BP485 (Nickels et al. 2005:75; Robinson 2001:121-122). An Early Triangular point was recovered from 41BP728 (Nickels et al. 2010). Turner and Hester (1999:108) and Turner et al. (2011:96) place this point style in the Early Archaic period with qualification from Black and McGraw (1985) who suggest this type is a beveled knife Nickels (2008) reported a radiocarbon date of 5980 ± 40 BP from a hearth feature at 41BP529 dating to the end of the Early Archaic period.

The Middle Archaic period (6000 to 4000 RCYBP) is dated by the appearance of Bell-Andice, Taylor, and Nolan-Travis point styles (Collins 1995:383). It is believed that the early part of the Middle Archaic was a more mesic period with bison hunting being part of subsistence practices (Collins 1995). Bison populations are believed to have declined with the onset of a more xeric environment late in the Middle Archaic (Collins 1995:384). Burned rock middens become common during this period (Collins 1995:384). There are no reported Middle Archaic radiocarbon dates or diagnostic artifacts for Camp Swift.

Bulverde and Pedernales point styles characterize the beginning of the Late Archaic period (4000 to 1300/1200 RCYBP). The period is associated with multiple point styles including Lange, Marshall, Marcos, Montel, Castroville, Ensor, Frio, Fairland, and Darl (Collins 1995:384). Late Archaic sites are common in Central Texas and generally within stratified contexts with good integrity (Collins 1995). Subsistence practices include the use of burned rock middens, which becomes abundant during the beginning of the period (Collins 1995). Increasing population and territoriality are postulated by the presence of large cemeteries (Black and McGraw 1985; Munoz 2012a). Projectile points diagnostic of the Late Archaic period documented at Camp Swift include Pedernales, Frio, Ellis, and Ensor (Nickels et al. 2003; Robinson 2001; Robinson et al. 2001). In addition, multiple radiocarbon samples date to the Late Archaic (see Mauldin et al. 2018; Nickels 2008). Both temporally diagnostics artifacts and radiocarbon dates suggest an increased presence during this period relative to the Middle Archaic.

The Late Prehistoric (1300/1200 to 350 RCYBP) is divided into two sub periods: termed the Austin (1200 to 700 RCYBP) and Toyah (700 to 350 RCYBP) intervals. The Austin interval is viewed as a continuation of the Late Archaic period with the exception that the bow and arrow are introduced (Collins 1995:385). Scallorn and Edwards arrow points are characteristic of this time with Scallorn found throughout the state (Turner and Hester 1999; Turner et al. 2011). Perdiz points, the defining point style of the Toyah phase, are also distributed statewide (Turner and Hester 1999; Turner et al. 2011). In addition, there is a proliferation of other arrow point styles, including Alba, Cuney, Fresno, and Young (Turner and Hester 1999; Turner et al. 2011). Bone-tempered pottery known as Leon Plain is also commonly recovered at Toyah-age sites. The Toyah tool kit consisting of Perdiz points, beveled knives, and end scrapers, was in part devised to exploit the increased presence of bison (Dillehay 1974; Huebner 1991; Prewitt 1981). Other researchers (Black 1986; Dering 2008; Mauldin et al. 2012) cite a broad-based diet including deer, small mammals, turtle, fish, and plant foods. Late Prehistoric sites are common on Camp Swift. Radiocarbon dates from the Late Prehistoric period dominate the assemblage and suggest a more intense use of the region at that time. Scallorn, Perdiz, and other Late Prehistoric arrow points are also common in the region.

Summary

This chapter summarized aspects of archaeological work conducted in Bastrop County with a focus on Camp Swift. The area was described using the framework of Central Texas archaeology with the caveat that Camp Swift is on the periphery of that region. Others (Fields 1995, 2004; Goode 1991; Robinson et al. 2001) suggest the region was also influenced to some extent by the Southeast Texas/Upper Gulf Coast region. While investigations and testing of sites in the county are infrequent, the available record suggests that the Camp Swift area was not intensively occupied throughout prehistory. The vast majority of sites recorded on Camp Swift are small, appear to have low artifact density, and often lack features and temporal assignments (see Mauldin et al. 2018; Munoz 2012a; Nickels 2008). Artifacts associated with the Paleoindian period are limited to one out-of-context point, the Early Archaic is evidenced by two points and a radiocarbon date, and no Middle Archaic material has been uncovered. Sites dating to the Late Archaic are increasingly common as shown by both diagnostics and radiocarbon dates. This increasing presence continues in the Late Prehistoric period.

Chapter 4: Emerging Regional Archaeological Patterns

Leonard Kemp and Raymond Mauldin

This chapter explores two related archaeological patterns, recognized by several researchers (see Bousman et al. 2010; Mauldin et al. 2018), that grow out of recent surveys (see Munoz 2012a; Nickels et al. 2005, 2010) and testing projects (see Mauldin et al. 2018; Nickels 2008) on Camp Swift. As noted in the previous chapter, the prehistoric archeological record available from Camp Swift suggests that the area was not intensively occupied. Most sites are small, low-density scatters that lack recognizable features. Most sites lack charcoal or bone that could be radiocarbon dated, and temporally diagnostic artifacts are all-but-non-existent. Those occupations that can be dated are often recent and suggest no significant use of the area prior to the Late Archaic. Most use seems to have occurred in the Late Prehistoric period. While interpretations are complicated by post depositional processes, variable levels of investigations, and underdeveloped methodologies, these emerging patterns are consistent with short-term occupations, smaller group sizes, low frequencies of reoccupation, limited activities, or various combinations of these elements. These two patterns, the apparent low intensity of use and the limited period of use at Camp Swift, are the focus of this chapter.

The summed probability distribution (SPD) model is the considered in relation to patterns in radiocarbon dates collected from Camp Swift and Bastrop County. The SPD model serves as a proxy for the timing and intensity of use in the area and is consistent with the patterns seen in the previous chapter for Camp Swift. It is also consistent with new radiocarbon dates on the current excavations reported in Chapter 8 (see also Appendix A).

Two other measures of use are proposed and considered in this report. The first of these is a new measure, the maximum level density (MLD). Broadly similar to a calculation of artifact density at a site level, the MLD as proposed focuses on chipped stone debitage, tools, and cores and considers the number of items recovered by excavation of a 1-x-1-x-0.1 m level on a site. The five levels with the highest density comprise the MLD. The MLD has the advantage of not being influenced by the excavation of null levels, which can impact site level densities. A review of previously excavated sites suggests that the measure has some utility as a proxy for occupational intensity, and this is explored this in greater detail in Chapter 10.

The last set of measures discussed in this chapter looks at lithic raw material use, tool kits, and the possibility that the Camp Swift area was used for a limited range on activities. Numerous studies have demonstrated that high quality lithic raw material is lacking at Camp Swift (Kay and Tomka 2001; Kelly and Roemer 1981; Skelton 1979), with Uvalde gravels being the principal locally available tool stone (Mauldin et al. 2018). Multiple collections of these gravels, including collections made on the current project (see Chapter 10 and Appendix D) demonstrate that they are dominated by quartzite, with cherts occurring in low frequencies and primarily as small nodules. Mauldin et al. (2018) argue that nonlocal raw materials dominate Camp Swift chipped stone assemblages. In an earlier study, Mauldin et al. (2018) suggests that groups were likely arriving in the Camp Swift area with finished or nearly finished tools and previously reduced cores of high quality material. This is consistent with some level of predictability in terms of the activities anticipated. When combined with the observations that tools are not common and that a narrow range of tool types seems to be present on Camp Swift sites, it may be that these anticipated activities are also narrowly focused on a few specific tasks.

Radiocarbon Dates and Patterns of Regional Use

The summed probability distribution (SPD) of radiocarbon dates, in which dates from a region are calibrated and their individual probability distributions are summed, are increasingly common in archaeological research (see Bamforth and Grund 2012; Crema et al. 2017). Originally proposed by Rick (1987), the resulting probability curve is often argued to be a proxy for population levels, a shift in those population levels, and/or a change in occupational intensity within a region (see Peros et al. 2010; Torfing 2015; Williams 2012). The argument assumes a relationship between population levels and the generation of organic material that can be dated by radiocarbon dating. While there are multiple complications (see Crema et al. 2017; Torfing 2015), including sample context, taphonomic loss, and calibration effects, SPDs minimally provide a gross measure of use intensity that is temporally grounded.

As noted in Chapters 3, there are few radiocarbon dates for Camp Swift (Mauldin et al. 2018; Nickels 2008), and most of those that have been published appear to date late in the sequence, reflecting use during the Late Archaic and Late Prehistoric periods. In order to supplement the Camp Swift sample, and look for patterns at larger spatial scale, the CAR gathered all the published radiocarbon dates from Bastrop County using the Texas Site Atlas as an initial source. This resulted in an additional 19 dates from five sites located in the cultural resource literature, with the earliest report published in 1984 (Bement 1984) and the latest report published in 2015 (Sherman et al. 2015). Table 4-1 provides site level information and dating details for these county level dates, as well as all 16 dates available from 11 sites located on Camp Swift. The additional county level dates are located in northern Bastrop County, as well as along the Colorado River (Figure 4-1).

Table 4-1. Bastrop Radiocarbon Dates

Site Name	41BPxxx	Assay Number	Radiocarbon Date	Std. Dev.	Source
Shoppa Site	191	TX-4953	1690	80	Bement 1984
Shoppa Site*	191	TX-4980	900	220	Bement 1984
McKinney Roughs	627	Beta-169225	850	110	Carpenter et al. 2006
McKinney Roughs	627	Beta-169226	2080	40	Carpenter et al. 2006
McKinney Roughs	627	Beta-195847	940	70	Carpenter et al. 2006
McKinney Roughs	627	Beta-195848	720	40	Carpenter et al. 2006
McKinney Roughs	627	Beta-195849	1840	40	Carpenter et al. 2006
McKinney Roughs	627	Beta-195850	1120	40	Carpenter et al. 2006
Kennedy Bluffs	19	Beta-15483	5620	100	Bement 1989
Bull Pen	280	Beta-199772	1990	80	Ensor and Mueller-Wille 1988
Bull Pen	280	Beta-199773	770	70	Ensor and Mueller-Wille 1988
Bull Pen	280	Beta-199774	2225	85	Ensor and Mueller-Wille 1988
None	595	Beta-351134	1020	30	Sherman et al. 2015
None	595	Beta-351135	1500	30	Sherman et al. 2015
None	595	Beta-351136	2570	30	Sherman et al. 2015
None	595	Beta-351137	1590	30	Sherman et al. 2015
None	595	Beta-361626	1950	30	Sherman et al. 2015
None	595	Beta-361627	850	30	Sherman et al. 2015
None	595	Beta-361628	2780	40	Sherman et al. 2015
None	595	Beta-361629	1950	30	Sherman et al. 2015
None	**487**	D-AMS019862	1515	36	Mauldin et al. 2018
None	**487**	D-AMS019863	1131	29	Mauldin et al. 2018
None	**802**	Beta-362162	1150	20	Mauldin et al. 2018
None	**392**	Beta-183895	870	40	Nickels 2008
None	**485**	Beta-183896	2340	40	Nickels 2008
None	**485**	Beta-183897	490	40	Nickels 2008
None	**488**	Beta-183898	910	40	Nickels 2008
None	**488**	Beta-183899	740	40	Nickels 2008
None	**488**	Beta-183900	640	40	Nickels 2008
None	**495**	Beta-183901	910	40	Nickels 2008
None	**495**	Beta-183902	640	40	Nickels 2008
None	**495**	Beta-183903	930	40	Nickels 2008
None	**495**	Beta-189904	1620	40	Nickels 2008
None	**505**	Beta-183904	1840	40	Nickels 2008
None	**521**	Beta-183905	1180	40	Nickels 2008
None	**529**	Beta-183906	5980	40	Nickels 2008

*Date not used due to the large standard deviation. Site numbers in **bold** are from Camp Swift.

Image Redacted

Figure 4-1. Location of sites used in the radiocarbon database relative to Camp Swift. The Colorado River is shown in blue.

Using data from the 35 dates listed in Table 4-1, a SPD of Bastrop radiocarbon dates was created using OxCal v 4.3.2 software (Bronk Ramsey 2017). The curve, shown in Figure 4-2, suggests that the initial use of the area occurs at the end of the Early Archaic. This early use is reflected in two dates, one from Camp Swift (Nickels 2008) and one from the Kennedy Bluffs site (Bement 1989). The Kennedy Bluffs site also had temporal diagnostics associated with the Early and Middle Archaic periods (Bement 1989). After this initial use, there are no dates for a roughly 3,200 years, a period spanning the Middle Archaic and the first thousand years of the Late Archaic period. As discussed in Chapter 3, there are no diagnostics on Camp Swift for the Middle Archaic and only four sites dating to the Initial Late Archaic period based on diagnostics (Nickels et al. 2010:Table 11-6). Figure 4-2 shows an increase in use, with some fluctuations, until 1100 BP when there is a short gap. This 200-year hiatus is followed by spike at around 1200 BP, and the curve suggests intensive use of the region. This intensity is consistent with the large quantity of Late Prehistoric diagnostics found on Camp Swift and at other sites in Bastrop County (Bement 1989; Mauldin et al. 2018; Nickels et al. 2010:Table 11-6).

Williams (2012) notes one of the issues in the construction of any SPD is what constitutes an adequate sample size. He argues that a minimum sample size of 500+ dates can provide robust patterns and suggests that SPDs relying on fewer dates should be considered conditional (Williams 2012). While the Figure 4-2 SPD is consistent with the pattern of temporal use suggested by diagnostic artifacts, with only 35 dates the Bastrop SPD is provisional. Additional dates will certainly alter the patterns. However, the model, which suggests no use during much of the sequence and a concentrated use late in time, can serve as a framework to structure research questions concerning the intensity of regional use.

Investigating the Intensity of Site Use

As summarized previously, several researchers (e.g., Bousman 2010; Mauldin et al. 2018) suggest that the Camp Swift region was occupied at low intensities, possibly for a limited set of tasks. Evidence for this view comes from the low densities of sites, artifacts, and features (see Mauldin et al. 2018; Munoz 2012; Nickels 2008; Nickels et al. 2010) on

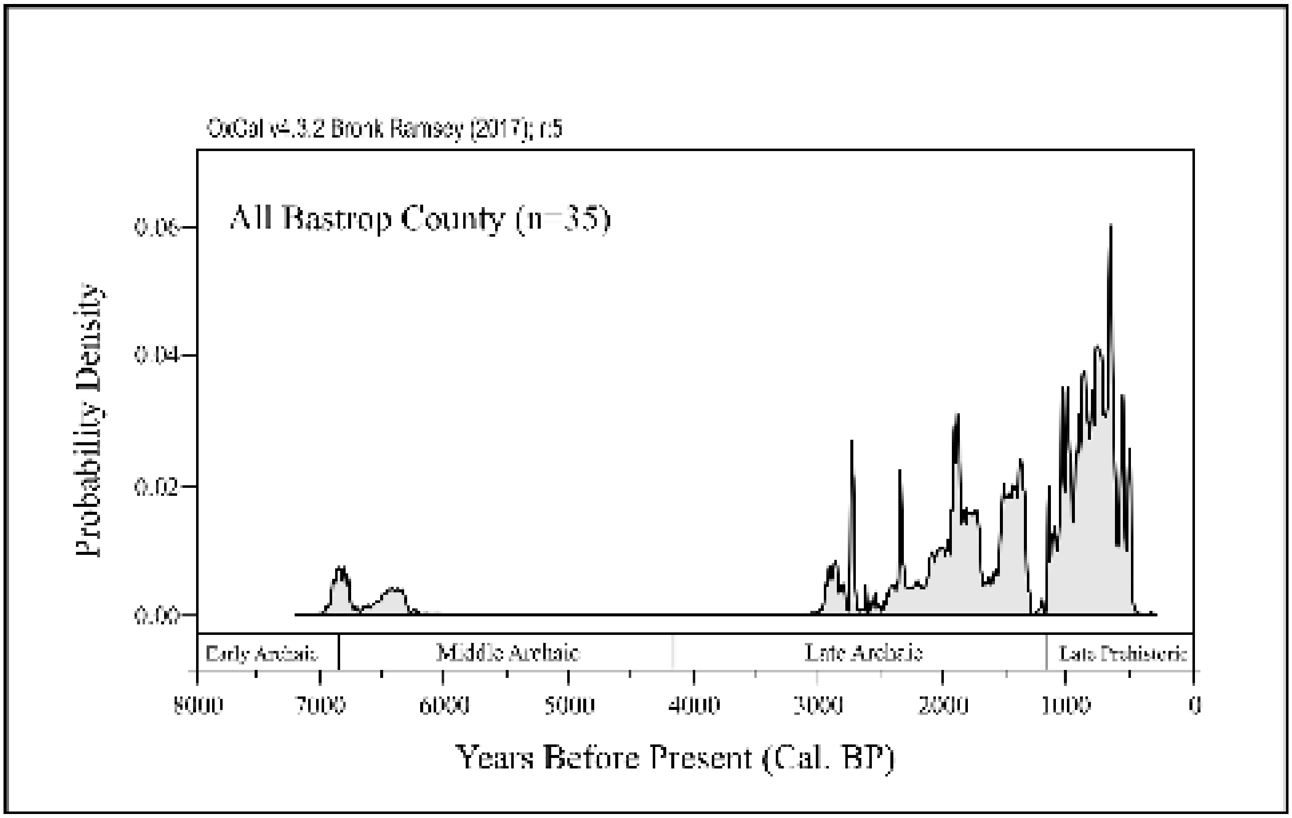

Figure 4-2. Summbed probability distribution (see Note 1) of all Bastrop radiocarbon dates (inclusive of 16 previously published ^{14}C dates from Camp Swift).

most of Camp Swift. The radiocarbon pattern summarized above, while provisional, suggests long periods of little or no use of the region and begins to define periods of more intensive use, such as the early portion of the Late Prehistoric period. The following section proposes an additional measure of use intensity termed the maximum level density (MLD) and then considers aspects of raw material use, planning, and observations on tools types that might suggest a limited, perhaps more specialized, use of the Camp Swift area.

Maximum Level Density

The MLD is suggested as a complement to measures of artifact density at the site level. The measure consists of the top five highest densities of debitage in a 1-x-1-x-0.1 m level at a site, assuming all levels were screened through ¼-inch mesh (see Note 2). Relative to overall site level artifact densities, the MLD has the advantage of being comparable between projects while reducing the impacts of excavation strategies. For example, on Camp Swift, Nickels (2008) will often excavate to clay, a strategy that, in some cases, will result in the excavation of multiple levels with no recovery. Others (e.g., Mauldin et al. 2018) will terminate excavations after two negative levels. Both strategies are reasonable, yet on the same site, with the same number of recovered artifacts, these two strategies could produce different site level densities as the amount of excavation is likely to differ. The MLD for the two strategies, however, will be the same. In addition, the MLD should be comparable for all areas where the level volumes are comparable and at least five levels have been excavated.

Table 4-2 lists the MLD for 24 sites from Nickels (2008) and Mauldin et al. (2018). The temporal assignments for the sites, if known, and the average of the five MLD measures for a site are also included in the table.

Cases are sorted from low to high by the site level MLD average. The table shows that most sites have both low average MLD totals and low individual level totals. Three groups are identified by visual inspection of the 24 sites. A low MLD group consists of 15 sites (62.5 percent) with an average MLD range of from 1 to 17.4 items. As a group, the highest individual level had 25 items on site 41BP782, with site 41BP778 having the lowest level recovery at 1. A second group, consisting of 6 sites, had site average ranges from 23.6 to 39.8 items, with the highest individual level in the group having 53 items (41BP486) and the lowest individual level having 20 items (41BP496). Finally, Table 4-2 shows that the

Table 4-2. Maximum Level of Density of Camp Swift Sites*

Site 41BPxxx	Time Period**	Highest Count	Second Highest	Third Highest	Fourth Highest	Fifth Highest	Average
778		1	1	1	1	1	1
107		2	2	2	2	1	1.8
780		5	4	3	3	3	3.6
125		10	7	6	3	3	5.8
505	LA	9	8	8	8	7	8
487	LA-LP	9	9	8	8	7	8.2
792	LP	18	10	7	6	5	9.2
506	LP	12	11	11	10	10	10.8
392	LP	14	13	12	12	11	12.4
112		14	12	12	12	12	12.4
802	LA-LP	15	13	13	12	11	12.8
782	LP	25	15	12	11	10	14.6
117		24	21	14	8	7	14.8
128	LP	18	18	18	17	15	17.2
108		19	18	18	17	15	17.4
496	LA	26	26	24	22	20	23.6
776	LP	34	33	30	22	21	28
488	LA-LP	34	34	31	31	30	32
521	LA-LP	50	33	32	28	28	34.2
801		41	39	37	34	33	36.8
486	LA-LP	53	49	33	33	31	39.8
485	EA-LA-LP	64	58	55	51	48	55.2
389	LA	107	59	52	33	29	56
495	LA-LP	82	66	54	51	50	60.6

*tan=low MLD sites, white=moderate MLD sites, blue=high MLD sites.
**Time Period: blank=unknown, EA=Early Archaic, LA= Late Archaic, LP=Late Prehistoric

last group consisted of three sites, with average MLD at a site level ranging between 55.2 and 60.6 pieces of debitage, and site 41BP389 having both the highest (n=107) and the lowest (n=29) level recovery in the group. Overall, then, sites have small accumulations of debitage. Using the MLD, sites in both the medium and high groups are not common.

Figure 4-3 shows the distribution of the MLD values for sites by group and temporal assignment (see also Table 4-2). Eight of the 15 low MLD sites (53 percent) could be assigned to a temporal period, with two of those eight, or 25 percent, having two components (LA/LP). Eighty-three percent of the medium MLD sites (5 of 6) and all three of the high MLD sites have temporal assignments. Sixty percent (3 of 5) of the medium MLD sites with temporal assignments are multicomponent, and 66 percent (2 of 3) of the high group have more than one component. At one level, this is not surprising, as more artifacts, in many cases, should increase the possibility that some of those artifacts would reflect a temporal period. However, the pattern is also consistent with the idea that the medium and high MLD sites are simply low MLD sites that have a higher frequency of reoccupation. The difference, then, may be one of quantity rather than quality.

Raw Material Availability, Tool Diversity, and Tool Types

The final area examined, in terms of looking at use intensity, is related to the availability of lithic raw materials and aspects of mobility and planning. As mentioned in Chapter 2, Uvalde Gravels are the only locally available lithic materials on Camp Swift (Kay and Tomka 2001). In 2017, CAR collected samples of Uvalde Gravels from seven outcrops on Camp

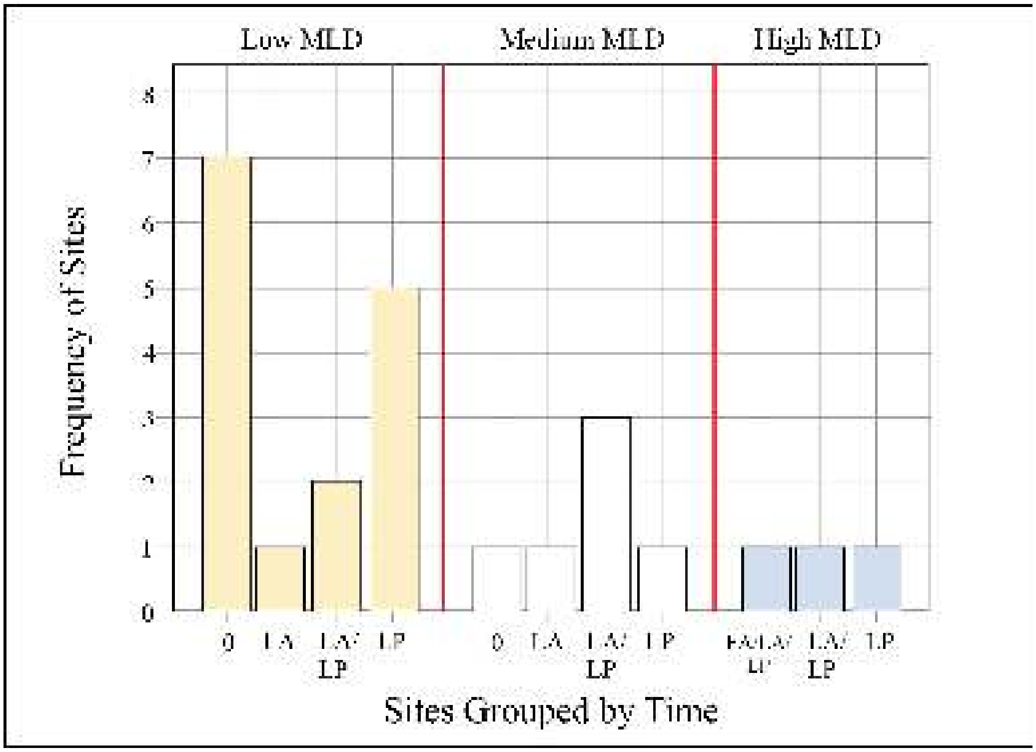

Figure 4-3. Sites grouped by MLD and time.

Swift (Mauldin et al. 2018; Appendix D in this report). The collected material was dominated by quartzite with only a small amount of chert. The chert that was found consisted of small nodules. Others, Kelly and Roemer (1981) and Skelton (1979) have remarked on the poor quality of that chert.

Mauldin et al. (2018), based on regional patterns (see Mauldin and Figueroa 2006), suggest that there are two general strategies when high quality tool stone is not available. The first strategy would be to use local material. The resulting archaeological signature would likely have less non-cortical debitage, more variability in quality, and have smaller debitage as locally available chert occurs as small nodules (Mauldin et al. 2018). The second strategy would be to secure high quality material from outside the area and transport it to the site. In this strategy, lithics, tools, or preforms would likely be manufactured at or near the source of the material. At the site, the archaeological signature would be dominated by high quality, non-cortical debitage with that debitage larger relative to the size ranges of local materials (Mauldin et al. 2018).

Table 4-3 provides summary data of seven of the eight sites tested in Mauldin et al. (2018); one site was not included because of the small amount of debitage. The table includes the relative frequency of non-cortical items, the mean flake length, and the frequency of ultraviolet fluorescence potentially indicating local and nonlocal sourcing. Sites from Nickels (2008) were not included in this analysis because debitage analysis data was not comparable. Table 4-3 shows patterns, with high relative percentages of non-cortical flakes (see Figueroa et al. 2009), larger average flake size relative to sizes in poor quality areas (e.g., Parker County; see Mauldin and Figueroa 2006), and UV florescence patterns (see Frederick and Ringstaff 1994, Hofman et al. 1991; Newlander and Speth 2009) dominated by nonlocal signatures (Mauldin et al. 2018). The results suggest that the initial knapping of stone likely took place elsewhere. CAR believes that previously reduced cores, including some finished or nearly finished items, were then transported onto what is now Camp Swift (see Mauldin et al. 2018). If Camp Swift assemblages are dominated by nonlocal stone with tools fashioned, as least to some degree, outside the area, this suggests some degree of predictability in anticipated tasks and possibly a limited range of tasks.

To explore these suggestions, expectations for two idealized site types are compared. These are locations where a limited number of activities are conducted, usually a subset of the population (special purpose sites), and locations where more general activities occur (residential sites). Other things being equal, it is anticipated that residential sites will have a wider range of tool types present when contrasted to special purpose sites. In addition, it is anticipated that as occupation duration increases (longer stays or reoccupation), the accumulations

Table 4-3. Summary Data on Chipped Stone Debitage by Site

Site	Number of Debitage	Percent Non-Cortical	Mean Flake Length (mm)	UV Florescence	
				Nonlocal	Local
41BP792	59	78.00%	20.21	79.66	20.33
41BP801	518	82.00%	19.27	79.65	20.34
41BP776	434	82.30%	19.88	90.11	9.88
41BP782	174	83.90%	21.04	92.48	7.51
41BP802	215	88.80%	19.18	85.58	14.41
41BP780	45	91.10%	21.64	80	20
41BP487	118	97.40%	16.79	78.94	21.05
Total	**1,974**	**83.60%**	**19.33**	**83.77**	**16.21**

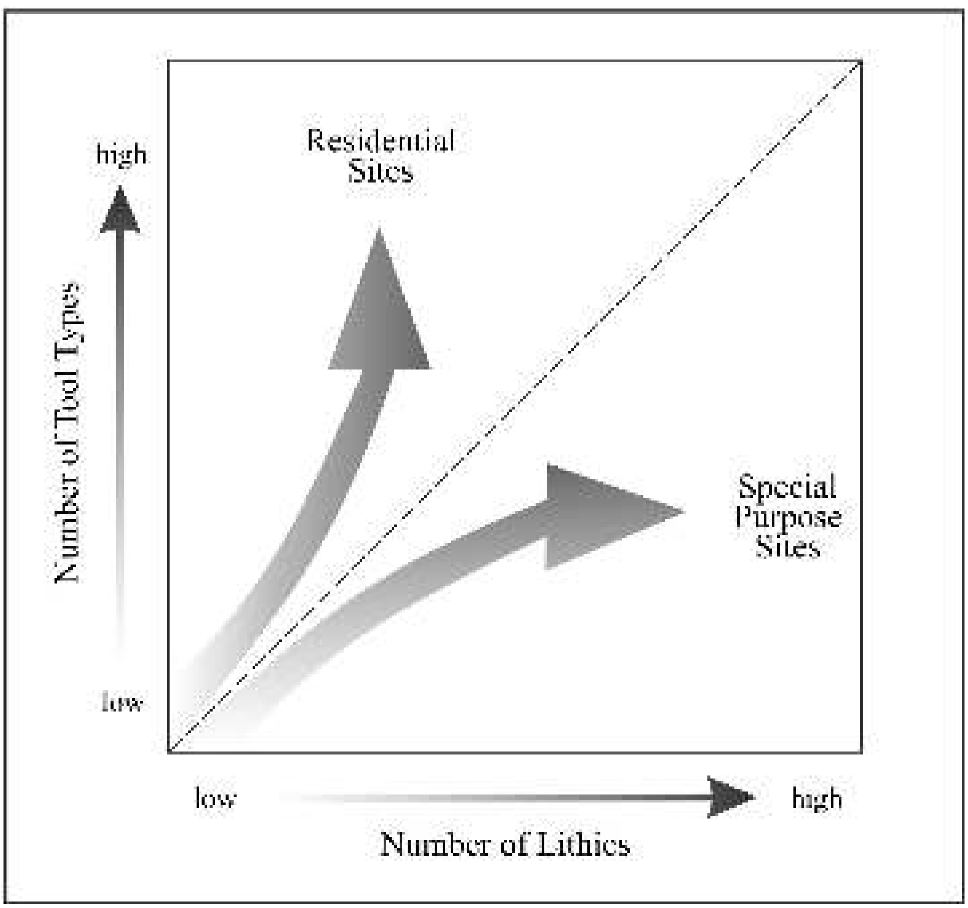

Figure 4-4. Expected patterns for number of tools and assemblage size relationships for special purpose and residential sites.

of tool types relative to increases in assemblage size will have different patterns of accumulation on these two idealized site types. As shown in Figure 4-4, on special purpose sites, greater occupational duration will produce more broken tools and more debitage but will not introduce any new tool types. Conversely, it would be anticipated that as occupational duration increases on residential sites, new tool types will be introduced into the archaeological record at a faster rate relative to assemble increases. While in reality it is likely to be much more complicated than the Figure 4-4 scenario (Note 3), these hypothetical cases provide a useful way to structure the data.

This comparison focuses on the diversity of tools and the range of tool types recovered from 18 Camp Swift sites using data in Nickels (2008). A review of several regional studies (e.g. Munoz et al. 2011; Thompson et al. 2012) and stone tool guides (Turner and Hester 1999; Turner et al. 2011) was conducted to identify likely chipped and ground stone tool types. Based on those sources, Table 4-4 lists 12 general classes of stone tools that were identified and some guidelines that were used in the review of the Camp Swift sites. Nickels (2008) may recognize not all of the 12 tool categories, and the assemblages were not reviewed independently. The published descriptions were used to fit the categories used by Nickels (2008) into the more general Table 4-4 framework.

Table 4-5 lists the number of tools by type, as well as the amount of debitage recovered from the 18 sites listed by Nickels (2008). Overall, tools were recovered from 15 of the 18 sites, with 10 of the 18 sites having three or fewer tools, and three of the sites having 20 or more tools. The 157 tools recovered reflect eight of the 12 potential tool types. Unifaces, including gouges and adzes, are the most common tool type (n=54, 34 percent), followed by bifaces (n=44, 28 percent), cores (n=30, 19 percent) and projectile points (n=15, 9.6 percent). No metates, drills/perforators, modified flakes, or gravers were recorded, and only a single mano was noted in the 18 assemblages. While "other ground stone" was present (n=5), several of these were recorded as "smoothing stones" rather than fragments from metates or manos potentially involved in plant processing (Table 4-5). While interpretations are limited by an absence of comparative data, unifaces, bifaces, cores, and projectile points make up 91 percent of the 157 tools. This dominance may suggest a focus on hunting and game processing activities, rather than a more generalized, residential focus. Note, however, that faunal recovery at these and other sites on Camp Swift is low.

Figure 4-5 considers the suggested relationships between assemblage size and tool variety. The top plot in Figure 4-5 contrasts the number of tool types (y-axis) and the number of tools (x-axis). The bottom plot shows the number of tool types (y-axis) by the number of debitage recovered (x-axis). Comparisons to the Figure 4-4 expectations suggest that both plots are consistent with the suggested special purpose pattern. This is especially the case for sites 41BP495 and 41BP485. Both assemblages are large, and while both have six different types of tools, unifaces are by far the dominate tool type (see Table 4-5 and Figure 4-4).

Summary

The reviews of the prehistoric archaeological record in the Camp Swift area presented in Chapter 3 and this chapter's summary of emerging patterns in that record suggest that occupation was limited in both time and intensity. The patterns shown by the recovery of temporally diagnostic artifacts and the SPD model developed in this chapter suggest limited or no occupation for long periods, with increasing use during the end of the Late Archaic and into the Late Prehistoric. Looking

Table 4-4. Tool Types and Descriptive Information

Tool Types	Descriptive Information and Included Terms
Cores	All items classified as cores, including items noted as tested cobbles, core tools, or choppers.
Bifaces	Items that have facial retouch. Includes items described as knives, preforms, and blanks.
Projectile Points	Includes all arrow and dart points, including haft fragments.
Unifaces	Item with facial retouch on one face. Often termed scrapers, as used here the term includes gouges and adzes.
Modified Flakes	Edge modified/retouched/utilized items.
Other Chipped Stone	Other chipped stone tools that do not fit anywhere else.
Gravers	If the element is a portion of another tool, count the other tool not the graver.
Drills, Perforators	Usually bifacially worked.
Hammer Stones	Includes tools described as hammer stones and battered stones.
Manos	Includes items identified as manos or hand stones.
Metates	Includes items termed metate, milling stones, or grinding slabs.
Other Ground Stone	Includes ground stone fragments not classified as manos or metates, as well as smoothing stones or pitted stones.

Table 4-5. Number of Tools Per Tool Type Identified by Nickels (2008)

41BP….	Core/Core Tool/ Chopper/Tested Cobbles	Biface	Point	Uniface/Scraper/ Gouge/Adze	Edge Modified/ Retouched/Utilized	Other Chipped Stone	Gravers	Drill/Perforator	Hammer Stone/ Battered Stone	Manos/Hand Stones	Metates	Other Ground Stone	Total Tools	Total Types	Total Debitage
107													0	0	10
125													0	0	31
505													0	0	145
520				1									1	1	112
108		1											1	1	240
112		1											1	1	328
117	3												3	1	89
128			1									1	2	2	213
497		1	1						1				3	3	144
506	1	1	1										3	3	334
392	4	1		2									7	3	499
488		3	2	2									7	3	1,245
496	2	7	1	2					1				12	5	772
521	2	4	3						3			1	12	5	810
389	5	8	1	5						1			20	5	754
486	3	1	1	5					2			1	13	6	1,300
485	4	9		12		1			1			1	28	6	3,335
495	6	7	4	25					1			1	44	6	2,983

*tan=low MLD sites, white=moderate MLD sites, blue=high MLD sites

at 24 previously tested sites and considering the MLD showed that the majority of these sites had a low intensity of use, with only three of the 24 having relatively high measures, this MLD pattern is especially surprising given that these 24 sites were selected for eligibility testing because their potential to yield significant data was in doubt. There were 152 other prehistoric sites on Camp Swift that lacked sufficient data to warrant testing. This summary of investigations in tool stone use suggests a dominance of nonlocal stone, while patterns in the types of tools, the number of tools, and assemblage size are consistent with limited activity occupations. The emerging pattern is one of short-term occupations, smaller group sizes, low frequencies of reoccupation, and a limited set of activities focused late in time. The results of CAR's testing on sites 41B528, 41BP859, and 41BP865 at Camp Swift appear to be consistent with these suggestions.

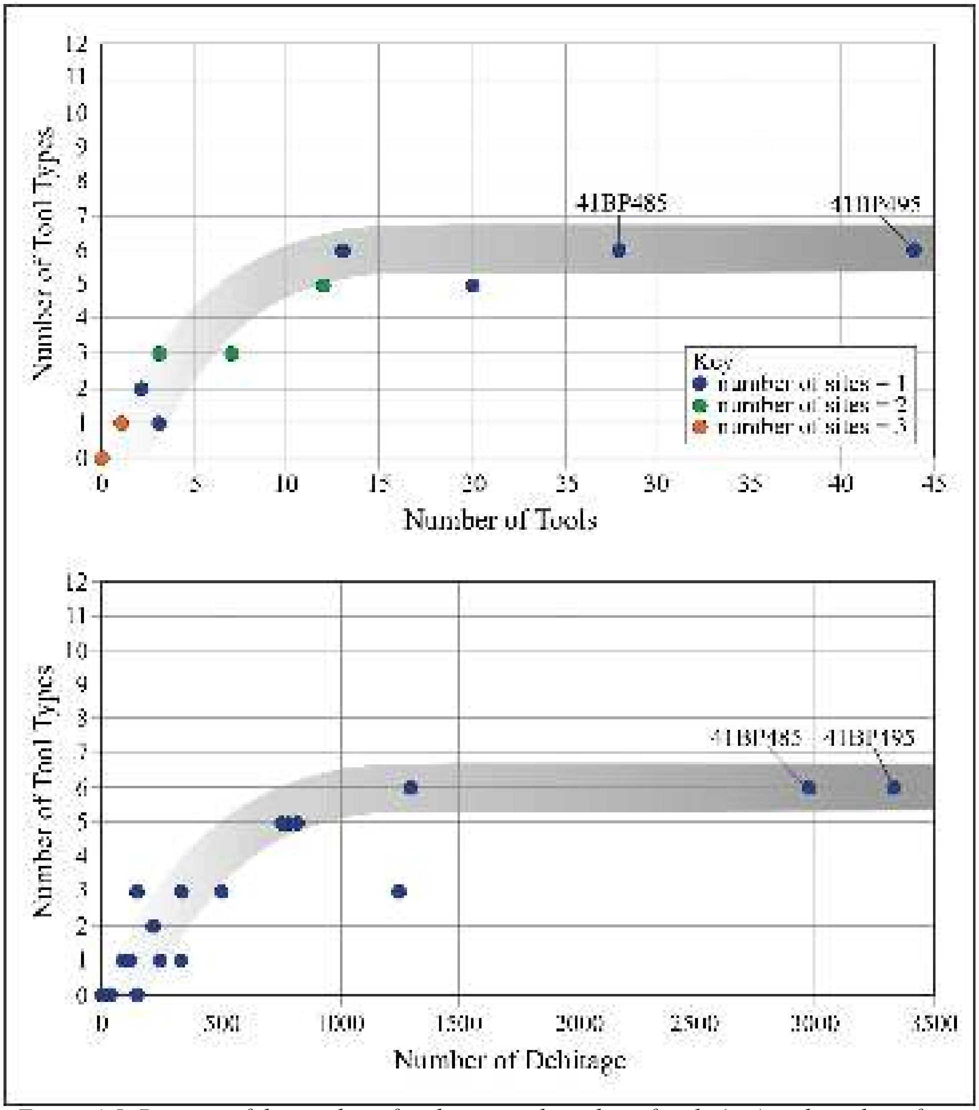

Figure 4-5. Patterns of the number of tool types and number of tools (top) and number of tool types and the number of recovered debitage (bottom) for tested Swift sites (see Table 4-5 and Figure 4-4).

Chapter 5: Field and Laboratory Methods

Leonard Kemp

The CAR used standard archaeological methods during the NRHP eligibility testing of 41B528, 41BP859, and 41BP865 at Camp Swift. This chapter describes those field and laboratory methods, as well as the curation strategy, on this project.

Field Methods

Pre-Field

Prior to the start of fieldwork, the Principal Investigator and Project Archaeologist reviewed reports of previous investigations (Lohse and Bousman 2006; Munoz 2012a; Nickels and Lehman 2004; Robinson et al. 2001) topographic maps, site maps, and aerial photographs to evaluate the project area and to aid in the placement of test units. For the initial testing of the three sites (Lohse and Bousman 2006; Munoz 2012a; Nickels and Lehman 2004; Robinson et al. 200), the CAR assessed the artifact density and overall depth of deposits on each site. It was determined that eleven 1-x-1 m test units (TUs), three at 41BP528 and four at both 41BP859 and 41BP865, should be excavated to the terminal clay level. Test unit locations were selected based on artifact density and depth from the previously dug backhoe trenches, shovel tests, and artifact scatters.

Testing

A crew of two to three staff archaeologists, under the supervision of the Project Archaeologist, performed all work involved in the testing over three five-day sessions. The investigations consisted of two stages: 1) test unit placement and mapping using a Trimble Juno GPS unit, and 2) the subsequent hand-excavations of the units. From October 22 through November 30, 2017, eleven 1-x-1 m test units and three 1-x-0.5 m units were excavated. A Sokkia total data station with a Carlson data collector was used to record the location and elevation of all excavation units. This data was downloaded into ArcGIS software and tied into two control points set up by the TMD.

Each test unit was excavated in arbitrary 10-cm levels referenced to the unit datum. In most cases, the first level was excavated to the nearest even 10-cm increment meaning it was usually removed as a partial level so that excavations could proceed in 10-cm increments for each subsequent level. Excavation was performed using shovel skimming with troweling when necessary to expose features and in situ artifacts. The collected sediment from each level was sifted through ¼-inch hardware cloth. Artifacts found in the screen were collected, labeled by provenience, given a unique identifier, and recorded in a field log. A standardized test unit form was completed for each level. When artifacts were found in situ, they were drawn on the unit grid on the excavation form. All units were photographed at the completion of each level. A small soil sample was collected from each level and brought back to the CAR laboratory for color analysis using Munsell Soil Color Charts. All prehistoric cultural material encountered in test units was collected and returned to the CAR laboratory for processing and analysis. Ammunition was noted as present when encountered but not collected.

Magnetic Soil Susceptibility (MSS) samples were taken as a sample column from a wall profile of each test unit upon completion of the unit's excavation. Plastic vials were inserted into a 1-m board with holes drilled at 5-cm increments. The board was placed against the profile wall, and the vials were tapped into the profile. The vials were carefully removed from the test unit wall, labeled, and placed into separate bags for each unit. All test units were backfilled upon completion of each session.

Prior to the 2012 CAR survey, an intense fire burned away the vegetation at 41BP859 and 41BP865 resulting in 100 percent surface visibility. This degree of visibility allowed archaeologists to record artifact scatters during survey, which would have normally been hidden by the dense vegetation found at Camp Swift (Munoz 2012a). Surface Recording Units (SRU) were established at the three sites to record visible surface artifacts. The SRUs were 5 m in diameter, and an archaeologist was assigned to document all artifacts within that circle. A standardized form was used to record all finds, including burned rock, debitage, and ceramics. Non-diagnostic tools were to be documented with a digital camera and left on site. If temporal diagnostics were observed, they were to be collected.

Laboratory Methods

Upon completion of fieldwork all recovered artifacts, sediment samples, and organic samples were transported to the CAR laboratory for processing. Proveniences for the materials were double-checked by comparing the unique field number to the field log. Prior to analysis, artifacts were washed, air-dried, and placed into zip-locking, archival-quality bags. Each bag contained a label with provenience information and a corresponding lot number. The artifacts were then separated into appropriate categories (e.g., debitage, tools, burned rock) for analysis.

Lithic Analysis

Lithic artifacts recovered from the site consisted of moderate quantities of debitage, a small number of lithic tools, and small quantities of non-feature burned rock. Debitage was analyzed using a hierarchical approach that combined color, texture, evidence of heating, and overall finish. The maximum size of each piece of debitage was recorded in addition to the estimate of the dorsal cortex cover (0%, 1-50%, 51-99%, 100%) to provide basic information on site use and raw material use. This analysis is reported in Chapter 8 with the analyzed debitage attributes presented in Appendix C. Projectile points and other lithic tools were identified using a variety of sources including typology guides (Andrefsky 2002; Turner and Hester 1999; Whittaker 1994) and regional reports (Bement 1984; Bement 1989; Carpenter et al. 2006; Ensor and Mueller-Wille 1988; Sherman et al. 2015). The projectile point analysis is discussed in Chapter 7. The remaining lithic tools, other than the points, are discussed in Chapter 9 and shown in Appendix E.

Magnetic Soil Susceptibility Analysis

Magnetic Soil Susceptibility (MSS) analysis measures the potential magnetic signature of a sediment sample, with higher values suggesting greater magnetic potential. In this study, MSS analysis can provide information on the overall integrity of a site as well as a means to infer buried cultural surfaces.

In the CAR lab, the MSS samples were air dried and packed into a pre-weighed 10-cm^3 plastic vial. The sample was weighed with the sample mass recorded less the weight of the empty vial. The sample was then placed into a Bartington MS2 frequency sensor attached to a MS2 magnetic susceptibility meter. Low frequency volume susceptibility (kappa, κ) was measured on each sample. Two readings were taken, and the results were averaged. The mass corrected magnetic susceptibility (chi, χ) values were then calculated using the sample mass (see Dearing 1999). These results are discussed in Chapter 7, and MSS data are presented in Appendix B.

Flotation

Flotation samples were taken from the fill of three features defined in the field on this project. Previous testing of float procedures with unburned poppy seeds indicates a recovery rate of approximately 90 percent. Table 5-1 lists the sites, features, provenience, amount of sample collected, and material collected from the light and heavy fraction. The material consisted of charcoal and micro debitage. Charcoal samples from features were used to date the three features (see following section on Radiocarbon). The debitage was added to the artifact counts but was not included in the analysis due to the small size.

Radiocarbon Dating

Four charcoal samples associated with three identified features on 41BP859 (Feature 1) and 41BP865 (Features 2 and 3) were submitted for radiocarbon analysis. The results of these samples are discussed in Chapter 7 with additional details in Appendix A. Remaining charcoal samples were placed in aluminum foil and curated.

Raw Lithic Material

During this project, 26 cobble samples weighing 14.6 kg were collected from two deposits on Camp Swift. Cobbles were returned to the CAR lab where their maximum dimension, weight, and material type were determined. These data are listed in Appendix D with the location of the new collection sites shown on Figure D-1.

Table 5-1. Flotation Samples Collected during the Present Project

Site	Feature	Provenience (Test Unit and Level)	Depth (cmbd)	Amount Floated (liters)	Recovered Material
41BP859	1	TU 5- Level 3	40-50	1.91	^{14}C and debitage
41BP859	1	TU5-Level 3	40-50	5.47	^{14}C, burned rock and debitage
41BP865*	1	TU3 -Level 4	32-40	1.98	debitage
41BP865	2	TU5 -Level 4	40-50	5.47	burned rock and debitage
41BP865	2	TU5- Level 4	40-50	6.96	^{14}C, burned rock and debitage
41BP865	2	TU6- Level 4	40-50	3.87	^{14}C and burned rock
41BP865	3	TU3-Level 6	50-60	4.57	^{14}C and burned rock
41BP865	3	TU3-Level 7	70-75	3	^{14}C, burned rock and debitage

*feature designation removed

Curation

All cultural materials and records obtained and/or generated during the project were prepared in accordance with federal regulation 36 CFR part 79 and THC requirements for State Held-in-Trust collections. The materials were curated in accordance with current CAR guidelines. Artifacts were stored in archival-quality bags with acid-free labels including a provenience and corresponding lot number. Materials needing extra support were double-bagged. Paper labels were applied to all tools using a clear coat of acrylic with an additional coat applied to protect the label. In addition, 50 percent of unmodified debitage greater than 25 mm from each lot was labeled with the appropriate provenience data. All artifacts were stored in acid-free boxes.

Digital photographs were printed on acid-free paper, labeled with archival appropriate materials, and placed in archival-quality sleeves. All field forms were completed with pencil. Field notes, forms, photographs, and drawings were printed on acid-free paper, placed in archival folders, and stored in acid-free boxes. A copy of this report and all computer media pertaining to the investigation were stored in an archival box and curated with the field notes and documents.

Following analyses and quantification, artifacts associated with this project possessing little scientific value will be discarded pursuant to Chapter 26.27(g)(2) of the Antiquities Code of Texas and in consultation with both the TMD and the THC. The only artifact class to be discarded specific to this project was non-feature burned rock. It was documented with counts and is included in curation documentation.

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Chapter 6: Site Descriptions, Work Accomplished, and Material Recovered

Leonard Kemp

Archaeological testing was performed on three sites in the southwest portion of Camp Swift, Bastrop County, Texas, during the fall of 2017. Fieldwork was conducted on 41BP528, 41BP859, and 41BP865, following procedures outlined in the previous chapter. This chapter presents an overview of these sites and previous site investigations, discusses the work accomplished during this investigation, and provides a summary of the recovered material.

41BP528

Site 41BP528 was recorded in 1997 by TMD archaeologists as a prehistoric open campsite approximately 225 m^2 in size (Robinson et al. 2001). The site is located in an oak and cedar woodland (Figure 6-1) adjacent to an unnamed tributary of McLaughlin Creek. The site ranges in elevation range from 141 to 143 m AMSL.

Background

Site 41BP528 was defined with eight shovel tests, and one of those shovel tests contained a dart point fragment (identified as Bulverde-like), a small quantity of debitage, and burned rock (Robinson et al. 2001). Based on these findings, the site's eligibility status was not determined following the initial survey (Robinson et al. 2001). In 2002, archaeologists from the Center for Archaeological Studies (CAS) of Texas State University revisited the site (Figure 6-2), excavating 15 shovel tests, five of which were positive with three pieces of debitage and five pieces of fire-cracked rock (FCR; Nickels and Lehman 2004:70). The CAS suggested, based upon the presence of FCR within three shovel test levels at 10-20, 30-40, and 60-70 cmbs, that the site likely had discrete and multiple occupations. Nickels and Lehman (2004) redefined the site boundary, increasing it to 2,400 m², and recommended additional testing by trenching to determine the site's eligibility status. Previously in 2001, 41BP498 was resurveyed and was also enlarged bringing it within approximately 10 m of 41BP528 (Nickels et al. 2003). Site 41BP498 was recommended not eligible to the NRHP due to the lack of artifacts and low site integrity (Nickels et al. 2003). It is likely that 41BP498 and 41BP528 are one site that was not recognized at the time of Nickels' surveys and evaluation. In 2005, the CAS excavated three backhoe trenches (BHT) near the positive shovel tests (Lohse and Bousman 2006). The three trenches were dug to the clay level and terminated. Backhoe Trench 1 was shallow and excavated to only 30 cmbs. Lohse and Bousman (2006) found FCR at a depth of 20-65 cmbs within the BHT 2 and 3. Backhoe Trench 2 also contained three pieces of debitage within the burned rock layer (Lohse and Bousman 2006). Lohse and Bousman (2006) recommended additional work to determine NRHP eligibility in those areas.

Work Conducted

The work at 41BP528 was conducted between October 22 and 26, 2017. CAR placed three 1-x-1 m test units (TUs) in the south central portion of the site. Test Unit 1 was placed 5 m southeast of BHT 3, and TU 2 was placed 11 m east of BHT 3. Test Unit 3 was placed between BHTs 1 and 2. Three surface recording units (SRU) were positioned with two SRUs falling within the site boundary and one located just outside of the boundary. The location of the three CAR test units and SRUs are shown on Figure 6-2 along with the previously excavated CAS shovel tests and trenches.

Figure 6-1. View to the north of the heavily wooded 41BP528. TU 3 is shown on the right.

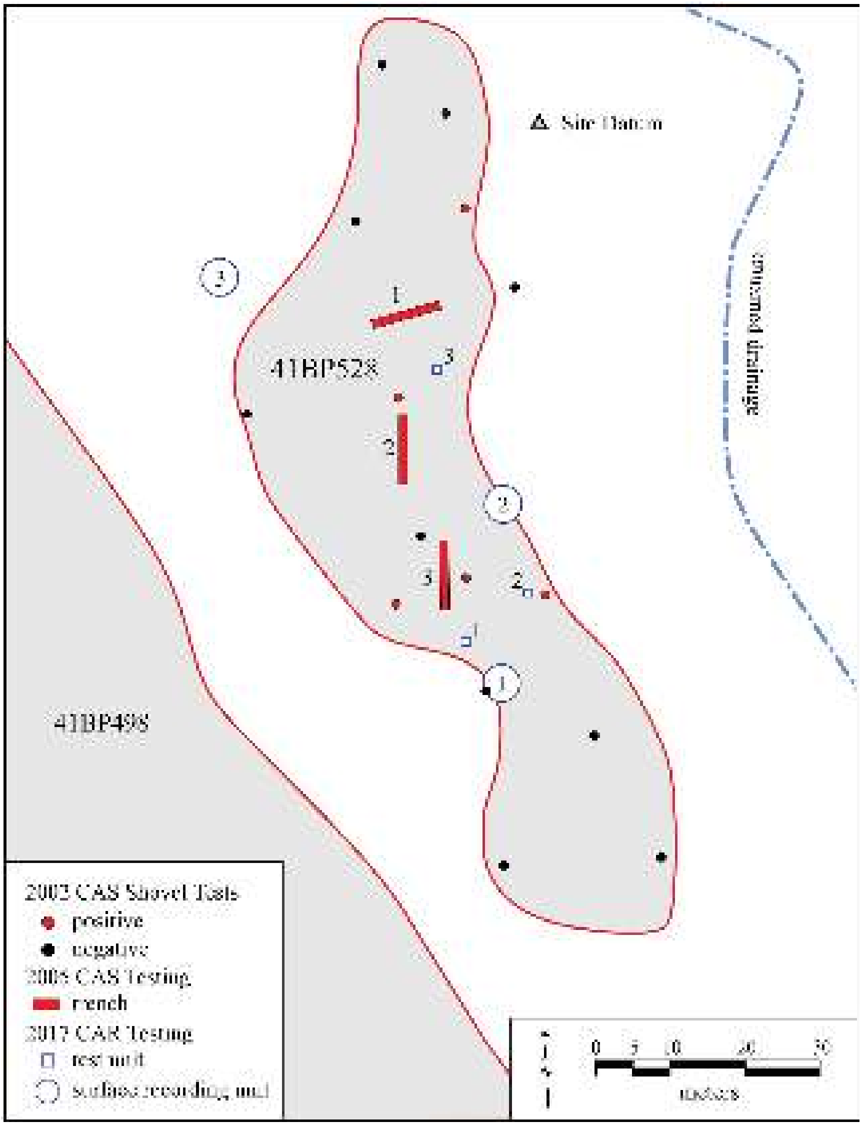

Figure 6-2. Site map of 41BP528 showing previous work by CAS (Lohse and Bousman 2006; Nickels and Lehman 2004) and current project.

CAR excavated 1.77 m^3 of sediment at 41BP528. The sediment was a fine to very sandy loam, primarily light yellowish brown (10YR 6/4) over a mottled yellowish brown to very pale brown sandy clay (10YR 5/8, 8/2). All units were excavated to clay and terminated at that level. The site, as previously mentioned, is located in a wooded area, and tree roots, some large in diameter (greater than 5 cm), were encountered in all of the units. The testing of 41BP528 recovered 42 pieces of debitage, two chipped stone tools, one core/core tool, and 1.4 kg of burned rock/ FCR. No features were found at this site.

In TU 1, 7 levels of sediment (0.64 m^3) were excavated to a termination depth of 70 cm below the datum (cmbd). Burned rock was present in Levels 2 through 7 (10-70 cmbd). A small amount of debitage (n=7) was recovered in Levels 2, 5, 6, and 7. In TU 2, 8 levels of sediment (0.7 m^3) were excavated to a terminal depth of 80 cmbd. Debitage (n=27) was found in Levels 2 through 8, and burned rock (420.8 g) was found in Levels 3 through 8. In addition, two tools, a uniface and a graver, were found in Levels 6 and 7, respectively. In TU 3, 5 levels of sediments (0.43 m^3) were excavated to a termination depth of 48 cmbd. Burned rock (701.9 g) was found in Levels 2 through 5. Lithics, including debitage (n=8) found in Levels 2, 3, and 4 were recovered, and a core was found in Level 3. No artifacts were found in any of three SRUs.

41BP859

CAR archaeologists recorded site 41BP859 in 2011 (Figure 6-3, top) as an open campsite measuring approximately 6,037 m^2 in size (Munoz 2012a). The site is located to the east of an intermittent drainage to McLaughlin Creek in an open area with bluestem, Indian, and bunch grasses (Figure 6-3, bottom). The site lies at an elevation range of 146 to 149 m AMSL.

Background

Site 41BP859 was found due to a wildfire that removed ground-obscuring vegetation resulting in 100 percent ground visibility (Figure 6-3, top). An Alba arrow point, four bifaces, and 29 pieces of debitage were recorded on the site surface (Munoz 2012a). Figure 6-4 shows 41BP859 and the locations of 17 shovel tests excavated to define the site boundary and to determine the depth of deposition, as well as the current work. Seven shovel tests were positive for cultural material consisting of debitage and/or burned rock (Munoz 2012a:Table 5-6). A positive shovel test (x-16) contained cultural material deposits to the terminal depth (70 cmbs). Soil samples from three shovel tests (x1-4, x1-7, and x1-14) were collected for magnetic soil susceptibility analysis. The results of one shovel test, x1-14, suggested a possible buried surface at 35 cmbs (Munoz 2012a:44, Table 5-7, Figure 5-14). The other two shovel tests were inconclusive with neither shovel test indicating a buried surface (Munoz 2012a:44, Table 5-7, Figure 5-14). Based upon the artifact scatter of lithic tools and a diagnostic point, positive shovel tests, and MSS results, CAR recommended additional testing to determine NRHP eligibility (Munoz 2012a).

Figure 6-3. Overview of 41BP859 at the time of discovery following a wildfire in August of 2011 (top). The bottom image is a view to the west/northwest of 41BP865 in 2017. The tree line marks the unnamed drainage (bottom).

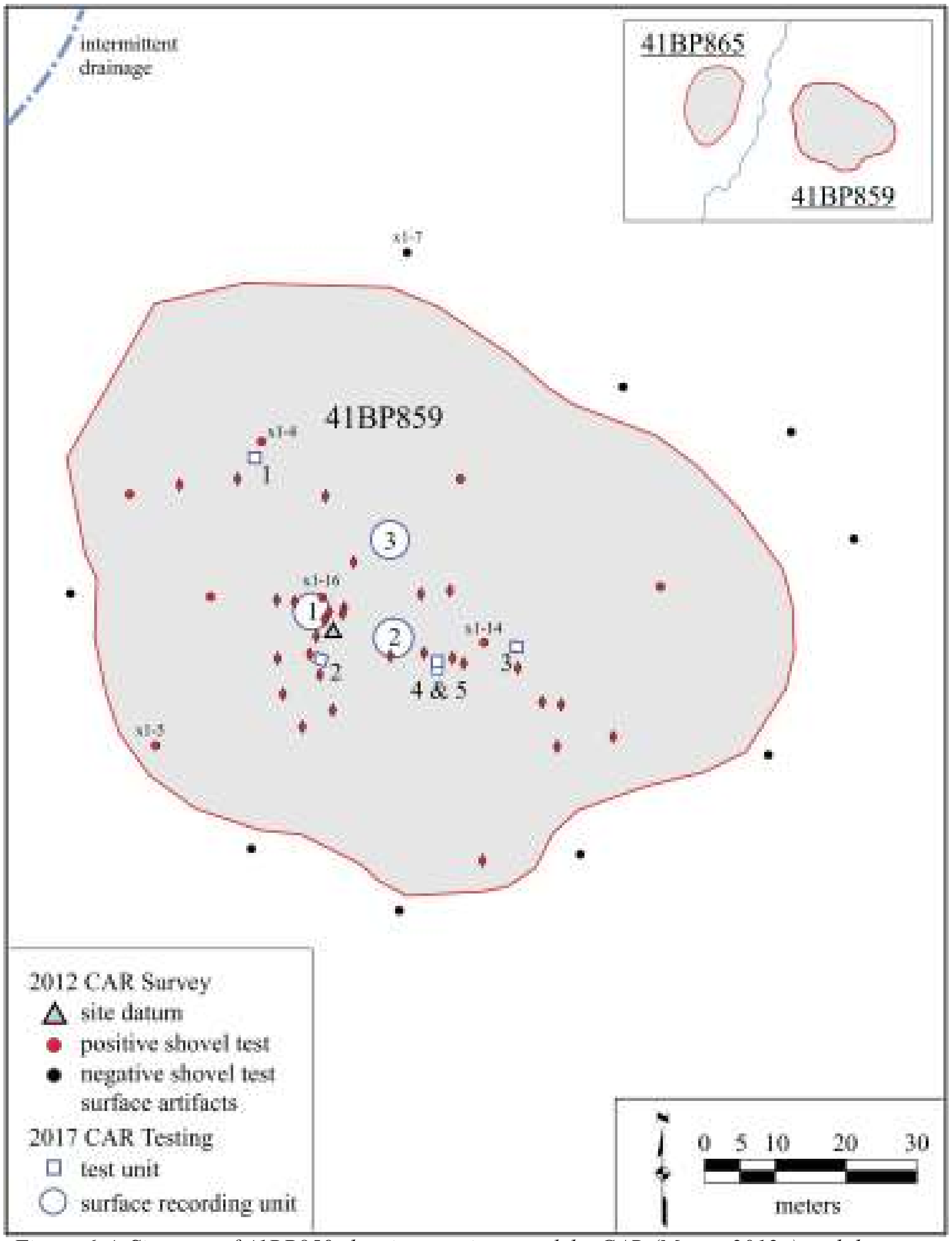

Figure 6-4. Site map of 41BP859 showing previous work by CAR (Munoz 2012a) and the current project. Inset shows the site's proximity to 41BP865.

Work Conducted

The work at 41BP859 was conducted between November 12-16 and on November 29, 2017. The CAR placed three 1-x-1 m TUs in the central portion of the site within the heaviest concentration of the artifact scatter. A fourth test unit (1-x-1 m) was placed in the northwest portion of the site near a positive shovel test (x1-4) and a scatter of bifaces. An additional unit (TU 5, 0.5-x-1 m) was excavated along the south wall of TU 4 to investigate a FCR feature. Three SRUs were placed within the artifact scatter recorded during the 2012 investigation. The locations of the five CAR test units and three SRUs are shown on Figure 6-4 within the site boundary along with the previously excavated CAR shovel tests and artifact scatter.

CAR excavated 4.5 m^3 of sediment at 41BP859. All units were excavated to clay and terminated at that level with the exception of TU 5, which was excavated to the feature depth. The sediment was an alluvial-derived very fine, fine sandy loam, primarily brown to dark yellowish brown (10YR 4/3, 4/4) terminating at mottled sandy clay, primarily yellowish brown (10YR 5/4, 5/8). Rodent burrows were observed across the site with both TUs 2 and 3 having rodent activity during excavation. The testing of 41BP859 recovered 2 projectile points, 10 lithic tools, 222 pieces of debitage, and 9.8 kg of burned rock/FCR. One hearth feature was defined at this site. CAR also extended the boundary of 41BP859 (Figure 6-4) to capture a positive shovel test (x1-5).

In TU 1, 13 levels of sediment (1.25 m^3) were excavated to a termination depth of 130 cmbd. Burned rock was present in every level with the exception of Level 3. Seventeen pieces of debitage were recovered from the unit in Levels 2, 7, 8, 9, 10, and 13. In addition, a medial section of a biface was found in Level 4. In TU 2, 11 levels of sediment (1.1 m^3) were excavated to a terminal depth of 120 cmbd. Burned rock (2.07 kg) was found in all levels, and debitage (n=63) was found in all levels with the exception of Level 11, the last level above clay. A biface (likely the distal portion of a dart point) was found in Level 7, and a biface was found in Level 8. The top portion of the east wall collapsed during excavation, and a uniface was recovered from a level between 0 to 24 cmbd. In TU 3, 11 levels of sediments (1.00 m^3) were excavated to a terminal depth of 110 cmbd. Burned rock (1.198 g) was found in all levels. Debitage (n=75) was found in Levels 2 through 8 with two edge modified flakes found in Level 4. In addition, three lithic tools were found including a Fresno-like projectile point (parallel-serrated edge, modified proximal round base) in Level 3, and an Ellis-like dart point (side-notched, rounded stem) and a uniface were found in Level 4. In TU 4, 10 levels of sediment (1.0 m^3) were excavated to a terminal depth of 110 cmbd. Burned rock was found in all levels with the exception of the last level. A significant increase in burned rock was observed in Level 4, which suggested the presence of a burned rock feature (Figure 6-5). Debitage (n=39) was found in Levels 1 through 8. Two lithic tools were also found, an edge modified flake in Level 5 and a retouched lithic tool in Level 7. Within the terminal level of TU 4, several large flat cobbles (approximately 20-25 cm in diameter) were found on the unit floor (Figure 6-5). No discernable shape or pattern suggesting a cultural feature was observed.

Figure 6-5. Image shows burned rock associated with Feature 1 (circled in white) and cobble-sized rocks found at the terminal level in TU 4. Red/white rod in 30-cm increments.

Test Unit 5 (0.5-x-1 m) was placed along the south wall of TU 4 to investigate the increase of burned rock observed in Level 4 of TU 4. Four levels (0.2 m^3) were excavated revealing a burned rock hearth (Figure 6-6). The feature was semi-circular in shape measuring 51–x-25 cm in size and 36-49 cmbd in depth. In the upper two levels, 0.09 kg of burned rock and 10 pieces of debitage were recovered. A biface, likely the distal portion of dart point, was found in Level 2. A total of 2.5 kg of burned rock and 28 pieces of debitage were collected from the two lower levels containing the feature. Two soil samples (7.3 liters) were collected from the feature and floated at the CAR laboratory. Charcoal, debitage, and burned rock were recovered from the samples.

Three SRUs were placed in the previously identified artifact scatter. One, SRU 3, contained six burned rock, while the other two SRUs were negative for surface artifacts. Note, however, that the site surface was heavily overgrown with grasses, vine, and brush, limiting ground visibility. The lack of visibility differed significantly from the 2012 survey.

41BP865

Site 41BP865 (Figure 6-7, top) is a lithic scatter measuring approximately 2,151 m^2 in size (Munoz 2012a). It is located west of an intermittent drainage of McLaughlin Creek across from site 41BP859. The site lies within an open area at an elevation range of 146 to 149 m AMSL. The site's vegetation included bluestem, yellow Indian, and bunch grasses and secondary brush growth (Figure 6-7, bottom).

Background

Site 41BP865 was also found due to a wildfire and 100 percent ground visibility (Figure 6-7, top). Due to this visibility, 40 pieces of debitage were recorded on the surface (Munoz 2012a). Figure 6-8 shows 41BP865 and the eight shovel tests excavated to define the site boundary and depth of deposition. Two shovel tests (x10-4 and x10-6) were positive for cultural material, and both contained debitage found below 30 cmbs (Munoz 2012a:Table 5-8). Shovel test x10-4 was excavated to 70 cmbs and contained sandy deposits to the terminal depth. Soil samples from two shovel tests (x10-1 and x10-6) were analyzed for magnetic susceptibility. The results of the magnetic susceptibility analysis suggested that neither shovel test had indicators of a buried surface (Munoz 2012a:Table 5-9, Figure 5-21). Based on the artifact scatter and the two positive shovel tests, CAR recommended additional testing focused in the area of the positive shovel tests and the surface artifact scatter to determine NRHP eligibility status (Munoz 2012a).

Work Conducted

The work at 41BP865 was conducted from November 26 through November 30, 2017. The CAR placed three 1-x-1

Figure 6-6. Feature 1 on 41BP859.

Figure 6-7. Overview of 41BP865 at the time of discovery following a wildfire in August 2011 (top). The bottom image is a view to the west/northwest of 41BP865 in 2017. The location of TU 1 (crewmember) is to the left and TU 2 (white screen) is to the right.

m TUs in the northern portion of the site within the artifact scatter and a positive shovel test (x10-6) from the previous testing. A fourth test unit (1-x-1 m) was placed near the positive shovel test (x10-4) in the southern portion of the site. Two additional units (0.5-x-1 m) were excavated along the east and south walls of TU 1 to investigate a FCR feature. Three surface observation areas were positioned within the artifacts scatter. The location of the CAR test units and SRUs are shown on Figure 6-8 within the site boundary, relative to the previously excavated CAR shovel tests and recorded artifact scatter.

CAR excavated 4.3 m^3 of sediment at 41BP865. All units were dug to clay and terminated at that level with the exception of the 0.5 x 1 m units (TUs 5 and 6). The sediment profile contained four strata. The uppermost level (0-5 cmbs) was an organic horizon of dark yellowish brown to very dark grayish brown (10YR 4/6, 3/2) sandy loam. Two strata consisted of very fine, fine sandy loam, primarily brown to dark yellowish brown (10YR 4/3, 4/4) silty loam. The lower strata contained some sandstone nodules and staining. The units terminated with a mottled yellowish brown (10YR 5/4, 5/8) sandy clay with sandstone inclusions. The testing of 41BP865 recovered

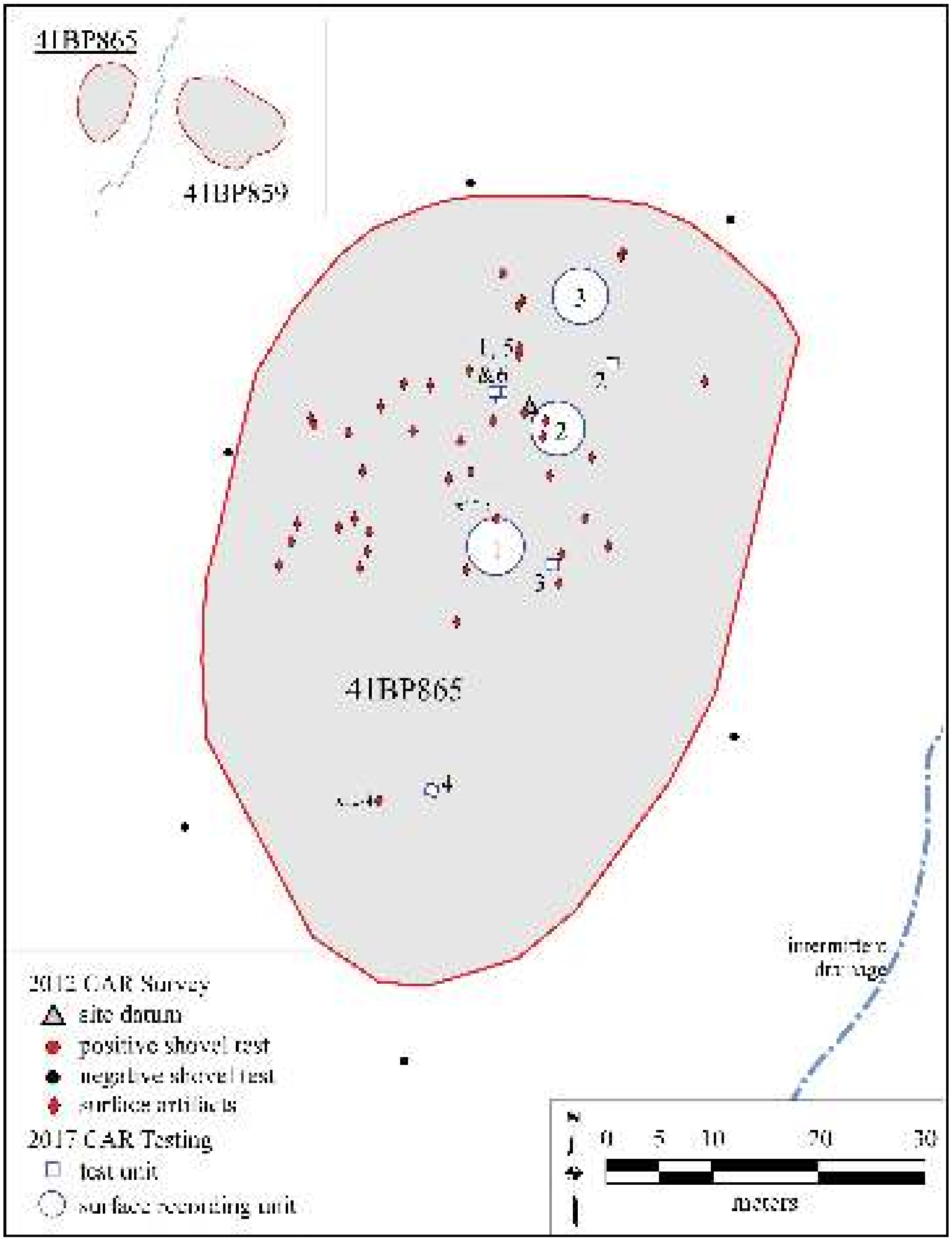

Figure 6-8. Site map of 41BP865 showing previous work by CAR (Munoz 2012a) and current project. Inset shows the site's proximity to 41BP859.

one arrow point, two other lithic tools, one core, 147 pieces of debitage, and 7.6 kg of burned rock and FCR. Two burned features were defined at this site.

In TU 1, 9 levels of sediment (0.9 m^3) were excavated to a depth of 10 cmbd. Cultural material was found in all levels. Fifty-two pieces of debitage were recovered in Levels 1 through 9. In addition, a biface, likely a proximal portion (stem) of a dart was found in Level 2. Burned rock (0.827 kg) was also found in the unit with a significant increase (quantity and weight) in Level 4 in the southeast portion of the unit. The burned rock concentration was mapped and designated Feature 2. In TU 2, 9 levels of sediment (0.9 m^3) were excavated to a depth of 100 cmbd.

A minimal amount of artifacts were found in TU 2, including burned rock (0.39 kg) and debitage (n=4). A heat-treated chert core was found at 65 cmbd. In TU 3, 11 levels of sediment (0.95 m^3) were excavated to a depth of 105 cmbd. Burned rock (1.4 g) was found in Levels 2 through 10, and debitage (n=39) was found in Levels 2 through 7 and Levels 9 and 10. A Perdiz projectile point was found in Level 4. Initially two features were identified in TU 3. Feature 1 was an alignment of burned rock found in Level 4. However, a large diameter root was found below the burned rock suggesting that the alignment was natural and not cultural. A charcoal stain and burned rocks were observed at 50-75 cmbd in the southeast corner of the unit. It was subsequently designated Feature 3, though it was not recognized until after the burned rock was removed. The feature was observed in the south and east wall profiles following excavation of the unit (Figure 6-9). The feature contained 0.75 kg of burned rock with charcoal, and five pieces of debitage were recovered from floated samples. In TU 4, 8 levels of sediment (0.79 m^3) were excavated to a depth of 90 cmbd. The unit produced only 7 pieces of debitage and 0.97 kg of burned rock.

Two test units, TU 5 and TU 6 were placed on the east and south walls of TU 1 to investigate Feature 2 (Figure 6-10). These units revealed an oval-shaped hearth feature measuring 40-x-40 cm in size and 35-48 cmbd in depth. Four levels of sediment (0.4 m^3 from TU 5 and 6) were excavated from each unit to a depth of 50 cmbd. Twelve pieces of debitage and 0.01 kg of burned rock were recovered from the upper two levels of TU 5.

Figure 6-9. Image of TU 3 showing Feature 3 (white circle) in the east and south profile walls.

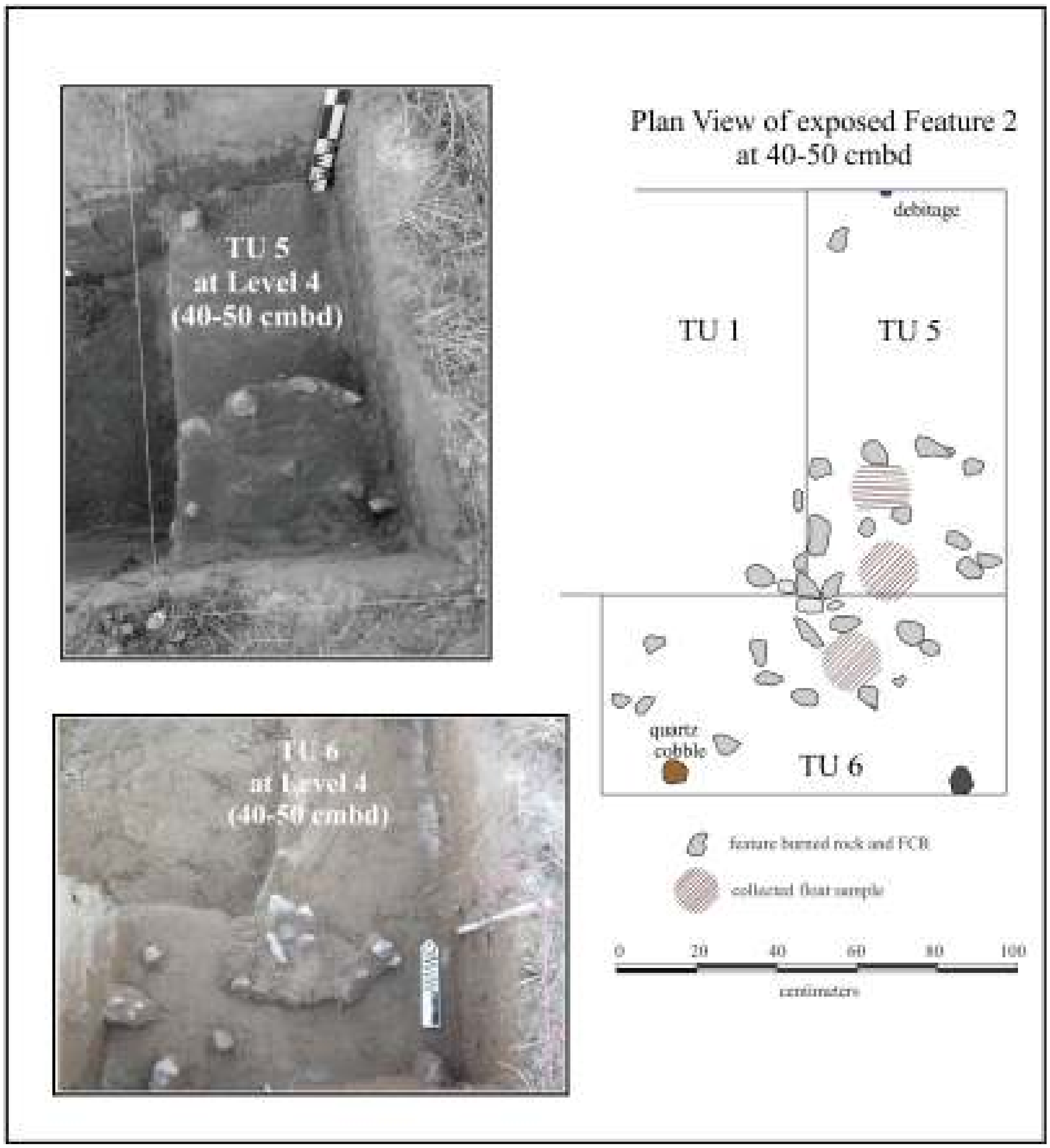

Figure 6-10. Photographs and plan view of Feature 2 at 41BP865.

In the feature, Levels 3 and 4, 2.1 kg of burned rock and 17 pieces of debitage were recovered. A soil sample was collected from the feature in TU 5 with charcoal recovered from the floated matrix. In TU 6, 9 pieces of debitage and 0.02 kg of burned rock were recovered from Levels 1 and 2. In the feature, Levels 3 and 4, 2.6 kg of burned rock, 8 pieces of debitage, and one chert core tool were recovered. A soil sample was also collected in TU 6, and charcoal was recovered from that sample.

Summary

This chapter presented a summary for each of the three sites investigated during this project that included background on the environment of the site, previous work, the current work, and a description of what was recovered during excavation. Table 6-1 summarizes the excavated units by site, including reasons for unit termination. The underlying clay was reached in all units with the exception of three units. Those three units focused solely on recovering sufficient information to characterize features found within them.

The work recovered projectile points, lithic tools, cores, debitage, and burned rock from these three sites. In addition, one burned rock feature at 41BP859 and two burned rock features at 41BP865 were documented. Table 6-2 summarizes the finding from each site.

Table 6-1. Summary of Testing Efforts

Site	Test Unit	Number of Levels	Volume (m^3)	Termination
41BP528	1	7	0.64	clay
41BP528	2	8	0.7	clay
41BP528	3	5	0.43	clay
41BP859	1	13	1.25	clay
41BP859	2	11	1.1	clay
41BP859	3	11	1	clay
41BP859	4	10	1	clay
41BP859	5	4	0.2	feature specific
41BP865	1	9	0.9	clay
41BP865	2	9	0.9	clay
41BP865	3	11	0.95	clay
41BP865	4	8	0.79	clay
41BP865	5	4	0.2	feature specific
41BP865	6	4	0.2	feature specific

Table 6-2. Summary of Findings by Site

Site	Pieces of Debitage	Burned Rock (kg)	Number of Lithic Tools/Core	Number of Projectile Points	Number of Features
41BP528	42	1.4	3	0	0
41BP859	222	9.8	10	2	1
41BP865	147	7.6	3	1	2
Total	**414**	**18.8**	**16**	**3**	**3**

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Chapter 7: Site Integrity

Leonard Kemp and Raymond Mauldin

The first eligibility criteria concerns site integrity. An assessment of the integrity of deposits is a critical step to determine whether an archaeological site warrants additional investigation and/or protection and is an integral part of National Register eligibility. Camp Swift is located in the Sandy Mantle formation of Texas. Sandy soils over clay coupled with bioturbation will have varying impacts on the archaeological record. This chapter summarizes the two competing models showing how the Sandy Mantle was formed and their differing implications for integrity of archaeological deposits. It then focuses on three methods to assess a site's integrity. This includes the evidence of ongoing and past bioturbation, the distribution and characteristics of artifacts and features, and the patterning in magnetic soil susceptibility (MSS) values. This three-part approach was previously employed in Mauldin et al. (2018) with relative success in accessing a site's overall integrity.

The Sandy Mantle

As noted in Chapter 2, Camp Swift is located within the Sandy Mantle of Texas (see Ahr et al. 2012). At present there are two models of the development of the Sandy Mantle, the pedogenic and the geomorphic, with the former suggesting that sites within it have low integrity and the latter suggesting that sites may have varying degrees of integrity (Figure 7-1). The pedogenic model (see Bruseth and Martin 2001) suggests that the Sandy Mantle and the argillic horizons are derived in situ from weathering Tertiary bedrock. Based on this hypothesis, the landscape is pre-Holocene in origin with artifacts moving downwards via bioturbation. Archaeologically, this viewpoint assumes that artifacts are in secondary contexts with limited to no research or preservation value. The geomorphic model (Bousman and Fields 1991; Frederick and Bateman 2001) proposes that the

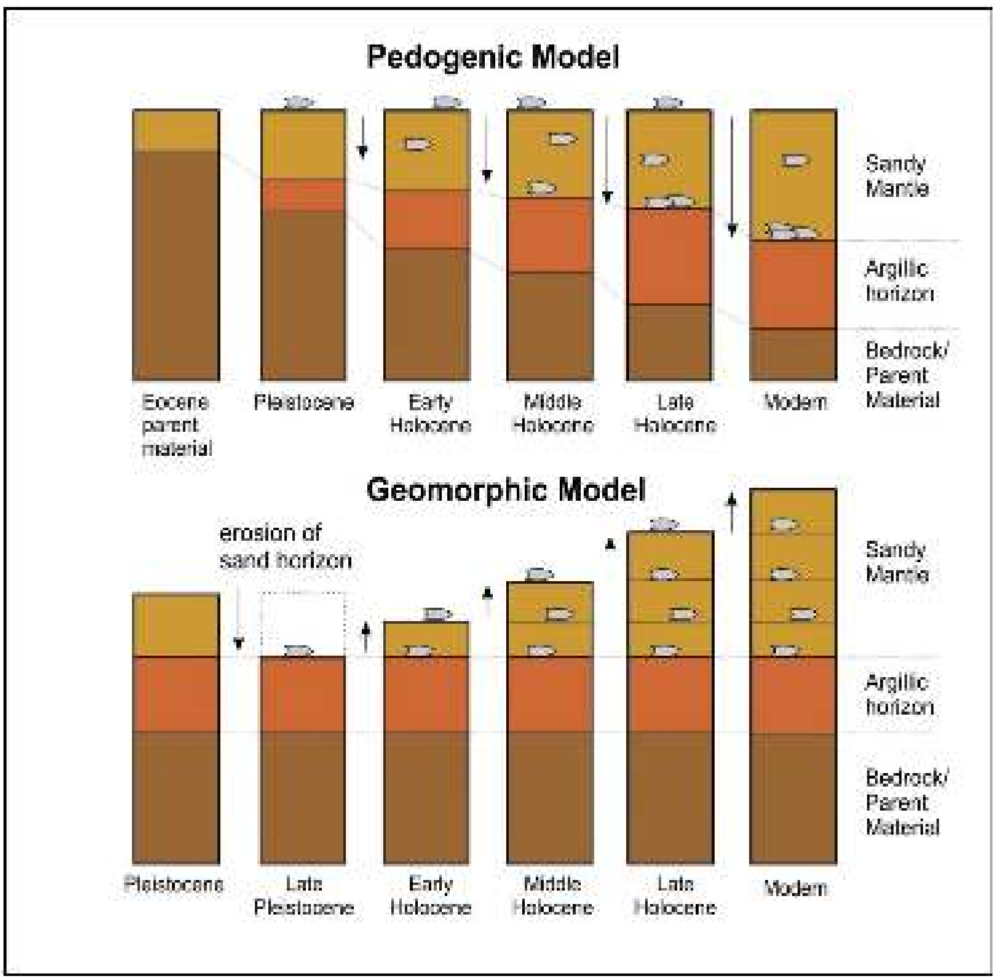

Figure 7-1. Models of pedogenic and geomorphic formation process for the Texas Sandy Mantle (Ahr et al. 2012).

Sandy Mantle is Holocene-age eolian and colluvial deposits overlaying the developed argillic horizon. If this scenario is accurate, archaeological deposits have the potential to be in a stratified context (Bousman and Fields 1991; Frederick and Bateman 2001).

Ahr et al. (2012) suggest the geomorphology of this region is complex with multiple formation processes (alluvial, colluvial, and eolian) likely working at several different scales. These processes could potentially preserve aspects of the archaeological record in some cases. Past archaeological testing by Nickels (2008) and Mauldin et al. (2018), as well as the present investigation, have excavated sites that fit within the pedogenic model. That is, in some cases, the majority of large artifacts are found lying on the clay floor of test units. Conversely, these three investigations have also found sites, or portions of sites, that have integrity with discrete and distinct horizon and artifact sequences that are internally consistent and supported by chronometric dates.

Bioturbation

Ongoing bioturbation, both floral and faunal, were observed at the three tested sites. Bioturbation caused by roots and rodents will move small artifacts within a loose sediment such as sand. As a root grows it would push aside artifacts, and conversely after the tree dies and the root begins to decay, artifacts will relocate into that void (Waters 1992). In Bastrop County, pocket gophers (Geomys attwateri) are the most likely animal to cause significant damage to an archaeological site by burrowing. This mammal has been reported on Camp Swift (see Table 2-1). Pocket gophers are abundant in grassland settings, burrowing from 15-30 cm below the surface (Bocek 1986). Without rapid burial of a surface to a depth exceeding 30 cm, pocket gophers and other rodents can have a significant impact on the landscape. Interestingly, while active burrowing was observed, no remains of rodents were found during the excavation.

Site 41BP528 was located within a wooded area with tree roots present in all units. Figure 7-2 shows multiple levels of tree roots found at TU 1 (41BP528). Evidence of faunal turbation was even more pronounced with animal burrows observed at 41BP859 and to somewhat a lesser degree at 41BP865. Figure 7-3 shows the animal burrows observed on the surface of site 41BP859. These areas were avoided during the placement of test units. However, in both TUs 2 and 3 active burrowing was documented during excavation. In TU 3, the spoil from a burrowing animal measured approximately 4 gallons within a 30-minute period. This scenario was similar to one documented during the testing of 41BP802 in which active animal burrowing into a unit occurred during a lunch break (Mauldin et al. 2018). The active rodent zone is approximately 0-30 or 0-35 cm below the current surface (Bocek 1986).

Artifact and Feature Distributions

The distribution, number, and size of items can provide additional information on the integrity of assemblages within a site. This analysis focuses on two of the three sites (41BP859 and 41BP865) that have more than 100 pieces of chipped stone debitage. Site 41BP528 was not considered in this portion of the analysis as it only had 42 pieces of debitage. The 100-item threshold reduces impacts associated with small sample sizes. Here the degree of bioturbation is explored by looking directly at the distribution and size of debitage.

Following criteria previously established by Mauldin et al. (2018), artifact distribution is calculated by their distance above the clay floor, as artifacts will not penetrate into the clay. Two scenarios are illustrated to demonstrate the thought process. As shown in Figure 7-4, high levels of turbation over time should result in artifacts increasingly concentrated near or on the clay surface (as shown by the blue bars). At one extreme, all of an assemblage would be concentrated at the clay level, forming a single peak on that surface. At the other extreme, if a single site assemblage had not been bioturbated, one isolated peak, some distance above the clay, should be present as shown by the red bars. Most assemblages will fall between these extreme cases.

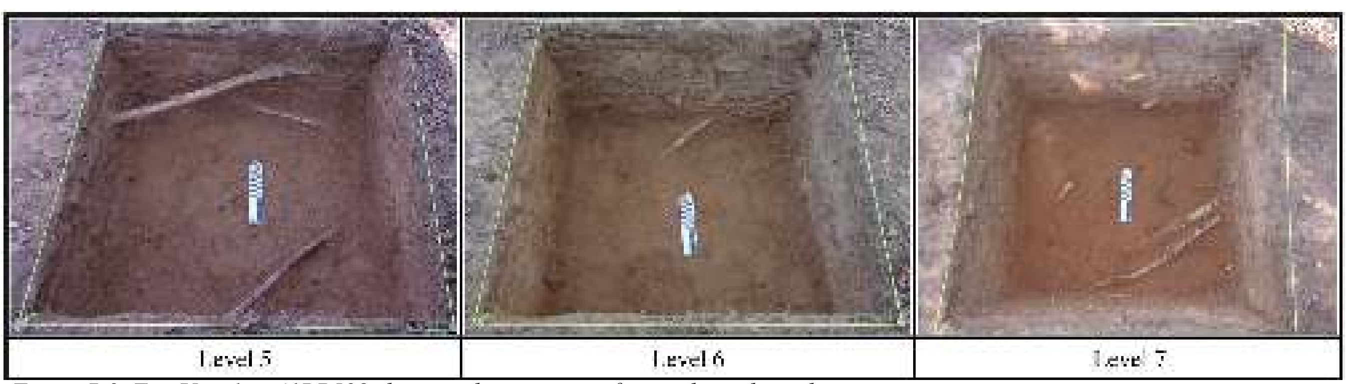

Figure 7-2. Test Unit 1 at 41BP528 showing the presence of roots throughout the excavation process.

Figure 7-3. Surface of 41BP859 showing spoil piles of animal burrows.

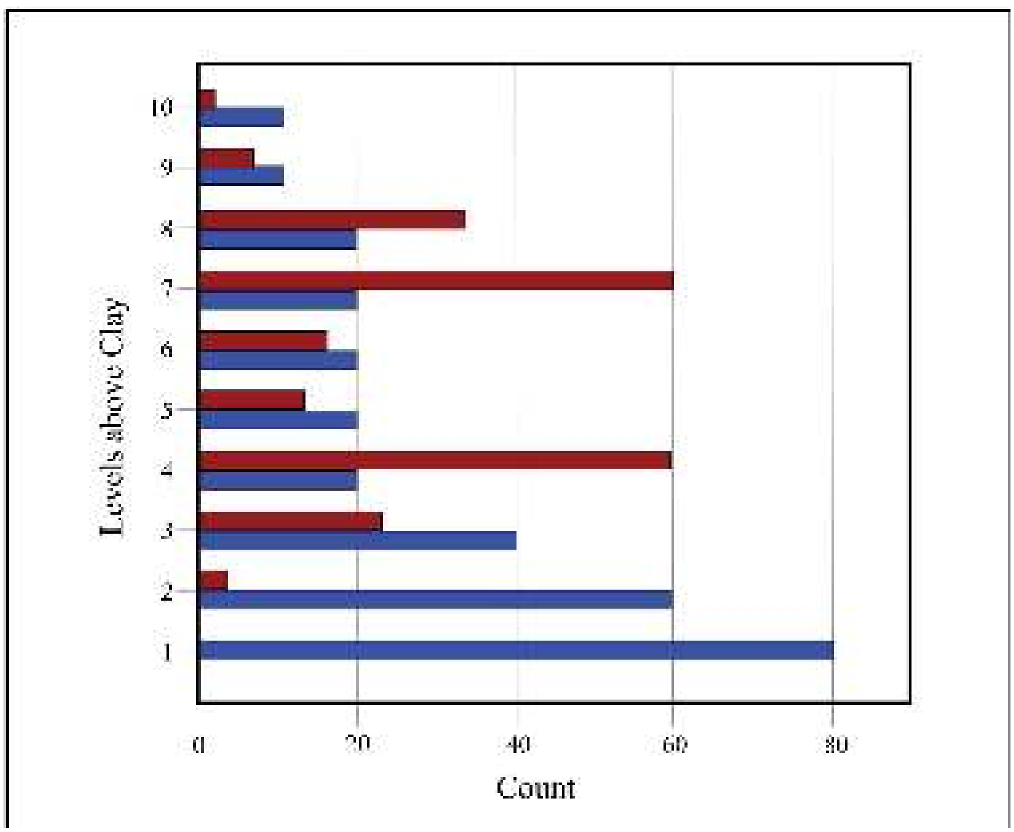

Figure 7-4. Two scenarios of debitage distribution by site at Camp Swift. In blue, artifacts cluster at the bottom of the units near the clay floor suggesting that these artifacts are in secondary contexts and have low integrity. The other pattern in red indicates some degree of integrity where two peaks are represented suggesting multiple occupations.

Figure 7-5 shows the distribution of debitage of 41BP859 and 41BP865 at a site level corrected for differential volumes. The debitage counts from TU 5 of 41BP859 and TUs 5 and 6 from 41BP865 are not included this analysis because they would inflate the counts in the upper level. In the case of 41BP859, the distribution of debitage shows several peaks at Levels 6, 8, and 10/11. Note very little to no debitage was found in the bottom levels. At 41BP865, a peak is observed in Levels 7 through 10. There is a significant decline in the number of debitage in the remaining six levels. The patterns suggest there is a degree of integrity at both sites with occupation surfaces possibly represented in the site profiles.

Bocek (1986) suggests that artifacts are size sorted through the soil profile due to rodent burrowing. Large artifacts are undercut or dug around and will tend to be displaced down, while smaller artifacts are more likely to be moved up the burrow with the spoil pile (Bocek 1986). To measure artifact size, in this case debitage, the debitage from each level was digitally photographed with an object of known area. The area of each piece of debitage was then calculated in square mm using SigmaScan© Pro (version 5.0; Mauldin et al. 2018).

The distribution of artifact area for debitage by sites is shown in Figure 7-6. In the case of 41BP859, the size of debitage is concentrated in Levels 4 and 5 with a decrease in size and concentration as it approaches the bottom. The average of the area spikes in Level 7 and decreases afterwards. Note that only TU 1 had 13 levels with the other units having 10 and 11 levels. A similar, but not as robust, pattern is shown for 41BP865 with larger artifacts concentrated in the upper levels and in the lower levels. After which, artifact area decreases with the exception of two outliers having the largest area of any of the artifacts at 41BP865. The area average spikes in Levels 5 and 6 and would decrease thereafter with the exception of the same outliers. The size distribution and average suggests some level of integrity at 41BP859 overall, while the pattern at 41BP865 is not as robust suggesting less integrity.

The following section examines artifact area at the unit level for the two sites (Figures 7-7 and 7-8). This was done to parse out parts of the site that may have more integrity as opposed to other parts that may not. In the case of TU 1 of 41BP859, there is no debitage in the upper levels (Levels 1-6) with debitage shown in Levels 7 through 10. The absence of debitage in the upper levels may be a function of rapid sedimentation due to its location nearest the drainage. If true, there may be some level of integrity in the lower levels. In TU 2, there is a spike in area size in Level 5; however, that level had only three pieces. The average of the debitage area is relatively the same through the profile if the outliers are removed. In TUs 3 and 4, there is a spike in the area size in Level 4 with a notable decrease in area size afterwards. There is no material in the last two levels of both units. Overall, size distribution suggests some level of integrity in the area encompassing TUs 3 and 4. The results of TU 2 are somewhat more ambiguous, while the TU 1 pattern may suggest some level of integrity in the lower levels.

The amount of debitage per unit at 41BP865 is low with TUs 2 and 3 having too few pieces to infer any pattern. The results of TU 1 at 41BP865, shows a spike in size in Level 4 after which there is a decrease in the area size until Levels 8 and 9 with a large piece in each level. If the outliers were removed from

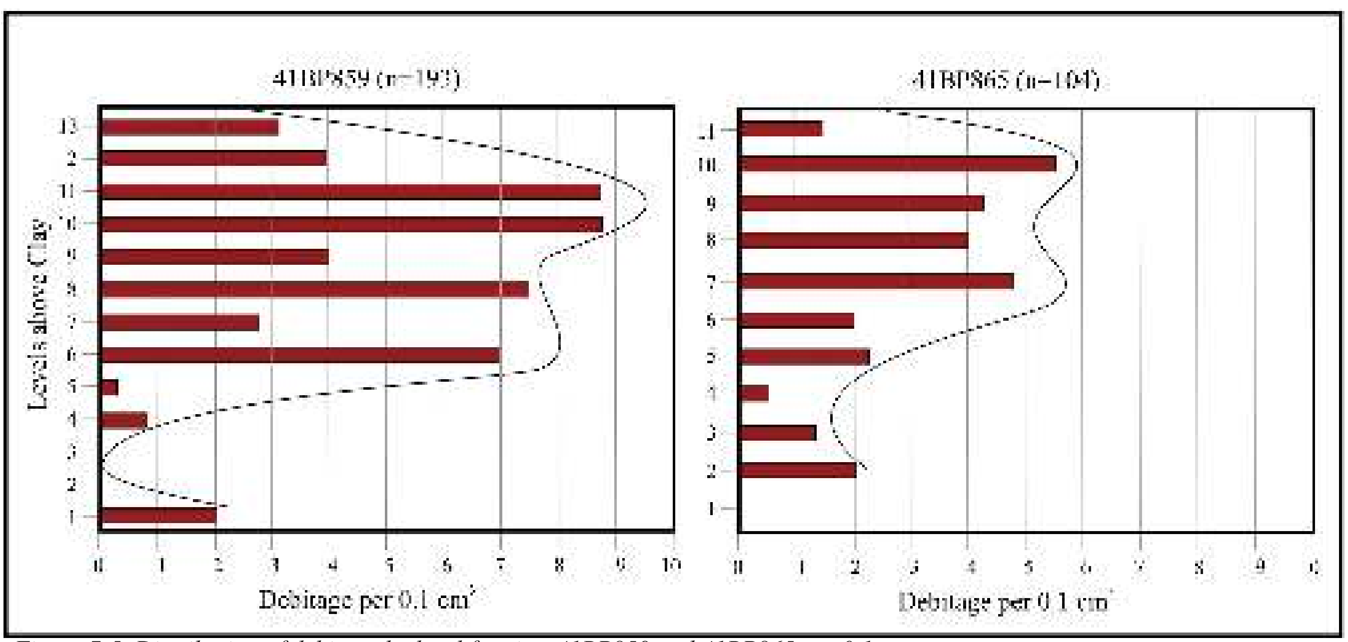

Figure 7-5. Distribution of debitage by level for sites 41BP859 and 41BP865 per 0.1 cm .

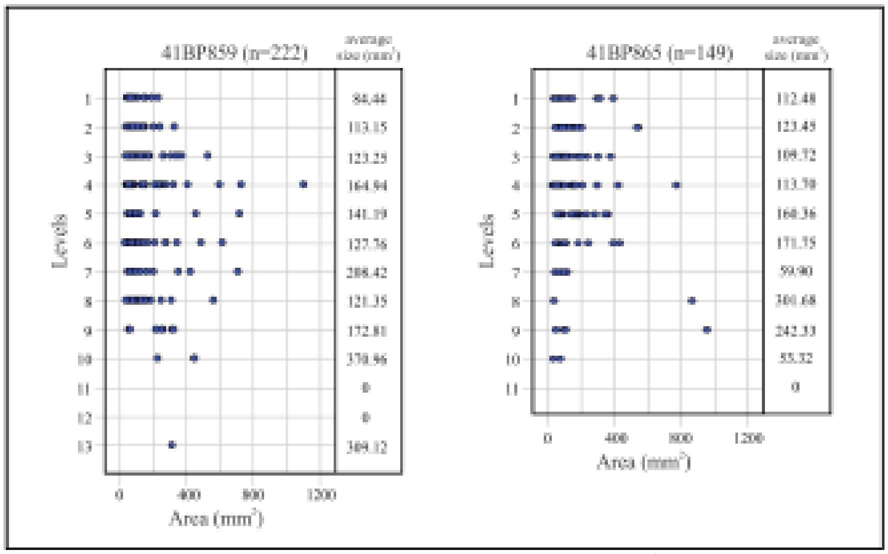

Figure 7-6. The distribution and average of debitage area (mm²) by site.

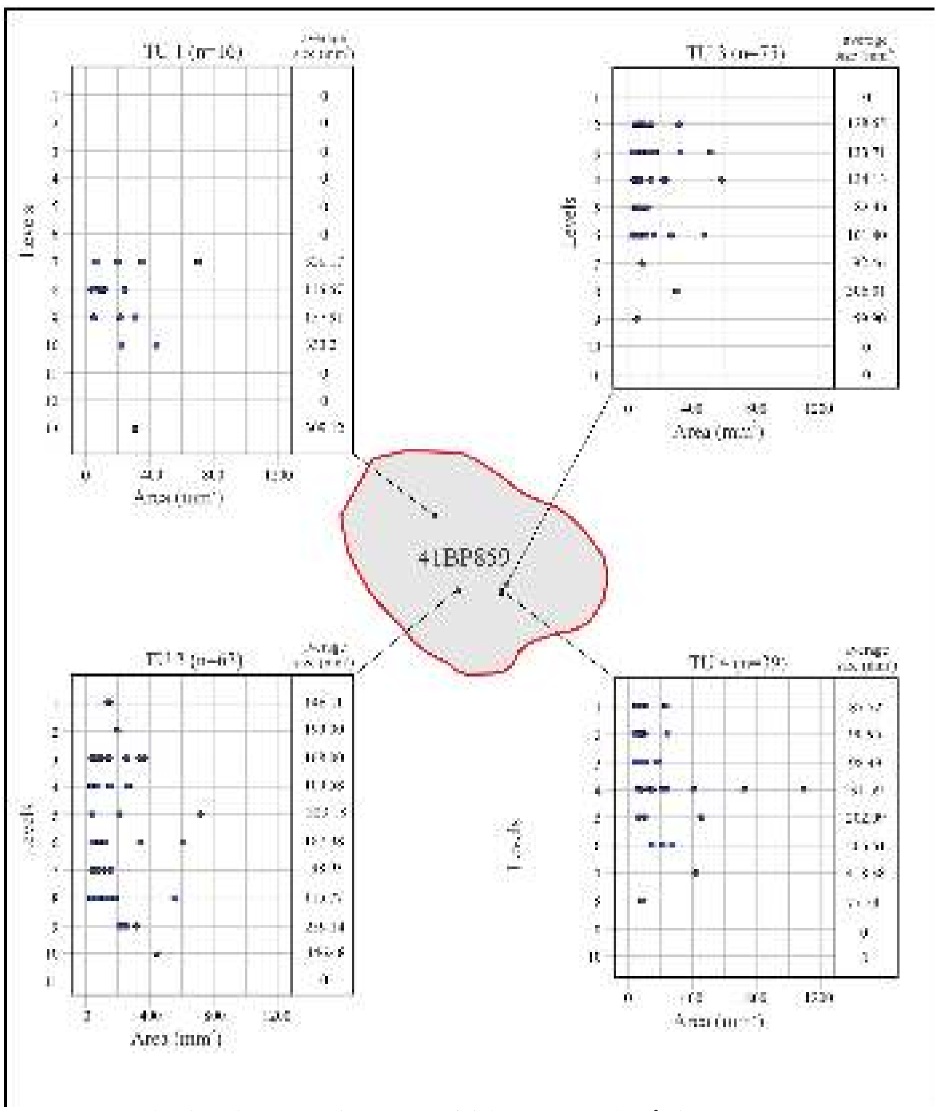

Figure 7-7. The distribution and average of debitage area (mm²) by unit at site 41BP859.

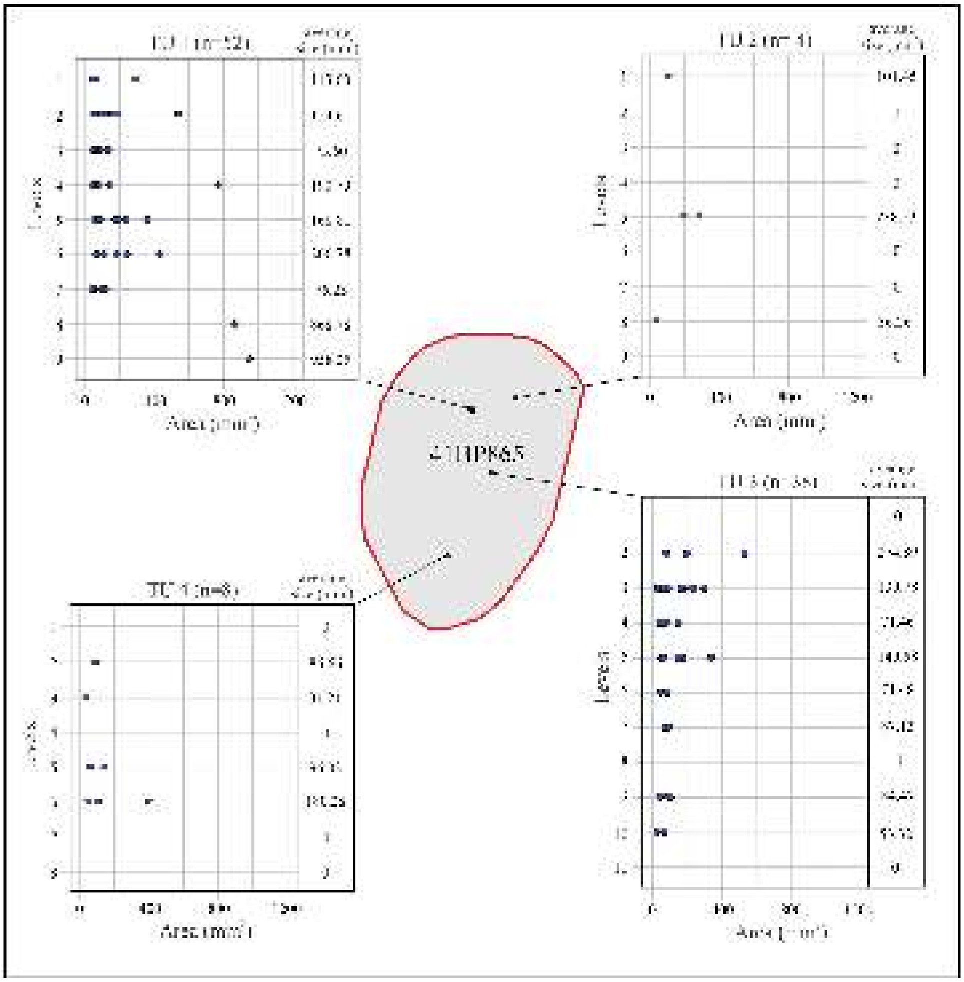

Figure 7-8. The distribution and average of debitage area (mm²) by unit at site 41BP865.

the average, there would be a spike in Level 5 followed by a decline in the average size. Both TUs 2 and 3 have too few pieces of debitage to infer any pattern. In TU 3, there is a spike in the distribution and the average area size in Level 5 with a notable decrease in both following that level. Overall, the amount of debitage in TUs 1 and 3 preclude any speculation as to the integrity of those units. For the two sites with sufficient sample sizes, the distributions and size characteristics of debitage, as well as the presence/absence of recognizable features, suggest that sites 41BP859 and 41BP865 appear to have sufficient integrity for additional investigation.

Magnetic Soil Susceptibility

The final consideration of the integrity of deposits uses patterning in Magnetic Soil Susceptibility (MSS) values. MSS provides evidence of more localized, intra-site level patterns. Mauldin et al. (2018) presented four hypothetical patterns of MSS values to aid in the interpretation of those signatures (Figure 7-9). In the upper left box, there are two peaks in MSS values, one at the surface and one shown approximately eight to nine levels below the surface. The first peak is likely a result of organic enrichment found on the surface that migrating into the profile. This peak would be suspect because it is also within the rodent activity zone. The second peak consisting of multiple successive levels may indicate a buried occupational surface. Mauldin et al. (2018) suggest that rapid burial could potentially place the occupation surface below the rodent zone, thereby maintaining assemblage integrity. Box B shows a spike near the surface level. This near-surface spike is common and is often due to organic enrichment from modern plants. Below the spike, the Box B pattern shows decreasing values. This suggests that constant sediment deposition may have prevented the formation of an enriched occupation surface. Box C shows a nearly vertical pattern of values interpreted as a profile impacted by a mixing of sediments caused by bioturbation. Box D shows a large spike in MSS values within a single level. This spike is likely a result of the soil chemical composition containing iron oxide that would return a high value (see Dearing 1999:36-38). Mauldin et al. (2018) state that MSS results are qualified in

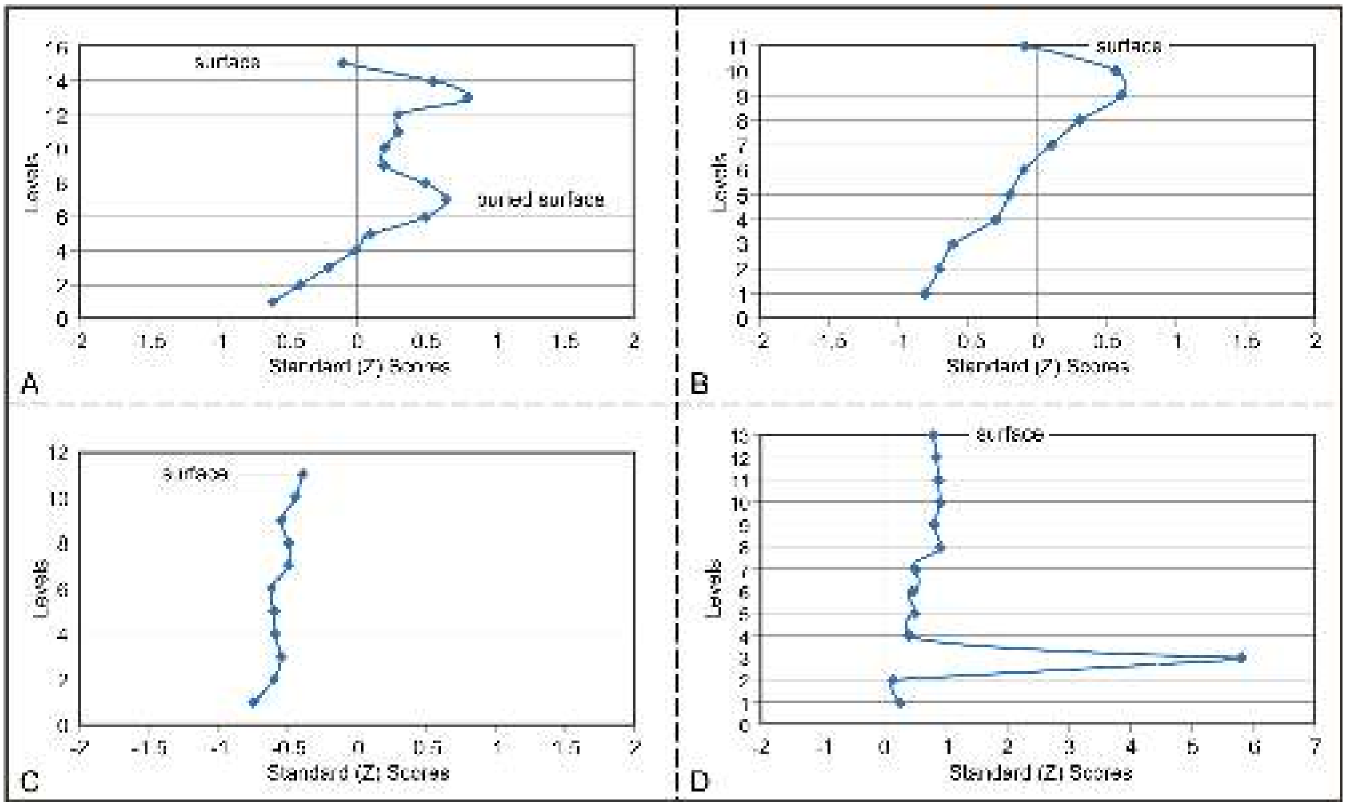

Figure 7-9. Four hypothetical patterns of MSS values (Mauldin et al. 2018:Figure 7-12).

that the interpretation of the data is somewhat subjective and that there may be multiple processes that may cause a similar signal. However, it is useful when considered in conjunction with other methods, such as artifacts patterning, to determine the degree of integrity.

On the current project, 182 sediment samples were processed from 11 of the 14 units excavated on the three sites. These were collected using procedures outlined in Chapter 4. Test Unit 5 at 41BP859 was not sampled, though profile samples were taken from the south wall of the adjoining unit, TU 4. Similarly, TUs 5 and 6 at 41BP865 were not sampled, but samples were collected from the south wall of the adjoining TU 1. The raw data and additional information on the 182 MSS samples used in the test unit discussions are presented in Appendix B.

The analysis focuses on indicators of buried surfaces at depths below 20 cm (Figure 7-9, Box B) and evidence of extensive bioturbation (Figure 7-9, Box C). Of note is the low MSS value and variability from the collected samples, although these finding are somewhat similar to the MSS values reported by Mauldin et al. (2018). The following section interprets the MSS value at the unit level to assess the integrity of the site as a whole.

41BP528

MSS samples were taken from the three TUs excavated at 41BP528 (Figure 7-10). The MSS signature from all units on this site suggests that bioturbation affected not only the upper levels but also the lower levels. The values from TU 1 reflect a fluctuating pattern that suggests mixing likely due to the roots found throughout the unit. Test Unit 2 spikes around Sample 7, which may suggest a surface or high iron content. There is an equivalent spike in the weight of burned rock (0.124 kg) at this level (Level 4) although the number of burned rock is small (n=3). The levels above and below TU 2 Sample 7 suggest bioturbation. The values of TU 3 show no buried surface and suggest bioturbation similar to the hypothetical Plot C of Figure 7-9.

41BP859

Figure 7-11 presents the MSS values for four units at 41B859. Two of the test units (2 and 3) are located near the shovel test of the 2012 survey with MSS values that suggested a buried surface. Test Unit 1 values fluctuate which suggests mixing. The values of TUs 2 and 3 vary slightly in the upper levels of the unit with a slight increase around Sample 10 after which the values decrease to the terminal depth. Active

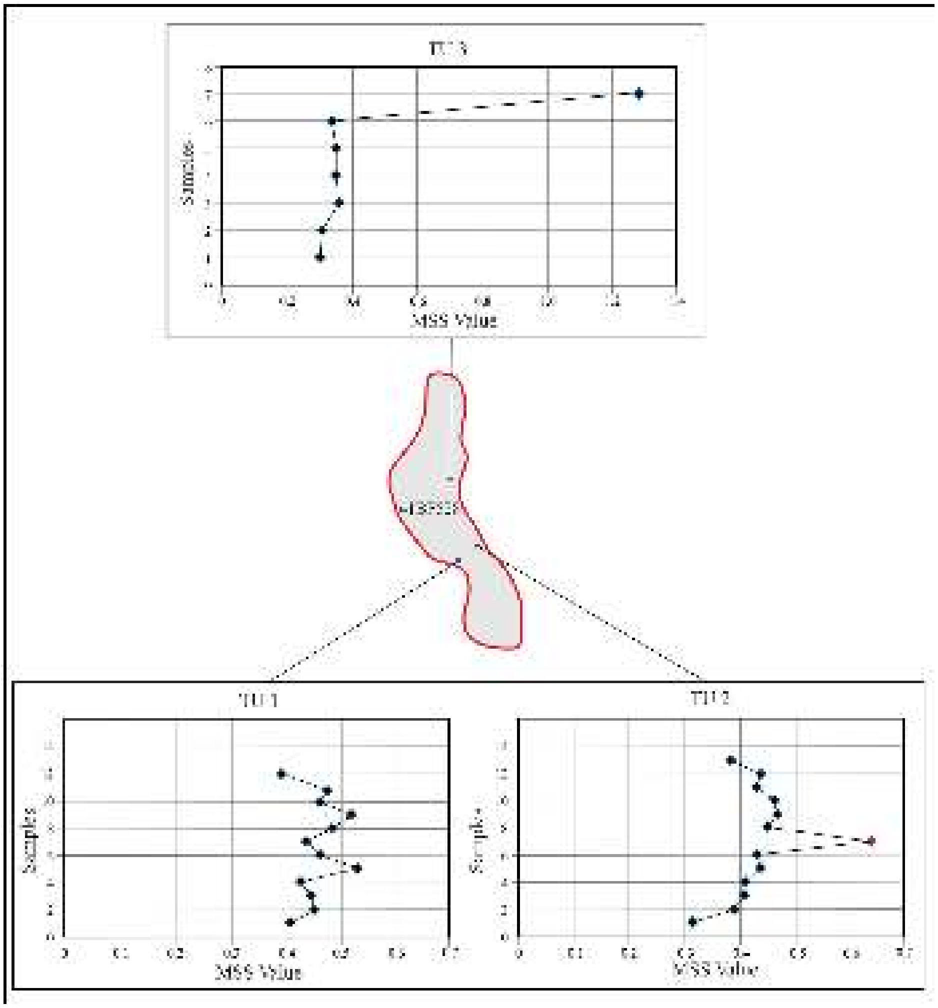

Figure 7-10. MSS values and locations of test units sampled at 41BP528. The red diamond is a spike in MSS value.

animal burrowing was observed in the upper levels of both these units suggesting that the values from these levels have low integrity. While the value increase is small in TU 2 and 3, the slight increase in both units at relatively the same level might suggest some surface stability. The values of TU 4 increase slightly to Sample 14 after which there is a positive trend at Sample 8. Feature 1 was found at this level. The MSS patterns at 41BP859 suggest that there may be some integrity below the upper bioturbated zone in the area of TUs 2, 3, and 4. These MSS values are supported by the Munoz (2012a) survey results in which MSS values from shovel test x1-14 suggested a buried surface in this area.

41BP865

Figure 7-12 presents the MSS values for four units at 41B865. Tests Units 1 and 2 were placed in the north-central portion of the site approximately 10 m from each other. These two units have a comparable signature with a slight increase in MSS value at Sample 9, after which the values decrease through the profile. Feature 2 was found at 46 cmbd at approximately the Sample 10 level. The similar pattern observed on both units may suggest a degree of surface stability at this level. Test Units 3 and 4 were located in the central and southern portion of the site, some distance from TU 1 and 2. The values of TUs 3 and 4 are relatively similar through the profile, which would suggest bioturbation in their respective units. The MSS value from 41BP865 suggests some level of integrity in the area of TUs 1 and 2, and TUs 3 and 4 values suggest little to no integrity. This characterization is qualified by the presence of Feature 3 in TU 3.

Conclusions

The integrity of a site is fundamental to most archaeological research and is a significant criterion of NRHP eligibility determination. All sites are impacted to some degree by processes that degrade the archaeological record. What defines “good” versus “bad” site integrity is qualitative and determined in part by relevant research questions.

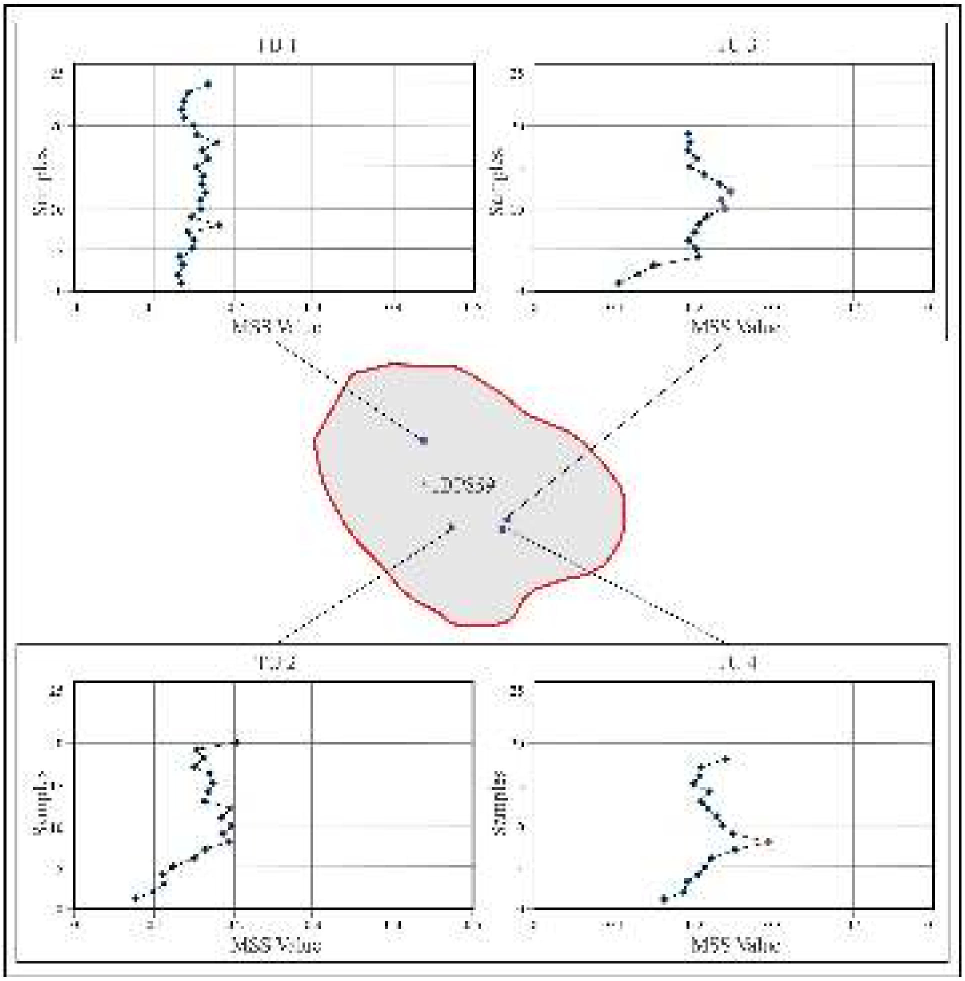

Figure 7-11. MSS values and locations of test units sampled at 41BP859. The red diamonds are spikes in MSS value.

In this geologic setting of the Sandy Mantle, two models suggest conflicting hypotheses of how the Mantle was formed that in turn imply the archaeological integrity of a site. The pedogenic model of Bruseth and Martin (2001) proposes that the landform was formed prior to the Holocene occupation of humans. In this model, all archaeological deposits are in secondary contexts due to bioturbation and have no integrity. The geomorphic model (Bousman and Fields 1991; Frederick and Bateman 2001) suggests that the landform was formed during the Holocene by eolian and colluvial deposition. In this model, archaeological deposits can potentially be in primary contexts and therefore have integrity. Nickels (2008) and Mauldin et al. (2018) have found sites on Camp Swift that exhibit characteristics of both models, which suggests some sites may have integrity and others may not.

The analysis of the integrity of each site was based upon three methods. The first approach was qualitative in that it used the archaeologist's observations of bioturbation. All three sites exhibited evidence of bioturbation, with roots having the primary impact on the record. At two sites, 41BP859 and 41BP865, active and recent rodent activity was observed. The second approach was more quantitative in that the distribution and size sorting of debitage was analyzed to discern patterns of intact surfaces. Both 41BP859 and 41BP865 had adequate sample size (debitage greater than 100), while the amount of debitage at 41BP528 was too small. These patterns, at a site level, suggested discrete occupation surfaces at 41BP859 and 41BP865. At a unit level analysis, the patterns at 4BP859 suggested some integrity in the area surrounding Feature 1. Unfortunately, the unit pattern analysis was not conclusive at 41BP865 due to the small sample size.

The final method used to assess integrity relied on patterning in MSS samples from profiles and features at a site. Table 7-1 summarizes the MSS findings by sites. The results suggests that 41BP528 has little overall integrity. The MSS values from 41BP859 and 41BP865 are marginal but suggest there are areas within each site that may have buried surfaces.

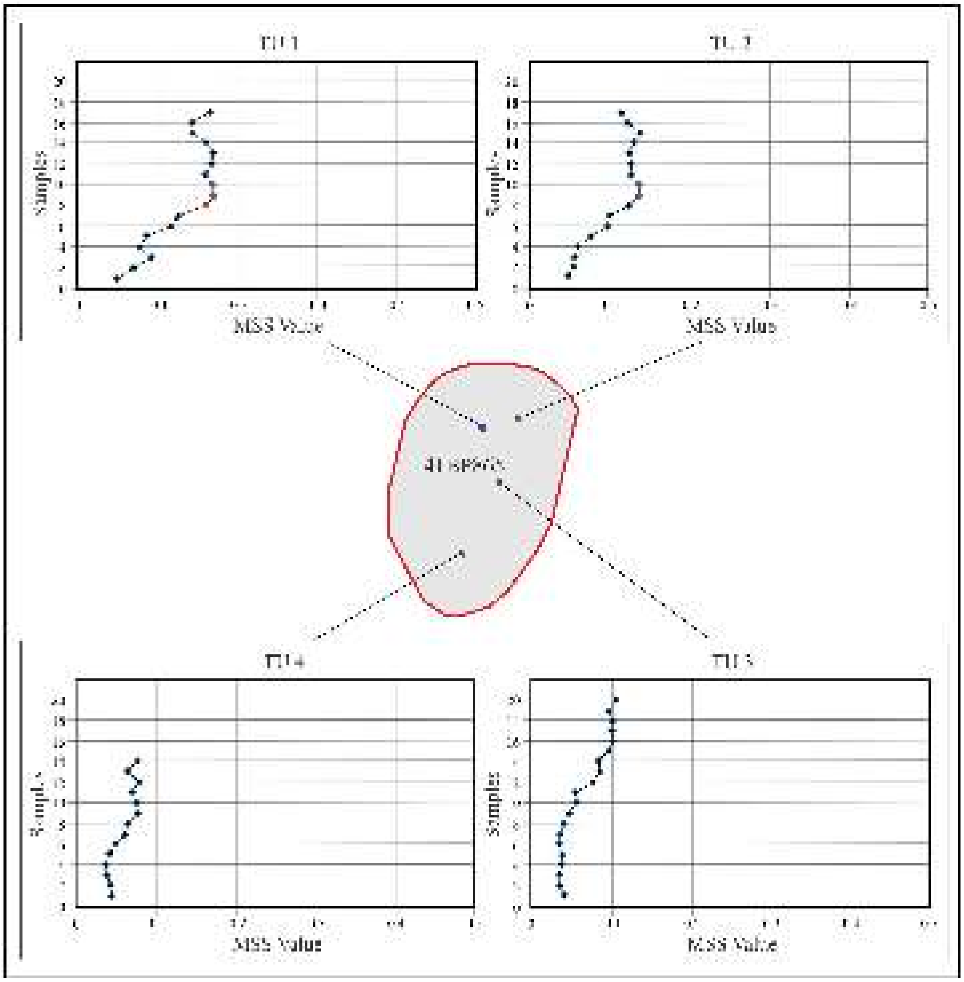

Figure 7-12. MSS values and locations of test units sampled at 41BP865. The red diamonds are spikes in MSS value.

Table 7-1. MSS Site Summary Data from Unit Profiles

Site	Number of Units Assessed	Number with Potential Surfaces	Percentage with Potential Surfaces	Percentage with Extensive Bioturbation	Overall Integrity Assessment
41BP528	3	0	0%	100%	low
41BP859	4	3	75%	25%	moderate
41BP865	4	2	50%	50%	low to moderate

Chapter 8: Chronological Potential

Leonard Kemp

This chapter assesses a site's potential to contribute to the chronological understanding of occupations at Camp Swift. In general, sites on Camp Swift lack temporal diagnostics and radiocarbon dates (Bousman et al. 2010; Mauldin 2018). This chapter presents the temporal indicators and the results of radiocarbon dating from the two features found during testing.

41BP528

As discussed in Chapter 5, Robinson et al. (2001) reported that a dart point fragment (Bulverde-like) was recovered in a shovel test at site 41BP528. During subsequent testing by CAS, no additional projectile points were found nor were any features identified (Lohse and Bousman 2006; Nickels and Lehman 2004). During the course of the current investigation, no projectile points or features were found at 41BP528. A small amount of charcoal was collected in TU 1 and TU 2. However, these samples were not dated because they lacked context within a feature. Given the small lithic assemblage and absence of features, the site has limited potential to increase current understanding of chronology.

41BP859

Two identifiable projectile points were recovered from TU 3 at this site. The first point (Figure 8-1, a) was recovered from Level 3 (20-30 cmbd). It is an unstemmed, triangular-shaped, chert point similar to a Fresno arrow point. It is missing its distal portion. This point style dates to the Toyah Phase of the Late Prehistoric period (Turner and Hester 1999; Turner et al. 2011). The second point (Figure 8-1, b) was recovered in the subsequent level (Level 4 30-40 cmbd). It is a small, side-notched, chert point that shows evidence of unintentional thermal alteration with a broken base and possibly color change. It is most similar to an Ellis point that dates to the Transitional Archaic period, 300 BC to AD 700 (Turner and Hester 1999; Turner et al. 2011).

A small, burned rock feature was found in TU 5 at 36-49 cmbd. A float sample was collected from the feature with approximately 6.8 mg of charred material recovered and radiocarbon dated. Figure 8-2 presents the acquired radiocarbon date of 870 BP±22 (D-AMS 026723; see Appendix A), which calibrates to AD 1151-1222 (Bronk and Ramsey 2017). This suggests that the feature dates to the Austin phase (AD 700-1250) of the Late Prehistoric period.

Site 41BP859 has evidence (both temporal diagnostics and a radiocarbon date) of use from the transitional Late Archaic to the beginning of the Late Prehistoric period. The dated feature and the presence of temporal diagnostics, and numerous tools found during the survey and excavation suggest a high chronological potential.

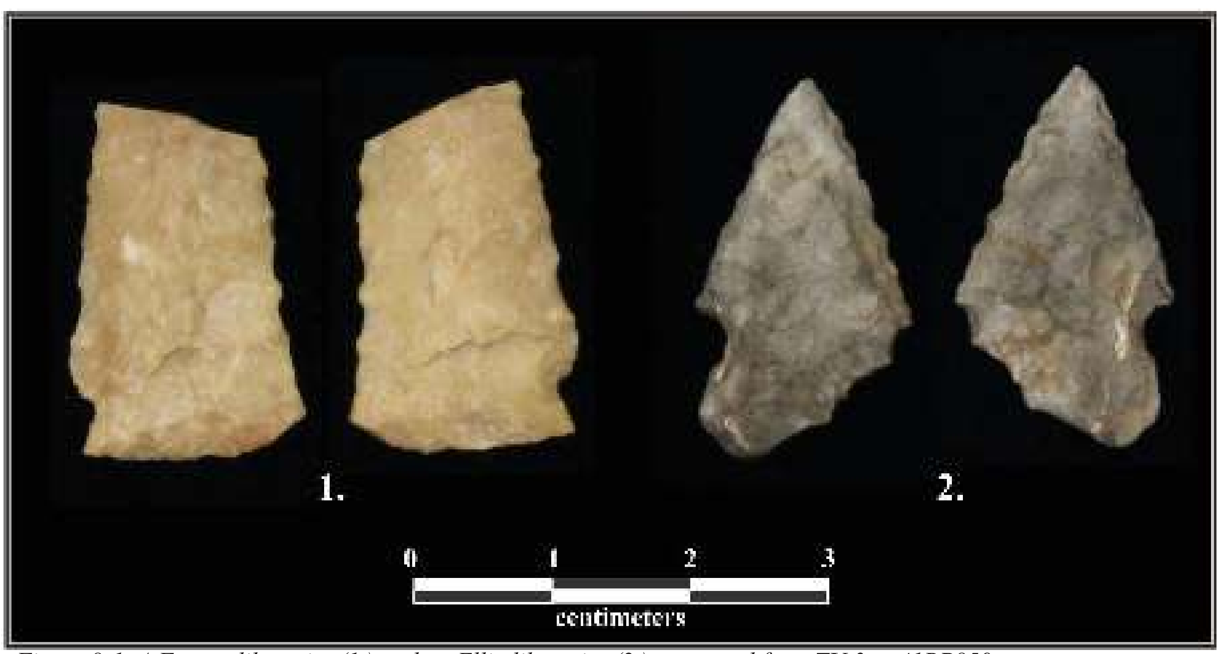

Figure 8-1. A Fresno-like point (1.) and an Ellis-like point (2.) recovered from TU 3 at 41BP859.

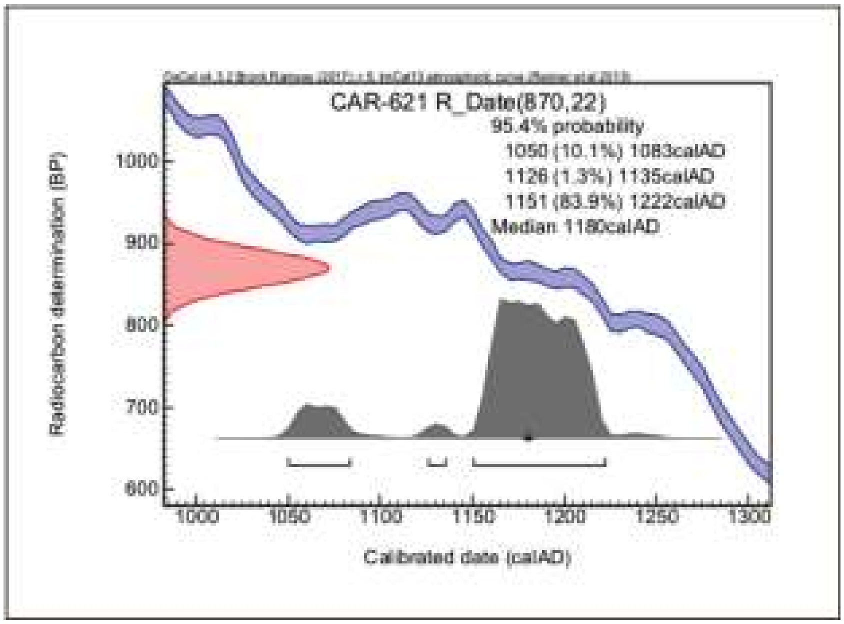

Figure 8-2. Calibrated date from Feature 1 at 41BP859.

41BP865

Three radiocarbon dates from two features and one diagnostic point were recovered from 41BP865. Feature 2 was initially identified in TU 1, Level 4. Two additional units (TUs 5 and 6) measuring 0.5-x-1 m were excavated in order to focus on the feature. Two float samples were collected with charred wood fragments weighing 5.7 and 30.4 mg recovered from Level 4 of TU 5. These fragments were radiocarbon dated. Figure 8-3 presents the radiocarbon dates of 984±23 and 366±21 BP (D-AMS 026724 and D-AMS 026725; see Appendix A). These dates calibrate using to AD 1424-1524 and AD 995-1125 (Bronk and Ramsey 2017), respectively. Both dates place the feature in the Late Prehistoric period. There is a temporal discrepancy between the two that likely reflects mixing of later and earlier sediments containing charred material.

A Perdiz arrow point (Figure 8-4, left) was recovered from TU 3, Level 4. This Late Prehistoric point (Suhm and Jelks 1962:283-284; Turner and Hester 1999:227) was created from a flake. A charcoal-stained and burned rock feature was identified in TU 3 (50-75 cmbd) as Feature 3. A float sample was collected from the feature with approximately 4.9 mg of charred material recovered and dated by AMS technique. Figure 8-4 (right) presents that radiocarbon date of 618 BP±23 (D-AMS 026726; see Appendix A), which calibrates to AD 1244-1399 (OxCal 2018). It places the feature in the Toyah phase (AD 1250 to 1550) of the Late Prehistoric period.

Both debitage and tool recovery from 41BP865 were lower in number compared to 41BP859. However, the presence of two dated features and a diagnostic might suggest the presence of additional features and diagnostic tools, which may contribute to the development of pertinent research questions.

Summary

As noted in Chapter 3, there is a lack of chronological data for Camp Swift sites as a whole. The few sites that have chronological data primarily date to the transitional Late Archaic through the Late Prehistoric periods. The finding from this investigation produced a similar situation with one site, 41BP528, producing no chronological data and the other two sites, 41BP859 and 41BP865, producing data specific to the later period of Texas prehistory.

Table 8-1 summarizes the chronological data present on the three individual sites and assesses each site's potential for contributing additional data. No temporal diagnostic artifacts were recovered from 41BP528. Charcoal was recovered from two of three test units at 41BP528, although not dated due to its lack of context. No bone was recovered from this site nor the other two sites. The lack of findings of 41BP528, in addition to the small number of artifacts, suggests that the site has little chronological potential. At both 41BP859 and 41BP865, temporal diagnostics and features that contained charcoal were recovered. The radiocarbon dates from these two sites places them within the Late Prehistoric period (AD 700 to 1550). This scenario is nuanced by temporal diagnostics that suggest a slightly early occupation that includes the Transitional Late Archaic period at 41BP859. The chronological potential from both sites is high with both having diagnostics and features with radiocarbon dated temporal contexts.

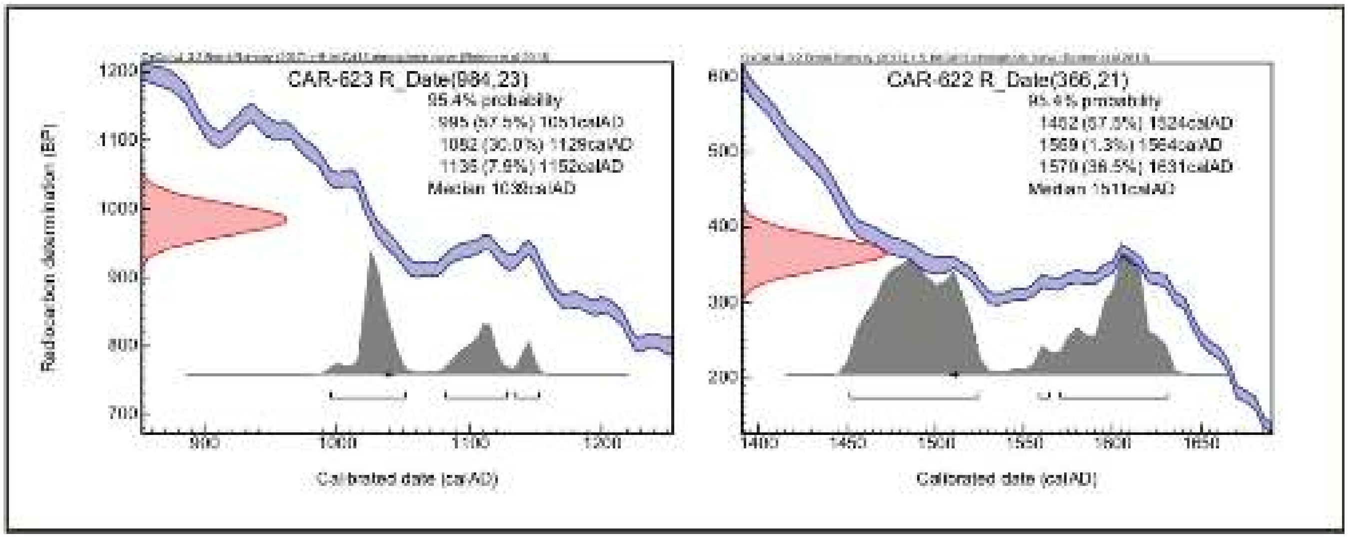

Figure 8-3. The two calibrated dates from Feature 2 at 41BP865.

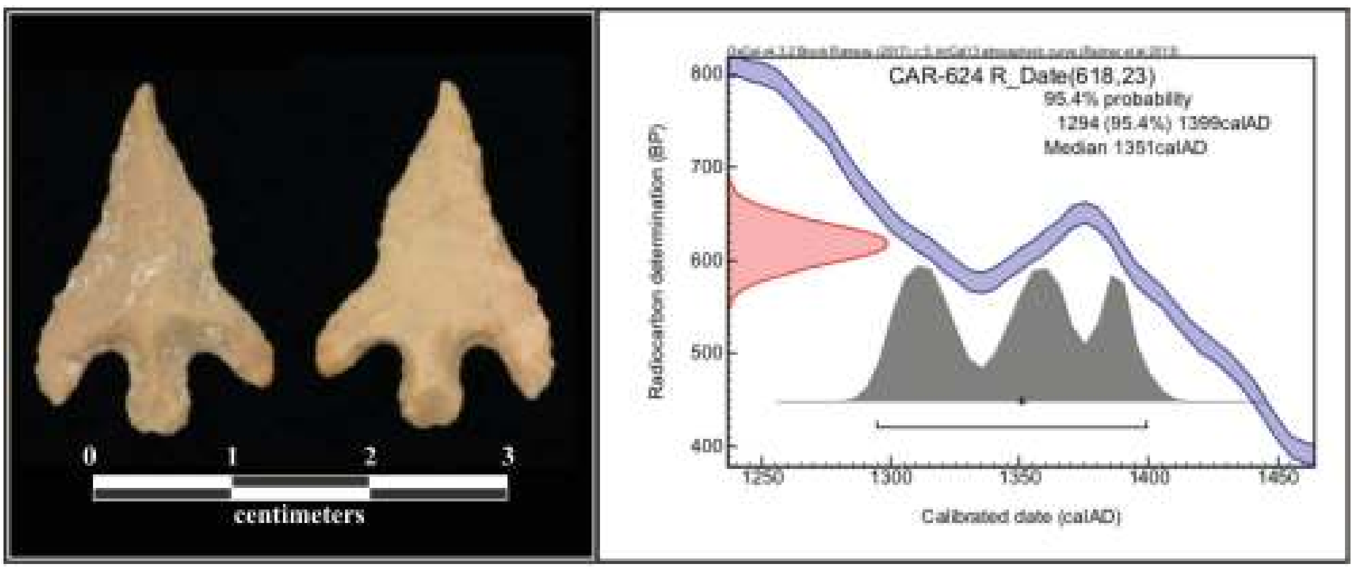

Figure 8-4. A Perdiz projectile point recovered from TU 3 and the calibrated date from Feature 3 at 41BP865.

Table 8-1. Chronological Potential of Tested Sites

Site	Features Present	Diagnostics	Charcoal	Bone	Number of Radiocarbon Date	Chronological Potential
41BP528	No	None	Yes	No	None	Low
41BP859	Yes	Yes	Yes	No	One	High
41BP865	Yes	Yes	Yes	No	Three	High

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Chapter 9: Site Content

Leonard Kemp and Raymond Mauldin

The final eligibility criteria concern the artifact assemblage of the three tested sites. This criterion assumes that sites with greater number of and density of artifacts, sites with greater diversity of tools and debitage, and sites with greater evenness of raw material can potentially address a larger suite of research questions (see Mauldin et al. 2018:81). The three tested sites are evaluated in relation to the previously tested sites reported in Chapter 4. The first section provides the artifact density for each of the three sites. The second section utilizes the attributes of debitage to create raw lithic material groups. This designation is used to measure the amount of diversity within the collection relative to the amount of debitage and the evenness of the different groups. Finally, the number of tools and the variety of types is explored.

Artifact Summary and Density

Details on site-specific content were presented in Chapters 6. Table 9-1 provides summary data by site including the amount of excavation and the number of debitage, cores, lithic tools, and non-feature burned rock recovered. The table also includes the weight of burned rock (kg), and presence/absence data on charcoal, bone, and features. Three burned rock features were found and radiocarbon dated during the investigation. They are described in Chapter 6 with the results of the radiocarbon dates reported in Chapter 8. An analysis of the burned rock from one of those features is presented in the following chapter.

The number of items recovered in each of these various categories results both from the activities conducted in the past, and the amount of matrix CAR excavated at each site. Consequently, the amount of excavation at each site is provided in the table. Table 9-2 uses the data from Table 9-1 to calculate density (items per m^3) for chipped stone debitage, lithic tools and cores, non-feature burned rock, and non-feature burned rock weight.

The two tables show that non-feature burned rock is more abundant at two of the three sites (41BP528 and 41BP859) than debitage both in terms of numbers and density. Site 41BP859 had the highest count and the greatest density of burned rock. Site 41BP528 was second in the amount and density of burned rock, which was surprising because a feature(s) was not found at this site and the excavation amount was the smallest. Previously, Lohse and Bousman (2006) described large amounts of burned rock found in two of the three excavated trenches at 41BP528. Site 41BP865 had the lowest amount and density of non-feature burned rock.

Debitage was the second most commonly recovered category of material at each of the three sites. The highest density was found at site 41BP859, with nearly 50 items per cubic meter of excavation, and at 41BP865, with close to 40 items per cubic meter. The lowest density was at 41BP528 with approximately 23 items per cubic meter. Figure 9-1 compares the density of debitage per site from the present project and the two most previous projects (Mauldin et al. 2018; Nickels 2008; see Chapter 4 and Note 1, which discusses that different excavation strategies can produce non-comparable results of artifact densities). The three sites from the current investigation trend towards the lower end of debitage density per site. Based on the assumption that sites that have a greater density of artifacts, in this case debitage, would be able to address a larger number of research questions, the three sites can address only a limited number of research questions. The MLD of the three tested sites is considered in Chapter 10.

Table 9-1. Site Content and Excavation Volume

Site	Excavated (m^3)	Debitage	Cores	Lithic Tools	Number of Non-feature Burned Rock	Non-feature Burned Rock Weight (kg)	Charcoal*	Bone*	# of Features
41BP528	1.77	42	1	3	122	1.4	1	0	0
41BP859	4.55	222	0	12	469**	6.1**	1	0	1
41BP865	3.94	147	1	3	151	1.1	1	0	2

*Presence/absence designation: 0=absent and 1=present

**This amount excludes burned rock from TU 4 Levels 3 and 4 that is likely part of Feature 1.

Table 9-2. Density Measures for Selected Artifact Classes

Site	Debitage per m³	Lithic Tools and Cores per m³	Number of Burned Rock per m³	Weight (kg) of Non-feature Burned Rock m³
41BP528	23.72	1.6	68.8	0.79
41BP859	48.79	2.6	103.07	1.3
41BP865	37.3	1	38.3	0.27

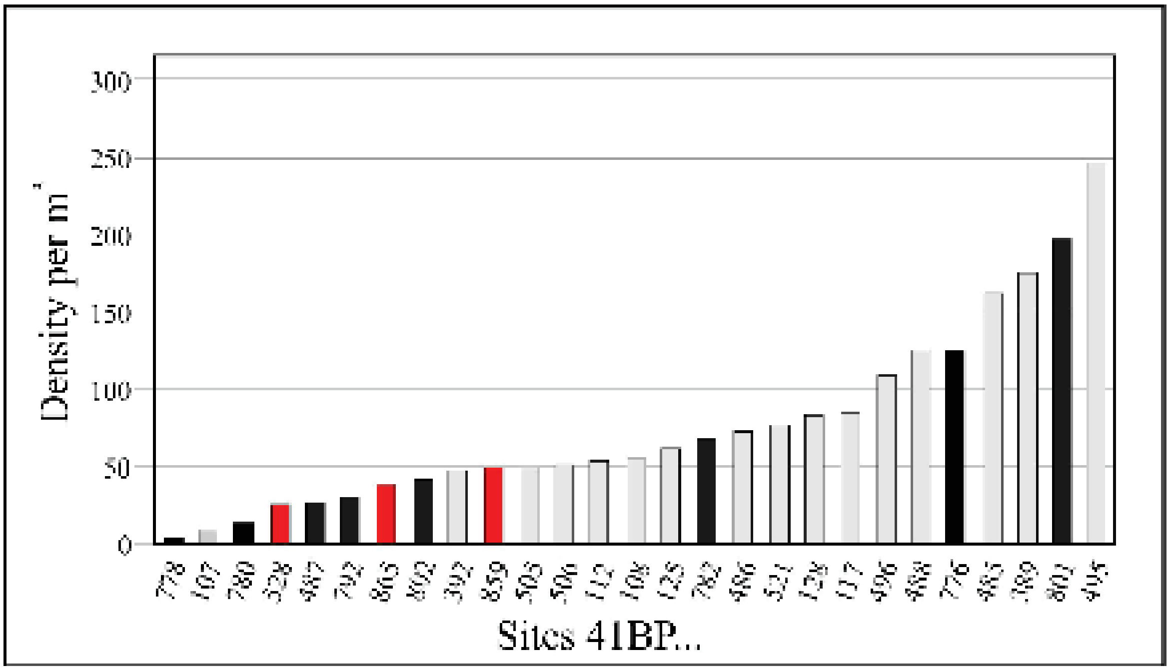

Figure 9-1. Current Camp Swift tested sites (red) and previously tested sites by Mauldin et al. (2018; black bars) and Nickels (2008; gray bars).

Lithic Material Groups

The final data set considered in this chapter is broad patterns in chipped stone debitage. CAR analyzed 424 specimens from the current project. Micro-debitage found during the floating of feature samples was not included in this analysis. Debitage was analyzed using the criteria established by Mauldin et al. (2018) and reported in Chapter 5. The sites from Nickels (2008) are not included in this analysis. For a given piece, CAR recorded the following:

a) finish (matte=1; translucent=2),
b) evidence of heating (present=1; absent=0),
c) grain of the item (1=fine; 2=coarse),
d) color of the item (e.g., 0=purple; 1=black; 2=moderate to dark brown, etc.)

These variables (finish, heating, grain, and color) formed a four-digit description potentially identifying what is termed a raw material group. For example, a specimen characterized as having a matte finish (1) with no evidence of heating (0), a fine grained surface (1), and being black in color (1) would form group 1011. Using this approach, there are 31 different raw material groups represented by debitage on the three sites. The debitage data is presented in Appendix C.

This section uses two criteria to evaluate material categories. The first is the number of type relative to the sample number. Sites with a greater variety of raw material types and sites with larger sample sizes for those individual raw material types may answer a greater variety of research questions. The second analysis examines the evenness of material groups by site. Evenness is defined as how close in relative frequency material types contribute to a site total with the assumption that sites with a more even distribution of material can answer more questions.

Figure 9-2 plots the number of material groups by sample size for the three sites relative to the eight sites tested by Mauldin et al. (2018) separated here into four groups. The first (green

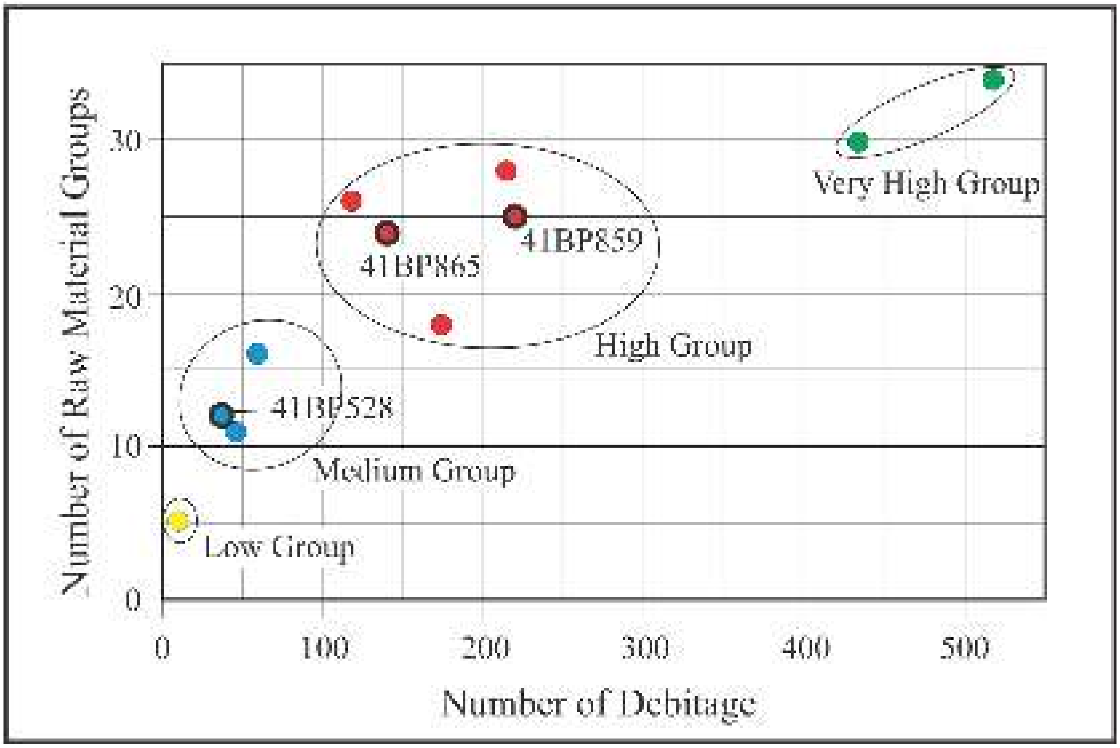

Figure 9-2. Bivariate plot of number of debitage by number of raw material groups for the current project (sites highlighted in black) and the previous project of Mauldin et al. (2018).

dots) consists of two sites with a very large number of raw material groups and a very large amount of debitage. Sites 41BP859 and 41BP865 (red dots) contain 24 and 25 material groups in their assemblage, respectively, with a moderate amount of debitage respectively placing them in high to moderate cluster. These two sites have may have potential to answer some research questions. Site 41BP528 (blue dots) falls within the low cluster of both a low number of raw material groups and a low number of debitage. This suggests the site has limited research potential.

Figure 9-3 plots the relative frequency of the five most common material groups of the three sites from the current project to assess the evenness of the material available for sites tested by Mauldin et al. (2018). Three groups are shown in the figure with the first group (shown in red) having an even distribution. The second group (blue) has one or two material groups with a moderate amount and the remaining three or four classes are more or less equivalent. The final (yellow) is where one raw material group dominates the assemblage. This site type would have more restricted potential. Site 41BP528 had a similar pattern to the last group with the highest ranked group comprising 51.1 percent, the second ranked group 21.8 percent, and the remaining three groups less than 10 percent each. Both 41BP865 and 41BP859 fall in the second group category. These sites are described as moderately even with some potential to address research questions.

Lithic Tool Variety

The first part of this section describes the type and number of lithic tools and cores found at each site. Appendix E provides photographs of the tools and cores found during this project. The second part of this section analyzes the variety of tools and cores found during this testing with the previously 24 tested sites of Nickels (2008) and Mauldin et al. (2018).

During the current project, 17 tools and two cores were recovered from the three sites. Tool types include projectile points, bifaces, a uniface, retouched and utilized flakes, gravers, a core tool, and a core. Table 9-3 provides summary data on the number of cores, number of tools, and the types of tools at a site level. Site 41BP859 had the greatest number of tools and cores, while 41BP528 had the fewest tools and cores.

The analysis uses the twelve tool types listed in Table 4-4. Figure 9-4 plots the variety of tool types relative to the number of tools at a site level and grouped into a high, medium, or low group based on the number of tool types. The three groups are equivalent in terms of how many sites there are in each category. The trend of the number of tools and type of tool changes with four sites having no tools to a single site in the high group with five tool types and 28 tools. One site, 41BP495, is defined as an outlier due to the high number of tools (n=44) almost four times the average number of tools

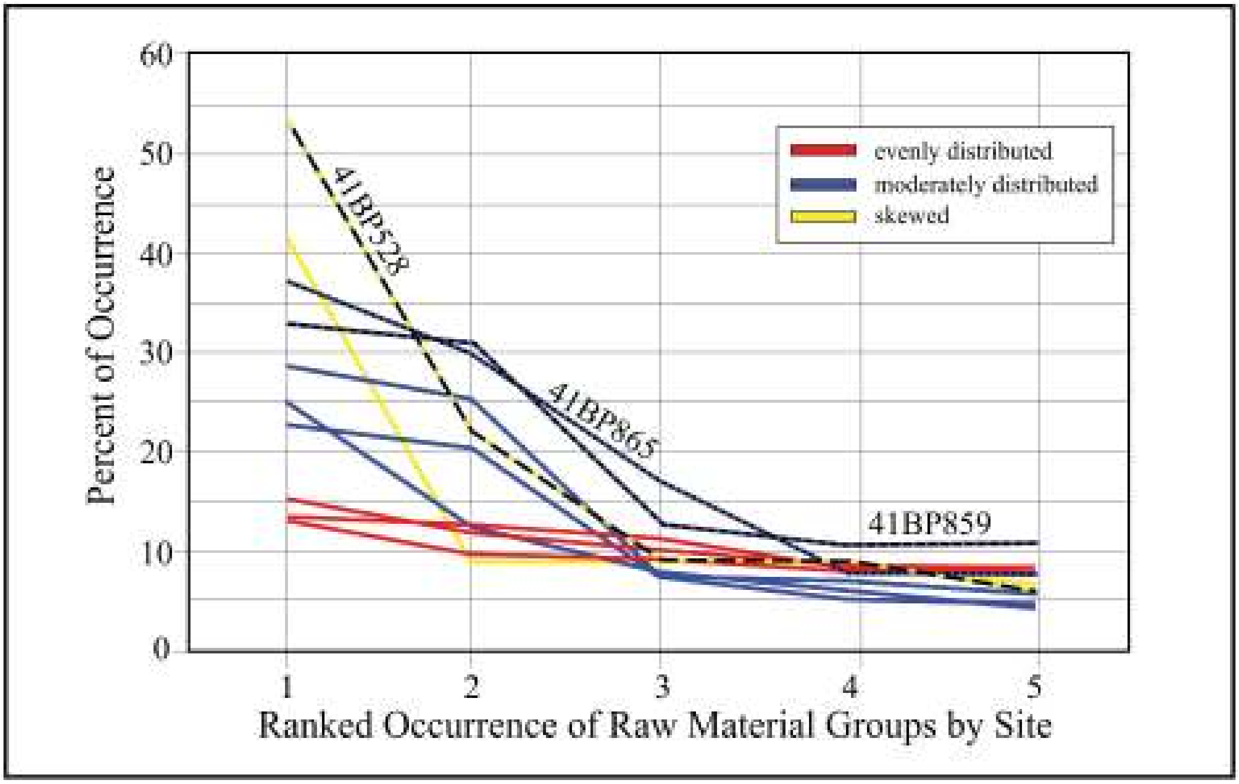

Figure 9-3. Relative frequencies of the top five raw material groups present in debitage (black lines) of sites from the current project and Maudlin et al. (2018) testing.

Table 9-3. Cores and Lithic Tool Types by Site

Site	Total	Cores	Projectile Points	Bifaces	Uniface	Utilized/ Retouched Items	Gravers	Other Chipped Stone Tools
41BP528	3	1	0	0	0	1	1	0
41BP859	12	0	2	4	2	3	0	1
41BP865	4	1	1	1	0	0	0	1

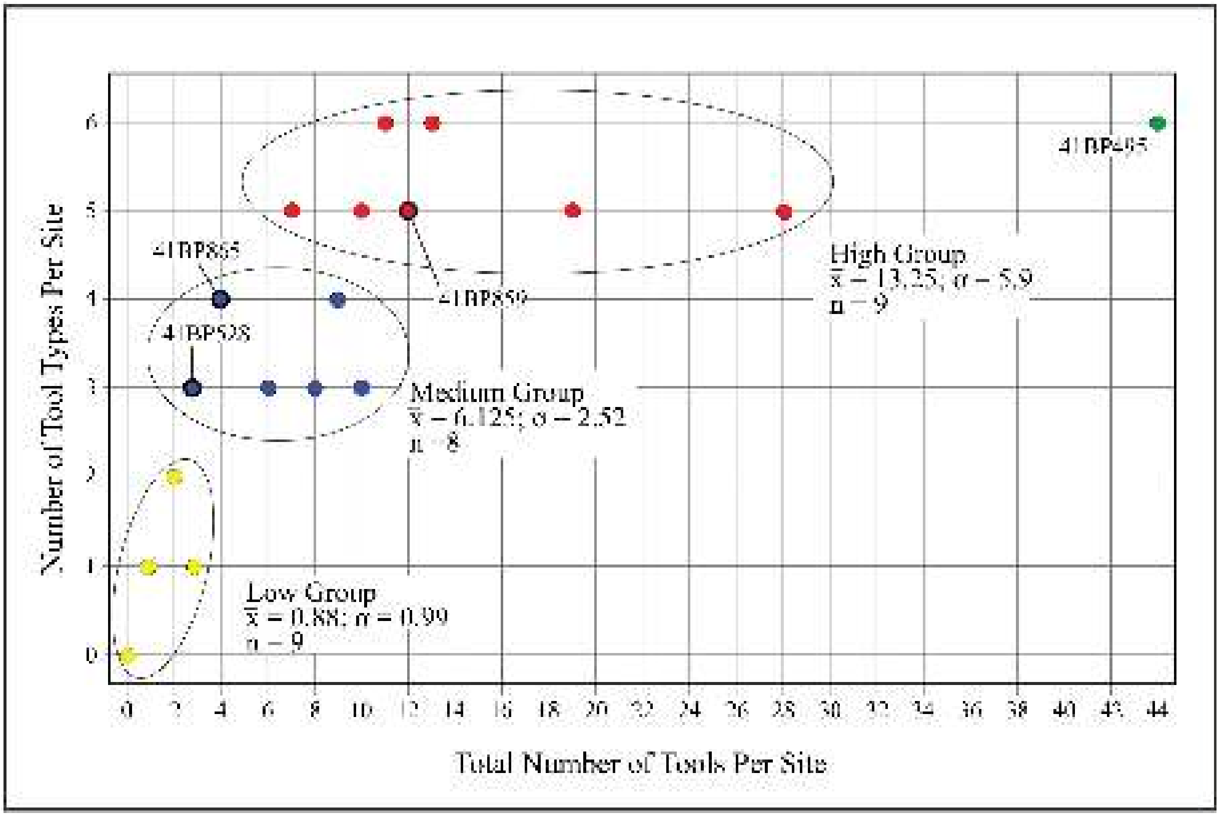

Figure 9-4. Current Camp Swift project sites grouped with previous project (Mauldin et al. 2018) by measure of lithic tool variety and sample size. Note some sites overlap and are hidden in this figure.

of the high group. Of the three current sites, 41BP859 fits in the high group with 12 tools and five types of tools (mean number of tools=13.25). This site may potentially provide data to a greater number of research questions. The other two sites, 41BP865 and 41BP528, fall within the lower end of the medium group (mean number of tools=6.125). Those sites would possibly address a more limited number of questions.

Summary

This chapter focused on the site content assuming that sites with a greater density and diversity of artifacts and material types could potentially address more research questions. The chapter presented previous artifact data from tested Camp Swift sites to place the present investigations in context. Table 9-4 summarizes the findings. The assessment of site content referencing density measures was low for the three sites. The second analysis found that both 41BP859 and 4BP865 had a sufficient number of and evenness of raw lithic material groups, while 41BP528 was moderate to low and not even. The final analysis that of the number of tools to the type of tools was relatively high at 41BP859 and moderate to low at 41BP528 and 4BP865. Overall, based on these criteria, 41BP859 could address more research questions than either 41BP528 or 41BP865.

Table 9-4. Summary of Site Content Analysis

Site	Overall Artifact Density	Number of Raw Lithic Material Groups to Amount of Debitage	Evenness of Raw Lithic Material Group	Number of Tool to the Number of Types of Tools
41BP528	Low	Moderate/Low	Not Even	Moderate/Low
41BP859	Low	High/Moderate	Moderately Even	High
41BP865	Low	High/Moderate	Moderately Even	Moderate/Low

Chapter 10: Archaeological Patterns at the Three Tested Sites

Leonard Kemp and Raymond Mauldin

Two of the more pertinent questions concerning Camp Swift archaeology are the chronology of past occupations and the nature of those occupations. The chronological question was generally addressed in Chapter 4 and specifically for the three tested sites in Chapter 8. This chapter looks at the second question that focuses on the nature of occupation. It uses the Maximum Level Density measure (previously used in Chapter 4) to assess the intensity of site use of the three current sites relative to the previously tested sites. It also characterizes intensity based on the size of feature burned rock. The final analysis examines the use of nonlocal material versus local to characterize site use and mobility.

Maximum Level Density of Debitage

The Maximum Level Density (MLD) is used to equalize the excavated amount of matrix to what was found during excavation. Table 10-1 lists the five highest-level counts of debitage per level, and the total and average of those five levels for the three tested sites. Figure 10-1 shows a scatter plot of the MLD to the density of debitage. If compared to the 24 previously tested sites, the three sites, 41BP528, 41BP859, and 41BP865, fall in the Lower MLD group. This suggests that even though two of the three sites date to the Late Prehistoric period the intensity of site use is still relatively low.

Raw Material Availability

This section examines raw material availability and the use of nonlocal versus local lithic material. In Chapter 4, the overwhelming amount of debitage found at Camp Swift was shown to be derived from nonlocal sources most likely from the Edwards Plateau. Table 10-2 provides summary data and includes the frequency of non-cortical debitage, the amount of fine-grained material, measures on the size of the assemblages, and the results of UV fluorescence.

At both 41BP859 and 41BP865, the percent of non-cortical debitage is greater (85.5 and 88.4, respectively) than the average of the seven tested sites of 83.6 percent suggesting the use of nonlocal material. Both sites were dominated by fine-grained chert not commonly found in the local environment. However, the mean length of debitage at 41BP859 and 41BP865 was smaller (16.37 and 16.14, respectively) compared to the average of the seven tested sites at 19.33 mm.

Site 41BP528 has a significantly lower amount of non-cortical debitage at 59.5 percent. It had less fine-grained chert (59.5 percent) relative to the average of 93 percent of the seven sites. Both of these characteristics suggest the use of local as opposed to nonlocal material. Interestingly, 41BP528 had the largest mean length of all the tested sites with an average 22.85 mm. This is contrary to the assumption that the local Uvalde Gravels would produce smaller flakes due to smaller nodule size.

The UV fluorescence analysis suggests nonlocal material dominates the assemblage. Both 41BP528 and 41BP859 had notably smaller frequencies (76.18 and 78.37, respectively) of nonlocal material to the average of 83.77 percent of the seven tested sites. Interestingly, nonlocal and non-Edward's chert is a significant proportion (19.9 percent) comprising nonlocal chert at 41BP859. Site 41BP865 had a higher frequency of nonlocal material at 88.43 percent than the seven-site average with nonlocal material accounting for 81.63 percent.

This analysis suggests that the majority of the lithic material was transported to Camp Swift. The majority of the nonlocal material came or was derived from the Edwards Plateau. In conjunction, with the relatively low intensity of site use, it suggests that groups that used this region may have used occupied the sites for other purposes than prolonged habitation.

Defining Feature Reuse

The following section analyzes the burned/fire-cracked rock collected from the three features during this project. Past research has suggested that there is a relationship between rock size and the frequency that a feature was used and reused (see Black et al. 1997; Johnson 2000; Mauldin et al. 1998, Mauldin et al. 2011). It is based on the assumption that as a feature is used, heated rock will crack and break lowering temperature requiring more rock to be added to the feature to maintain thermal efficiency (see Mauldin et al. 2011). An experimental study found that rock features with smaller surface area are more efficient (i.e., heat dissipates slowly and lasts longer), because as rock cracks the surface area increases and the heat dissipates more quickly (Mauldin et al. 2011).

Figure 10-2 illustrates two archaeological burned rock features, the first represented by a dashed red line is thought to have been reused multiple times generating smaller-sized

Table 10-1. Maximum Level of Density of Debitage from the Three Tested Sites

Site	Highest Level Count Found during Excavations	Second Highest Level Count	Third Highest Level Count	Fourth Highest Level Count	Fifth Highest Level Count	TOTAL for All Five Highest Levels at Site	MLD Average
41BP528	6	6	4	4	3	23	4.6
41BP859	21	20	18	16	11	86	17.2
41BP865	18	10	9	8	8	53	10.6

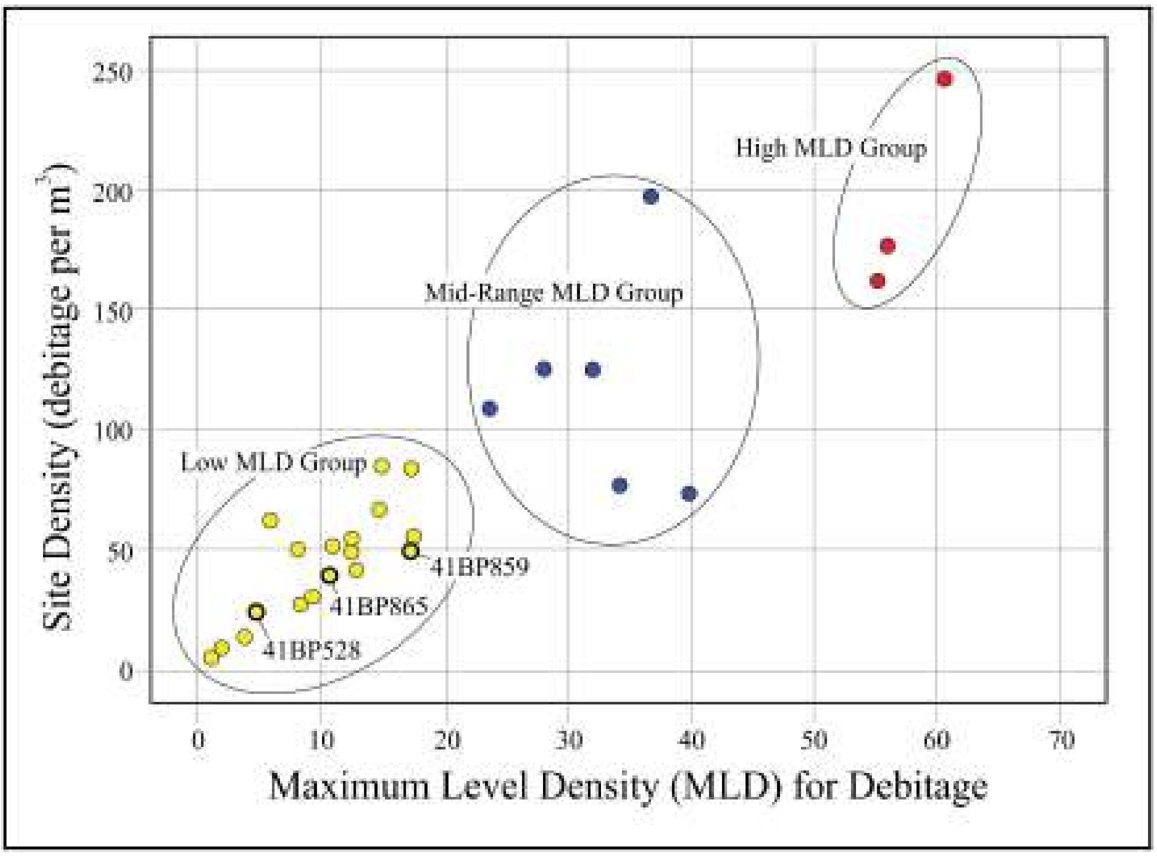

Figure 10-1. A scatter plot of the MLD of debitage to the site density per m^3 of 27 tested Camp Swift sites with the current project sites identified.

rocks, while the second feature (solid black line) has been used relatively little maintaining larger-sized rocks (after Thompson et al. 2012:Figure 12-14).

Three features were discovered during the present investigation, Feature 1 from 41BP859 and Features 2 and 3 from 41BP865. At a project level, the feature burned rock (n=70) ranged in size from 3.1 to 11.2 cm having an average maximum length of 6.42 cm with a standard deviation of 1.66. Note burned rock from features less the 2.54 cm in size was not used in this analysis. Only Feature 2 from 41BP865 has sufficient sample size (n=44) for the present analysis. CAR used unburned rock samples collected from Camp Swift to quantify locally available lithic material that might be used for a thermal feature. The collection, consisting of chert, quartzite, petrified wood, ironstone, and sandstone, was obtained from terraces, ridges, and exposed deposits along roads and creeks.

Figure 10-3 (right) shows a histogram of the pattern of Feature 2 burned rock (right) compared to the pattern of collected unburned rock samples (left). The average length of the unburned rock sample is 9.29 cm with approximately half of the samples measuring between 7.5 and 10 cm. The Feature

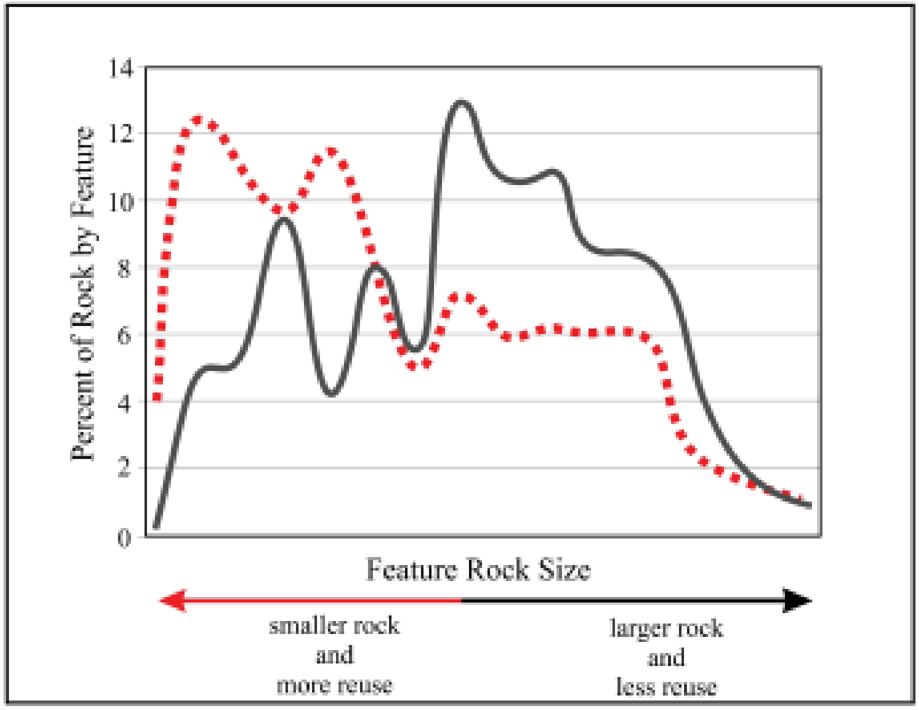

Figure 10-2. The percentage of rock size illustrating two types of features: one (red-dashed line) was more intensively used, and the other (black solid line) was less intensively used (after Thompson et al. 2012:Figure 12-14).

Table 10-2. Summary Data on Chipped Stone Debitage of the Three Tested Sites

Site	Number of Debitage	Percent Non-Cortical	Mean Flake Length (mm)	Fine-Grained	UV Florescence	
					Nonlocal	Local
41BP528	42	59.50%	22.85	78.50%	76.18%	23.80%
41BP859	222	85.50%	16.37	94.50%	78.37%	21.62%
41BP865	147	88.40%	16.14	90.40%	88.43%	11.56%

2 burned rock had an average length of 6.64 and a standard deviation of 1.562. Feature 2 only had three rocks in excess of the mean of unburned rock or 6.8 percent of the sample. Sixty-eight percent of the Feature 2 burned rock is below the 7 cm size suggesting that the feature may have been used multiple times. However, given the feature's dimensions and the number of rock, the feature was not intensively utilized over a prolonged period.

Summary

In addition to eligibility considerations, the three sites tested were subject to analyses that examined the intensity of site use (see Chapter 4). The MLD analysis suggests that the three sites were not intensively used and fit within the lower spectrum of the previously tested sites. This lower MLD group is the norm for Camp Swift archaeology as it is currently understood. Nonlocal lithic material dominates the assemblage at the three sites and indicates that the materials were likely transported into the region. The presence of nonlocal material and the infrequent occupation may suggest some sort of special purpose use site as opposed to a residential use. The final analysis focused on intensity of use and considered rock size in a burned rock feature at 41BP865. While comparable data and information on the pattern of rock breakage with these raw materials is not available, the findings suggest that the feature was likely used multiple times. However, the mean rock size and the low frequency of material in the smaller size classes does not indicate intensive use (Thompson et. al 2012:125-127). Overall, the three sites follow a pattern that suggests the region was occupied intermittently for a limited time, likely to exploit selected resources during the Late Archaic and Late Prehistoric periods.

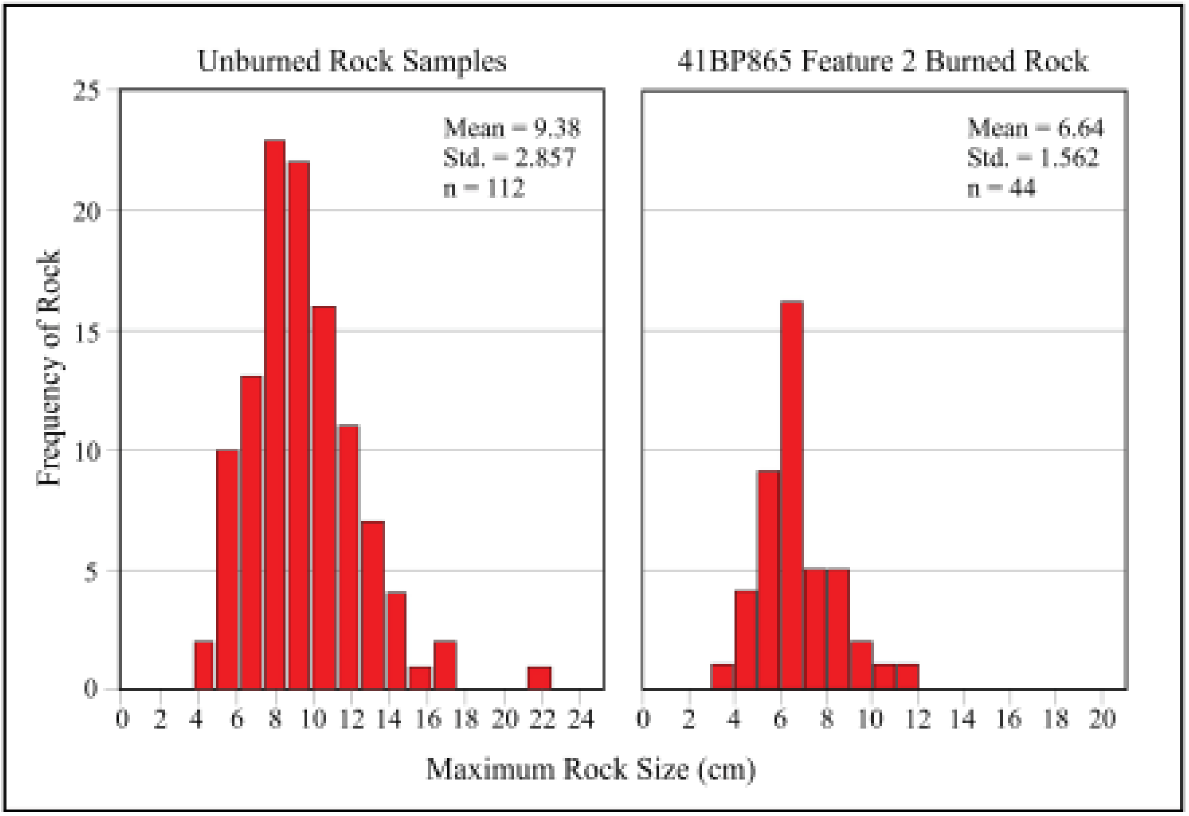

Figure 10-3. A histogram of unburned rock collected from Camp Swift (left) and the maximum size (cm) of rock in Feature 2 (right).

Chapter 11: Summary and Recommendations

Leonard Kemp

The Center for Archaeological Research (CAR) at The University of Texas at San Antonio (UTSA) conducted fieldwork associated with National Register of Historic Places (NRHP) eligibility testing on three prehistoric sites located on Camp Swift in Bastrop County, Texas. The CAR carried out the work in accordance with Section 106 of the NHPA of 1966. During these investigations, CAR excavated 11 1-x-1 m test units and 3 1-x-0.5 m test units that focused on discovered features, and CAR screened roughly 10.26 m^3 of deposits from the three sites. Three thermal features were identified, one at 41BP859 and two at 41BP865. These three features were AMS radiocarbon dated to the Late Prehistoric period. The CAR recovered three projectile points, a small number of lithic tools (n=14) including bifaces, unifaces, core tool, and edge modified flakes, two cores, 411 pieces of debitage, and burned rock.

Recommendations

CAR's recommendations regarding eligibility for inclusion to the NRHP are based on Criterion D of 36 CFR 60.4, which covers properties that have yielded, or may be likely to yield, information in prehistory or history. The CAR relied on three interrelated criteria to determine site eligibility (Mauldin et al. 2018). These criteria consist of the integrity of a site, discussed in Chapter 6, the chronological potential of a site, discussed in Chapter 7, and the content of a site, discussed in Chapter 8. Table 11-1 summarizes the findings of each of these domains and presents CAR's eligibility recommendations. Highlighted cells identify those elements that contribute positively (green) or negatively (orange) to the three criteria, while cells that are inconclusive are not highlighted. Sites that were lacking in more than one element for a given criteria were judged to have little or no potential to contribute to resolutions of broader research questions. They would not yield information important in prehistory and were not considered eligible.

Sites 41BP859 and 41BP865 produced temporal diagnostics from burned rock features and radiocarbon dates with both sites having excellent chronological potential. Both sites have the potential to contain more features that may contribute to the current understanding of site use and occupation. The current excavation at 41BP528 did not find any temporal diagnostics, although the initial survey recovered the base of a dart point. Little charcoal was found at the site, and none was within the context of a feature. Both aspects suggest poor chronological potential at 41BP528.

All sites exhibited signs of bioturbation. However, the artifact distribution (the amount and size of debitage) and results of MSS at 41BP859 suggest there is a degree of integrity at a site level. The site integrity results of 41BP865 is mixed with artifact patterning suggesting an occupational surface, while the MSS results suggest it has low integrity. The results from 41BP528 indicate a lack of integrity at the site level.

Four characteristics were used to assess the site content: debitage density, the number of features and burned rock density, the number of and variety of tool types, and the raw material group and evenness. This approach was done not

Table 11-1. Summary of Archaeological Sites and NRHP Eligibility Recommendations

Site (41BP…)	Site Size (ha)	Test Units Excavated	Amount Excavated (m^3)	Chronological Potential		Site Integrity		Site Content				NRHP Eligibility Recommendation
				Temporal Diagnostics	Radiocarbon Dates/ Potential	Artifact Patterning	MSS Assessment of Integrity	Debitage Density (m^3)	Number of Features; Burned Rock Density	Number of Tools; Diversity of Tool Type	Raw Material Groups; Number and Evenness	
528	225	3	1.77	None	Poor	Poor	Low	23.72	0; 68.8	3; 3	Very Low; Skewed	Not Eligible
859	6,037	4.5	4.55	Yes; Late Archaic/Late Prehistoric	Yes	Good	Moderate	49.5	1; 111.8	12; 5	High; Moderately Even	Eligible
865	2,151	6	3.94	Yes; Late Prehistoric	Yes	Good	Low	39.08	2; 38.3	4; 4	Moderate; Moderately Even	Eligible

only to put the current work into context, but also to build a synthesis of the archaeological record of Camp Swift.

All three sites had a low density of debitage and compared to previously tested sites, fell towards the lower spectrum of the tested Swift sites. The measure of raw material group and evenness found that both 41BP859 and 41BP865 ranked with the highest grouping of previously tested sites, while 51BP528 ranked towards the bottom of the moderate grouping. The measure of evenness found that the raw material groupings were moderately distributed at 41BP859 and 41BP865. Evenness was skewed at 41BP528. The number of tools and the variety of tools at 41BP859 ranked in the highest group of the 24 tested sites. Both 41BP529 and 41BP865 fell in the lower end of the moderate group for number and variety of tools.

CAR recommends that site 41BP528 be considered ineligible for NRHP listing due to the lack of chronological potential, poor integrity, and poor site content. CAR further recommends that sites 41BP859 and 41BP865 be considered as eligible for listing on the NRHP. Based on testing, these two sites had moderate integrity and features that reflect Late Prehistoric use. Sites 41BP859 and 41BP865 should be avoided if possible and protected from damage related to future development or military activities. If avoidance is not possible, then additional research is warranted to mitigate adverse effects from these impacts. If necessary, CAR suggests targeting the Late Prehistoric material (ca. 0-50 cm) associated with the dated features at these two sites by opening up several excavation blocks around the three features to acquire statistically useful samples of dated tools and debitage.

Notes to Text:

Note 1: The Summed Probability Distribution analysis uses calibrated radiocarbon dates, which is different from the uncalibrated or raw radiocarbon dates that were used in Chapter 3. Calibrated radiocarbon dates are calculated with samples of known age such as tree rings or other type of chronologies. The Central Texas chronological period dates shown in Figure 4-2 have been calibrated. See Radiocarbon Calibrations at https://c14.arch.ox.ac.uk/calibration.html#conventions_timescale for further information.

Note 2: Nickels (2008) sampled a portion (5 gl) of matrix from each unit level and screened them through ¼-inch and ⅛-inch hardware cloth and window screen to estimate the amount of debitage lost using solely ¼-inch hardware cloth. It is not clear if this debitage was then added to the total counts or kept separate from the total. CAR's review of Nickels (2008) was unable to determine if the data from this earlier study was comparable.

Note 3: The principal problems with this approach are that it ignores the organizational component (see Binford 1979, 1980), reoccupations of locations for different purposes, and issues with tool use life relative to occupation length (see Shott 1989). Nevertheless, the simplistic distinction provides a starting point for investigating these complex issues.

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Appendix A:
Radiocarbon Dates

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DirectAMS
RADIOCARBON DATING SERVICE

Report: 1391-026723-026726 2 March 2018

Customer: 1391
Leonard Kemp
Center for Archaeological Research
University of Texas at San Antonio
One UTSA Circle
San Antonio, TX 78249
USA

Samples submitted for radiocarbon dating have been processed and measured by AMS. The following results were obtained:

DirectAMS code	Submitter ID	Sample type	Fraction of modern		Radiocarbon age	
			pMC	1σ error	BP	1σ error
D-AMS 026723	CAR 521	charred wood	89.73	0.25	870	22
D-AMS 026724	CAR 522	charred wood	95.55	0.25	366	21
D-AMS 026725	CAR 523	charred wood	88.47	0.25	984	23
D-AMS 026726	CAR 524	charred wood	92.60	0.27	618	23

Results are presented in units of percent modern carbon (pMC) and the uncalibrated radiocarbon age before present (BP). All results have been corrected for isotopic fractionation with an unreported $\delta^{13}C$ value measured on the prepared carbon by the accelerator. The pMC reported requires no further correction for fractionation.

11822 North Creek Parkway N, Suite 107, Bothell, WA 98011
Tel (425) 481-8122 – www.DirectAMS.com

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Appendix B:
MSS Sampling Information

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Table B-1. MSS Sampling Information

Site	Test Unit	Sample	Total Weight (g)	VSS 1	VSS 2	Average VSS	Sample Weight (g)	MSS Value
41BP528	1	1	9	24	23.7	23.85	5.88	0.406
41BP528	1	2	8.7	24.8	25	24.9	5.58	0.446
41BP528	1	3	7.5	19.3	19.4	19.35	4.38	0.442
41BP528	1	4	7.9	20.5	20.3	20.4	4.78	0.427
41BP528	1	5	8.4	27.8	27.7	27.75	5.28	0.526
41BP528	1	6	8.7	25.5	25.8	25.65	5.58	0.460
41BP528	1	7	9	25.6	25.5	25.55	5.88	0.435
41BP528	1	8	8.8	27.6	27.5	27.55	5.68	0.485
41BP528	1	9	11.4	42.8	42.8	42.8	8.28	0.517
41BP528	1	10	10.5	33.1	34.9	34	7.38	0.461
41BP528	1	11	8.7	26.5	26.4	26.45	5.58	0.474
41BP528	1	12	5.7	10.1	10.3	10.2	2.58	0.395
41BP528	2	1	13.1	31.4	31.6	31.5	9.98	0.316
41BP528	2	2	13.3	39.6	40	39.8	10.18	0.391
41BP528	2	3	12.7	39	39	39	9.58	0.407
41BP528	2	4	14.3	45.7	45.6	45.65	11.18	0.408
41BP528	2	5	13.5	45.3	45.2	45.25	10.38	0.436
41BP528	2	6	13.9	46.4	46.5	46.45	10.78	0.431
41BP528	2	7	11.5	53.6	53	53.3	8.38	0.636
41BP528	2	8	13.5	46.3	47	46.65	10.38	0.449
41BP528	2	9	13.5	48.7	48.3	48.5	10.38	0.467
41BP528	2	10	13	45.7	45.6	45.65	9.88	0.462
41BP528	2	11	13.2	43.3	43.3	43.3	10.08	0.430
41BP528	2	12	11.1	35	34.9	34.95	7.98	0.438
41BP528	2	13	8.4	20.5	20	20.25	5.28	0.384
41BP528	3	1	12.3	27.3	27.6	27.45	9.18	0.299
41BP528	3	2	9.9	20.8	20.7	20.75	6.78	0.306
41BP528	3	3	13.2	35.6	36.7	36.15	10.08	0.359
41BP528	3	4	12.2	31.7	31.5	31.6	9.08	0.348
41BP528	3	5	9.6	22.6	22.9	22.75	6.48	0.351
41BP528	3	6	12.5	31.7	31.7	31.7	9.38	0.338
41BP528	3	7	10.8	98.4	98.7	98.55	7.68	1.283
41BP859	1	1	13.5	13.8	13.4	13.6	10.38	0.131
41BP859	1	2	14.5	14.5	14.5	14.5	11.38	0.127
41BP859	1	3	14.1	14.6	14.7	14.65	10.98	0.133
41BP859	1	4	13.7	13.6	13.8	13.7	10.58	0.129
41BP859	1	5	14.9	17	17.2	17.1	11.78	0.145
41BP859	1	6	13.5	15.3	15.3	15.3	10.38	0.147
41BP859	1	7	14.7	16.1	16	16.05	11.58	0.139
41BP859	1	8	13.6	18.5	18.9	18.7	10.48	0.178

Table B-1. MSS Sampling Information, continued...

Site	Test Unit	Sample	Total Weight (g)	VSS 1	VSS 2	Average VSS	Sample Weight (g)	MSS Value
41BP859	1	9	14.3	16.3	16.1	16.2	11.18	0.145
41BP859	1	10	13.5	16.1	16.3	16.2	10.38	0.156
41BP859	1	11	14	17	16.8	16.9	10.88	0.155
41BP859	1	12	13.3	16.3	16.6	16.45	10.18	0.162
41BP859	1	13	12	14	14.1	14.05	8.88	0.158
41BP859	1	14	13.9	17.2	17.3	17.25	10.78	0.160
41BP859	1	15	14.9	17.7	17.9	17.8	11.78	0.151
41BP859	1	16	13.2	16.5	16.8	16.65	10.08	0.165
41BP859	1	17	13.2	16	15.9	15.95	10.08	0.158
41BP859	1	18	14.5	20	20	20	11.38	0.176
41BP859	1	19	14.5	17.2	17.1	17.15	11.38	0.151
41BP859	1	20	13.2	14.8	14.8	14.8	10.08	0.147
41BP859	1	21	14.7	15.7	15.6	15.65	11.58	0.135
41BP859	1	22	13.6	13.9	13.9	13.9	10.48	0.133
41BP859	1	23	14.5	15.3	15.2	15.25	11.38	0.134
41BP859	1	24	13.2	14.1	14.1	14.1	10.08	0.140
41BP859	1	25	13.7	17.2	17.4	17.3	10.58	0.164
41BP859	2	1	14.1	8.3	8.3	8.3	10.98	0.076
41BP859	2	2	14	10.7	10.8	10.75	10.88	0.099
41BP859	2	3	13.7	12.1	12	12.05	10.58	0.114
41BP859	2	4	14.6	12.7	12.7	12.7	11.48	0.111
41BP859	2	5	14	13.2	13.4	13.3	10.88	0.122
41BP859	2	6	13.6	15.8	15.8	15.8	10.48	0.151
41BP859	2	7	14.7	18.9	19.1	19	11.58	0.164
41BP859	2	8	14.3	21.9	21.4	21.65	11.18	0.194
41BP859	2	9	13.4	19.1	19.1	19.1	10.28	0.186
41BP859	2	10	13.6	20.6	20.8	20.7	10.48	0.198
41BP859	2	11	14.5	21	20.9	20.95	11.38	0.184
41BP859	2	12	13.3	19.7	20.1	19.9	10.18	0.195
41BP859	2	13	14	17.7	18	17.85	10.88	0.164
41BP859	2	14	13.3	17.2	17.1	17.15	10.18	0.168
41BP859	2	15	14.1	18.9	18.9	18.9	10.98	0.172
41BP859	2	16	13.9	18.5	18.2	18.35	10.78	0.170
41BP859	2	17	14.8	17.4	17.6	17.5	11.68	0.150
41BP859	2	18	13.7	17	17.2	17.1	10.58	0.162
41BP859	2	19	12.8	14.7	14.7	14.7	9.68	0.152
41BP859	2	20	12.6	19.4	19.4	19.4	9.48	0.205
41BP859	3	1	13.2	10.4	10.8	10.6	10.08	0.105
41BP859	3	2	14.2	14.3	14.7	14.5	11.08	0.131
41BP859	3	3	13.5	15.4	15.5	15.45	10.38	0.149

Table B-1. MSS Sampling Information, continued...

Site	Test Unit	Sample	Total Weight (g)	VSS 1	VSS 2	Average VSS	Sample Weight (g)	MSS Value
41BP859	3	4	14.2	22.7	22.6	22.65	11.08	0.204
41BP859	3	5	13.7	21.4	21.5	21.45	10.58	0.203
41BP859	3	6	13.3	19.7	19.6	19.65	10.18	0.193
41BP859	3	7	14.3	22.4	22.2	22.3	11.18	0.199
41BP859	3	8	12.7	19.5	19.6	19.55	9.58	0.204
41BP859	3	9	13.5	22.4	22.4	22.4	10.38	0.216
41BP859	3	10	13.4	24.7	24.6	24.65	10.28	0.240
41BP859	3	11	13.9	25.2	25.3	25.25	10.78	0.234
41BP859	3	12	13.4	24.9	25.5	25.2	10.28	0.245
41BP859	3	13	12.4	21.5	21.8	21.65	9.28	0.233
41BP859	3	14	12.7	20.1	20.4	20.25	9.58	0.211
41BP859	3	15	13.5	19.9	20.3	20.1	10.38	0.194
41BP859	3	16	13.4	20.9	20.8	20.85	10.28	0.203
41BP859	3	17	12.8	18.5	18.7	18.6	9.68	0.192
41BP859	3	18	14.1	21.3	21.3	21.3	10.98	0.194
41BP859	3	19	13.5	19.9	20.1	20	10.38	0.193
41BP859	4	1	13.4	16.6	16.5	16.55	10.28	0.161
41BP859	4	2	13.7	19.5	19.7	19.6	10.58	0.185
41BP859	4	3	13.5	19.4	19.7	19.55	10.38	0.188
41BP859	4	4	13.4	21.1	21.1	21.1	10.28	0.205
41BP859	4	5	13.4	21.8	21.7	21.75	10.28	0.212
41BP859	4	6	14.1	24.1	24	24.05	10.98	0.219
41BP859	4	7	14.1	27.3	27.5	27.4	10.98	0.250
41BP859	4	8	13.1	29.2	29.2	29.2	9.98	0.293
41BP859	4	9	13.7	26.2	26.4	26.3	10.58	0.249
41BP859	4	10	13.7	24.8	24.7	24.75	10.58	0.234
41BP859	4	11	14.2	25.4	25.3	25.35	11.08	0.229
41BP859	4	12	13.8	23.2	23.1	23.15	10.68	0.217
41BP859	4	13	14.2	22.9	23.1	23	11.08	0.208
41BP859	4	14	13.3	21.9	22.3	22.1	10.18	0.217
41BP859	4	15	13.2	19.8	20	19.9	10.08	0.197
41BP859	4	16	13.6	21.5	21.8	21.65	10.48	0.207
41BP859	4	17	13.9	22.1	22.3	22.2	10.78	0.206
41BP859	4	18	12.4	22.2	22.1	22.15	9.28	0.239
41BP865	1	1	12.7	4.8	4.6	4.7	9.58	0.049
41BP865	1	2	13.2	6.9	6.9	6.9	10.08	0.068
41BP865	1	3	13.2	9.4	9.2	9.3	10.08	0.092
41BP865	1	4	13.1	7.7	7.7	7.7	9.98	0.077
41BP865	1	5	12.5	8.1	8.1	8.1	9.38	0.086
41BP865	1	6	14.2	13	13	13	11.08	0.117

Table B-1. MSS Sampling Information, continued...

Site	Test Unit	Sample	Total Weight (g)	VSS 1	VSS 2	Average VSS	Sample Weight (g)	MSS Value
41BP865	1	7	11.9	11	11	11	8.78	0.125
41BP865	1	8	12.7	15.4	15.4	15.4	9.58	0.161
41BP865	1	9	13.2	17.2	17.1	17.15	10.08	0.170
41BP865	1	10	13.2	16.9	16.8	16.85	10.08	0.167
41BP865	1	11	13.8	17	17.1	17.05	10.68	0.160
41BP865	1	12	13.1	16.6	16.5	16.55	9.98	0.166
41BP865	1	13	12.3	15.5	15.5	15.5	9.18	0.169
41BP865	1	14	13.5	16.6	16.6	16.6	10.38	0.160
41BP865	1	15	13.7	15.1	15.2	15.15	10.58	0.143
41BP865	1	16	13.1	14.2	14.3	14.25	9.98	0.143
41BP865	1	17	12.5	15.6	15.4	15.5	9.38	0.165
41BP865	2	1	12.9	4.6	4.5	4.55	9.78	0.047
41BP865	2	2	14	6	6	6	10.88	0.055
41BP865	2	3	11.4	4.6	4.6	4.6	8.28	0.056
41BP865	2	4	14.1	6.5	6.5	6.5	10.98	0.059
41BP865	2	5	13.8	8.1	8	8.05	10.68	0.075
41BP865	2	6	13.1	9.7	9.6	9.65	9.98	0.097
41BP865	2	7	13.6	10.3	10.5	10.4	10.48	0.099
41BP865	2	8	14.7	14.3	14.2	14.25	11.58	0.123
41BP865	2	9	13	13.7	13.4	13.55	9.88	0.137
41BP865	2	10	14.8	15.9	15.8	15.85	11.68	0.136
41BP865	2	11	13.6	13.2	13.1	13.15	10.48	0.125
41BP865	2	12	14.3	14.1	14.1	14.1	11.18	0.126
41BP865	2	13	13.9	13.3	13.2	13.25	10.78	0.123
41BP865	2	14	13.7	13.7	13.8	13.75	10.58	0.130
41BP865	2	15	11	10.7	11	10.85	7.88	0.138
41BP865	2	16	13.5	12.7	12.7	12.7	10.38	0.122
41BP865	2	17	5.3	2.5	2.5	2.5	2.18	0.115
41BP865	3	1	12.4	3.7	3.5	3.6	9.28	0.039
41BP865	3	2	13.8	3.6	3.6	3.6	10.68	0.034
41BP865	3	3	13.3	3.4	3.3	3.35	10.18	0.033
41BP865	3	4	14	3.9	3.9	3.9	10.88	0.036
41BP865	3	5	14.3	4.2	4.1	4.15	11.18	0.037
41BP865	3	6	12.5	3	3	3	9.38	0.032
41BP865	3	7	14.8	3.9	3.8	3.85	11.68	0.033
41BP865	3	8	13.5	4	3.9	3.95	10.38	0.038
41BP865	3	9	13.5	4.8	4.7	4.75	10.38	0.046
41BP865	3	10	13.8	5.8	5.6	5.7	10.68	0.053
41BP865	3	11	14.1	5.8	5.6	5.7	10.98	0.052
41BP865	3	12	13.9	8.2	8.2	8.2	10.78	0.076

Table B-1. MSS Sampling Information, continued....

Site	Test Unit	Sample	Total Weight (g)	VSS 1	VSS 2	Average VSS	Sample Weight (g)	MSS Value
41BP865	3	13	13.5	8.7	8.5	8.6	10.38	0.083
41BP865	3	14	13.9	8.9	8.9	8.9	10.78	0.083
41BP865	3	15	14	10.4	10.3	10.35	10.88	0.095
41BP865	3	16	13.4	10.1	10.2	10.15	10.28	0.099
41BP865	3	17	13.3	10	10	10	10.18	0.098
41BP865	3	18	13.7	10.6	10.3	10.45	10.58	0.099
41BP865	3	19	13.3	9.7	9.6	9.65	10.18	0.095
41BP865	3	20	13.5	10.8	10.6	10.7	10.38	0.103
41BP865	4	1	13.6	4.6	4.4	4.5	10.48	0.043
41BP865	4	2	12.8	4	4	4	9.68	0.041
41BP865	4	3	13.9	3.9	4.2	4.05	10.78	0.038
41BP865	4	4	14.4	4.2	4.1	4.15	11.28	0.037
41BP865	4	5	14	4.4	4.5	4.45	10.88	0.041
41BP865	4	6	13	4.9	4.7	4.8	9.88	0.049
41BP865	4	7	14.5	7	6.8	6.9	11.38	0.061
41BP865	4	8	14.2	7.2	7.3	7.25	11.08	0.065
41BP865	4	9	13.9	8.2	8.3	8.25	10.78	0.077
41BP865	4	10	14.2	8.4	8.3	8.35	11.08	0.075
41BP865	4	11	11.6	5.9	5.7	5.8	8.48	0.068
41BP865	4	12	14.3	8.8	8.7	8.75	11.18	0.078
41BP865	4	13	11.8	5.5	5.4	5.45	8.68	0.063
41BP865	4	14	10.8	5.8	6	5.9	7.68	0.077

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Appendix C:
Debitage Attribute Data

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Table C-1. Debitage Attribute Data
DR: dark red, O: orange, Y: yellow, YG: yellow green, YO: yellow orange

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP528 - TU1	2	1028	25	21.73	DR	DR
BP528 - TU1	11	1122	100	29.39	DR	DR
BP528 - TU1	9	1128	25	20.36	DR	DR
BP528 - TU1	17	1012	0	18.13	YO	YO
BP528 - TU1	2	1013	0	23.51	YO	YO
BP528 - TU1	9	1013	25	17.1	YO	YO
BP528 - TU1	11	1113	25	27.19	YO	YO
BP528 - TU2	6	1012	100	31.49	DR	DR
BP528 - TU2	6	1012	0	13.66	DR	DR
BP528 - TU2	1	1013	0	9.81	DR	DR
BP528 - TU2	16	1019	75	38.06	DR	DR
BP528 - TU2	3	1022	0	15.76	DR	DR
BP528 - TU2	8	1022	100	23.42	DR	DR
BP528 - TU2	12	1025	100	32.4	DR	DR
BP528 - TU2	16.01	1112	100	55.08	O	O
BP528 - TU2	3	1012	0	15.69	Y	YO
BP528 - TU2	6	1012	0	28.63	Y	YO
BP528 - TU2	6	1023	0	15.12	Y	O
BP528 - TU2	10	1023	100	28.84	Y	YO
BP528 - TU2	3	2012	0	12.5	Y	YO
BP528 - TU2	3	1012	0	17.04	YG	O
BP528 - TU2	12	1028	25	39.26	YG	O
BP528 - TU2	1	2012	0	11.94	YG	DR
BP528 - TU2	8	1012	0	21.48	YO	O
BP528 - TU2	8	1012	0	14.32	YO	O
BP528 - TU2	12	1012	25	43.43	YO	O
BP528 - TU2	12	1012	25	27.76	YO	O
BP528 - TU2	12	1012	25	23.96	YO	O
BP528 - TU2	1	1013	0	10.98	YO	YO
BP528 - TU2	12	1013	0	36.26	YO	O
BP528 - TU2	16	1013	0	24.05	YO	O
BP528 - TU2	10	1019	0	20.17	YO	O
BP528 - TU2	10	1019	0	11.36	YO	O
BP528 - TU2	16	1112	100	26.05	YO	DR
BP528 - TU3	13	1012	0	21.13	Y	YO
BP528 - TU3	13	1012	0	16.2	Y	YO
BP528 - TU3	13	1012	0	16.54	Y	O
BP528 - TU3	7	1012	0	41.32	YO	YO
BP528 - TU3	13	1012	75	25.41	YO	O

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP528 - TU3	13	1012	0	12.9	YO	O
BP528 - TU3	14	1013	0	10.02	YO	O
BP528 - TU3	13	1112	0	10.62	YO	O
BP859 - TU1	9	1012	0	18.88	DR	DR
BP859 - TU1	35	1019	0	13.12	DR	DR
BP859 - TU1	38	1019	25	33.02	DR	DR
BP859 - TU1	36	1112	0	24.51	DR	DR
BP859 - TU1	36.5	1112	0	9.954	DR	DR
BP859 - TU1	33	1013	0	20.94	O	YO
BP859 - TU1	33	1115	0	35.52	O	YO
BP859 - TU1	33	2013	0	9.68	O	YO
BP859 - TU1	43	1012	75	26.72	Y	YO
BP859 - TU1	35	1013	0	12.71	Y	Y
BP859 - TU1	35	1013	0	7.47	Y	Y
BP859 - TU1	38	1013	0	24.1	Y	YO
BP859 - TU1	35	1019	0	15.22	Y	YO
BP859 - TU1	36	2013	0	9.94	Y	Y
BP859 - TU1	36.4	1012	75	29.01	YO	YO
BP859 - TU1	33	1019	0	25.29	YO	YO
BP859 - TU1	35	1113	0	26.2	YO	YO
BP859 - TU2	20	1012	0	9.68	DR	DR
BP859 - TU2	15	1015	0	15.09	DR	DR
BP859 - TU2	20	1015	25	20.85	DR	DR
BP859 - TU2	37	1015	0	17.25	DR	DR
BP859 - TU2	37	1015	0	10.27	DR	DR
BP859 - TU2	37	1016	0	13.53	DR	DR
BP859 - TU2	32	1017	0	10.84	DR	DR
BP859 - TU2	37	1025	25	14.66	DR	DR
BP859 - TU2	37	1028	0	9.21	DR	DR
BP859 - TU2	37	1115	25	15.58	DR	DR
BP859 - TU2	37	1116	0	11.79	DR	DR
BP859 - TU2	15	1117	25	10.54	DR	DR
BP859 - TU2	32	1117	0	9.05	DR	DR
BP859 - TU2	34	1117	0	14.2	DR	DR
BP859 - TU2	37	1117	75	14.33	DR	DR
BP859 - TU2	37	1117	75	12.66	DR	DR
BP859 - TU2	37	1117	25	14.06	DR	DR
BP859 - TU2	37	1117	0	8.02	DR	DR
BP859 - TU2	37	1118	0	11.01	DR	DR
BP859 - TU2	32	1013	0	10.35	O	O

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP859 - TU2	11	1019	0	15.38	O	DR
BP859 - TU2	39	1022	25	24.72	O	O
BP859 - TU2	4	1012	0	19.37	Y	O
BP859 - TU2	37	1012	25	32.54	Y	O
BP859 - TU2	37	1012	0	14.49	Y	YO
BP859 - TU2	5	1013	75	20.7	Y	O
BP859 - TU2	20	1013	25	36.83	Y	YO
BP859 - TU2	32	1013	25	13.85	Y	YO
BP859 - TU2	39	1013	0	27.78	Y	O
BP859 - TU2	32	1015	0	25.96	Y	YO
BP859 - TU2	37	1015	0	11.42	Y	YG
BP859 - TU2	37	1018	0	10.14	Y	YO
BP859 - TU2	37	1018	0	7.45	Y	Y
BP859 - TU2	11	1019	25	24.18	Y	O
BP859 - TU2	11	1019	0	24.19	Y	O
BP859 - TU2	11	1019	0	15.9	Y	O
BP859 - TU2	11	1019	0	10.37	Y	O
BP859 - TU2	37	1028	0	19.38	Y	O
BP859 - TU2	34	1113	0	17.16	Y	O
BP859 - TU2	37	1113	0	12.07	Y	YO
BP859 - TU2	11	1116	75	17.16	Y	YO
BP859 - TU2	11	1119	0	26.53	Y	O
BP859 - TU2	11	1119	0	17.92	Y	O
BP859 - TU2	37	2013	0	10.01	Y	YO
BP859 - TU2	11	2019	0	9.83	Y	Y
BP859 - TU2	37	1019	0	18.79	YG	O
BP859 - TU2	4	1112	25	25.99	YG	O
BP859 - TU2	34	2013	0	10.36	YG	O
BP859 - TU2	11	2112	0	10.99	YG	DR
BP859 - TU2	42	1012	0	32.02	YO	O
BP859 - TU2	15	1013	0	23.97	YO	YO
BP859 - TU2	15	1013	0	10.53	YO	YO
BP859 - TU2	39	1013	0	23.11	YO	O
BP859 - TU2	39	1018	0	23.02	YO	DR
BP859 - TU2	32	1019	25	38.96	YO	O
BP859 - TU2	34	1019	0	13.91	YO	O
BP859 - TU2	32	1023	0	18.09	YO	YO
BP859 - TU2	15	1116	0	18.6	YO	YO
BP859 - TU2	15	1116	0	8.36	YO	YO
BP859 - TU2	11	1119	0	32.12	YO	O

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP859 - TU2	34	2012	0	20.11	YO	O
BP859 - TU2	15	2013	0	17.12	YO	YO
BP859 - TU2	15	2013	0	9.22	YO	YO
BP859 - TU3	6	1012	0	12.5	DR	DR
BP859 - TU3	13	1012	0	11.73	DR	DR
BP859 - TU3	16	1013	0	22.26	DR	DR
BP859 - TU3	2	1115	25	10.46	DR	DR
BP859 - TU3	10	1117	0	12.51	DR	DR
BP859 - TU3	10	1117	0	12.24	DR	DR
BP859 - TU3	13	1117	0	11.98	DR	DR
BP859 - TU3	13	1117	0	12.25	DR	DR
BP859 - TU3	2	1012	0	15.58	O	O
BP859 - TU3	6	1012	0	17.31	O	DR
BP859 - TU3	10	1012	0	12.96	O	O
BP859 - TU3	10	1115	0	20.89	O	O
BP859 - TU3	6	1122	0	34.29	O	O
BP859 - TU3	6	1012	0	27.73	Y	YO
BP859 - TU3	6	1012	0	17.32	Y	YO
BP859 - TU3	6	1012	0	18.62	Y	YO
BP859 - TU3	6	1012	0	14.07	Y	YO
BP859 - TU3	10	1012	0	10.07	Y	YO
BP859 - TU3	10	1012	0	9.38	Y	YO
BP859 - TU3	13	1012	0	13.31	Y	YO
BP859 - TU3	16	1012	0	15.79	Y	Y
BP859 - TU3	16	1012	0	12.55	Y	YO
BP859 - TU3	16	1012	0	9.16	Y	YO
BP859 - TU3	16	1012	0	8.56	Y	YO
BP859 - TU3	6	1013	0	15.32	Y	O
BP859 - TU3	6	1013	0	15.85	Y	O
BP859 - TU3	6	1013	0	17.53	Y	O
BP859 - TU3	6	1013	0	23.47	Y	YO
BP859 - TU3	6	1013	0	12.43	Y	YO
BP859 - TU3	6	1013	0	13.77	Y	YO
BP859 - TU3	13	1013	0	14.3	Y	YO
BP859 - TU3	13	1013	0	11.11	Y	YO
BP859 - TU3	13	1013	0	15.87	Y	YO
BP859 - TU3	16	1013	0	16.81	Y	Y
BP859 - TU3	16	1013	0	14.62	Y	YO
BP859 - TU3	23	1013	0	15.16	Y	YO
BP859 - TU3	10	1015	0	15.8	Y	O

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP859 - TU3	13	1015	0	16.86	Y	YO
BP859 - TU3	16	1015	0	7.58	Y	Y
BP859 - TU3	10	1018	0	20.56	Y	YO
BP859 - TU3	10	1018	0	8.61	Y	Y
BP859 - TU3	16	1018	0	20.66	Y	YO
BP859 - TU3	16	1018	0	11.22	Y	Y
BP859 - TU3	16	1018	0	8.81	Y	YO
BP859 - TU3	16	1018	0	7.9	Y	YO
BP859 - TU3	16	1018	0	9.76	Y	YO
BP859 - TU3	16	1023	0	33.7	Y	YO
BP859 - TU3	6	1113	0	16.03	Y	YO
BP859 - TU3	16	1113	0	14.92	Y	Y
BP859 - TU3	6	2013	0	8.89	Y	YO
BP859 - TU3	13	2013	0	16.26	Y	YO
BP859 - TU3	16	1013	0	12.82	YG	DR
BP859 - TU3	16	1013	0	16.71	YG	DR
BP859 - TU3	16	1013	0	10.77	YG	DR
BP859 - TU3	27	1116	0	11.32	YG	DR
BP859 - TU3	2	1012	0	12.26	YO	YO
BP859 - TU3	6	1012	25	14.96	YO	DR
BP859 - TU3	6	1012	0	10.16	YO	DR
BP859 - TU3	10	1012	0	9.52	YO	YO
BP859 - TU3	16	1012	0	13.31	YO	DR
BP859 - TU3	2	1013	25	23.79	YO	O
BP859 - TU3	2	1013	0	16.04	YO	O
BP859 - TU3	2	1013	0	8.55	YO	O
BP859 - TU3	6	1013	0	8.2	YO	DR
BP859 - TU3	10	1013	25	23.03	YO	O
BP859 - TU3	10	1013	0	20.59	YO	O
BP859 - TU3	10	1022	0	35.04	YO	YO
BP859 - TU3	2	1113	0	13.94	YO	O
BP859 - TU3	10	1116	0	10.69	YO	DR
BP859 - TU3	13	1116	0	15.46	YO	O
BP859 - TU3	25	1116	0	36.18	YO	O
BP859 - TU3	16	1117	0	24.31	YO	O
BP859 - TU3	2	2013	0	13.79	YO	O
BP859 - TU3	10	2013	0	9.6	YO	YO
BP859 - TU3	10	2013	0	9.61	YO	YO
BP859 - TU4	17	1012	0	9.25	DR	DR
BP859 - TU4	8	1013	0	14.85	DR	DR

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP859 - TU4	12	1013	0	12.83	DR	DR
BP859 - TU4	12	1112	0	11.23	DR	DR
BP859 - TU4	3	1115	0	18.4	DR	DR
BP859 - TU4	3	1117	0	11	DR	DR
BP859 - TU4	8	1117	0	12.78	DR	DR
BP859 - TU4	19	1013	0	13.99	O	O
BP859 - TU4	24	1116	0	16.09	O	O
BP859 - TU4	19	1117	25	37.7	O	O
BP859 - TU4	3	1012	0	12.7	Y	YO
BP859 - TU4	3	1012	0	12.13	Y	YO
BP859 - TU4	12	1012	0	13.75	Y	YO
BP859 - TU4	24	1012	0	22.39	Y	YO
BP859 - TU4	26	1012	25	30.66	Y	YO
BP859 - TU4	8	1013	0	9.75	Y	O
BP859 - TU4	24	1018	0	20.92	Y	Y
BP859 - TU4	17	1019	0	26.04	Y	Y
BP859 - TU4	8	1113	0	12	Y	O
BP859 - TU4	17	1113	0	43.98	Y	YO
BP859 - TU4	17	1113	0	41.97	Y	YO
BP859 - TU4	3	1116	0	9.27	Y	O
BP859 - TU4	3	2012	0	12.41	Y	YO
BP859 - TU4	19	2013	0	11.37	Y	YO
BP859 - TU4	28	2018	0	11	Y	YO
BP859 - TU4	17	1012	0	20.88	YG	O
BP859 - TU4	8	1013	25	19.6	YG	O
BP859 - TU4	17	1012	0	15.79	YO	O
BP859 - TU4	17	1012	0	10.48	YO	O
BP859 - TU4	12	1013	0	8.27	YO	O
BP859 - TU4	17	1013	0	13.99	YO	O
BP859 - TU4	17	1019	0	16.12	YO	O
BP859 - TU4	12	1112	0	22.02	YO	O
BP859 - TU4	8	1113	0	15.93	YO	O
BP859 - TU4	8	1113	0	9.11	YO	O
BP859 - TU4	12	1113	25	16.07	YO	O
BP859 - TU4	3	1116	0	23.63	YO	DR
BP859 - TU4	17	1116	0	21.95	YO	O
BP859 - TU4	17	1116	25	11.44	YO	O
BP859 - TU5	52.13	1012	0	8.41	DR	DR
BP859 - TU5	50	1015	0	12.13	DR	DR
BP859 - TU5	49	1018	0	10.5	DR	DR

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP859 - TU5	51	1018	0	11.18	DR	DR
BP859 - TU5	50	1025	0	17.15	DR	DR
BP859 - TU5	51	1028	0	14.07	DR	DR
BP859 - TU5	51	1028	0	12.78	DR	DR
BP859 - TU5	49	1113	0	11.2	DR	DR
BP859 - TU5	51	2113	0	11.74	DR	DR
BP859 - TU5	53	1012	0	10.68	Y	YO
BP859 - TU5	49	1013	0	11.98	Y	O
BP859 - TU5	51	1013	0	13.06	Y	Y
BP859 - TU5	51	1013	25	12.01	Y	YO
BP859 - TU5	53	1019	0	12.08	Y	YO
BP859 - TU5	49	1113	0	17.21	Y	Y
BP859 - TU5	53	2019	0	9.65	Y	YO
BP859 - TU5	49	1015	0	10.87	YG	DR
BP859 - TU5	53	1012	0	22.86	YO	O
BP859 - TU5	52.1	1012	0	10.49	YO	O
BP859 - TU5	50	1013	100	19.26	YO	O
BP859 - TU5	49	1016	0	16.36	YO	O
BP859 - TU5	51	1019	0	15.58	YO	O
BP859 - TU5	51	1019	0	11.83	YO	O
BP859 - TU5	53	1019	0	10.38	YO	O
BP859 - TU5	50	1022	0	15.96	YO	YO
BP859 - TU5	53	1112	25	32.18	YO	O
BP859 - TU5	51	1113	0	23.83	YO	O
BP859 - TU5	51	1119	75	13.27	YO	O
BP865 - TU1	17 - 7	1012	25	15.21	DR	DR
BP865 - TU1	5	1013	0	10.42	DR	DR
BP865 - TU1	8	1118	0	15.52	DR	DR
BP865 - TU1	20	1117	0	40.15	O	DR
BP865 - TU1	26	1013	0	52.44	O	O
BP865 - TU1	5	1106	0	13.57	O	O
BP865 - TU1	5	1112	25	14.06	O	O
BP865 - TU1	12	1117	0	30.4	Y	DR
BP865 - TU1	5	1012	25	16.8	Y	O
BP865 - TU1	8	1012	0	9.52	Y	O
BP865 - TU1	5	1013	0	16.41	Y	O
BP865 - TU1	5	1013	0	15.49	Y	O
BP865 - TU1	12	1013	0	12.35	Y	O
BP865 - TU1	5	1116	0	13.84	Y	O
BP865 - TU1	12	1117	0	12.14	Y	O

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP865 - TU1	1	2013	0	10.94	Y	O
BP865 - TU1	17 - 1	1012	25	29.2	Y	YO
BP865 - TU1	17 - 2	1012	0	25.34	Y	YO
BP865 - TU1	17 - 4	1012	75	23.67	Y	YO
BP865 - TU1	5	1013	0	32.19	Y	YO
BP865 - TU1	8	1013	0	13.03	Y	YO
BP865 - TU1	8	1013	0	10.78	Y	YO
BP865 - TU1	8	1013	0	8.48	Y	YO
BP865 - TU1	12	1013	0	10.69	Y	YO
BP865 - TU1	21	1013	0	14.66	Y	YO
BP865 - TU1	21	1013	0	8.92	Y	YO
BP865 - TU1	5	1016	0	26.46	Y	YO
BP865 - TU1	20	1018	0	18.06	Y	YO
BP865 - TU1	20	1127	0	20.79	Y	YO
BP865 - TU1	17 - 3	2012	0	18.95	Y	YO
BP865 - TU1	5	1012	0	9.76	YG	DR
BP865 - TU1	5	1117	0	13.46	YG	DR
BP865 - TU1	5	1012	0	10.59	YG	O
BP865 - TU1	5	1013	0	10.39	YG	O
BP865 - TU1	12	1013	0	8.35	YO	DR
BP865 - TU1	1	1012	25	24.69	YO	O
BP865 - TU1	1	1012	0	10.17	YO	O
BP865 - TU1	17 - 6	1012	0	10.45	YO	O
BP865 - TU1	5	1013	0	23.39	YO	O
BP865 - TU1	5	1013	25	14.06	YO	O
BP865 - TU1	5	1013	0	15.89	YO	O
BP865 - TU1	8	1013	0	13.55	YO	O
BP865 - TU1	5	1023	0	12.97	YO	O
BP865 - TU1	12	1112	75	37.69	YO	O
BP865 - TU1	20	1112	25	23.31	YO	O
BP865 - TU1	21	1113	0	17.33	YO	O
BP865 - TU1	24	1113	75	55.02	YO	O
BP865 - TU1	1	1116	0	11.34	YO	O
BP865 - TU1	5	1126	0	15.32	YO	O
BP865 - TU1	17 - 5	2012	0	11.34	YO	O
BP865 - TU1	21	1013	0	10.07	YO	YG
BP865 - TU1	20	1113	0	13.56	YO	YO
BP865 - TU2	2	1117	0	13.84	DR	DR
BP865 - TU2	14	1127	75	25.4	DR	DR
BP865 - TU2	25	1013	0	8.03	Y	YO

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP865 - TU2	14	1013	0	21.28	YO	O
BP865 - TU3	31	1116	0	12.82	DR	DR
BP865 - TU3	11	1117	0	10.09	DR	DR
BP865 - TU3	29	1018	0	10.03	O	O
BP865 - TU3	11	1116	0	12.39	Y	YO
BP865 - TU3	7	1012	0	14.4	Y	YO
BP865 - TU3	11	1012	0	18.7	Y	YO
BP865 - TU3	11	1012	0	12.26	Y	YO
BP865 - TU3	15	1012	0	20.68	Y	YO
BP865 - TU3	15	1012	0	15.56	Y	YO
BP865 - TU3	7	1013	0	24.85	Y	YO
BP865 - TU3	7	1013	0	15.78	Y	YO
BP865 - TU3	7	1013	0	14.01	Y	YO
BP865 - TU3	7	1013	0	10.07	Y	YO
BP865 - TU3	37.2	1013	0	9.02	Y	YO
BP865 - TU3	11	1112	0	13.04	Y	YO
BP865 - TU3	15	1112	0	11.66	Y	YO
BP865 - TU3	3	2013	0	26.7	Y	YO
BP865 - TU3	11	2013	0	12.48	Y	YO
BP865 - TU3	11	1012	0	10.89	YG	DR
BP865 - TU3	15	1025	0	17.14	YG	DR
BP865 - TU3	29	1025	0	15.73	YG	DR
BP865 - TU3	7	1012	0	13.13	YG	O
BP865 - TU3	7	1013	0	9.09	YG	O
BP865 - TU3	11	1116	0	10.19	YG	O
BP865 - TU3	7	1022	0	19.13	YG	YG
BP865 - TU3	3	2013	0	12.88	YG	YG
BP865 - TU3	15	1018	0	25.08	YG	YO
BP865 - TU3	15	1117	0	20.58	YO	DR
BP865 - TU3	22	1012	0	15.72	YO	O
BP865 - TU3	31	1012	0	7.54	YO	O
BP865 - TU3	37.1	1013	0	8.2	YO	O
BP865 - TU3	22	1025	0	14.13	YO	O
BP865 - TU3	3	1112	75	33.31	YO	O
BP865 - TU3	7	1117	0	17.68	YO	O
BP865 - TU3	7	1117	0	19.85	YO	O
BP865 - TU3	18.1	1117	0	10.47	YO	O
BP865 - TU3	29	2013	0	16.39	YO	O
BP865 - TU3	15	1013	0	9.92	YO	YO
BP865 - TU3	18	1025	0	12.88	YO	YO

Table C-1. Debitage Attribute Data, continued...

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP865 - TU3	15	1112	0	11.42	YO	YO
BP865 - TU4	13	1013	0	9.18	Y	O
BP865 - TU4	16	1012	0	30.2	Y	YO
BP865 - TU4	4	1022	0	13.74	YG	DR
BP865 - TU4	13	1017	75	16.95	YO	DR
BP865 - TU4	6	1013	0	8.07	YO	O
BP865 - TU4	9	1013	0	9	YO	O
BP865 - TU4	9	1117	25	20.49	YO	O
BP865 - TU5	34	1025	0	10.52	DR	DR
BP865 - TU5	36	1025	0	12.39	DR	DR
BP865 - TU5	34	1117	0	10.94	DR	DR
BP865 - TU5	35	1117	0	11.26	DR	DR
BP865 - TU5	36	1117	0	13.44	DR	DR
BP865 - TU5	34	1125	0	21.5	DR	DR
BP865 - TU5	37 - 3	1019	0	14.88	O	O
BP865 - TU5	37 - 2	1022	75	23.11	O	O
BP865 - TU5	34	1012	0	14.04	Y	O
BP865 - TU5	34	1018	0	13.63	Y	O
BP865 - TU5	34	1013	0	10.86	Y	YO
BP865 - TU5	36	1013	0	16.23	Y	YO
BP865 - TU5	36	1018	0	12.28	Y	YO
BP865 - TU5	34	1012	75	26.99	YG	O
BP865 - TU5	35	1015	0	10.59	YG	O
BP865 - TU5	36	2019	0	18.12	YG	YG
BP865 - TU5	37 - 1	1012	0	27.23	YO	O
BP865 - TU5	37 - 4	1012	0	9.41	YO	O
BP865 - TU5	37.1	1012	0	20.36	YO	O
BP865 - TU5	34	1013	25	20.06	YO	O
BP865 - TU5	35	1013	0	12.32	YO	O
BP865 - TU5	37.1	1013	0	16.07	YO	O
BP865 - TU5	37 - 6	1015	0	10.66	YO	O
BP865 - TU5	37 - 5	1018	0	9.72	YO	O
BP865 - TU5	36	1116	0	23.96	YO	O
BP865 - TU5	36	1117	0	28.31	YO	O
BP865 - TU5	34	2013	0	8.17	YO	O
BP865 - TU6	42 - 3	1015	0	10.99	DR	DR
BP865 - TU6	40 - 4	1117	0	15.11	DR	DR
BP865 - TU6	40 - 6	1117	0	8.79	DR	DR
BP865 - TU6	41 - 4	1012	0	10.07	Y	YO
BP865 - TU6	39	1116	0	12.73	Y	YO

Table C-1. Debitage Attribute Data, continued....

Site - TU	Field Sack	Material Code	Percent of Dorsal Cortex	Max. Length (mm)	Short Wave	Long Wave
BP865 - TU6	40 - 5	2013	0	9.45	Y	YO
BP865 - TU6	41 - 3	1018	0	11.19	YG	DR
BP865 - TU6	39	1012	0	29.56	YG	O
BP865 - TU6	41 - 1	1018	0	13.03	YG	O
BP865 - TU6	42 - 4	1019	0	8.09	YG	O
BP865 - TU6	40 - 2	1012	0	19.99	YO	O
BP865 - TU6	41 - 2	1019	0	13.3	YO	O
BP865 - TU6	40 - 1	1112	0	19.03	YO	O
BP865 - TU6	42 - 2	1116	0	10.66	YO	O
BP865 - TU6	40 - 3	2102	0	12.32	YO	O
BP865 - TU6	39	2113	0	17.46	YO	O
BP865 - TU6	42 - 1	1012	0	18.53	YO	YO

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Appendix D:
Attributes of Raw Lithic Materials

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Appendix D:
Raw Lithic Collection

CAR collected raw lithic samples from two locales (6 and 7, Figure D-1) on Camp Swift continuing its investigation of the local material initiated in Mauldin et al. (2018). The first location was eroding from an unnamed drainage found on the walk to the project location. The second location was found during a brief survey along the road of the east boundary of the facility.

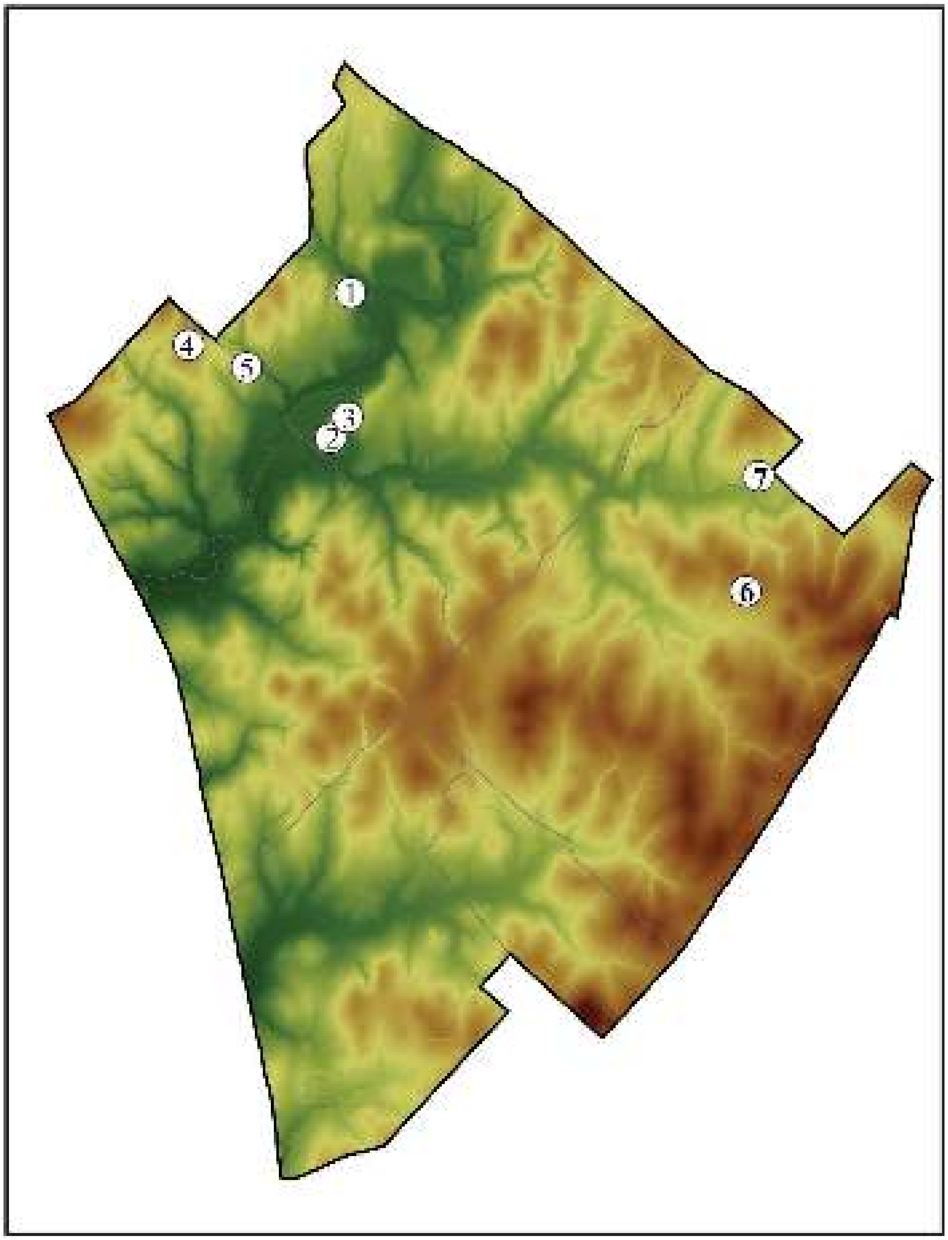

Figure D-1. Map showing rock sampling locations. Locations 6 and 7 were found during the current project, and Locations 1 through 5 are from the previous project (Mauldin et al. 2018).

Location 6 yielded 15 cobbles weighing a total of 9.35 kg. The material consisted of quartzite nodules with the exception of one petrified wood cobble. The maximum length of quartzite cobbles ranged from 7.5 to 17 cm. Location 7 yielded 14 cobbles weighing a total of 5.25 kg. Again, quartzite was the dominate material, in addition to one chert and one petrified wood sample. The chert sample was a small, flat, and fine-grained specimen. It weighed 0.37 kg and measured 8.5 cm in maximum length and 2.0 cm in maximum width. The chert fluoresced dark red in both the short and long wave ultraviolet light.

Table D-1. Attributes of Raw Lithic Material

Map Location	Specimen	Max Length (cm)	Weight (kg)	Material Type
6 (3site)	1	11	0.52	Quartzite
6 (3site)	2	14.1	0.86	Quartzite
6 (3site)	3	11.5	0.96	Quartzite
6 (3site)	4	17	2.515	Quartzite
6 (3site)	5	14	1.305	Quartzite
6 (3site)	6	10.5	0.62	Quartzite
6 (3site)	7	11.3	0.545	Quartzite
6 (3site)	8	8.5	0.13	Petrified wood
6 (3site)	9	9.5	0.25	Quartzite
6 (3site)	10	8.5	0.36	Quartzite
6 (3site)	11	9.5	0.245	Quartzite
6 (3site)	12	11.1	0.365	Quartzite
6 (3site)	13	7.5	0.385	Quartzite
6 (3site)	14	7.5	0.185	Quartzite
6 (3site)	15	10	0.24	Quartzite
7 (3site)	1	16	1.465	Quartzite
7 (3site)	2	12	0.515	Quartzite
7 (3site)	3	6.5	0.11	Quartzite
7 (3site)	4	8.5	0.09	Chert
7 (3site)	5	9	0.38	Quartzite
7 (3site)	6	11	0.37	Petrified wood
7 (3site)	7	10.5	0.225	Quartzite
7 (3site)	8	10.5	0.515	Quartzite
7 (3site)	9	9	0.385	Quartzite
7 (3site)	10	8	0.37	Quartzite
7 (3site)	11	7	0.215	Quartzite
7 (3site)	12	9	0.26	Quartzite
7 (3site)	13	9	0.315	Quartzite
7 (3site)	14	10	0.495	Quartzite

References Cited:

Mauldin, R.P., C.M. Munoz, and L. Kemp
2018 *National Register Eligibility Testing of Eight Sites on Camp Swift, Bastrop County, Texas*. Archaeological Report, No.436. Center for Archaeological Research, The University of Texas at San Antonio.

Appendix E:
Tools Collected during the Camp Swift Three Sites Project

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Appendix E:
Tools Collected during the Camp Swift Three Sites Project

41BP528

Two tools and one core were recovered from 41BP528, including a core/core tool, an edge-modified flake, and a graver.

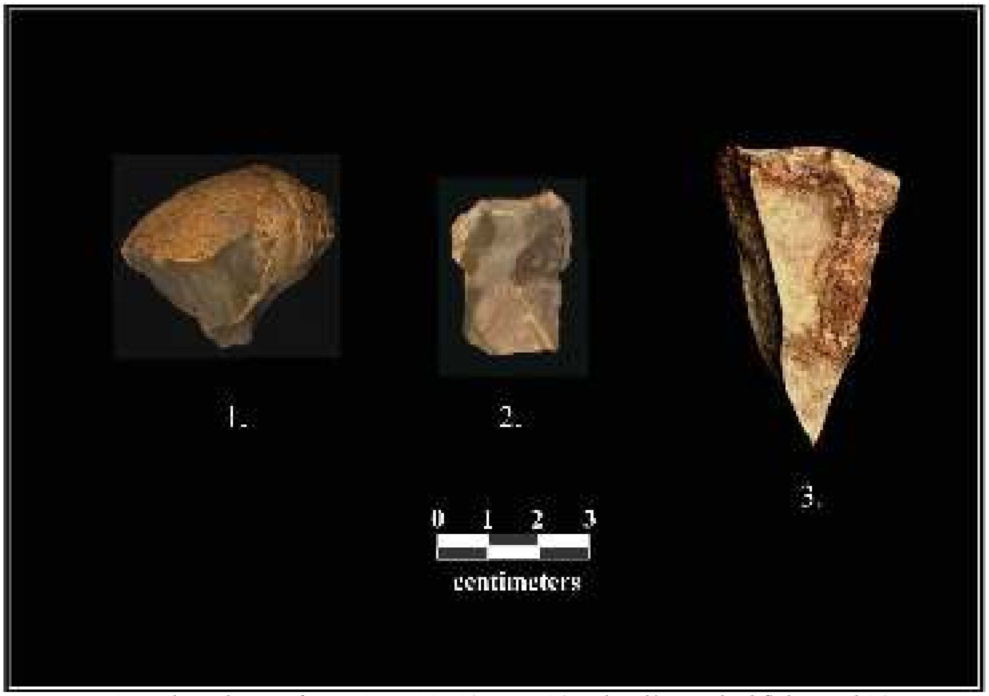

Figure E-1. Tools and cores from 41BP528: 1.) core; 2.) utilized/retouched flake; and 3.) graver.

41BP859

Twelve tools were recovered from 41BP859, including biface fragments, uniface fragments, retouched tools, and edge-modified flakes. The two points are shown in Chapter 8 (Figure 8-1).

Figure E-2. Tools from 41BP859: 1., 2., 3., 4a., 4b.) bifaces, items 1., 2., and 3. are likely point fragments; 5., 6.) unifaces; 7a., 7b., 8.) utilized/retouched flakes; 9., 10.) edge-modified flakes.

41BP865

Three tools and one core were recovered from 41BP865, including an arrow point, a biface fragment (a possible dart stem), and a core tool. The point is shown in Chapter 7 (Figure 7-4).

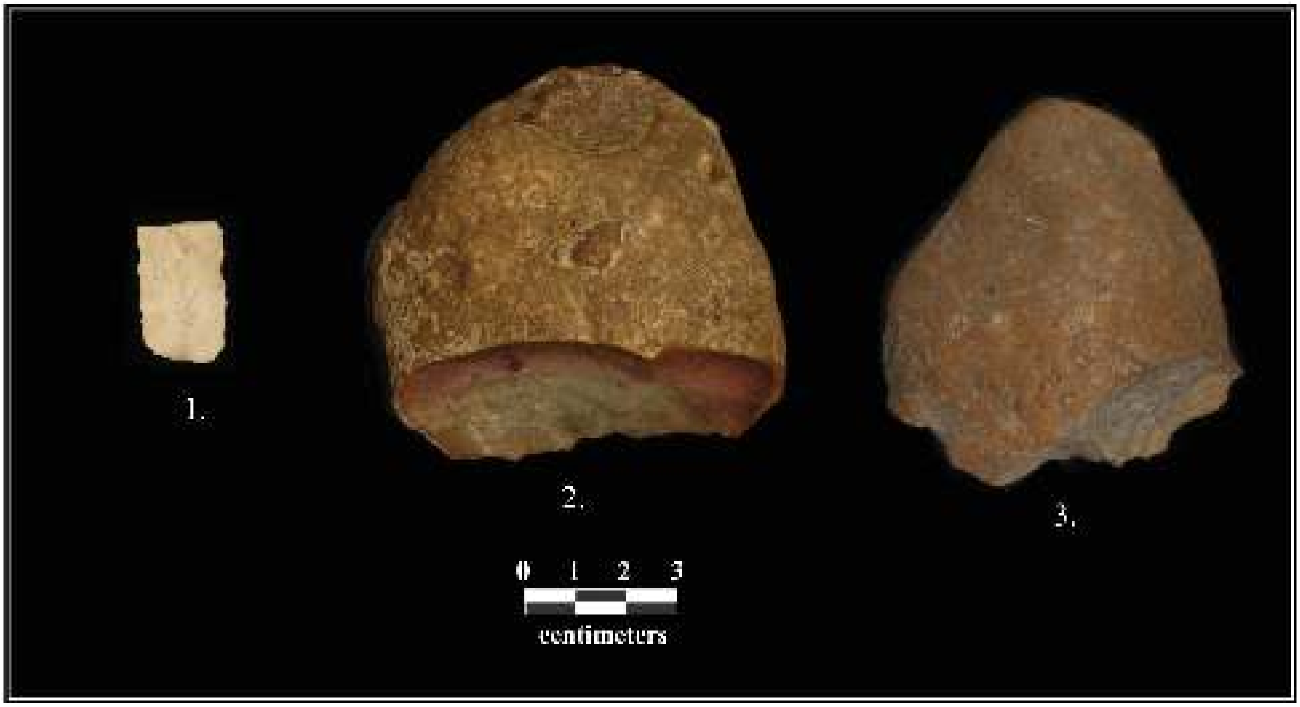

Figure E-3. Tools and cores from 41BP865: 1.) biface, possible point stem; 2.) core; and 3.) core tool.