National Register of Historic Places Eligibility Testing of 41WN120 at the Helton San Antonio River Nature Park in Wilson County, Texas

by
Cynthia M. Munoz

with a contribution by
Raymond P. Mauldin

Texas Antiquities Committee Permit No. 5854

Archaeological Report, No. 418

Prepared for:
San Antonio River Authority
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Principal Investigator

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Abstract:

From January 18 through January 31, 2011 the Center for Archaeological Research (CAR) of the University of Texas at San Antonio (UTSA) conducted limited eligibility testing at 41WN120. The site was previously identified during a 2010 intense pedestrian archaeological survey of the proposed Helton San Antonio River Nature Park located near Floresville, in Wilson County, Texas (Munoz 2010). The site is on land that is slated for phased in park improvements. The construction of a park road, a turnaround, a pavilion, and a nature center will impact the southwestern portion of 41WN120, an area identified in the 2010 survey as containing a high-density of buried cultural materials. The testing, conducted under the requirements of the Texas Antiquities Code, was performed under Texas Antiquities Permit No. 5854, with Dr. Steve Tomka serving as Principal Investigator and Cynthia Moore Munoz serving as Project Archaeologist. The work was conducted in advance of the proposed improvements. The testing involved mechanical backhoe trenching, hand auger boring, and the hand excavation of a limited number of test units.

Testing confirmed that the southwestern portion of 41WN120, located along a bluff overlooking Calaveras Creek, contains a high-density of cultural material. The site consists of two broad temporal components. The upper component produced one temporally diagnostic artifact, a Marcos point, dating the component to the Late Archaic period. The lower component contained three diagnostics, an Early Triangular point, an Angostura point, and a Guadalupe tool, associating the component with the Early Archaic period. One radiocarbon date, obtained from a piece of isolated charcoal in the upper portion of the lower component confirmed this time designation. No features were encountered but burned rock was collected from throughout the components suggesting the presence of buried thermal features. A detailed debitage and tool analysis suggests that the excavated lithic material from the lower component represents late stage reduction focusing on tool production.

The high density of cultural materials, burned rock suggesting buried thermal features, intact sediments, diagnostic artifacts in good context in conjunction with a radiocarbon date, and the depth of buried prehistoric material suggest that the southwest portion of 41WN120, near the bluff, possesses high potential for future research. It is the CAR's assessment that the integrity of deposits dating to the Early Archaic occupation of 41WN120 is good. The CAR recommends that the portion of 41WN120 with high-density cultural material be listed as eligible for the National Register of Historic Places (NRHP) under criterion D of 36CRF 60.4, in that the site has and is likely to yield information significant in prehistory. The CAR also recommends listing as a State Archaeological Landmark (SAL) under criterion 1, 2, and 3 of 13TAC26.8. We recommend that this portion of 41WN120 remain off limits to any construction activities and that the San Antonio River Authority (SARA) develop a plan to protect the area. If this portion of 41WN120 cannot be avoided, then the CAR recommends the development of a plan to recover significant data from the area of high-density artifact concentration. We further recommend that the remainder of site 41WN120, the area off of the high-density artifact concentration, does not contribute to the eligibility of the site and therefore, proposed improvements may proceed as planned away from the high-density concentration. In addition to the recommendation of eligibility, as a result of the 2010 survey of the property, the CAR recommended, that the historic brick ruin adjacent to the high-density artifact area be protected (see Munoz 2010). The Texas Historic Commission (THC) and SARA agreed with the CAR's recommendation to protect of this historic building.

Following laboratory processing and analysis, and in consultation with both SARA and the THC, all burned rock, snail, and sediment samples collected on the project were discarded. This discard was in conformance with THC guidelines. All remaining archaeological samples collected by the CAR, along with all associated artifacts, documents, notes, and photographs, were prepared for curation according to THC guidelines and are permanently curated at the Center for Archaeological Research at the University of Texas at San Antonio.

Table of Contents:

List of Figures:

List of Tables:

Acknowledgements:

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Chapter 1: Introduction

This report discusses the test excavations of site 41WN120 that occurred from January 18 through January 31, 2011. The site was identified in 2010 (Munoz 2010) during an intensive pedestrian survey of a 98-acre (41.7 ha) property on the Helton San Antonio River Nature Park owned by the San Antonio River Authority (SARA). Two archaeological sites were documented during the survey, 41WN120 and 41WN121. The Texas Historical Commission (THC) in accordance with the SARA listed 41WN120 as having unknown eligibility until testing to determine eligibility is completed. 41WN121 was not eligible.

The Center for Archaeological Research (CAR) of the University of Texas at San Antonio (UTSA) was contracted by the SARA, in accordance with THC recommendations, to conduct limited archaeological testing at 41WN120, on the portion of the site containing deeply buried prehistoric material. The site and project area are located in west-central Wilson County, Texas (Figure 1-1). The nature park, located approximately 8.8 miles (14.2 km) northwest of Floresville, Texas, is bounded by the San Antonio River to the south and surface roads to the north and east. The west boundary consists of a fence line delineating private rural property. 41WN120 lies on the northeastern quadrant of the park on a bluff adjacent to Calaveras Creek.

The excavations were conducted in advance of proposed improvements to the park. Phased in improvements planned for Helton San Antonio River Nature Park include roads, three parking areas, hike and bike trails, scenic overlooks, picnic areas, campsites, recreational vehicle (RV) campsites, an overnight research cabin, multiple toilets and water stations, a multi-use pavilion, an environmental education center, an amphitheater, river accesses for paddling, a pond, a bridge, a riparian land management demonstration area, and a tree and native plant farm. Four existing structures on the property are planned to be used as the park headquarters building and an operations facility. 41WN120 will be directly impacted by the construction of the pavilion, the education center, a parking area, an overlook, and a turnaround. The pavilion, education center, and turnaround are planned for the area of the site with the greatest research potential (Figure 1-2).

The principal goal of the National Register eligibility testing of 41WN120 was to better define the depth and the horizontal extent of the boundaries of the high-density artifact distribution and to explore details of the stratigraphy and character of the deposits. The testing involved a combination of mechanical backhoe trenching, hand augering, and hand excavating of test units. The land impacted by the project is owned by SARA, a political subdivision of the State of Texas. As such, the project has to comply with State Historic Preservation laws and specifically the mandates of the Antiquities Code of Texas. The archaeological testing of 41WN120 was performed under Texas Antiquities Permit No. 5854, with Dr. Steve Tomka, CAR Director, serving as Principal Investigator and Cynthia Moore Munoz serving as Project Archaeologist.

The testing of 41WN120 included the excavation of six backhoe trenches (BHT), twelve auger tests (AT), and four 1-x-1 m, two 0.5-x-0.5 m, and one 0.5-x-1 m test units (TU). The auger bores, backhoe trenches, and test units were positioned along the southwestern portion of the site, the area determined, in the previous survey (Munoz 2010), to contain the deepest deposits of cultural material.

The results of the testing efforts conducted at 41WN120 suggest the presence of two broad temporal prehistoric components,

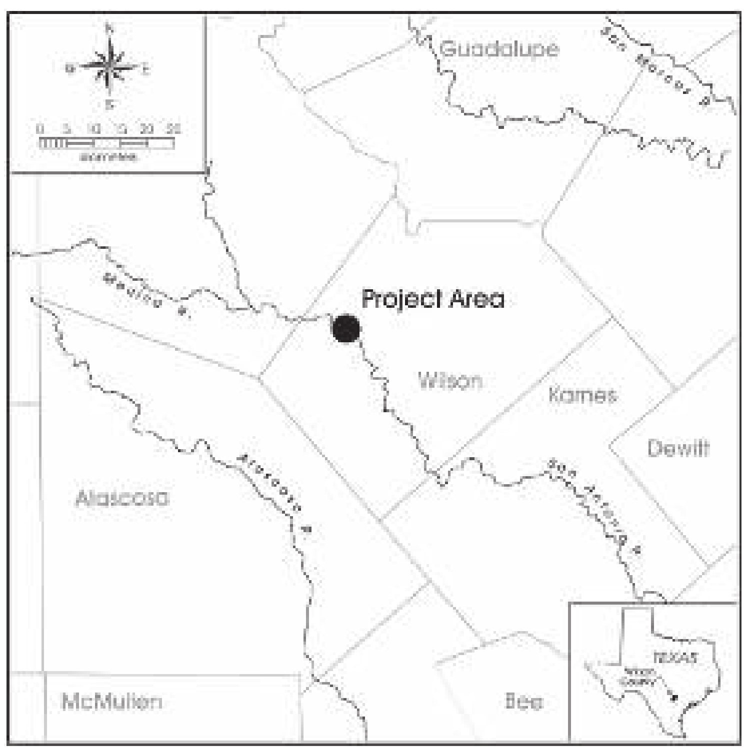

Figure 1-1. *Map of Wilson County showing location of project area.*

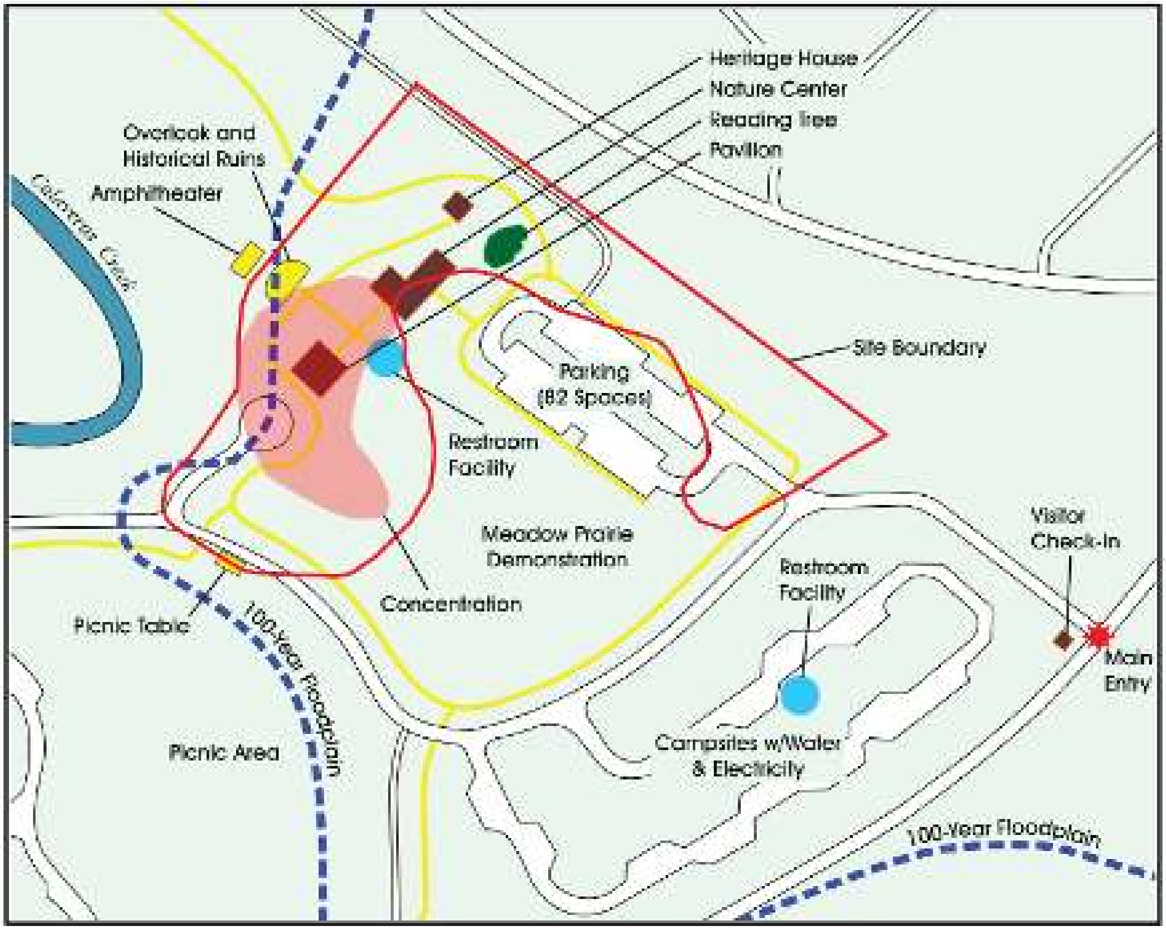

Figure 1-2. *Map of 41WN120 showing proposed improvements.*

which we have grouped into analytical units (AU). AU 1 occurs in the upper sediments and AU 2 in the lower sediments. One diagnostic was recovered from AU 1, a Marcos projectile point (2550-1750 BP; Turner and Hester 1999), suggesting a Late Archaic date for the upper component. An Early Triangular point (5650-5550 BP; Turner and Hester 1999), an Angustura point (8805-7278 BP; Turner and Hester 1999), and a Guadalupe adze (5450 BP or earlier; Turner and Hester 1999) were excavated from AU 2. One radiocarbon sample, obtained from an isolated piece of charcoal near the top of AU 2, produced a date of 4820 ± 40 BP (Beta-294176) calibrated to 5610-5570 BP and 5540-5480 BP. The date and the diagnostics suggest use of the lower component of the site during the Early Archaic. No intact cultural features were identified on 41WN120 although the recovery of burned rock and charcoal does potentially suggest their presence. As a result of magnetic soil susceptibility analysis and test unit artifact distribution, the boundary of the high-density cultural material was refined from the boundary previously defined in the site survey (see Munoz 2010).

The high density of cultural materials, intact sediments, diagnostic artifacts in good context in conjunction with a radiocarbon date, and the depth of buried prehistoric material suggest that the southwest portion of 41WN120, near the bluff overlooking Calaveras Creek, possesses high potential for future research. It is the CAR's assessment that the integrity of deposits dating to the Early Archaic occupation of 41WN120 is good.

Because Early Archaic period sites are an underrepresented component of the prehistory of Texas and are not commonly found in south/central Texas, the CAR recommends that the portion of 41WN120 with high-density cultural material be listed as eligible for the National Register of Historic Places (NRHP) under criterion D of 36CRF 60.4, in that the site has and is likely to yield information significant in prehistory. The CAR also recommends listing 41WN120 as a State Archaeological Landmark (SAL) under criterion 1, 2, and 3 of 13TAC26.8. We recommend that this portion of 41WN120 remain off limits with regard to any construction activities and that SARA develop a plan to protect the area. If this portion of 41WN120 cannot be avoided, then the CAR recommends the development of a plan to recover significant data from the area of high-density artifact concentration. We further recommend that the remainder of site 41WN120, the area off of the high-density artifact concentration, does not contribute to the eligibility of the site and therefore, proposed improvements may proceed as planned away from the high-density concentration. In addition to the recommendation of eligibility, as a result of the 2010 survey of park property, the CAR recommended, that the historic brick ruin adjacent to the high-density artifact area be protected (see Munoz 2010). The THC and SARA agreed with the CAR's recommendation to protect this historic building.

This document summarizes the results of the testing and provides recommendations regarding the management of cultural resources located on the project area. The report is organized into six chapters. Chapter 2 discusses the environment of the project area and provides an overview of the cultural chronology of the area. Chapter 3 discusses the fieldwork and laboratory methodology used during the testing of 41WN120. The results of the excavation are presented in detail in Chapter 4. Chapter 5 presents descriptions of the artifacts and the results of their analyses. Chapter 6 summarizes the testing phase and provides recommendations for the site. Appendix A presents the results of radiocarbon dating.

Chapter 2: Project Overview

This chapter contains a description of the environmental setting of the project area, including climate, vegetation, geology, and soils. A brief discussion of the culture history of south Texas is included. Portions of the environmental and cultural history material were adopted from the archaeological survey report of the Helton San Antonio River Nature Park (Munoz 2010). The chapter concludes with a detailed description of the findings at 41WN120 during the initial survey conducted in August 2010.

Environmental Setting

The project area is located on the Saspamco, Texas USGS 7.5' quadrangle map at the confluence of Calaveras Creek and the San Antonio River in west-central Wilson County. Topographically, the proposed park improvements affecting 41WN120 will be situated on the T2 terrace on an eastern bluff overlooking Calaveras Creek near its confluence with the San Antonio River. Elevations on the site range from 128-131 m amsl. A large portion of the 4.6-acre site (approximately 69%) shows evidence of recent plowing including approximately 60% (0.6 acres) of the 1-acre portion of the site containing deeply buried prehistoric material. The site lies in the westernmost portion of the Inner Gulf Coastal Plain of North America's Coastal Plain physiographic province with the Edwards Plateau and the Balconies Escarpment division of the Great Plains province roughly 50 km to the northwest (Fenneman 1938). Calaveras Creek originates on the Post Oak Savannah region of the southern Plains flowing southeast for 24 km to its confluence with the San Antonio River on the Helton Nature Park project area. The creek, crossing rolling terrain sustaining mesquite and grasses, is a meandering alluvial channel with a low gradient and a substantial floodplain (Handbook of Texas Online 2010a). The San Antonio River, emerging from a group of springs in central Bexar County, flows to the southeast for 290 km through Wilson, Karnes, and Goliad counties. The river forms the county line between Victoria and Refugio counties. Eight kilometers from the Gulf of Mexico it empties into the Guadalupe River in Calhoun County (Handbook of Texas Online 2010b; Texas Parks and Wildlife GIS Lab 2010).

The Helton San Antonio River Nature Park is located near the northernmost limits of the Tamaulipan Biotic Province (Blair 1950). The province has a semiarid, megathermal climate that allows year round plant growth and supports a wide range of vertebrate species (Blair 1950:103). The project area is located near the intersection of the Post Oak Savannah and the South Texas Plain ecological zones (Frye et al. 1984) that are characterized by a modern vegetation regime of oak-hickory forests, mesquite-chaparral, and bunch and short grass (Arbingast 1976; McMahan et al. 1984). Sixty-one species of mammals, fifty-seven reptiles, and twenty-one amphibians have been documented on the Tamaulipan province (Blair 1950).

Climate in this general area is classified as humid subtropical with hot, humid summers and mild, dry winters. Mean annual precipitation at Floresville, Texas for the period 1971-2000 was 71 cm (28 inches), but there was considerable annual variation in rainfall. Monthly averages ranged from 4.1 cm (1.6 inches) in January to 9.4 cm (3.7 inches) in May. The average minimum and maximum temperatures for the project area (1971-2000) were 51°F in January and 85°F in July, respectively (National Oceanic and Atmospheric Administration 2004). The growing season in Wilson County averages 280 days annually (Handbook of Texas Online 2010c). For a more in-depth discussion of climate in Wilson County refer to the Helton San Antonio River Nature Park survey report (Munoz 2010).

The surface geology on the project area consists of fluviatile terrace deposits laid down during the late Pleistocene. Combinations of gravel, sand, silt and clay in varying proportions overlying older Cretaceous and Tertiary strata generally characterize these alluvial sediments. Carrizo sand deposits, dating to the Eocene, are located approximately 150 m to the northeast of 41WN120. These sediments contain medium to coarse grained sandstone (Barnes 1983). Based on research by Mauldin and Figueroa (2006) on the distribution of Edwards Limestone (Frederick and Ringstaff 1994), 41WN120 is located in the southernmost reaches of an area of high raw material availability (Figure 2-1). It is likely that hunters and gatherers in this area were not a significant distance from abundant, good quality stone resources.

The T2 terrace comprising 41WN120 is composed of Colibro sandy clay loam (CbB and CbC). This series consists of very deep, well drained soils that formed in erosional calcareous loamy material of Quaternary age. These nearly level to moderately steep soils are on ancient alluvial terraces. CbB soils have a surface layer of sandy clay loam roughly 41 cm thick resting on 81 cm of loam overlying 36 cm of fine sandy loam. CbC consists of 122 cm of sandy clay loam over 36 cm of loam (Soil Survey Staff 2010).

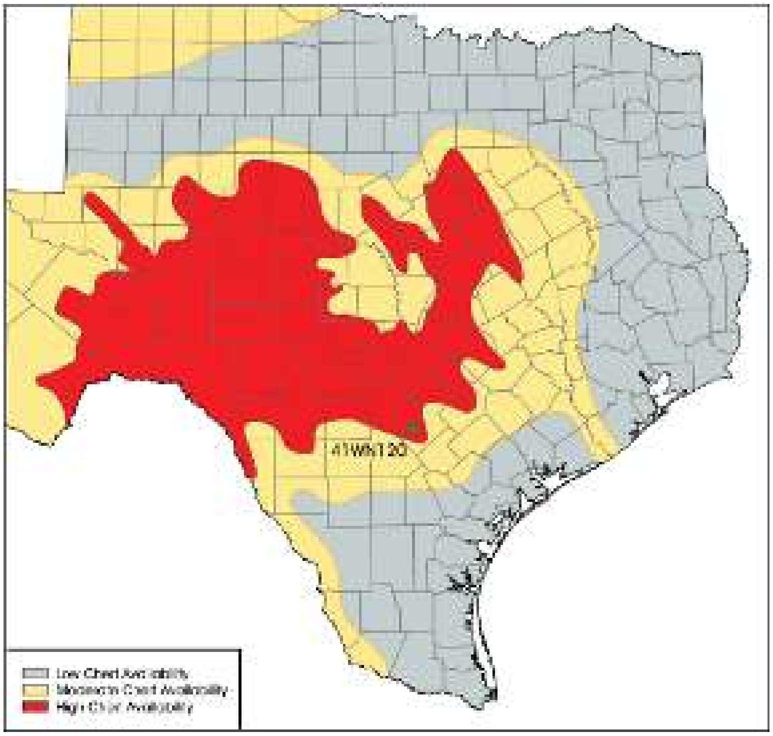

Figure 2-1. *Distribution of chert availability throughout Texas (after Mauldin and Figueroa 2006).*

Paleoenvironment

Several studies conducted in counties near the project area have contributed to a reconstruction of the paleoenvironment of the region. A number of different data sets were used to document the paleoenvironment of Texas. These include fluvial system observations, geomorphic observations, pollen, organic carbon, and faunal remains. This section relies on information taken from various studies located in Central, South and East Texas (Abbott 1994; Blum et al. 1994; Bousman 1998; Gadus et al. 2006; Johnson and Goode 1994; Mahoney et al. 2003; Nickels and Mauldin 2001; Ricklis and Collins 1994; Robinson 1982; Toomey 1993). Figure 2-2 presents the combined data sets discussed in this section.

Late Pleistocene (ca. 18,000-10,000 BP)

From 18,000 to 14,000 years ago grassland vegetation dominated the Edward's Plateau along the Pedernales and upper Colorado Rivers. Pollen data from Boriack Bog in Central Texas suggest a cool moist environment evident in the existence of forested boreal communities throughout most of the Late Pleistocene with shifts to more xeric grassland communities at 16,500 BP and at 12,500 BP (Bousman 1998). Raw pollen counts from Patschke bog were reviewed and compared to Boriack Bog data and it was concluded that between 17,000 BP and 15,000 BP, "a cool grassland environment may have been present" (Nickels and Mauldin 2001). The decline in spruce (cold adapted) pollen at Boriack Bog, around 15,000 BP, indicates a trend to a warmer climate (Bousman 1998). Late Pleistocene data indicate a dry period evident geomorphically in the downcutting and scouring of sediments in the valleys of central Texas from approximately 15,000 to 12,000 years ago. This was followed by valley filling during the subsequent mesic interval resulting in deep sediments along central Texas rivers (Collins 2004).

During the latter part of the Late Pleistocene (14,000-10,000 BP) moisture decreased and channels incised bedrock valleys leaving no preserved depositional record. Geomorphic processes observed by Abbott (1994) along the Pedernales and Upper and Lower Colorado Rivers reveal soil aggradation and incision. Incisions likely occurred during times of severe dry periods followed by periodic downpours, resulting in heavy erosion. Between 12,500 and 11,800 BP, the Boriack Bog evidence also indicates that a drier episode stimulated a brief shift to grasslands. With the exception of a few peaks around 13,200 BP, grass pollen percentages indicate that after 15,500 BP there was an abrupt decline that continued till 10,500 BP (Nickels and Mauldin 2001).

Toomey et al. (1993) argue that faunal data from Hall's Cave in the Edwards Plateau in Central Texas indicate that summer temperatures in the Late Pleistocene were 6°C cooler than present averages, and that by 13,000 BP (or 12,500 BP; Toomey and Stafford Jr. 1994) the wetter interval became warm and more arid. The Hall's Cave record indicates a subsequent wetter interval around 11,000 BP (Toomey and Stafford Jr. 1994).

Early Holocene (ca. 10,000-8000 B.P)

Pollen samples from the Llano Estacado and the dry caves of the Trans Pecos region prompted Bryan and Shafer (1977:15-19) to suggest a gradual warming and drying trend throughout the Holocene (after about 10,000 BP). Others, including Aten (1979) and Gunn and Mahula (1977), use data from Oklahoma and eastern Texas to propose a more variable change from the colder, wetter Pleistocene to the modern climate.

Research in opal phytoliths from archaeological sites in the Coleto Creek drainage of the Coastal Plain of South Texas shows that, at least since the Early Holocene, climatic

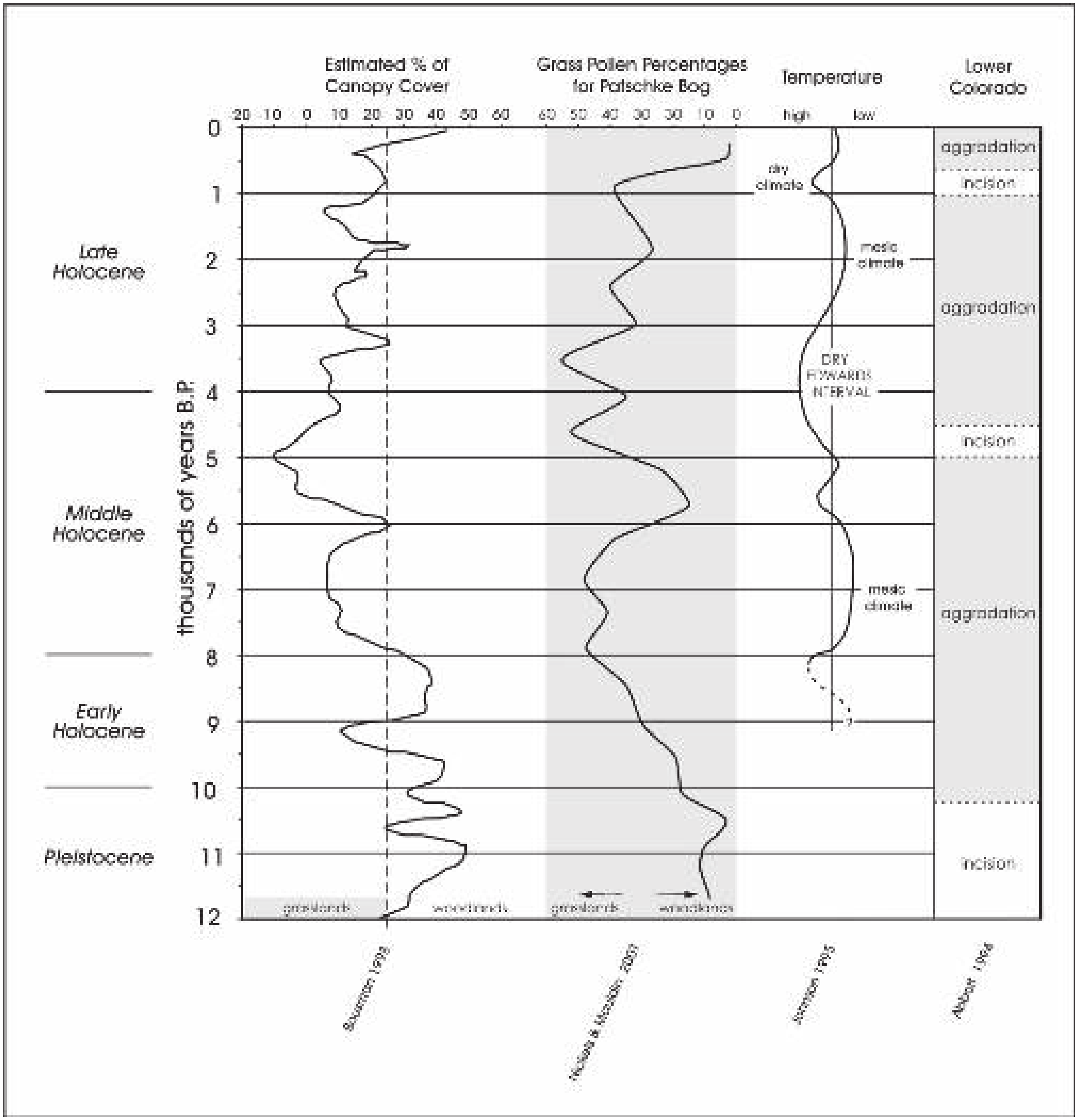

Figure 2-2. *Paleoenvironmental data for the portion of Texas encompassing the project area.*

change has been highly variable (Robinson 1979). Based on the Boriack Bog and Weakly Bog pollen data, Bousman (1998) suggests significant climatic fluctuations during this subperiod. Toward the Pleistocene-Holocene boundary at about 10,000 BP, arboreal species in the Boriack bog spectra show a return of woodlands by 9500 BP, followed by their decline and a reestablished predominance of open vegetation communities. Woodlands, reestablished by 8750 BP, were replaced by grasslands by 7500 BP (Bousman 1994:80). This warming trend is also evident in the consistent increase in grass pollen at Patschke Bog with the overall result being one of increased grass pollen at the expense of woody species and arboreal pollen. Robinson (1979:109) associated his oldest white oak phytolith sample, although poorly dated, with the late Paleoindian period and suggested an age of about 8000 BP. The predominance of tall grass species, white oak phytoliths, a generally high frequency of unidentifiable tree species and the generally small size of the grass phytoliths indicates a wet environment.

It appears that climatic shifts during the late Pleistocene and transition into the Holocene are responsible for aggradation and abandonment of T2 deposits (Abbott 1994:369). According to Blum et al. (1994:15) the Early to Middle Holocene was characterized by warming and a dry climate, accompanied by "a precipitation regime dominated by high-density but relatively localized convectional storms…." Soil aggradation is evident along the Edwards Plateau river courses with some evidence of erosion (Abbott 1994:367).

Middle Holocene (ca. 8000-4000 BP)

Evidence from Boriack Bog indicates the beginning of an arid period around 8000 BP (Bousman 1998). Faunal evidence from Hall's Cave replicates this pattern signifying an arid episode between 7000 BP and 2500 BP (Toomey and Stafford Jr. 1994). The opal phytolith records from the Wilson-Leonard site (Fredlund 1994) and two sites on Coleto Creek in South Texas (Robinson 1979) agree with increasing aridity in the Middle Holocene, indicated by spreading grasslands around 4500 BP. In the Middle Holocene, river courses along the Edward's Plateau were characterized by slow lateral migration and valley widening, with slow aggradation (Blum et al. 1994). This xeric period was characterized by severe erosion (Collins 1995; after Antevs 1955).

In contrast to the faunal and opal phytolith data, Boriack Bog data signifies an increase in arboreal pollen around 5000 BP indicating the appearance of a wetter climate (Bousman 1994:80). Grass pollen data from Patschke Bog suggest a grassland setting for the Middle Holocene, but with a marked, brief decline between 6000 BP and 5000 BP, hinting at a wet interval as well (Nickels and Mauldin 2001). Phytolith analysis of sediments from the Choke Canyon project further supports claims of considerable climatic variability. Between 5300 BP and 4300 BP, a cool, mesic climatic regime existed that returned to a more arid period after 4300 BP. The data then indicates a return to both cooler and wetter conditions by 3250 BP (Robinson 1982:597-610).

Late Holocene (4000-Present)

There are indications of continued climate fluctuation in the Late Holocene. Nordt et al. (1994) suggest a warm and dry episode between 3000 BP and 1500 BP based on stable carbon ratios from alluvial deposits gathered from the Fort Hood Military Reservation in central Texas. Pollen data from Milam County indicate a decrease in arboreal cover between 3200-3000 BP, with the next thousand years dominated by open grasslands (Mahoney et al. 2003). Oxygen and carbon isotope analyses of snail shell from 41MM341 suggest variation in temperature and rainfall between 3000 BP and 2500 BP (Mauldin 2006). Toomey and Stafford (1994) identified a wet period appearing about 2500 BP at Hall's Cave. Their observations agree with those of Robinson's phytolith analysis of Choke Canyon sediments suggesting mesic conditions by 2450 BP (Robinson 1982:598-599). Relatively drier conditions appeared by 1000 BP but appear to have been more mesic than the modern climate (Robinson 1982:599). Grass pollen frequencies in the Boriack and Weakly bog pollen spectra indicate drying episodes at 1500 to 1300 BP and 500-400 BP (Bousman 1998). Data from Patschke Bog suggest a fluctuating but generally dry period early in the Late Holocene, with accelerated mesic conditions after about 1000 BP (Nickels and Mauldin 2001). A notably wetter climate is evident in the environs of 41MM341 (Gadus et al. 2006) correlating with moist conditions indicated by Hall's Cave data (Toomey 1993).

There is evidence of high magnitude floods along the Edward's Plateau from ca. 2500 BP to 1000 BP. At this time large chute channels were cut and filled on floodplain surfaces and soils developed stable terrace surfaces (Blum et al. 1994). Aggradation of soil continued during the Late Holocene, with prominent incision and downcutting occurring after 1000 BP (Abbott 1994; Hall 1990).

Summary

The previous sections suggest that the paleoenvironment of Texas was quite varied. While, in part, this variability may reflect problems with comparing different data sets that measure different aspects of climate at varying spatial and temporal scales, as well as problems with the temporal assignment of particular samples or sequences, the variability may be real, especially during certain periods. The end of the Pleistocene clearly marked a transition from a cooler, wetter environment to one that steadily grew warmer and drier. All the data sets indicate that much of the Early Holocene was relatively mesic. The Middle Holocene was generally warm and/or dry, with a brief mesic period suggested sometime between 6200 and 5000 BP. Faunal data sets appear to indicate the onset of a more mesic climate at around 4500 BP, while pollen data sets suggest that the xeric conditions continued until as late as 3000 BP. Between about 1500 and 750 years ago, all the available data sets point to a dryer period, while a more mesic interval is suggested by two of the three applicable data sets for the last 750 to 800 years with cooler temperatures present from 1500 BP to 500 BP.

Cultural History

Whereas the previous discussion of the paleoenvironment covers four geological time periods, the Late Pleistocene through the Late Holocene, the cultural history of South Central Texas is defined by four major cultural time periods: Paleoindian, Archaic, Late Prehistoric, and Historic. These periods are further divided into sub-periods that are based on particular subsistence strategies and material culture. Because the testing of 41WN120 uncovered cultural materials from the Archaic period, a brief description of this period and of the Paleoindian period follows. The 2010 Helton San Antonio River Nature Park survey report (Munoz 2010) presents descriptions of each of the four major time periods as well as a detailed discussion of the historic ownership of the property.

Paleoindian

The Paleoindian period (11,500-8800 BP) is divided into early and late sub-periods, each characterized by particular projectile point styles and subsistence patterns (Collins 1995). The period begins at the close of the Pleistocene with the earliest evidence of humans in the Central Texas region. Clovis and Folsom point types, and bifacial Clear Fork tools and finely flaked end scrapers characterize the early Paleoindian period (Black 1989a). The first stemmed points (e.g., Wilson), along with lanceolate points (e.g., Angostura and Golondrina), begin to appear during the late Paleoindian period. In the past, Paleoindian populations have generally been characterized as hunter-gatherers ranging over wide areas in pursuit of now extinct megafauna, such as mammoth and bison (*Bison antiques)*. However, research from the Wilson-Leonard site in Central Texas (Collins 1998) and other perspectives on Paleoindian adaptations (Tankersley and Isaac 1990) indicate that the diet of these early inhabitants may have been much broader. Although exploiting Late Pleistocene megafauna may have constituted a part of Paleoindian subsistence, these peoples are perhaps better characterized as more generalized hunter-gatherers, exploiting a wide variety of plants and animals including large herbivores like deer and bison and small animals such as turtles, alligators, rabbit, and raccoons (Collins 1995; Nickels 2000).

In South-Central Texas, many of the sites containing Paleoindian materials are found on high terraces, valley margins, and upland locations (Black 1989a). This seems to fit with a broader pattern of Paleoindian site distributions where sites are located on landforms providing views of the surrounding landscape, are centered on critical resource zones, or are found in highly productive resource areas (Tankersley and Isaac 1990). Paleoindian artifacts are commonly recovered as isolated finds or from lithic scatters lacking good stratigraphic context including kill, quarry, cache, camp, ritual and burial sites (Collins 1995). No mammoth kill or butchering sites attributable to the Paleoindian period have been found in South Texas (Hester 1995).

Archaic

The Archaic period, 8800-1200 BP, is marked by intensification of hunting and gathering of local resources, changes in projectile points, and by a broader array of material culture (Collins 1995; Prewitt 1981; Weir 1976). A change in food processing is evident from a widespread increase in hearth, oven and midden features. During this period, large cemeteries were formed, probably indicating an increasing population and the subsequent establishment of territories (Black and McGraw 1985). Collins (1995) and Johnson and Goode (1994) subdivided the Archaic into Early, Middle, and Late sub-periods. These sub-periods are distinguished by variances in climate conditions, resource availability, subsistence practices, and diagnostic projectile point styles (Collins 1995; Hester 1995).

Early Archaic

In Central Texas, the Early Archaic dates from 8800 to 6000 BP (Collins 1995). Changing climate and the extinction of megafauna appear to have initiated a behavioral change by the Prehistoric peoples of Texas. Because of the necessary economic shift away from some level of dependence on big game hunting, local resources in Central Texas, such as deer, fish, and plant bulbs were more intensively exploited. This behavioral change is indicated by greater densities of ground stone artifacts, burned rock cooking features, and more specialized tools such as Guadalupe bifaces and Clear Fork gouges (Turner and Hester 1999). These tools exhibit wear patterns as adzes and gouges, suggesting wood working during this time. Grooved stones and Waco Sinkers also appear during the Early Archaic pointing to the inclusion of nets in the subsistence tool kit (Collins 1998). Projectile point styles found in sites from this period include Angostura, Early Triangular, Early Split Stem, and Martindale-Uvalde (Collins 1995, 1998). Angostura points appear to span the transition from the Late Paleoindian to the Early Archaic Periods. Open campsites, including Loeve, Richard Beene, Wilson-Leonard, Jetta Court, Sleeper, Camp Pearl Wheat, Youngsport, and Landslide, and a cave site, Hall's Cave, contain notable Early Archaic components (Collins 1995).

Weir (1976) concludes that the Early Archaic groups were highly mobile and small. He bases this inference on the fact that Early Archaic sites are sparsely distributed and that projectile points are widely distributed across most of Texas and northern Mexico. The decline in bison numbers on the plains suggested to Hurt (1980) that the inhabitants were forced to broaden their diets to include animals and plants that produce equivalent amounts of calories and protein with the same or slightly more expended effort. Story (1985) concurs with Weir that population densities were low during the Early Archaic. She suggests that groups were made up of small bands of related individuals with "few constraints on their mobility" (Story 1985:39) subsisting on a broad range of resources, such as prickly pear, lechugilla, rodents, rabbits, and deer.

Middle Archaic

The Middle Archaic, 6000 to 4000 BP (Collins 1995), appears to have been a period of increasing population, based on the large number of sites documented from this time in South and Central Texas (Story 1985; Weir 1976). Projectile point variation at the Jonas Terrace Site points to a period of "ethnic and cultural variety, as well as group movement and immigration" (Johnson 1995:285). Point styles from this period include Bell, Andice, Calf Creek, Taylor, Nolan and Travis (Collins 1995). Exploitation of broadly scattered, year-round resources such as prickly pear, deer and rabbit continued (Campbell and Campbell 1981) with the addition of seasonal nut harvests from the riverine settings of the Balcones Escarpment (Black 1989a, b). Weir (1976) posits that the expansion of oak on the Edwards Plateau and Balcones Escarpment resulted in intensive plant gathering and acorn processing that may have been the catalyst for the merging of the widely scattered bands prevalent in the Early Archaic into larger groups. These larger groups likely shared the intensive labor involved with the gathering and processing of acorns. Some investigators believe burned rock middens resulted from acorn processing (Creel 1986; Weir 1976) although others (e.g., Black et al. 1997; Goode 1991) question this argument. Black et al. (1997) suggest that the burned rock middens of Central Texas accumulated as a result of the baking of a relatively broad range of resources in rock/earth ovens These resources potentially included carbohydrate laden nuts, bulbs, roots, and pads as well as various vertebrate and invertebrate animals.

Late Archaic

The final interval of the Archaic in Central Texas dates from 4000 to 1200 BP (Collins 1995). There is not a consensus among researchers as to population size in this sub-period. Prewitt (1985) posits an increase while Black (1989a) believes populations remained the same or decreased. There is also disagreement as to the continuing use of burned rock middens. Prewitt (1981) suggests the near cessation of the midden construction, whereas excavations at a number of sites document large cooking features up to 15 meters in diameters (Black and Creel 1997; Houk and Lohse 1993; Johnson 1995; Mauldin et al. 2003). Bison reemerge during this sub-period in Central Texas (Mauldin et al. 2010) after evidence of a definitive decrease during the Middle Archaic (Dillehay 1974). Projectile points from the Late Archaic sub-period are generally smaller than those of the Middle Archaic and include Bulverde, Pedernales, Kinney, Lange, Marshall, Marcos, Montell, Castroville, Ensor, Frio and Darl types (Collins 1995; Turner and Hester 1999). During this period, large cemeteries were formed indicating an increasing population and the subsequent establishment of territories (Black and McGraw 1985). The earliest occurrences are at Loma Sandia (Taylor and Highley 1995), Ernest Witte (Hall 1981), Hitzfelder Cave (Givens 1968), and Olmos Dam (Lukowski 1988).

2010 Survey Results of 41WN120

Site 41WN120 is located on a T2 terrace on a bluff immediately to the east of a bend in Calaveras Creek approximately 260 m northeast of the San Antonio River. It was originally recorded during a 2010 intensive pedestrian survey of the Helton San Antonio River Nature Park (see Munoz 2010), The large multi-component site extends onto a previously ploughed field. 41WN120 stretches approximately 275 m east/west by 190 m north/south and contains an area of approximately 4.6 acres (1.9 hectares). The site contains two structures, a wood pier and beam house and the brick ruins of an historic building.

Of the 45 shovel tests excavated to delineate site boundaries and define the depth of cultural material, 25 were positive (Figure 2-3). Shovel test (ST) artifacts were recovered from all levels (0-60 cmbs) and consisted of debitage (n=60), tools (n=1), burned rock (n=63), burned bone and plant material (ST 77, Level 5), mussel shell (present in 13 shovel tests), bone (present in 9 shovel tests), historic building debris (present in 13 shovel tests), metal (n=6), historic ceramics (n=6), and glass (n=14). Three specimens of burned rock were recovered from the same level as the burned material in ST 77 suggesting the possibility of a hearth feature (Munoz 2010).

In addition to subsurface cultural material, 41WN120 contains a low density surface scatter of lithic debitage, tools, burned rock without associated staining or charcoal, and historic building debris. One backhoe trench was excavated within the site to attempt to further define the depth of cultural material and to define the plow zone (see Figure 2-3). No artifacts were noted in the trench profile but mussel shell was documented in the backdirt.

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Figure 2-3. *Location of shovel tests and backhoe trenches at 41WN120 during Phase I investigations (after Munoz 2010).*

Because the plow zone was not evident in the trench profile, soil samples (n=24) were collected every 5cm from the trench to determine magnetic soil susceptibility readings. For comparison, three auger tests, two in the plowed field and one off of the field were excavated to 120 cmbs. The results of the soil susceptibility testing suggest two buried surfaces within 41WN120, one at 40-50 cmbs and one at 60 cmbs, but failed to clarify the plow zone (Munoz 2010).

One prehistoric diagnostic artifact, a Refugio dart point (Archaic Period; Turner and Hester 1999), was collected from the surface of 41WN120 on a dirt road skirting the plowed field. A cut nail was recovered from a shovel test excavated within the brick ruin. In Central Texas cut nails suggest a pre-1880 manufacture date. Cut nails were almost completely replaced by wire nails after 1900 (Gross and Meissner 1997). Wire nails were also recovered from shovel tests within the structure. Bricks containing maker's marks date the structure to 1887-1897 (Kosub and Kosub 2010). White earthenware (mid 19^{th}-mid 20^{th} century), yellow ware and stoneware (both post late 19^{th} century) also suggest occupation in the late 1800s to the mid 1900s (Greer 1981; Miller 1991; Tennis 1997). Archival research suggests that the brick structure was built with local brick by the Jose Cassiano family in the late 1800s. The wood pier and beam house appears to have been constructed in the mid 1900s (Munoz 2010).

Summary

The 2010 survey and shovel testing on 41WN120 produced chipped stone tools and debitage, as well as burned rock from the surface down to 60 cmbs. No features were recorded on the site, though burned rock is present. An Archaic period dart point was recovered from the surface. The survey concluded that there was insufficient information to make a determination on the eligibility of 41WN120 for listing on the National Register of Historic Places (NRHP). It was recommended that if the planned nature park improvements on the site area could not be moved a testing phase would be necessary to determine the eligibility status of the site. In concurrence with the THC, the CAR recommended testing of the portion of the site containing deeply buried prehistoric material via test units and additional backhoe trenches as well as protection of the late 1800s structure. No further work is necessary on the pier and beam structure.

Chapter 3: Field and Laboratory Methods

The proposed improvements to the Helton San Antonio River Nature Park will impact 41WN120. The previous survey indicated that the site has probable intact deposits (see Munoz 2010). The southwestern portion of 41WN120, located along a bluff overlooking Calaveras Creek, possesses high potential for future research. The CAR provided the following services for this project: 1) application for the Texas Antiquities Eligibility Testing Permit; 2) NRHP and State Archeological Landmark (SAL) testing of the portion of the site with the deepest cultural deposits using a minimum of six backhoe trenches, three hand excavated 1-x-1 units and one 1-x-2 test unit; 3) laboratory processing and analysis of all artifacts recovered during the testing; 4) preparation of a draft and final technical report summarizing the results of the investigations; 5) recommendations regarding the NRHP and SAL eligibility of the area tested; 6) curation of artifacts recovered and documentation generated during the project at the CAR facility; and 7) coordination with the appropriate oversight agencies (Archeology Division of the THC) to seek cultural resources clearance of the project. This chapter presents the field and laboratory methods used during the archaeological investigations of 41WN120.

Field Methods

A combination of excavation techniques were used during the testing of 41WN120 including backhoe trenching, hand augering, and hand excavating test units. Six backhoe trenches were dug prior to test units in order to determine the horizontal distribution and the depth of cultural material on the site. Two hand augers were excavated in each trench to determine whether cultural deposits extend below the base of the trench, i.e., deeper than 1.5 meters below surface (mbs). Based on cultural deposits identified in the walls or bases of the backhoe trenches, four test units (two 1-x-1 m and two 0.5-x-0.5 m) were placed adjoining the trenches to allow for controlled hand excavation to expose and document the vertical distribution and density of buried materials. Because Shovel Test 77, excavated on site during the intensive pedestrian survey (Munoz 2010), revealed burned bone and charcoal at a depth of 40-60 cmbs indicating good organic preservation and suggesting the presence of a cultural feature in the area, a 1-x-2.5 meter unit was centered on ST 77 and excavated to allow the documentation of a possible feature.

Backhoe Trenching

The first phase of the investigation consisted of the mechanical excavation of six backhoe trenches (Figure 3-1). The backhoe trenches were excavated to expose stratigraphic profiles, buried materials, and potential features. Furthermore, backhoe trenches were used to guide the positioning of subsequent hand excavated test units. To comply with the Minimum Survey Standards as defined by the THC, the backhoe trenches were approximately one meter wide, four to five meters in length and did not exceed 1.5 meters deep. The backhoe trenches were excavated in full compliance with Occupational Safety and Health Administration (OSHA) standards for protection of employees in excavations (29CFR1926.652). After the excavation of each backhoe trench, the project archaeologist entered the trench to examine the stratigraphy and artifact density associated with the trench walls. Based on these observations locations were determined for test units. No matrix removed via mechanical means was screened, but sediments were inspected for artifacts upon excavation. Selected portions of the backhoe trench walls were profiled and soil samples (n=162) were collected every 5 cm from the trench walls to determine soil magnetic susceptibility readings. The location of every backhoe trench was recorded with a Trimble Geo X GPS unit.

Auger Testing

Twelve auger holes, two from the base of each backhoe trench, were hand-excavated using a 3 inch (7.6 cm) auger bit. These were excavated in 10 cm levels to a depth of 1 m below BHT floor surface to establish the presence/absence and density of deeply buried cultural materials. The location of every auger bore was recorded with a Trimble Geo X GPS unit. Figure 3-1 presents the spatial distribution of the augers. All sediments from these bores were collected in 9-x-12 plastic bags with the appropriate provenience information (specific auger-hole number) and returned to the CAR laboratory for screening through ¼” hardware cloth. No artifacts were recovered from the auger sediment.

Test Units

As a more fine-grained exploratory and documentation strategy, four 1-x-1 m units, one 1-x-0.5 m unit, and two 0.5-x-0.5 m units were excavated (Figure 3-1). Two of the 1-x-1 m units and both the 0.5-x-0.5 m units were placed adjoining backhoe trenches (BHTs 1, 2, 3, and 4) to allow for controlled hand excavation to expose and document the vertical distribution and density of buried materials. A 1-x-2.5 meter unit was placed over Shovel Test 77 (see Munoz 2010) to potentially expose and document a possible burned rock feature identified during the 2010 survey. All test units

Image Redacted

Figure 3-1. *Auger tests, backhoe trenches, and test units excavated within 41WN120.*

were excavated in 10 cm levels and all matrix removed from each level was screened through ¼-inch hardware cloth. The depth of the test units did not exceed 145 cmbs. All artifacts recovered were bagged and referenced to the appropriate provenience. Sediments were described (texture, consistency, Munsell color, and inclusions) and a small bag of matrix was collected from each level of every test unit. Additionally soil samples (ca. 5-x-7.5 cm bag) were collected every 5 cm from the west wall of Test Unit 2 to determine soil magnetic susceptibility readings (n=27). One representative wall from each test unit was profiled and photographed. The location of every test unit was recorded with a Trimble Geo X GPS unit. All material collected was returned to the CAR laboratory for processing and detailed analysis.

Archaeological Laboratory Methods

Cultural materials recovered from the testing procedures outlined above were inventoried and processed at the CAR laboratory at the UTSA. All artifacts recovered were identified and analyzed. Proveniences for the materials were double checked through the use of a field sack number that was recorded on a field log form and through the information recorded on the excavation forms. Field sack numbers were assigned to all artifact bags in the field. At the CAR all artifacts and samples were separated by type and recovery context to facilitate analysis. Processing of recovered artifacts began with washing and sorting into appropriate categories (e.g., debitage, bifaces, unifaces, and cores). CAR uses Mircosoft Access databases to track provenience and artifact information. These data were exported to Excel for analysis. Individual categories were then analyzed by specific attributes designed for each group in Excel. The resulting data in the Excel spreadsheets was imported into the Access project database for curation. Summary information is also imported and stored in the CAR Collections Inventory database for future research access.

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 under the Curatorial Facility Certification Program. Artifacts processed in the CAR laboratory were washed, air-dried, and stored in archival-quality zip-locking bags. Laser printed computer generated acid-free tags were placed in all artifact bags with complete provenience information and a catalogue number tied to provenience and class. All appropriate artifacts were labeled with a bottom coat of B-72 in acetone, labeled with Pigma archival ink pen, and top coated with B-72 in acetone. Tools and projectile points, as well as any other diagnostic material were labeled with site and catalogue numbers. In addition, a small sample (roughly 50% of any item over a quarter in size) of unmodified debitage from each lot was labeled. Other artifacts were separated by class and stored in polyethylene corrugated boxes.

Digital photographs were printed on acid-free paper with photograph log information as identifiers. The original jpgs of the photographs were placed on an archival quality CD for storage. All field forms on acid-free paper were completed with pencil. Field notes, forms, photographs, and drawings were placed in archival quality page protectors if soiled or fragile and placed in archival folders. All records have been scanned and are stored on an archival quality CD with the photographs. A copy of this survey report is curated with the field notes and documents in filing cabinet according to its CAR assigned accession number.

Chapter 4: Results of Testing at 41WN120

Phase II testing of 41WN120 occurred January 18 through January 31, 2011. The site was initially subject to backhoe trenching (n=6) and magnetic soil susceptibility testing (n=135). This was followed by hand auger boring (n=12), 1-x-1 m (n=4), 1-x-0.5 m (n=1), and 0.5-x-0.5 m test units (n=2). The placement of test units was based on the results of the backhoe trench excavations and susceptibility results. The backhoe trenches and test units at 41WN120 revealed a high density distribution of cultural material both vertically and horizontally and better defined the area of deepest material. This chapter discusses the results of the test excavations.

Backhoe Trenching and Magnetic Soil Susceptibility Testing

Based on the artifact distribution encountered in shovel testing during the 2010 survey of the project area (Munoz 2010), six backhoe trenches were excavated on site 41WN120. Backhoe trenches were spaced roughly evenly across the target area (i.e., the portion of the site containing deeply buried prehistoric material; see Figure 3-1). One-hundred and thirty-five soil samples were collected for magnetic soil susceptibility (MSS) testing from BHTs 1-5 from the surface to trench termination at 5 cm intervals. Because samples were previously obtained from BHT 6 during the survey (see Munoz 2010; the trench was reopened for the testing project), additional samples were not collected from the trench. Collected in plastic bags, the samples were transported to the CAR laboratory where they were air dried and then crushed using a ceramic mortar and pestle. The sediment was then screened through a 2 mm plastic sieve, with material passing the sieve packed into plastic pots (10 cm^3). The mass of the sample was determined by subtracting the weight of the pots. Low frequency volume susceptibility (kappa, κ) was measured on a Bartington MS2 meter with an MS2b sensor, and the mass corrected magnetic susceptibility (chi, χ) values were calculated using the sample mass (see Dearing 1999). The values obtained from BHTs 1-5 are reported in Tables 4-1 and 4-2 in SI units ($10^{-6}m^3kg^{-1}$).

Table 4-1. MSS Values of Sediments from BHTs 1-3 on 41WN120

Location	3p4.35	Sample wt.	K Reading	MSS Value	Location	Mid-point depth	Sample wt.	K Reading	MSS Value
BHT 1	2.5	10.2	52.0	0.510	BHT 2	72.5	9.6	41.2	0.429
BHT 1	7.5	9.3	37.0	0.398	BHT 2	77.5	9.6	67.3	0.701
BHT 1	12.5	8.8	35.9	0.408	BHT 2	82.5	9.4	40.2	0.428
BHT 1	17.5	9.3	27.5	0.296	BHT 2	87.5	9.3	42.1	0.453
BHT 1	22.5	7.0	17.8	0.254	BHT 2	92.5	9.4	29.3	0.312
BHT 1	27.5	8.9	24.5	0.275	BHT 2	97.5	9.6	27.4	0.285
BHT 1	32.5	9.1	20.9	0.230	BHT 2	102.5	10.7	34.2	0.320
BHT 1	37.5	9.7	22.5	0.232	BHT 2	107.5	11.2	22.5	0.201
BHT 1	42.5	9.4	26.7	0.284	BHT 2	112.5	10.4	20.2	0.194
BHT 1	47.5	8.1	20.9	0.258	BHT 2	117.5	9.9	17.8	0.180
BHT 1	52.5	6.5	15.9	0.245	BHT 2	122.5	11.1	18.8	0.169
BHT 1	57.5	8.8	21.4	0.243	BHT 2	127.5	11.7	17.4	0.149
BHT 1	62.5	9.9	27.2	0.275	BHT 2	132.5	11.4	15.8	0.139
BHT 1	67.5	9.9	29.3	0.296	BHT 3	2.5	10.7	51.5	0.481
BHT 1	72.5	10.4	29.4	0.283	BHT 3	7.5	11.3	41.0	0.363
BHT 1	77.5	10.6	34.2	0.323	BHT 3	12.5	11.0	45.3	0.412
BHT 1	82.5	10.2	28.5	0.279	BHT 3	17.5	11.7	54.1	0.462
BHT 1	87.5	9.6	26.1	0.272	BHT 3	22.5	10.2	50.3	0.493
BHT 1	92.5	10.6	26.8	0.253	BHT 3	27.5	11.0	55.6	0.505
BHT 1	97.5	7.1	16.8	0.237	BHT 3	32.5	11.0	60.1	0.546
BHT 1	102.5	10.1	19.5	0.193	BHT 3	37.5	11.5	58.1	0.505
BHT 1	107.5	6.6	9.5	0.144	BHT 3	42.5	11.0	66.1	0.601
BHT 1	112.5	6.8	10.3	0.151	BHT 3	47.5	10.4	64.2	0.617
BHT 1	117.5	9.8	13.1	0.134	BHT 3	52.5	9.9	58.1	0.587
BHT 1	122.5	8.0	2.9	0.036	BHT 3	57.5	9.4	57.8	0.615
BHT 1	127.5	11.0	15.1	0.137	BHT 3	62.5	9.2	52.6	0.572
BHT 1	132.5	10.3	14.7	0.143	BHT 3	67.5	9.0	51.2	0.569

Table 4-1. Continued...

Location	3p4.35	Sample wt.	K Reading	MSS Value	Location	Mid-point depth	Sample wt.	K Reading	MSS Value
BHT 2	2.5	8.2	39.4	0.480	BHT 3	72.5	8.0	41.2	0.515
BHT 2	7.5	10.7	42.7	0.399	BHT 3	77.5	8.5	43.1	0.507
BHT 2	12.5	11.6	41.4	0.357	BHT 3	82.5	9.0	40.5	0.450
BHT 2	17.5	9.9	46.6	0.471	BHT 3	87.5	8.3	37.1	0.447
BHT 2	22.5	10.2	46.9	0.460	BHT 3	92.5	6.8	30.0	0.441
BHT 2	27.5	12.0	61.0	0.508	BHT 3	97.5	10.2	41.5	0.407
BHT 2	32.5	10.3	62.3	0.605	BHT 3	102.5	9.8	41.2	0.420
BHT 2	37.5	10.7	65.8	0.615	BHT 3	107.5	9.0	33.4	0.371
BHT 2	42.5	10.0	64.0	0.640	BHT 3	112.5	9.9	20.0	0.202
BHT 2	47.5	10.2	67.0	0.657	BHT 3	117.5	10.4	27.8	0.267
BHT 2	52.5	10.2	64.5	0.632	BHT 3	122.5	10.9	27.0	0.248
BHT 2	57.5	9.8	63.1	0.644	BHT 3	127.5	9.9	21.4	0.216
BHT 2	62.5	9.9	52.2	0.527	BHT 3	132.5	8.7	18.1	0.208
BHT 2	67.5	9.3	44.1	0.474					

Table 4-2. MSS Values of Sediments from BHTs 4 and 5 on 41WN120

Location	Mid-point depth	Sample wt.	K Reading	MSS Value	Location	Mid-point depth	Sample wt.	K Reading	MSS Value
BHT 4	2.5	12.3	59.5	0.484	BHT 5	2.5	10.9	74.9	0.687
BHT 4	7.5	13.0	36.9	0.284	BHT 5	7.5	10.8	78.4	0.726
BHT 4	12.5	12.5	40.1	0.321	BHT 5	12.5	10.4	82.7	0.795
BHT 4	17.5	11.7	42.9	0.367	BHT 5	17.5	10.3	76.8	0.746
BHT 4	22.5	9.9	44.0	0.444	BHT 5	22.5	10.1	69.2	0.685
BHT 4	27.5	10.6	52.5	0.495	BHT 5	27.5	8.1	50.4	0.622
BHT 4	32.5	9.2	46.9	0.510	BHT 5	32.5	10.7	67.4	0.630
BHT 4	37.5	9.1	47.5	0.522	BHT 5	37.5	9.7	55.3	0.570
BHT 4	42.5	9.8	49.9	0.509	BHT 5	42.5	10.3	55.4	0.538
BHT 4	47.5	10.0	56.8	0.568	BHT 5	47.5	10.7	55.5	0.519
BHT 4	52.5	9.9	46.8	0.473	BHT 5	52.5	9.8	53.9	0.550
BHT 4	57.5	10.2	44.7	0.438	BHT 5	57.5	10.1	33.9	0.336
BHT 4	62.5	10.0	43.1	0.431	BHT 5	62.5	10.6	39.2	0.370
BHT 4	67.5	10.2	44.6	0.437	BHT 5	67.5	12.0	38.4	0.320
BHT 4	72.5	10.2	50.4	0.494	BHT 5	72.5	11.6	27.8	0.240
BHT 4	77.5	13.0	50.3	0.387	BHT 5	77.5	11.7	27.6	0.236
BHT 4	82.5	9.2	45.9	0.499	BHT 5	82.5	12.1	29.8	0.246
BHT 4	87.5	10.8	43.5	0.403	BHT 5	87.5	11.6	28.8	0.248
BHT 4	92.5	10.4	39.2	0.377	BHT 5	92.5	11.7	25.9	0.221
BHT 4	97.5	10.8	34.6	0.320	BHT 5	97.5	11.3	23.0	0.204
BHT 4	102.5	11.7	26.4	0.226	BHT 5	102.5	11.1	22.6	0.204
BHT 4	107.5	10.4	27.4	0.263	BHT 5	107.5	11.8	24.4	0.207
BHT 4	112.5	10.6	28.7	0.271	BHT 5	112.5	12.8	26.1	0.204
BHT 4	117.5	12.5	26.9	0.215	BHT 5	117.5	12.3	23.7	0.193
BHT 4	122.5	11.2	25.5	0.228	BHT 5	122.5	12.3	22.3	0.181
BHT 4	127.5	12.3	24.0	0.195	BHT 5	127.5	12.2	23.0	0.189
BHT 4	132.5	11.2	25.1	0.224	BHT 5	132.5	12.6	22.2	0.176

In archaeological research, magnetic soil susceptibility has primarily been used to help identify buried soils that may be associated with occupation (e.g., Takac and Gose 1998) and as an aid in identifying sediment (Bellomo 1983; Dalan and Banerjee 1998) or rock associated with hearths (Mauldin and Figueroa 2006). The magnetic susceptibility of a given sample can be thought of as a measure of how easily that sample can be magnetized (Dearing 1999). While the measure of susceptibility is initially dependent on the mineralogy of a particular sample, that is the concentration and grain size of ferro- and ferromagnetic minerals, a number of processes can result in an increase in MSS values in a sediment sample. These processes include an increase in the organic constitutes and changes in the mineralogy of sediments in a given sample (see Collins et al. 1994; McClean and Kean 1993; Singer and Fine 1989). Sediments with higher organic content tend to have higher magnetic susceptibility values, probably as a result of the production of maghemite, an iron oxide, during organic decay (Reynolds and King 1995). Pedogenic processes, such as soil formation and weathering, can result in the concentration of organic material, as well as alterations in the mineralogy of a given zone. These processes can significantly increase susceptibility readings. Cultural processes, such as the concentration of ash, charcoal, and organic refuse, would also produce higher MSS readings (Mauldin 2003).

No features were identified during the backhoe trench excavations but some artifacts consisting of debitage (n=7), tools (n=2), a point, and mussel shell were encountered in the trench walls and a few specimens of debitage and mussel shell were observed in the backdirt. Sediments varied across the target area. Six types were identified in the backhoe trenches ranging from very dark brown, silty clay loam near the surface on the northern portion of the area to brownish yellow, sand at the base of the trenches along the southern and western edges of the target area. One additional sediment, very pale brown sand, was identified in Test Units 1, 2, and 7 and is discussed in a following section of this chapter. Table 4-3 presents a description of each sediment.

Table 4-3. Sediment Descriptions from Testing of 41WN120

Sediment	Texture	Color	Munsell
1	silty clay loam	very dark brown	10YR2/2
2	silty clay	very dark grayish brown	10YR3/2
3	silty clay loam	brown	10YR4/3
4	sandy loam	yellowish brown	10YR5/4
5	sandy loam	light yellowish brown	10YR6/4
6	sand	brownish yellow	10YR6/6
7	sand	very pale brown	10YR7/4

BHT 1, excavated on the southeastern portion of the target area, consisted of four sediment types. Sediment 2 was noted from 0 to approximately 25 cmbs. Sediment 4 was evident from 25 cmbs to roughly 75 cmbs overlying Sediment 5 to 115 cmbs. The final deposit continuing to the base of the trench (155 cmbs) consisted of Sediment 6 (see Table 4-3). The west wall of BHT 1 contained three pieces of burned rock (15-50 cmbs), one fragment of mussel shell (40 cmbs), a biface (65 cmbs), and a scattering of snail (30-100 cmbs). A biface was located approximately 76 cmbs on the east wall. Both bifaces were collected. Figure 4-1 presents a plot of the BHT 1 MSS values relative to depth in relation to the trench profile. The plot shows two peaks that appear to reflect buried surfaces with prehistoric associations. The first peak is present at 42.5 cmbs in association with the layer of burned rock and mussel in the trench profile. The second peak at

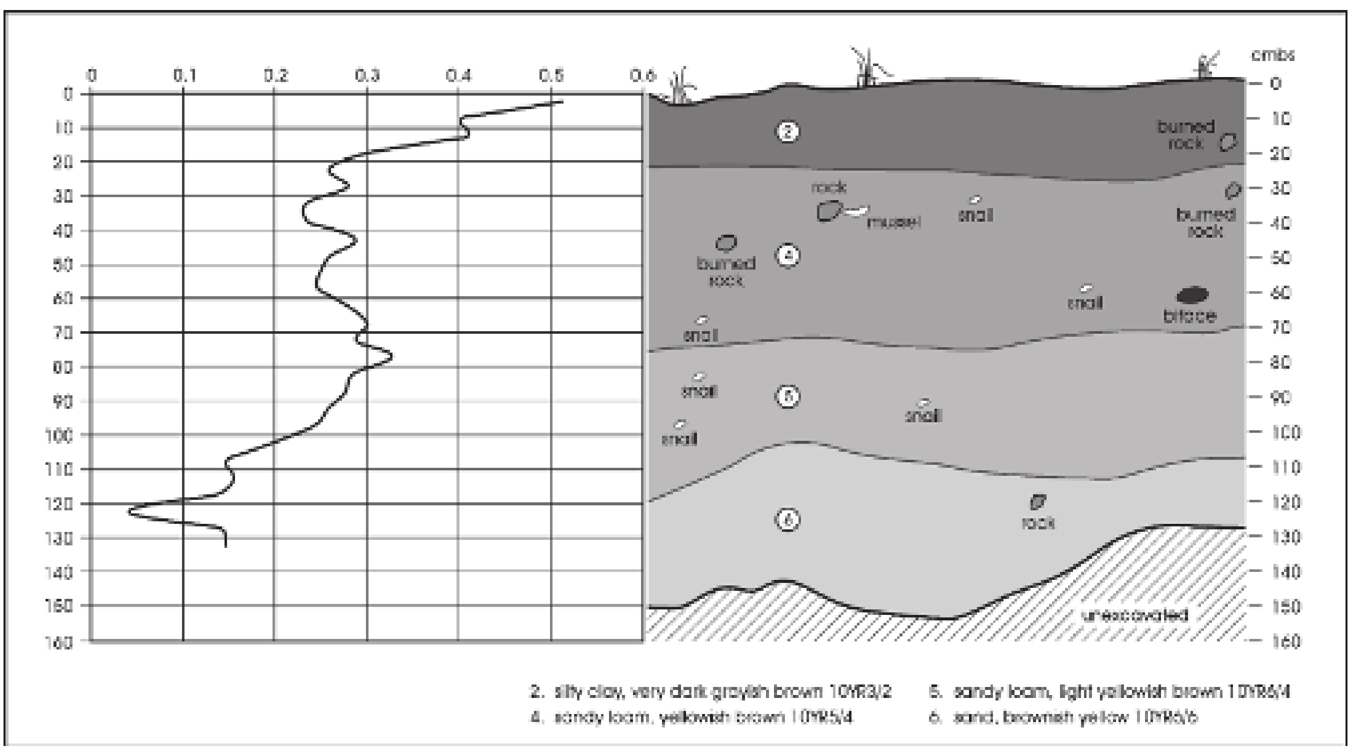

Figure 4-1. *Portion of Backhoe Trench 1 west wall profile and results of magnetic susceptibility testing.*

77.5 cmbs falls immediately below a biface at the juncture of Sediments 4 and 5.

The sediments in BHTs 2 and 3, located along the bluff on the western portion of 41WN120 were roughly the same consisting of Sediment 2 in the top 55 cm over Sediment 3 to approximately 75 cmbs and 85 cmbs, respectively. Sediment 4 was evident to roughly 115 cmbs, followed by Sediment 6 to the termination of the trenches (125 and 135 cmbs, respectively; see Table 4-3). One meter profiles of both trenches (Figures 4-2 and 4-3) show prehistoric material in the top sediment from approximately 35-55 cmbs; mussel shell (n=1), burned rock (n=4), a flake, and snails in BHT 2 and a bone fragment in BHT 3. Additional specimens of debitage (n=6) were noted in the walls of BHT 2 but were not profiled. MSS values (see Figure 4-2) indicate two strong peaks in BHT 2. The first at 37.5-57.5 may indicate a buried surface associated with the prehistoric material in the profile ending at the transition between Sediments 2 and 3. The second peak, at 77.5, falls at the transition between Sediments 3 and 4. Three peaks suggesting buried surfaces are evident from the MSS values in BHT 3 (see Figure 4-3). The first at 32.5 is associated with Sediment 2 and is above the bone fragment. The second at 42.5-57.5 brackets the transition between Sediments 2 and 3. The third, at 117.5, falls into Sediment 6.

BHT 4, excavated on the northern portion of the target area (see Figure 3-1) contained deposits of Sediment 1 from the surface to approximately 38 cmbs. Sediment 2 was evident from 38 to 115 cmbs overlying Sediment 3 to the termination of the trench (125 cmbs; Figure 4-4 and see Table 4-3). One artifact, an untyped projectile point, similar to a Pandale (Turner and Hester 1999), was noted in the trench walls (117 cmbs). MSS values point to four possible buried surfaces. Peaks 1, 2, and 3, at 47.5, 72.5, and 82.5 cmbs, respectively, fall into Sediment 2. No artifacts were evident in the backhoe trench walls in association with these peaks. Peak 4, at 107.5 cmbs, is associated with the untyped projectile point on the transition between Sediments 2 and 3.

Two additional BHTs, 5 and 6, were excavated in the center of the target area and the southeastern boundary, respectively. BHT 6 was reopened from the 2010 survey. This trench was originally excavated within 41WN120 near the deep artifact concentration in part to define the plow zone (see Munoz

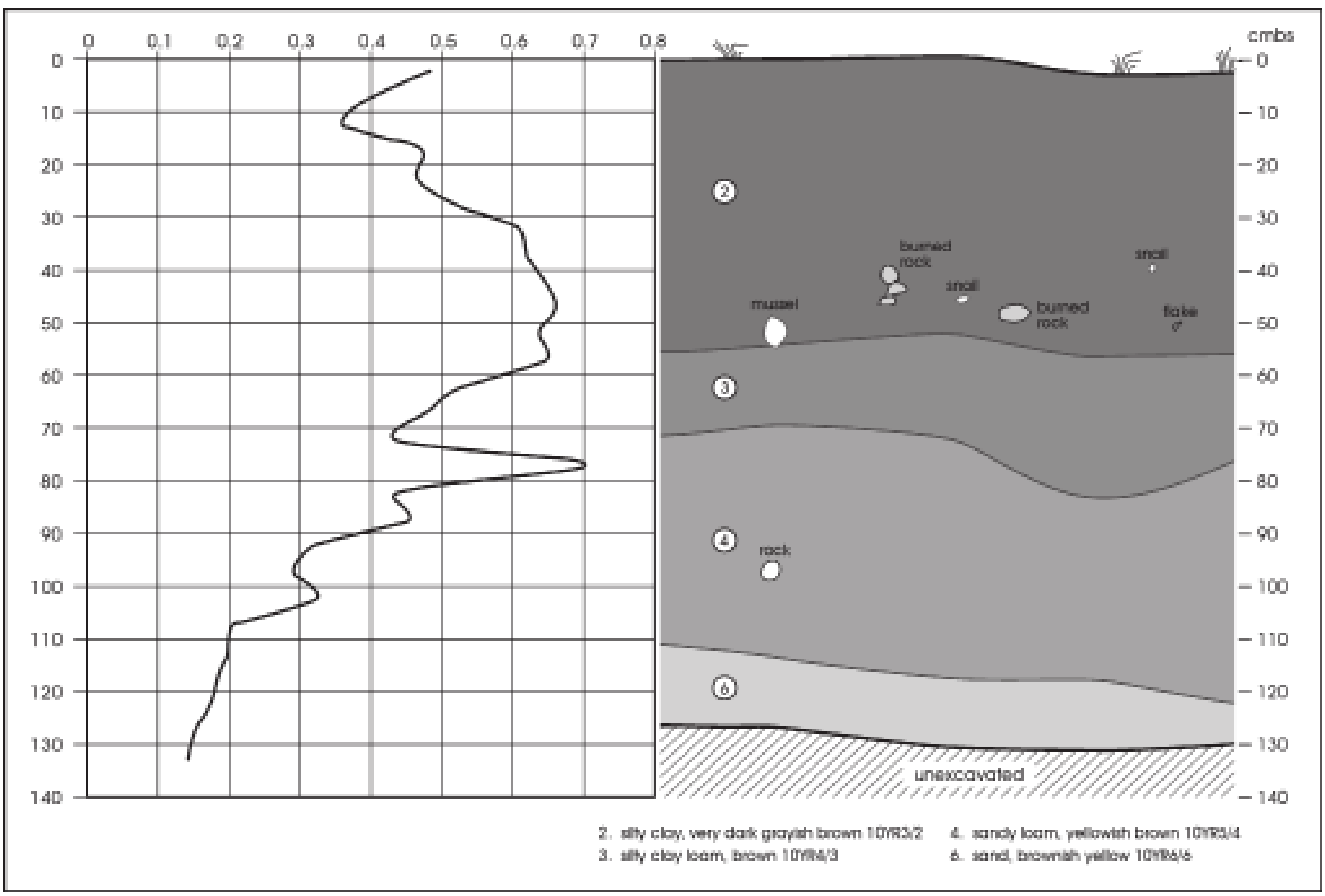

Figure 4-2. *Portion of Backhoe Trench 2 west wall profile and results of magnetic susceptibility testing.*

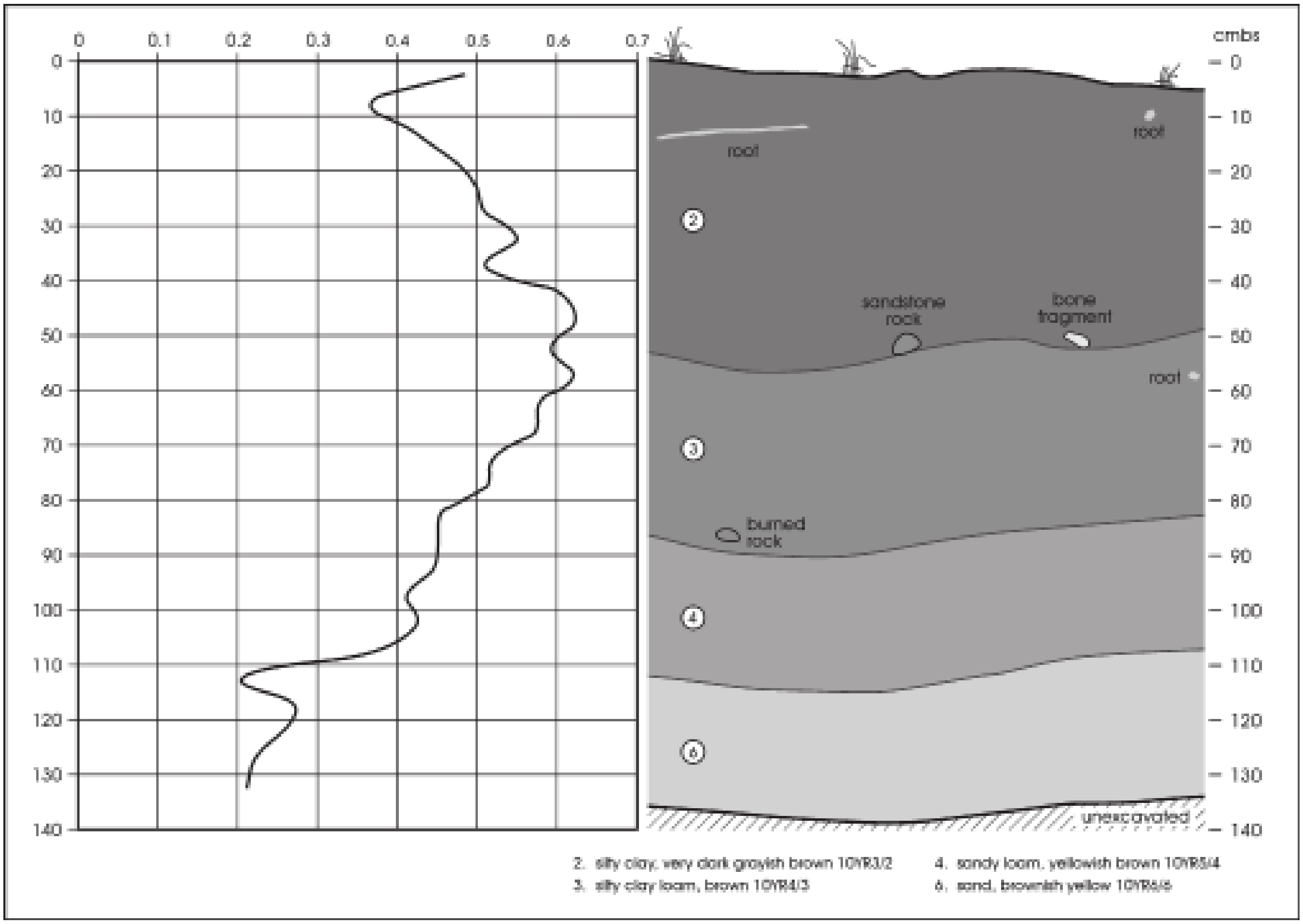

Figure 4-3. *Portion of Backhoe Trench 3 west wall profile and results of magnetic susceptibility testing.*

2010). Because the plow zone was not evident in the trench profile, soil samples (n=24) were collected every 5 cm from the trench to determine MSS readings. For comparison, three auger tests off of 41WN120, two in the plowed field and one off the edge of the field were excavated to 120 cmbs. Soil samples were collected from each 10 cm level. The lack of peaks in ATs 1 and 2 excavated off of 41WN120 but on the plowed field suggested that MSS peaks in the samples from BHT 6 were not evidence of the bottom of the plow zone (see Figure 4-12 in Munoz 2010). No artifacts or other materials suggesting cultural surfaces were noted in BHTs 5 or 6.

Auger Testing

Twelve hand auger bores, two in each backhoe trench, were excavated during the testing phase of 41WN120 (see Figure 3-1). The bores were dug in 10 cm levels to 1 meter below the termination of BHTs 1-6 to determine whether culture deposits extend below the base of the trenches (Figure 4-5). Of the 12 auger bores, 3 were positive (25%). Deposits weighing a total of 59 gm were recovered from the bores, 57 gm of burned rock (n=7) and 2 gm of mussel shell. Ninety-seven percent of the burned rock was recovered from Level 2 (10-20 cm below backhoe trench termination), whereas the mussel shell was fairly evenly distributed among Levels 1-4 (0-40 cm) and 6 (50-90 cm; Table 4-4).

Test Units

Based on BHT artifact density and soil susceptibility results, four test units, two 1-x-1 m test units off BHTs 2 and 3 and two 0.5-x-0.5 m test units off BHTs 1 and 4, were excavated. Because of the possibility of a buried feature (see Munoz 2010), a 1-x-2.5 m unit was placed over ST 77 (see Figure 3-1). Test units, excavated in 10 cm increments, produced 2,058 prehistoric artifacts, 444 gm of bone, 1,367 gm of mussel shell, 20 historic artifacts, and over 360,000 gm of brick and slag (Tables 4-5, 4-6, and 4-7). Most of the historic material was uncovered in Test Units 3 and 5. These units were located approximately 20 m south and east, respectively, of the ruins of a brick structure built in the late 1800s (see Figure 3-1 and Munoz 2010). The excavations of Test Units

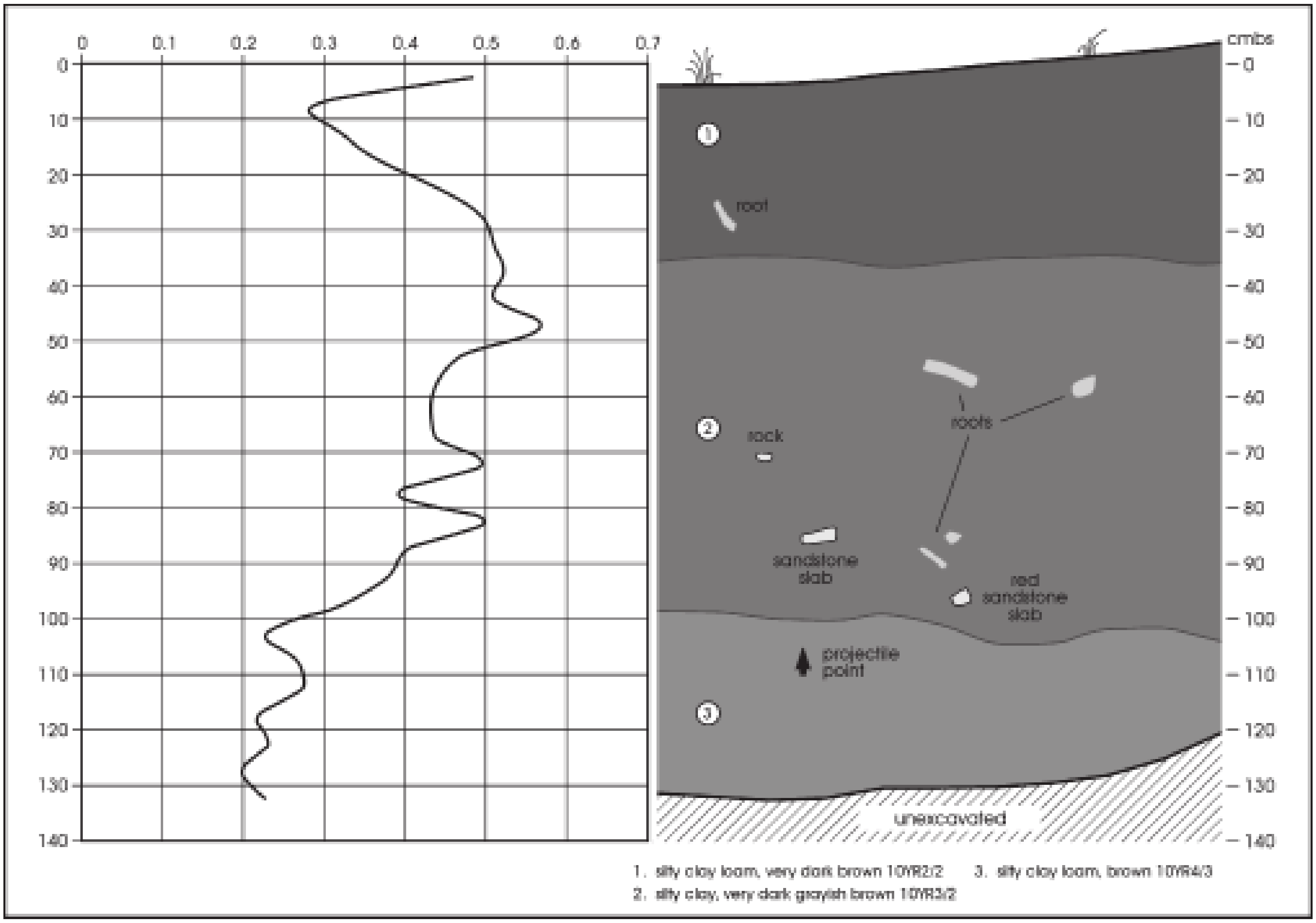

Figure 4-4. *Portion of Backhoe Trench 4 southwest wall profile and results of magnetic susceptibility testing.*

Figure 4-5. *Hand auger in use on 41WN120.*

1-4 and 7 produced the majority of the artifacts (97%) recovered from the target area. These units were located between the bluff edge and the two-track road, off the plowed area. When examining the vertical distribution of cultural material in TUs 1-4 and 7 artifact peaks are evident in Sediments 2-5 (Figure 4-6 and see Figures 4-2, and 4-3).

Test Units 1, 2, and 7

Test Units 1, 2, and 7 were located over ST 77, excavated in 2010 as part of the nature park survey. Because burned plant and rock were recovered from the lower levels of this shovel test, the 1-x-2.5 m unit was opened to explore the possibility of a buried thermal feature. The unit datum was located off the northwest corner of TU 2. The soils from this unit

Table 4-4. Auger Test Results from 41WN120

	Level (gm)										Total
	1	2	3	4	5	6	7	8	9	10	
Burned Rock		55.8	1.6								57.4
Mussel Shell	0.3	0.5	0.6	0.3		0.2					1.9
Total	0.3	56.3	2.2	0.3		0.2					59.3

Table 4-5. Results from Test Units 1, 2, and 7 (1-x-2.5 m) from 41WN120

Test Unit	Level	Depth (cmbs)	Tools	Points	Cores	Groundstone	Debitage	Burned Rock	Total	Burned Rock (gm)	Bone (gm)	Mussel Shell (gm)	Snail	Charcoal	Historic
1	1	0-3						1	**1**	0.2		0.3			√
	2	3-13					4	4	**8**	12.6		8			√
	3	13-23	3				22	26	**51**	125.3	8.6	130.6	√	√	
	4	23-33					14	21	**35**	142.3	8	95	√	√	
	5	33-43					10	19	**29**	84.6	9.2	16.2	√		
	6	43-53	1	1			10	30	**42**	202		25	√		
	7	53-63	2	1	1		31	29	**64**	87.3	1.2	30.6	√	√	
	8	63-73	1	1			30	24	**56**	113	0.2	49.1	√		
	9	73-83	1				62	86	**149**	422.2	0.2	32.3	√		
	10	83-93	4				43	24	**71**	309.7	0.3	7.5	√		
	11	93-103	1				47	52	**100**	282.4	0.2	17.2	√		
	12	103-113	3				30	25	**58**	169.6		6.8	√		
	13	113-123	2				21	23	**46**	23.3		0.9	√		
	14	123-133					4	8	**12**	3.4			√		
	15	133-143							**0**						
Total			**18**	**3**	**1**	**0**	**328**	**372**	**722**	**1977.9**	**27.9**	**419.5**			
2	1	0-4						3	**3**	21.3					√
	2	4-14					4	4	**8**	76.9		7.5			
	3	14-24	1				7	13	**21**	121.2	3.2	22.1	√	√	
	4	24-34					22	21	**43**	93.5	6.7	177.4	√		
	5	34-44	1				12	14	**27**	19.8	7.5	28.1	√		
	6	44-54					2	1	**3**	1.1	3.8	5.7	√		
	7	54-64					8	8	**16**	3	1.2	20.7	√	√	
	8	64-74	4		1		44	60	**109**	236.3	15.6	56.9	√		
	9	74-84	1				36	44	**81**	127.2	2.1	23.5	√		
	10	84-94	2				45	26	**73**	89.2	0.5	6.3	√		
	11	94-104	2				15	10	**27**	121.6		2.1	√		
	12	104-114	1				20	18	**39**	167.1	2.1	4	√		
	13	114-124	3				9	5	**17**	30		1.6	√		
	14	124-134					1		**1**				√		
	15	134-144							**0**						
Total			**15**	**0**	**1**	**0**	**225**	**227**	**468**	**1108.2**	**42.7**	**355.9**			
7	2	0-11						1	**1**	2.7		6.4			
	3	11-21							**0**			11.3			
	4	21-31					4	8	**12**	24.7	5	31.1	√		
	5	31-41					8	6	**14**	3.4	3.1	3.4	√		
	6	41-51					4	2	**6**	0.4	0.5		√		
	7	51-61	1				7	5	**13**	10.4		7.2	√		
Total			**1**	**0**	**0**	**0**	**23**	**22**	**46**	**41.6**	**8.6**	**59.4**			
Grand Total			**34**	**3**	**2**	**0**	**576**	**621**	**1236**	**3127.7**	**79.2**	**834.8**			

Table 4-6. Results from Test Units 3, 4, 5, and 6 from 41WN120

Test Unit	Level	Depth (cmbs)	Tools	Points	Cores	Groundstone	Debitage	Burned Rock	Total	Burned Rock (gm)	Bone (gm)	Mussel Shell (gm)	Snail	Charcoal	Historic
3	2	0-4							**0**						
	3	4-14							**0**						√
	4	14-24					1	1	**2**	1.6	57.3	3.5	√		√
	5	24-34					6	5	**11**	30.9		6.3	√		
	6	34-44					4	1	**5**	1.3		2.8	√	√	
	7	44-54	1				43	66	**110**	1230.8	62.5	73.8	√	√	
	8	54-64	3		1	2	27	27	**60**	284.6	1.1	37	√	√	
	9	64-74	2		3		37	52	**94**	74.2	5.8	20.8	√	√	
	10	74-84					42	46	**88**	53.1	130.5	24.6	√	√	
	11	84-94	1				13	15	**29**	34.2	21.4	3.3	√		
	12	94-104					12	10	**22**	7.6	4.6	12.9	√		
Total			**7**	**0**	**4**	**2**	**185**	**223**	**421**	**1718.3**	**283.2**	**185**			
4	1	0-6							**0**						√
	2	6-16							**0**						
	3	16-26							**0**			1.1			
	4	26-36					5		**5**		2.1	25.7	√		
	5	36-46	2	2	1		19	91	**115**	685.9	14	189.6	√	√	
	6	46-56	2				20	17	**39**	42.8		18.6	√	√	
	7	56-66	2				18	17	**37**	72.5	3.9	16.8	√		
	8	66-76	1		1		11	7	**20**	29.4	2.3	9.9			
	9	76-86	1				11	7	**19**	18.8		27.4	√		
	10	86-96	2				14	15	**31**	13.5		9.8	√		
	11	96-106	2				25	22	**49**	47.7	15	6.9	√		
	12	106-116					2	16	**18**	60.7		0.9	√		
Total			**12**	**2**	**2**	**0**	**125**	**192**	**333**	**971.3**	**37.3**	**306.7**			
5	2	0-10							**0**						
	3	10-20							**0**						
	4	20-30							**0**						√
	5	30-40							**0**						√
	6	40-50							**0**				√	√	√
	7	50-60							**0**				√	√	
	8	60-70						1	**1**	2			√		
	9	70-80							**0**						
	10	80-90						10	**10**	56.1		2.4	√		
	11	90-100			1			3	**4**	2	0.7	1.1	√		
	12	100-110						7	**7**	29.7	0.6	2.1	√		
	13	110-120						5	**5**	9.9		8.2	√		
	14	120-130						4	**4**	5.2		0.3		√	
Total			**0**	**0**	**1**	**0**	**0**	**30**	**31**	**104.9**	**1.3**	**14.1**			
6	2	0-7							**0**						
	3	7-17					2	6	**8**	30.8		4.4			
	4	17-27						10	**10**	70.3		2.1	√		
	5	27-37						4	**4**	2.5	1.2		√		
	6	37-47							**0**			5.1			
	7	47-57					2	1	**3**	29			√		
	8	57-67						2	**2**	3.8		2.8	√		
	9	67-77							**0**						
	10	77-87					2	3	**5**	7	41.1	3.2	√		
	11	87-97			1		2	2	**5**	13.6	0.7	9	√		
Total			**0**	**0**	**1**	**0**	**8**	**28**	**37**	**157.0**	**43**	**26.6**			
Grand Total			**19**	**2**	**8**	**2**	**318**	**473**	**822**	**2951.5**	**364.8**	**532.4**			

Table 4-7. Historic Artifacts Recovered from Test Units at 41WN120

Test Unit	Level	Ceramics (n)	Glass (n)	Metal (n)	Total	Brick (gm)	Slag (gm)
1	1		1		1		
	2		1	1	2		
2	1		1		1		
3	3		3	3	6	13915.0	
	4	1			1	336.1	95.9
4	1		2		2		
5	4	1	2	2	5		
	5	1			1		
	6	1			1		
Total		**4**	**10**	**6**	**20**	**14251.1**	**95.9**

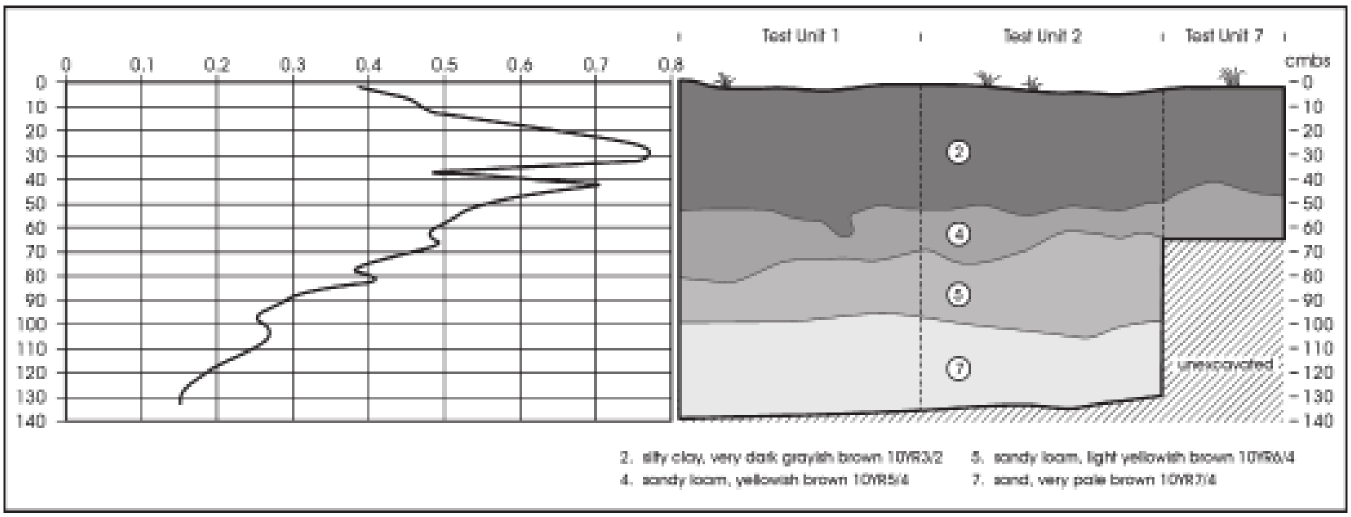

Figure 4-6. *Test Units 1, 2, and 7 west wall profile and results of magnetic susceptibility testing.*

consisted of Sediment 2 from the surface to approximately 55 cmbs in TU 1, 50 cmbs in TU 2, and 45 cmbs in TU 7 (see Figure 4-6 and Table 4-3). Sediment 4, containing calcium carbonate threads and small nodules, was evident from the termination of the top sediment to roughly 75 cmbs in TU 1, 70 cmbs in TU 2, and to the termination of TU 7 (61 cmbs). This matrix overlies Sediment 5, containing a lighter concentration of calcium carbonates, to 95 cmbs in TU 1 and 100 cmbs in TU 2. The final deposit continuing to the base of the TU 1 and 2 (144 cmbs) consisted of Sediment 7. The high concentration of calcium carbonates in the deposits from roughly 45 to 100 cmbs resulted in heavy carbonate coatings on the associated artifacts. Of interest, material that appeared to be bone in Level 7 and 8 (51-74 cmbs) of TUs 2 and 7, open further inspection and treatment with hydrochloric acid at the CAR laboratory appear to be rhizoliths (Figures 4-7 and 4-8). Rhizoliths are a form of pedogenic carbonate formed by encrustation of plant roots in sandy and silty calcareous sediments. The organic portion of the root is degraded during decomposition leaving bone-like, carbonatic structures in terrestrial sediments. Rhizoliths can form within decades or even years (see Gocke et al. in press; Gocke et al. 2009). The unit was originally planned as a 1-x-2 m but was extended to a 1-x-2.5 m to explore the calcified material running parallel from the southeast wall of TU 2 into the northwest wall of TU 7.

Cultural materials retrieved from the 1-x-2.5 m unit include lithic debitage (n=576), tools (n=34), points (n=3), cores (n=2), burned rock (n=621), bone (79 gm), and mussel shell (835 gm; Table 4-5). Contrary to expectations from ST 77 (see Munoz 2010) the unit did not contain a buried thermal feature. Snail shell was present in Levels 3-14 with 64% occurring in Levels 3-5 (11-44 cmbs). Historic materials consisting of glass (n=3) and a .22 cartridge casing were uncovered in the first two levels (0-13 cmbs; Table 4-7). The vertical distribution of artifacts (debitage, tools, and

Figure 4-7. *Calcified plant material running through Test Units 2 and 7 in Levels 7 and 8.*

Figure 4-8. *Calcified plant material from sediments containing heavy concentrations of calcium carbonates in Test Units 2 and 7.*

burned rock) indicates that the highest density was from Level 9 (19%), followed by Levels 8 (14%), 10 (12%), 11 (11%), 12 (8%), and Levels 4 and 7 (7% each; Figure 4-9).

A plot of the MSS values relative to depth in relation to the test unit profile (see Figure 4-6 and Table 4-8) shows three peaks that appear to reflect buried surfaces with prehistoric associations. The first peak is present at 27.5 to 42.5 cmbs in association with Sediment 2 in the profile. A second and third peak at 67.5 and 82.5 cmbs falls at the transition between Sediments 4 and 5.The high density of artifacts in Level 4 (23-34 cmbs) corresponds to the first MSS peak (27.5-42.5 cmbs), Level 8 (63-74 cmbs) to the second peak (67.5 cmbs), and Level 9 (73-84 cmbs) corresponds to the third MSS peak (82.5 cmbs).

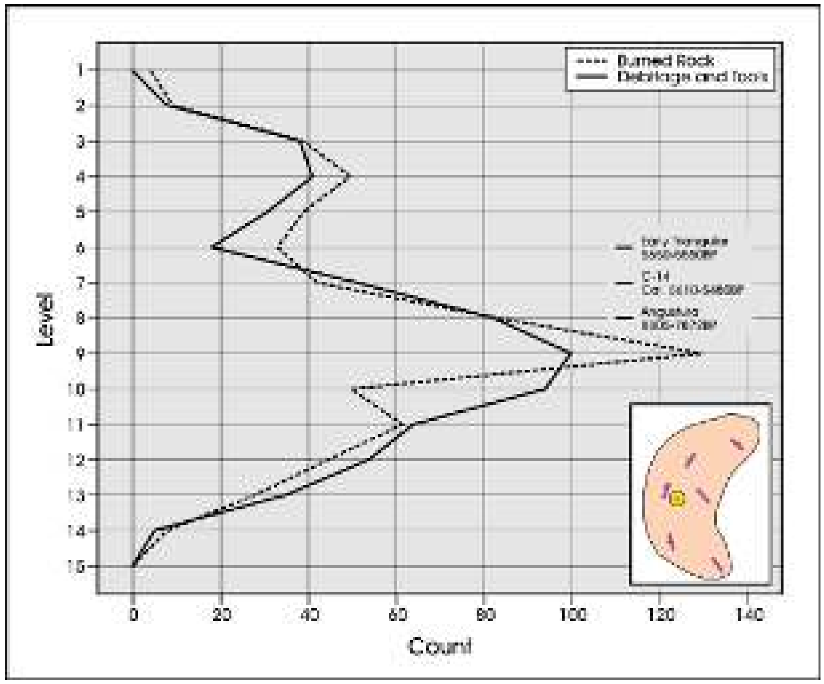

Figure 4-9. *Counts of burned rock, debitage, and tools from Test Units 1, 2, and 7.*

Two diagnostic artifacts were recovered from TU 1, an Early Triangular and an Angustura point. The Early Triangular, assigned an Early Archaic date range from 5650-5550 BP (Turner and Hester 1999), was removed from Level 6 on the transition between Sediments 2 and 4 (43-53 cmbs). The Angustura point (8805-7872 BP) was uncovered in Level 8 (63-73 cmbs) in Sediment 4 (Turner and Hester 1999). In addition to the diagnostics, the 1-x-2.5 m unit produced an adze (Level 9) with evidence of hafting and use, bifaces (n=7), a uniface (Level 7), a drill tip (Level 11; 93-103 cmbs), gravers (n=4; Levels 7, 8, 10, and 12), retouched flakes (n=14), and utilized flakes (n=7). The tools will be discussed in more detail in Chapter 5.

Table 4-8. MSS Values of Sediments from TUs 1, 2, and 7 on 41WN120

Mid-point depth	Sample wt.	K Reading	MSS Value
2.5	11.1	43.0	0.387
7.5	10.8	49.2	0.456
12.5	11.6	55.7	0.480
17.5	11.0	63.7	0.579
22.5	10.6	74.2	0.700
27.5	8.7	67.2	0.772
32.5	8.8	67.4	0.766
37.5	9.0	44.0	0.489
42.5	7.9	55.6	0.704
47.5	8.1	48.4	0.598
52.5	9.6	51.1	0.532
57.5	9.8	49.5	0.505
62.5	10.0	48.0	0.480
67.5	9.4	46.4	0.494
72.5	9.7	42.4	0.437
77.5	10.9	41.1	0.377
82.5	10.8	44.1	0.408
87.5	11.7	36.5	0.312
92.5	11.8	32.6	0.276
97.5	12.1	30.3	0.250
102.5	11.6	31.0	0.267
107.5	11.8	30.9	0.262
112.5	11.6	26.7	0.230
117.5	10.3	20.7	0.201
122.5	12.5	21.8	0.174
127.5	10.9	16.8	0.154
132.5	9.9	14.9	0.151

The CAR acquired a single radiocarbon date from an isolated piece of charcoal from Level 7 (54-64 cmbs) of TU 2. Figure 4-10 presents the corrected, calibrated date using the OxCal Version 3.9 calibration program (Ramsey 2003). Additional information on this data is provided in Appendix A. The corrected date (4820 ±40 BP) calibrates to a 1-sigma range of 5610 to 5570 BP and 5540 to 5480 BP.

Test Unit 3

Test Unit 3 was located on the west side of Backhoe Trench 3 (see Figure 3-1). The unit datum was located at the midpoint of the west wall of the unit. The soil in Test Unit 3 consisted of three stratigraphic layers, Sediments 2, 3, and 4. See Figure 4-3 and the previous section on backhoe trenching for a description of the layers. Four hundred and twenty one prehistoric artifacts consisting of debitage (n=185), tools (n=7), cores (n=4), groundstone (n=2), and burned rock (n=223) were recovered from this unit (Table 4-6). Mussel shell (185 gm) and bone (283 gm) were present in most levels. Snail shell was recovered from Levels 4-12 with the highest density (47%) occurring in Levels 7 and 8 (44-64 cmbs). Historic materials, including porcelain (n=1), glass (n=3), metal (n=3), brick (369,718 gm), and slag (95.9 gm) was uncovered in Levels 3 and 4 (4-24 cmbs; see Table 4-7). The highest density of artifacts (26%) was from Level 7 (44-54 cmbs), followed by Levels 9 (22%), 10 (21%), and 8 (14%; Figure 4-11). A second small peak is evident in this figure in Level 5 (24-34 cmbs) with 3% of the unit's artifacts. Of the three peaks that were evident from the plot of MSS values from BHT 3 (see Figure 4-3), the upper peak in Sediment 2 (32.5 cmbs) reflects the artifact peak in Level 5, and the middle MSS peak on the transition between Sediments 2 and 3 (42.5-57.5) corresponds to the artifact peak from Level 7.

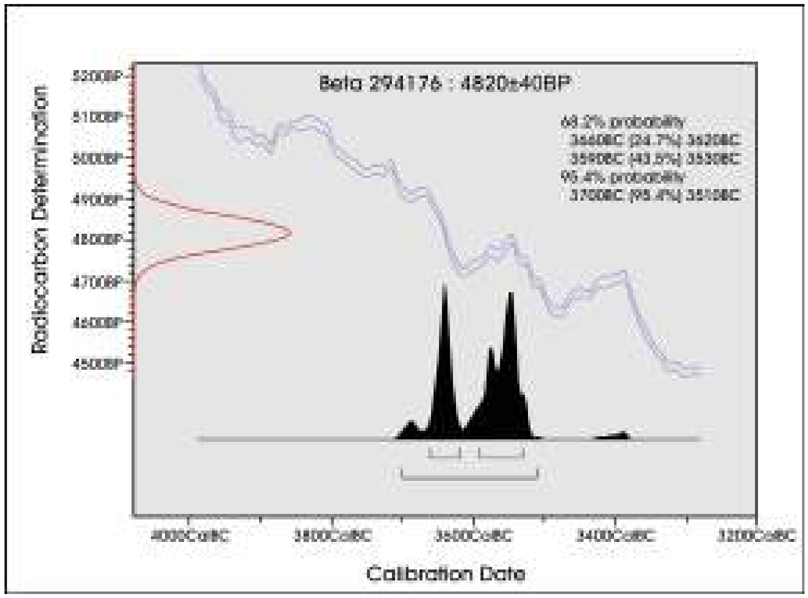

Figure 4-10. *Calibrated radiocarbon date from 41WN120 from TU 2, Level 7 (54-64 cmbs).*

No features or prehistoric diagnostic artifacts were recovered from TU 3. The unit produced bifaces (n=2), retouched flakes (n=3), and utilized flakes (n=2). Two groundstone fragments, one possibly the remains of a metate, were recovered from Level 8 (54-64 cmbs) immediately below the transition from Sediment 2 to Sediment 3 (see Figure 4-3). The upper levels contained a dump of historic building material including possible kiln refuse. No evidence of a kiln was found on 41WN120 or on the Hilton San Antonio River Nature Park property. Several historic kilns were known to have operated in the area, including Mackey Brick and Tile, the San Antonio Sewer Pipe and Manufacturing Company (SASPAMCO), and the Calaveras Pottery Kiln (see Munoz 2010). The artifacts will be discussed in more detail in Chapter 5.

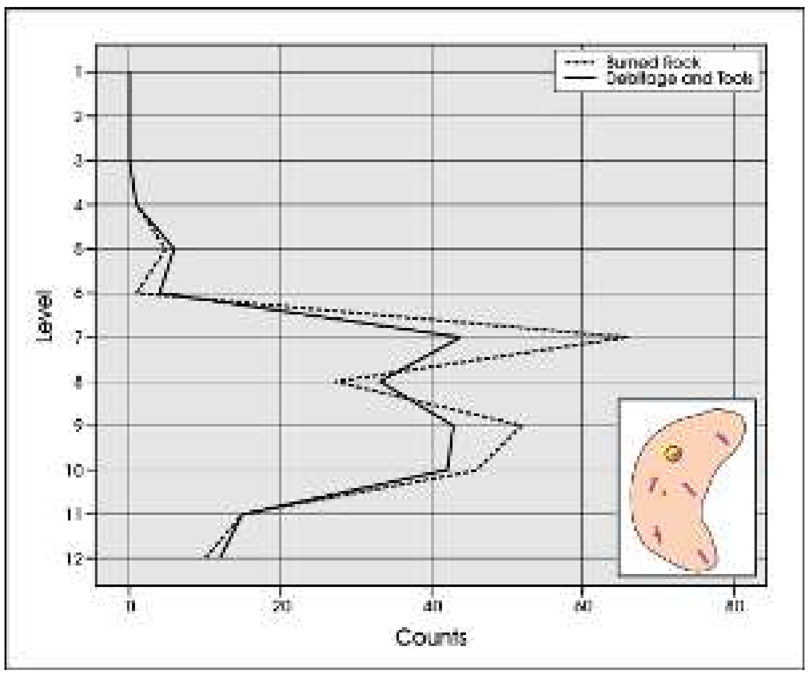

Figure 4-11. *Counts of burned rock, debitage, and tools from Test Unit 3.*

Test Unit 4

Test Unit 4 was excavated off the west wall of BHT 2 (see Figure 3-1). The datum was located near the northwest corner of the unit. This unit, similar to TU 3, contained three matrix layers, Sediments 2, 3, and 4 (see Figure 4-2). The sediments were subsequently described in detail in the backhoe trench section of this chapter. Cultural materials retrieved from TU 4 include lithic debitage (n=125), tools (n=12), points (n=2), cores (n=2), burned rock (n=192), bone (37 gm), and mussel shell (307 gm; see Table 4-6). Snail shell was present in Levels 4-7 and 9-12 with 81% occurring in Levels 4-7 (26-66 cmbs). Historic materials consisting of two shards of glass were uncovered in the first level (0-6 cmbs; Table 4-7). The vertical distribution of artifacts (debitage, tools, and burned rock) indicates that the highest density was from Level 5 (35%), followed by Levels 11 (15%), 6 (12%), 7 (11%), and 10 (9%; Figure 4-12). Of the two peaks that were evident from the plot of MSS values from BHT 2 (see Figure 4-2), the upper peak in Sediment 2

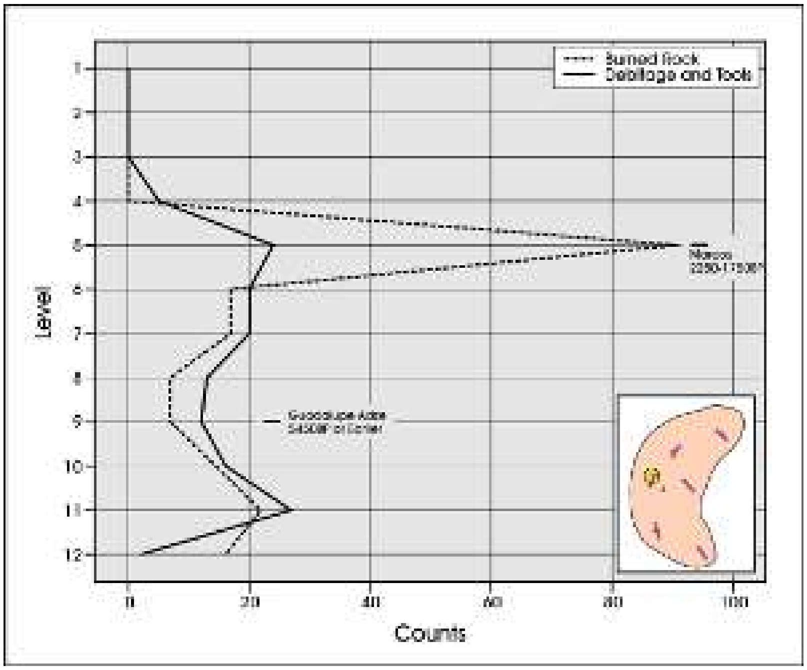

Figure 4-12. *Counts of burned rock, debitage, and tools from Test Unit 4.*

(37.5-57.5 cmbs) corresponds to the artifact peak in Levels 5 and 6. The lower MSS peak (77.5 cmbs) does not correspond to the lower artifact peak at Level 11 (96-106 cmbs). This MSS peak reflects Level 9 (76-86 cmbs) of TU 4, containing a tool, 11 specimens of debitage, 7 pieces of burned rock, and 27 gm of bone.

Two diagnostic artifacts were recovered from TU 4, a Marcos dart point and a fragmented Guadalupe adze. The Late Archaic period Marcos point, ranging in date from 2550-1750 BP (Turner and Hester 1999), was removed from Level 5 in Sediment 2 (36-46 cmbs). The Early Archaic period Guadalupe tool (5450 BP or earlier; Turner and Hester 1999) was uncovered in Level 9 (76-86 cmbs) at the transition between Sediments 3 and 4. In addition to the diagnostics, the unit produced a fragmented expanding stem point (Level 5), bifaces (n=3), a graver (Level 11), retouched flakes (n=2), and utilized flakes (n=5). The tools will be described in more detail in Chapter 5.

Test Unit 5

Test Unit 5, measuring 0.5-x-0.5 m, was located off the north wall of Backhoe Trench 4 (see Figure 3-1). The datum was located at the midpoint of the north wall of the unit. The soil in TU 5 was composed of three stratigraphic layers, Sediments 1, 2, and 3. See Figure 4-4 and the previous section on backhoe trenching for a description of the layers. A low density of prehistoric artifacts (n=31) consisting of a core, 30 specimens of burned rock, 1.3 gm of bone, and 14.1 gm of mussel shell were recovered from the unit (see Table 4-6). A small quantity of snail shell was present from Level 6 to the termination of the unit. Historic materials, including ceramic sherds (n=3), glass (n=2), and metal (n=2), were uncovered in Levels 4, 5, and 6 (20-50 cmbs; see Table 4-7). The highest density of artifacts, i.e. burned rock, (32 %) was from Level 10 (80-90 cmbs), followed by Level 12 (23%). Of the four peaks that were evident from the plot of MSS values from BHT 4 (see Figure 4-4), the third peak in Sediment 2 (82.5 cmbs) reflects the burned rock peak in Level 10 and the lowest peak at the transition between Sediments 2 and 3 (107.5 cmbs) corresponds to the burned rock peak from Level 12 (100-110 cmbs).

No features, prehistoric diagnostic artifacts, or tools were recovered from TU 5. Directly across from TU 5, in the south wall of BHT 4 and corresponding to Level 13 (110-120 cmbs), an untyped projectile point, resembling an Early Archaic period Pandale dart point (5950-4450 BP), was recovered. Like a Pandale, the lanceolate point has a distinctive beveling of the body creating a corkscrew twist, but the point's stem is convex unlike the straight to concave Pandale stem (Turner and Hester 1999).

Test Unit 6

Test Unit 6, measuring 0.5-x-0.5 m, was excavated off the south wall of BHT 1 (see Figure 3-1). The datum was located near the southeast corner of the unit. This unit contained three matrix layers, Sediments 2, 4, and 5 (see Figure 4-1). The sediments were subsequently described in detail in the backhoe trench section of this chapter. Cultural materials retrieved from TU 6 include lithic debitage (n=8), a core, burned rock (n=28), bone (43 gm), and mussel shell (27 gm; see Table 4-6). Snail shell was present in Levels 4, 5, and 7-11 with 49% occurring in Levels 4 and 5 (17-37 cmbs) and 28% in Level 11 (87-97 cmbs). No historic material was recovered from the unit. The vertical distribution of artifacts (debitage, tools, and burned rock) indicates that the highest density (49%) was from Levels 3 and 4 (7-27 cmbs) in Sediment 2, followed by Levels 7 and 8 in Sediment 4 (14%), and Levels 10 and 11 in Sediment 5 (27%). Of the two peaks that were evident from the plot of MSS values from BHT 1 (see Figure 4-1), the lower peak (77.5 cmbs), immediately below the transition from Sediment 4 to 5, corresponds to the lower artifact peak in Levels 10 and 11 (77-97 cmbs). The upper MSS peak (42.5 cmbs), in Sediment 4, falls in between the two upper artifact peaks.

No features, prehistoric diagnostic artifacts, or tools were recovered from TU 6. Two bifaces were recovered from the trench walls adjacent to TU 6, one 65 cmbs, corresponding to Level 8, the other 76 cmbs, corresponding to Level 9.

Summary of Excavations

Phase II testing of 41WN120 used backhoe trenching, magnetic soil susceptibility testing, auger boring, and hand-excavated test units to investigate the area of the site determined in the site survey (Munoz 2010) to have the deepest cultural material deposits. The principal goal of the eligibility testing was to better define the depth and horizontal extent of the boundaries of the high-density artifact distribution and to explore details of the stratigraphy and character of the deposits.

The boundary of the high-density cultural material was refined from the boundary previously defined in the site survey (Munoz 2010) as a result of magnetic soil susceptibility results and test unit artifact distribution. The lack of artifacts or other materials suggesting cultural surfaces in BHTs 5 and 6 and the low artifact densities in TU 5 off of BHT 4 and TU 6 off of BHT 1 resulted in a boundary reduction, from approximately 3,927 m^2 to 1,086 m^2, of the high density area towards the west in the direction of the bluff (Figure 4-13).

Two thousand fifty-eight prehistoric and twenty historic artifacts along with bone, mussel shell, snail shell, charcoal, and brick were recovered from test unit excavations (see Tables 4-5, 4-6, and 4-7). Seven test units were excavated resulting in the removal of approximately 5.95 cubic meters of sediment. The vertical distribution of cultural material in Test Units 1, 2, 3, 4, and 7 strongly suggests the presence of two prehistoric components, one in Sediment 2, between the surface and approximately 50-60 cmbs, and the second in Sediments 3-7, from approximately 60-134 cmbs. A Marcos projectile point (2550-1750 BP; Turner and Hester 1999) diagnostic of the Late Archaic period is associated with Sediment 2. Two Early Archaic period dart points, an Early Triangular (5650-5550 BP.; Turner and Hester 1999) and an Angostura (8805-7278 BP; Turner and Hester 1999), and a Guadalupe adze (5450 BP or earlier; Turner and Hester 1999), all associated with Sediment 4 were recovered in good context. A radiocarbon date, obtained from a isolated piece of charcoal from Sediment 4 (TU 2), produced 1-sigma range calibrated date of 5610-5570 BP and 5540-5480 BP. No features were observed at this site, though burned rock was present throughout the test units.

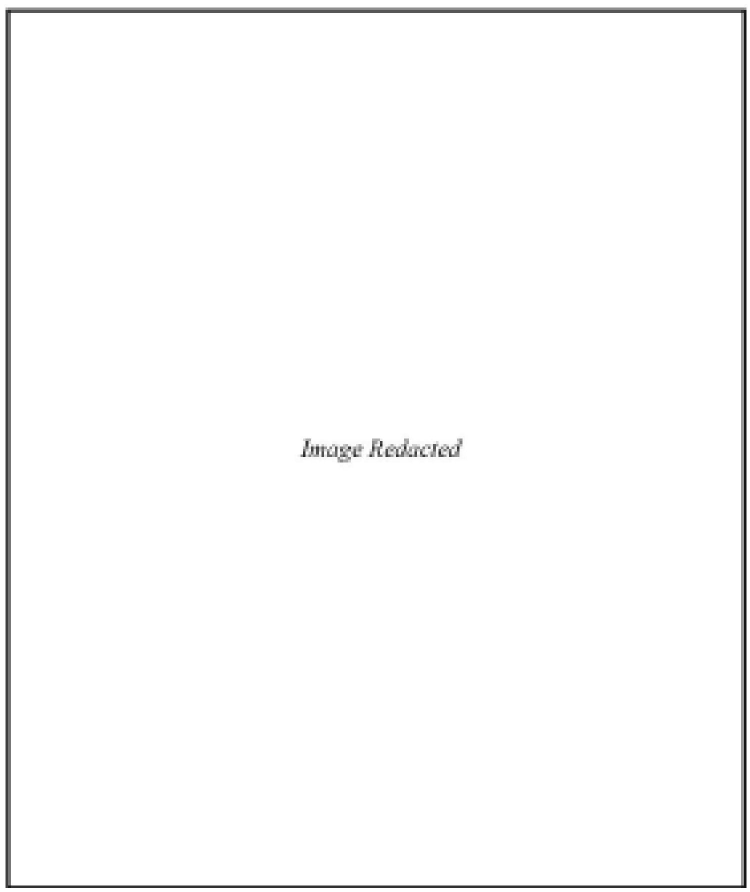

Figure 4-13. *Redefined area of high-density cultural material based on the results of Phase II testing of 41WN120.*

Chapter 5: Artifact Descriptions and Analysis

This chapter presents descriptive data for the cultural material recovered during Phase II testing of 41WN120. Excavated artifacts include burned rock, lithic debitage, cores, projectile points, lithic tools, groundstone, historic material, and faunal material consisting of bone, mussel, and snail shell. Because two components were identified on 41WN120, the artifacts are grouped into two analytical units: AU 1 corresponding to the Late Archaic in the upper sediments and AU 2 corresponding to the Early Archaic in the lower sediments. These AUs are tied to the stratigraphy noted in the BHT and TU walls, diagnostic artifacts, and a radiocarbon date. Test unit excavations resulted in the removal of 2.50 m^3 and 3.45 m^3 of sediment from AUs 1 and 2, respectively. Table 5-1 presents the test unit levels comprising both AUs. In addition to the descriptive data, the results of a lithic debitage and tool analysis are discussed.

Table 5-1. Analytical Units Comprised of Test Unit Levels from 41WN120

Test Unit	AU 1 (2.50 m^3)		AU 2 (3.45 m^3)	
	Level	cmbs	Level	cmbs
1	1-5	0-43	6-15	43-143
2	1-5	0-44	6-15	44-144
3	1-7	0-54	8-12	54-104
4	1-6	0-56	7-12	56-116
5	1-11	0-100	12-14	100-130
6	1-4	0-27	5-11	27-97
7	1-5	0-41	6-7	41-61

Burned Rock

Burned rock indicates the presence of hearth or oven features. Surface fires (i.e. wildfires) may also result in burned rock. However, for rock to develop the angular breakage patterns and heat spalls suggesting cultural use, i.e., purposeful heating, the fire must be intense and prolonged. Surface fires tend to move over the landscape fairly rapidly, thus no one area is usually exposed to intense heat for extended time periods. Although no features were encountered during the testing of 41WN120, burned rock was recovered. Sixty-one hundred and thirty-seven grams of burned rock were collected from the high density target area of the site, 57 gm from auger tests and 6,080 gm (n=1,094) from test units. Burned rock was encountered throughout the excavation levels. In the auger tests the burned material was associated with the first 30 cm below backhoe trench termination with 97% recovered from Level 2. For purposes of comparison, burned rock density per cubic meter was calculated resulting in 1,154 gm/m3 in AU 1 and 926 gm/m^3 in AU2 for all the test units combined. Figure 5-1 presents the density of burned rock for each AU by test unit. The test unit with the highest density of burned rock was TU 3 with 2,342 gm/m^3 in AU 1 and 907 gm/m^3 in AU 2. Because burned rock is associated with cultural features, its presence in the components suggests the probability of buried thermal features in the target area, possibly in the vicinity of TU 3.

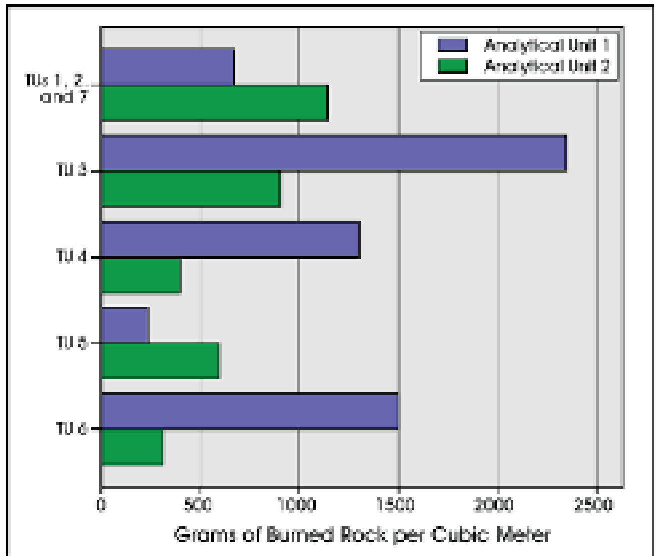

Figure 5-1. *Density of burned rock in each test unit at 41WN120.*

Lithic Debitage

Lithic debitage recovered from 41WN120 consisted of 893 specimens all collected from test units. For comparison, debitage density per cubic meter was calculated resulting in 83 specimens/m^3 in AU 1 and 199 specimens/m^3 in AU 2 for all the test units combined. The density of debitage for each AU by test unit is illustrated in Figure 5-2. Test Unit 3 contained the highest density of debitage in AU 1 with 100 specimens/m^3 and in AU 2 with 262 specimens/m^3. Test Units 1, 2, and 7, comprising the 1-x-2.5 m unit contained similar levels of debitage with 99 specimens/m^3 in AU 1 and 223 specimens/m^3 in AU 2. The figure illustrates the large drop in artifacts away from the bluff on the plowed field in TUs 5 and 6.

Lithic Debitage Analysis

An analysis was conducted on the lithic debitage recovered from 41WN120 in an attempt to determine the probable reduction/production strategy used at the site (late stage verses early stage/tool manufacture verses core reduction). The results of the analysis should also allow conclusions to be

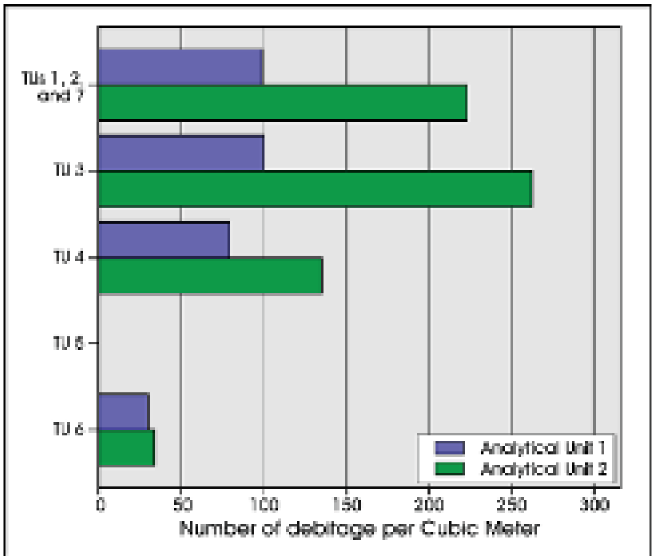

Figure 5-2. *Density of debitage in each test unit at 41WN120.*

drawn regarding raw material availability in the area. Debitage recovered from 41WN120 was analyzed by technological attributes, including presence/absence of cortex and flake condition (breakage pattern). Additionally, the flakes were measured for maximum length and thickness. The following discussion on the debitage analysis is organized by attribute.

Cortex

A commonly analyzed debitage attribute in lithic reduction analysis is the percentage of cortex on a flake. Debitage can be sorted into primary, secondary, or tertiary cortex categories. Primary flakes have the dorsal face completely covered by cortex, secondary flakes have some cortex on their dorsal side, and tertiary flakes have no cortex. High frequencies of primary flakes are assumed to be indicative of early reduction, and high frequencies of tertiary flakes are assumed to reflect late reduction. Logically, the amount of cortex should be less on late reduction specimens and greater on early reduction pieces (Andrefsky 1998; Sutton and Arkush 2002). An additional factor related to the presence of cortex on a specimen is raw material availability, type, and size. Andrefsky notes that debitage produced from cobbles with complete cortical surfaces will have a greater amount of dorsal cortex (1998:109). If raw material availability is limited, noticeable variability in the reduction stage processes will be evident (Magne 1989). For example, if the lithic resource base consists only of pebble sized rocks, flakes should contain large amounts of dorsal cortex well into the reduction stages (Magne 1989:19).

Each specimen of debitage was examined to determine the percentage of dorsal cortex present. The debitage was coded as (0) 0% cortex, (1) 1-50% cortex, and (2) 51-100% cortex. Of the 893 specimens recovered, 70% (n=628) are tertiary (0% cortex), 21% (n=186) are secondary (1-50% cortex), and 9% (n=79) are primary (50-100% cortex). In AU 1, 62% (n=129) of the 207 flakes are tertiary, 27% (n=55) are secondary, and 11% (n=23) are primary. In AU 2, 73% (n=499) of the 686 flakes are tertiary, 19% (n=131) are secondary, and 8% (n=56) are primary (Table 5-2). The high percentage of tertiary flakes in AU 2 may reflect a late reduction stage, possibly indicative of tool manufacture or refurbishing. Cortex percentages from AU 1 suggest an earlier reduction stage relative to AU 2. A comparison of cortex coverage between AUs produces adjusted residuals of 2.9 and 2.3 for flakes with no cortex and flakes with 1-50 % cortex, respectively, suggesting that the cortex differences between the two AUs are significant (Pearson Chi-Square Asymp sig. = 0.016). Two large primary flakes, one from AU 1 and one from AU 2, both with 100% dorsal cortex, are remnants of cobbles and noted to have battering on the dorsal surfaces suggesting they are hammerstone debris.

Table 5-2. Cortex Percentages

Cortex %	**AU 1**		**AU 2**		**Total**	
No cortex	129	62%	499	73%	628	70%
1-50%	55	27%	131	19%	186	21%
51-100%	23	11%	56	8%	79	9%
Total	207		686		893	
		100%		100%		100%

Research investigating the relationship between cortex percentage and raw material availability suggests that sites in areas with low raw material availability have a low percentage of tertiary flakes, while sites in areas with greater raw material availability have a higher percentage of tertiary flakes (Mauldin and Figueroa 2006). 41WN120 is in an area with high raw material availability (See Figure 2-1). The amount of tertiary flakes (73%) in AU 2 correlates with expectations of greater amounts of tertiary flakes in areas with moderate to high raw material resources. AU 1, however, with 62% tertiary flakes suggests low to moderate raw material availability (see Mauldin and Figueroa 2006). In AU 1 95% of the flakes (n=197) are made from chert. The remaining 10 are made of quartzite. A third material was noted in AU 2. Two (0.3%) flakes are from petrified wood, 29 from quartzite, and 655 (96%) are from chert. Of the 29 flakes, 6 were recovered from Level 10 in Sediment 5 of the 1-x-2.5 m unit (TUs 1, 2, and 7; see Figure 4-6) and 7 from Level 10 in Sediment 3 of TU 3 (see Figure 4-3). One flake of petrified wood was also found Level 10 of the 1-x-2.5 m unit. An adjusted residual of -2.1 from Level 10 of the 1-x-2.5 m unit indicates that the amount of chert is significantly less than expected in this level (95% confidence level). An adjusted residual of 3.0 from Level 10 of TU 3 suggests that significantly more quartzite is present in the level than statistically expected.

In addition to indicating reduction stage and raw material availability, cortex percentages can also be used to infer raw material size. As stated above a resource base made up of small cobbles would produce flakes with large amounts of dorsal cortex simply as a function of raw material size. Because the majority of the specimens do not contain cortex, it is probable that the raw material was not limited to small cobbles. However, all but one of the cores recovered from 41WN120 is small and all are from cobbles suggesting small sized raw material (Figures 5-3 and 5-4). The two cores uncovered in AU 1 measured 43 mm (maximum length) by 26 mm (width) and 82-x-54 mm. The eight cores from AU 2 ranged in length from 41-56 mm and width from 13-35 mm. The cores do not reflect the cortex patterning seen on the debitage suggesting, perhaps, the early reduction of larger cobbles or tabular material off the site. 41WN120 is located on a bluff adjacent to Calaveras Creek and immediately northeast of the San Antonio River. It is likely cobbles would have been associated with these water systems.

Midpoint Thickness

Another debitage attribute commonly used to determine reduction stage is flake thickness. The thickness of a flake should correlate with the stage of reduction. Thicker specimens are likely to result from early stage reduction and thinner flakes are likely to result from late stage reduction. Optimally, there should be a positive correlation between

Figure 5-3. *Cores recovered from TUs 1-3: clockwise from top left – TU 1, Level 7; TU 2, Level 8; TU 3, Level 8, and TU 3, Level 9 (n=3).*

Figure 5-4. *Cores recovered from TUs 4-6: clockwise from top left – TU 4, Levels 5 and 8; TU 6, Level 11; and TU 5, Level 11.*

flake thickness and reduction stage. Using the same logic a positive correlation should exist between cortex percentage and flake thickness. Early stage flakes should contain more cortex and should be thicker, whereas late stage flakes should have little to no cortex and should be thinner. Ideally, debitage should get smaller, thus thinner, as the tool being manufactured gets closer to completion (Andrefsky 1998).

Flake thickness for this analysis is defined as the distance from the dorsal side to the ventral side of the flake, perpendicular to the flake length line (Andrefsky 1998). Midpoint thickness was measured for each of the 893 specimens of lithic debitage using digital calipers (Table 5-3). The mean thickness for the assemblage was 3.7 mm; 4.0 mm for AU 1, and 3.6 mm for AU 2. A Mann-Whitney U test (Z=-3.028; Asymp. Sig. = 0.002) and an Independent Samples Median test (Asymp. Sig. =0.017) run on the data suggests that the differences in debitage thickness between AUs 1 and 2 is statistically significant.

A comparison of flake thickness to cortex percentage (Figure 5-5) suggests a significant relationship between specimens with no cortex and specimens with cortex for both AU1 and 2 (Z=-4.865, Asymp. Sig <0.001 and -10.110, Asymp. Sig. <0.001, respectively). The relationship between flakes with 1-50% cortex and flakes with 51-100% cortex is statistically significant in AU2 (Z=-2.411, Asymp Sig. = 0.016) but not in AU1 (Z=-1.709, Asymp. Sig. =.087). Specimens without

Table 5-3. Comparison of Midpoint Thickness by Cortex Coverage Groups

	AU 1					AU 2				
Cortex %	Median	Minimum	Maximum	25%	75%	Median	Minimum	Maximum	25%	75%
No cortex	2.65	0.56	10.89	1.87	3.92	2.26	0.42	19.13	1.53	3.50
1-50%	4.65	1.61	12.79	2.69	6.84	4.41	1.19	14.08	2.96	6.57
51-100%	5.38	3.41	16.18	4.44	6.94	6.09	1.56	20.92	3.47	8.02

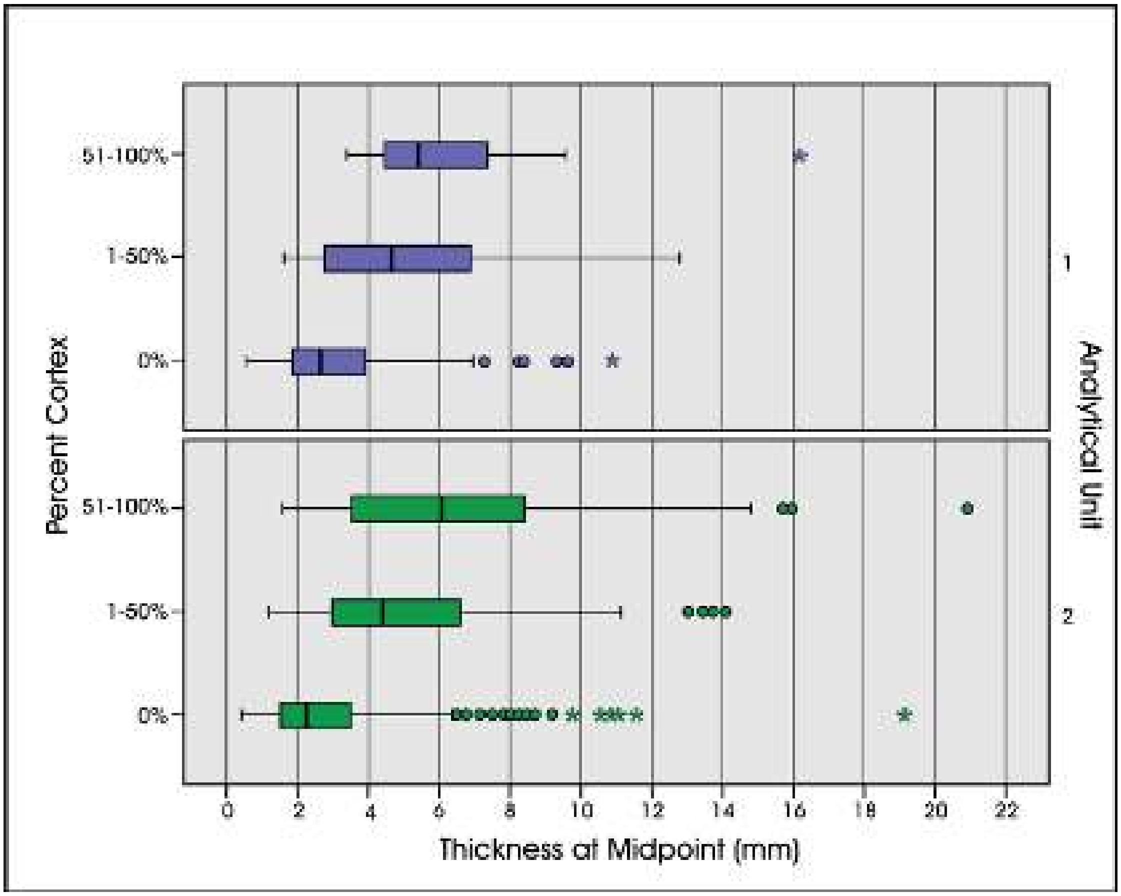

Figure 5-5. *Boxplot comparing midpoint measurement by cortex coverage group.*

cortex are relatively thin (median = 2.7 mm for AU 1 and 2.3 mm for AU 2), specimens with cortex in the range of 1-50% are thicker (median = 4.7 mm for AU 1 and 4.4 mm for AU 2), and specimens with cortex in the range of 51-100% are the thickest (median = 5.4 mm for AU 1 and 6.1 mm for AU 2).

This data supports a conclusion of a positive correlation between cortex percentage and flake thickness. The conclusion reached above that the high frequency of tertiary flakes suggests tool manufacture and late stage reduction is further supported by the cortex/thickness correlation. The tertiary flakes are relatively thin and thinner flakes are likely to result from late stage reduction. Debitage from AU 2 is significantly thinner than flakes from AU 1. The debitage data suggests late stage reduction for AU2.

Maximum Length

The maximum length of lithic debitage is another attribute commonly used to determine reduction stage. The length of a flake should correlate with the stage of reduction. Longer specimens are likely to result from early stage reduction and shorter flakes are likely to result from late stage reduction. As with flake thickness, there should be a relationship between flake length and reduction stage. Using the same logic a relationship should exist between cortex percentage and flake length. Early stage flakes should contain more cortex and should be longer, whereas late stage flakes should have little to no cortex and should be shorter. Ideally, debitage should get smaller, thus shorter, as the tool being manufactured gets closer to completion (Andrefsky 1998). In addition, flakes late in the reduction trajectory may have a tendency to break more often, thus resulting in shorter lengths.

Maximum length as defined by Andrefsky is measured as the maximum distance from the proximal to distal end along a line perpendicular to striking platform width (Andrefsky 1998). For the purposes of this analysis maximum length is defined as the maximum distance between any two points on the flake. The maximum length of each specimen was recorded regardless of specimen condition (i.e. complete verses incomplete flake). Maximum length was measured for each of the 893 specimens of lithic debitage using digital calipers (Table 5-4). The median maximum length of the assemblage was 23.8 mm, 25.1 mm for AU 1, and 21.8 mm for AU 2. A Mann-Whitney U test (Z=-3.910; Asymp. Sig. < 0.001) and an Independent Samples Median test (Asymp. Sig. <0.001) run on the data suggests that the differences in debitage thickness between AUs 1 and 2 is statistically significant.

A comparison of maximum length to cortex percentage (Figure 5-6) suggests a significant relationship between specimens with no cortex and specimens with cortex for both AU1 and 2 (Z=-3.953, Asymp. Sig <0.001 and -8.982, Asymp. Sig. <0.001, respectively). The relationship between flakes with 1-50% cortex and flakes with 51-100% cortex is not statistically significant in either AU 1 or 2 (Z=-1.671, Asymp Sig. = 0.095 and Z=-1.293, Asymp. Sig. =0.196). Specimens without cortex are relatively short (mean = 23.7 mm for AU 1 and 21.1 mm for AU 2), specimens with cortex in the range of 1-50% are longer (mean = 29.2 mm for AU

Table 5-4. Comparison of Maximum Length by Cortex Coverage Groups

	AU 1				AU 2			
Cortex %	**<23 mm**	**>23 mm**	**Total**		**<23 mm**	**>23 mm**	**Total**	
No cortex	66	63	129	62%	329	170	499	73%
1-50%	10	45	55	27%	32	99	131	19%
51-100%	4	19	23	11%	12	44	56	8%
Total	80	127	207		373	313	686	
	39%	61%		100%	54%	46%		100%

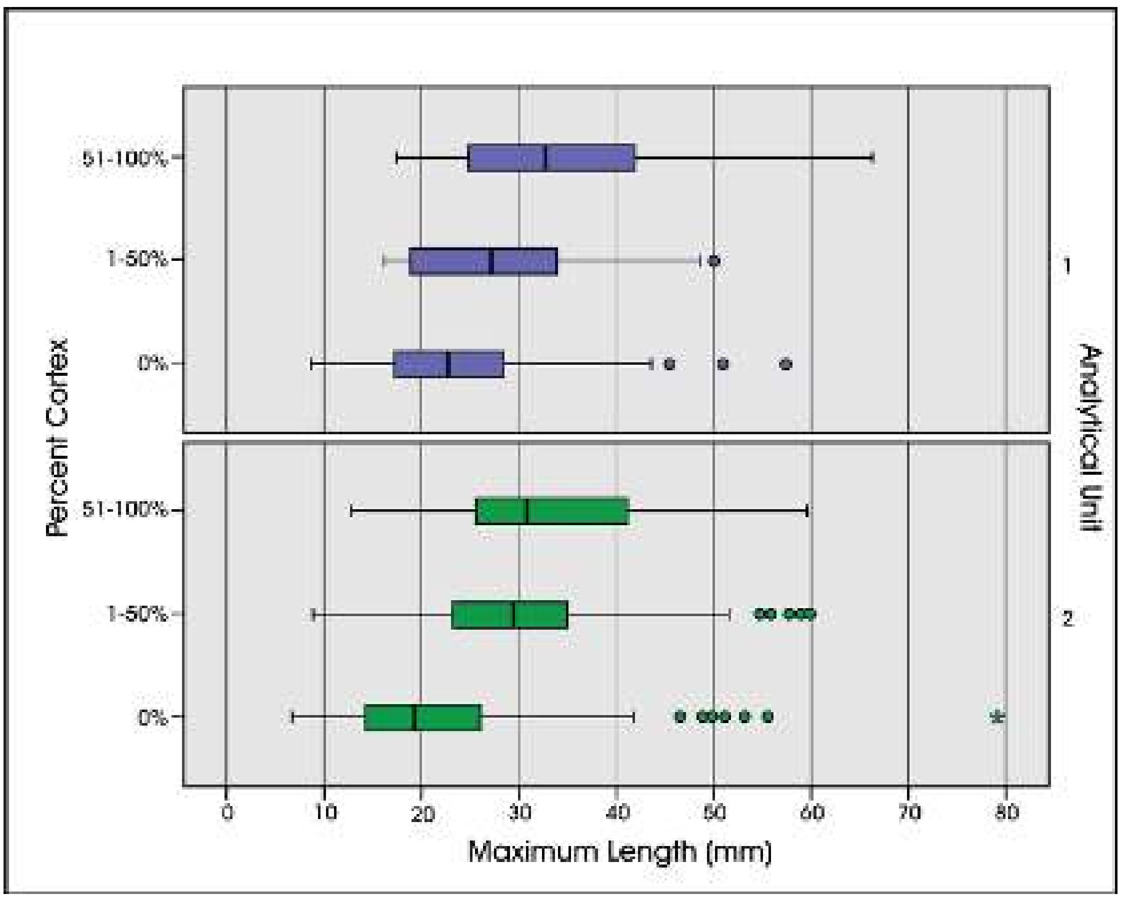

Figure 5-6. *Boxplot comparing maximum length by cortex coverage group.*

1 and 29.9 mm for AU 2), and specimens with cortex in the range of 51-100% are the longest (mean = 34.1 mm for AU 1 and 32.2 mm for AU 2).

This data supports a conclusion of a positive correlation between cortex percentage and flake length. The conclusion reached above that the high presence of tertiary flakes suggests tool manufacture or refurbishing and late stage reduction is further supported by the cortex/length correlation. The tertiary flakes are relatively short and shorter flakes are likely to result from late stage reduction.

Flake Breakage Pattern

Analysis of debitage can provide valuable insights into site specific reduction/production strategies and raw material availability. Multiple studies have addressed various aspects of lithic debitage analysis. Sullivan and Rozen (1985) developed a typology composed of "interpretation-free and mutually exclusive debitage categories." This typology consisted of an attribute key used to separate debitage into four categories: complete flakes, broken flakes, flake fragments, and debris. This attribute key was used to analyze two archaeological collections from east-central Arizona. The resulting percentages of debitage assigned to each of the four categories in conjunction with nonassemblage site data led Sullivan and Rozen to develop a method to infer site type (core reduction verse tool production) based on flake condition. Prentiss and Romanski (1989) examined Sullivan and Rozen's approach using experimentally produced debitage assemblages. This study contradicted Sullivan and Rozen's conclusions concerning the relationship of flake condition percentages to site type. Sullivan and Rozen postulated that tool assemblages should contain high numbers of proximal fragments and low numbers of complete flakes compared to core reduction assemblages. Prentiss and Romanski conclude that more complete flakes indicate tool production. They also explored fracture properties of differing raw materials and the effects of trampling on the archaeological record (Prentiss and Romanski 1989). Amick and Mauldin (1997) explored the effects of the differences in the mechanical properties of raw materials and the resulting patterns of flake breakage. They concluded that raw material differences significantly alter flake breakage patterns and must be addressed before using breakage patterns to infer site type (Amick and Mauldin 1997).

The final attribute included in the debitage analysis was flake breakage pattern. Flake condition is a result of breakage. Tool production and core reduction will produce a variety of flakes, including complete flakes (CF), platform remnant bearing flakes (PRBF), medial/distal flakes (MDF), and non-orientable fragments (NF; Amick and Mauldin 1997; Prentiss and Romanski 1989; Sullivan III and Rozen 1985). The percentage of complete flakes produced in lithic reduction has been determined to be dependent upon the raw material type. Amick and Mauldin (1997) determined that the proportion of complete flakes may be determined greatly by the use of chert. Thus, breakage patterns in an assemblage consisting of multiple raw material types (chert, quartzite, etc.) may be reflecting the different flaking qualities of the different raw materials, not different technological activities (Amick and Mauldin 1997). Ninety-five percent of the debitage (n=852) from 41WN120 was produced from chert. The remaining specimens, produced from quartzite (n=39) and petrified wood (n=2), were not included in the breakage pattern analysis.

Each of the 852 chert lithic debitage specimens recovered during testing of 41WN120 were examined and placed into one of the four flake condition categories. For a flake to be categorized as complete, it must contain both the proximal and distal ends, the platform, and intact margins. If the flake was broken but contains a platform it was categorized as a platform remnant bearing flake. A broken flake missing the platform was considered a medial/distal fragment and a specimen of debitage without discernible flake attributes was categorized as a non-orientable fragment. Of the 852 chert flakes, 197 were from AU 1 and 655 flakes were from AU 2. Of the 197 AU 1 flakes, 58% were classified as complete, 16% as platform remnant bearing, 26% as medial/distal, and 0% as non-orientable. In AU 2, 58% of the 655 flakes were complete, 10% were platform remnant bearing, 31% were medial/distal, and 1% were non-orientable.

The flake breakage pattern percentages were compared to data gathered by Amick and Mauldin (1997) on the breakage patterns of an assemblage generated experimentally on chert and to data from Prentiss and Romanski (1989; Table 5-5). The patterns evident in both analytical units at 41WN120 are most similar to Amick and Mauldin's tool reduction data (Figure 5-7). Because neither patterns are a good fit to the 41WN120 breakage pattern data, the data was further compared to four patterns noted by Sullivan and Rozens (1989). In addition to CF, PRBF, MDF, and NF flakes,

Table 5-5. Comparison of Flake Breakage Patterns at 41WN120 to Experimental Data

Assemblage	CF	PRBF	MDF	NF
41WN120 AU 1	58%	16%	26%	0%
41WN120 AU 2	58%	10%	31%	1%
Amick and Mauldin (1987) Core Reduction	36%	21%	41%	2%
Amick and Mauldin (1987) Tool Reduction	42%	19%	38%	1%
Prentiss and Romanski (1989) Core Reduction	22%	23%	24%	32%
Prentiss and Romanski (1989) Tool Reduction	33%	26%	36%	5%

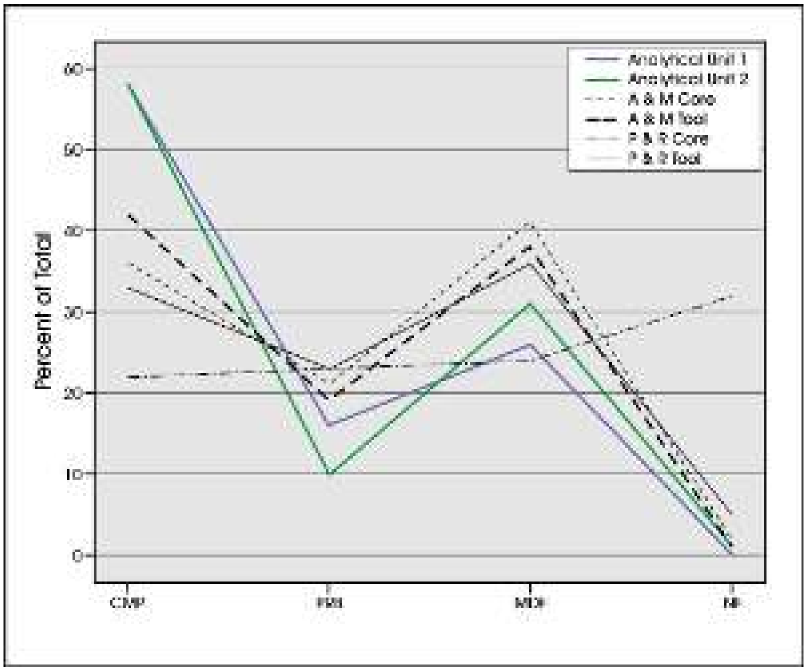

Figure 5-7. *Comparison of 41WN120 flake breakage pattern to experimental data from Amick and Mauldin 1997 (A & M).*

Sullivan and Rozen included cores and flakes with retouch. Table 5-6 compares 41WN120 breakage pattern percentages to the four groupings (unintensive core, core reduction and tool manufacture, intensive core, and tool manufacture). The patterns from AUs 1 and 2 are not a good fit to any of the four patterns, but are most similar to the unintensive core and core reduction and tool manufacture groupings (Figure 5-8).

Table 5-6. Comparison of Flake Breakage Patterns at 41WN120 to Experimental Data from Sullivan and Rozen (1985)

Assemblage	CF	PRBF	MDF	NF	Cores	Retouched
41WN120 AU 1	58%	15%	25%	0%	1%	1%
41WN120 AU 2	56%	10%	31%	0%	1%	2%
Sullivan and Rozen (1985) Group IA Unintensive Core Reduction	53%	7%	16%	6%	15%	3%
Sullivan and Rozen (1985) Group IB1 Core Reduction and Tool Manufacture	33%	13%	35%	8%	3%	8%
Sullivan and Rozen (1985) Group IB2 Intensive Core Reduction	30%	8%	35%	23%	2%	2%
Sullivan and Rozen (1985) Group II Tool Manufacture	21%	17%	51%	7%	1%	3%

Lithic Debitage Analysis Conclusions

The purpose of the analysis of the lithic debitage from 41WN120 was to attempt to determine the lithic technology practiced at the site and to determine accessibility and quality of raw material. To attempt to determine what type of technology was used at the site (core reduction verses tool production/early verses late stage reduction), cortex percentage, maximum length, midpoint thickness, and flake condition were analyzed. Based on the assumption that both early stage reduction and core reduction produce large flakes with some percentage of cortex on the dorsal surface and on the assumption that both late stage reduction and tool manufacture produce smaller, tertiary flakes, the debitage assemblage from AU 2 of 41WN120 appears to represent late stage tool manufacturing. While the percentages of flake types in the assemblage is not a good fit to the comparative data used in the analysis, the patterns from both AU 1 and 2 correspond closest to patterns produced from experimental studies on tool production (Amick and Mauldin 1997). The high percentage of tertiary flakes recovered from AU 2 point to a site with access to moderate to high sources of raw material, whereas the patterns produced from AU 1 reflect low to moderate raw material availability.

Analytical Units 1 and 2, based on the two broad temporal components present at 41WN120, were selected as a means of organizing artifacts for analytical purposes. These components formed over thousands of years and likely consist of multiple occupational events. The presence of statistically significant numbers of debitage produced from quartzite in Levels 10 of the 1-x-2.5 m unit and in Level 10 of TU 3 suggests one or more occupations. The difficulty fitting breakage patterns to comparative experimental data is also probably a result of the broad time depth making up each analytical unit.

Lithic Tools

Sixty-two lithic tools were identified in the 41WN120 collection (Table 5-7). The tool assemblage consists of 14 bifaces, 1 uniface, 2 adzes, 1 drill tip, 5 gravers, 6 points, 19 retouched flakes, and 14 utilized flakes. Of the 62 tools, 2 were discovered in the wall of BHT 1, 1 in the wall of BHT 4, 22 in TU 1, 15 in TU 2, 7 in TU 3, 14 in TU 4, and 1 in TU 7. Analytical Unit 1 produced 12 (4.8 tools/m^3) and Analytical Unit 2 produced 50 tools (13.9 tools/m^3).

Projectile points recovered during the testing project include a Marcos and a fragmented untyped point (corner notched with an expanding stem) from AU 1, and an Early Triangular, two untyped points (one resembling a Pandale), and an Angustura from AU 2. Both the Marcos (2550-1750 BP; Turner and Hester 1999) and the untyped point were

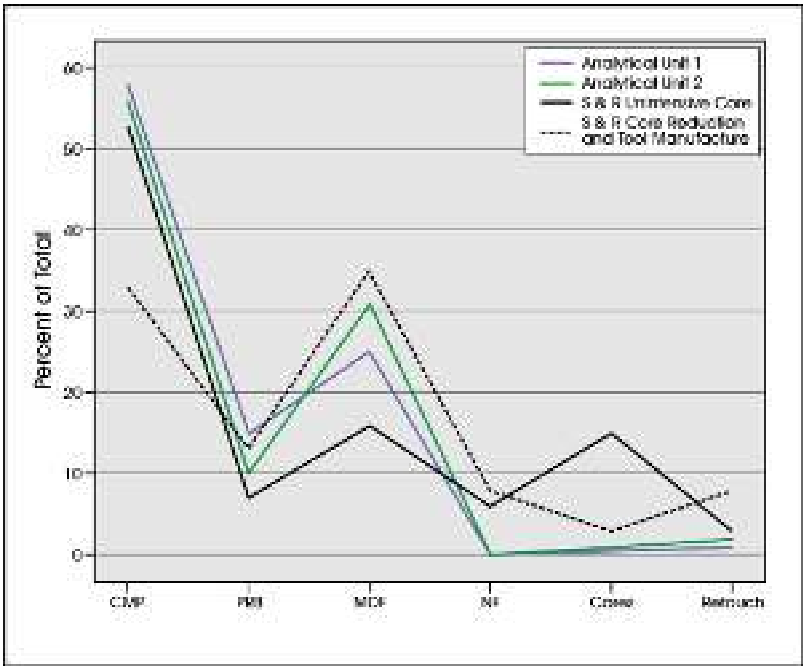

Figure 5-8. *Comparison of 41WN120 flake breakage pattern to experimental data from Sullivan and Rozen 1985 (S & R).*

recovered from Level 5 of TU 4 (Figure 5-9). The Early Triangular (5650-5550 BP; Turner and Hester 1999), an unstemmed untyped point, and the Angustura (8805-7278 BP; Turner and Hester 1999) were uncovered in Levels 6, 7, and 8 of TU 1, respectively (Figure 5-10). The remaining untyped point was discovered 117 cmbs in the wall of BHT 4 (see Figure 5-9). This lanceolate point has a distinctive beveling of the body creating a corkscrew twist similar to a Pandale dart point (5950-4450 BP; Davis Jr. 1991; Turner and Hester 1999) but the point's stem is convex unlike the straight to concave Pandale stem.

Two adzes, a drill tip, and five gravers were recovered from AU 2. Six of the eight tools were removed from the 1-x-2.5 m unit (TUs 1, 2, and 7). The drill tip was found in TU 1, 20-30 cm below the Angustura point. An untyped adze was excavated from Level 9 of TU 2 below the Angustura and above the drill. This adze, based on macroscopic evidence, retains polish possibly the result of wood working, and is

Table 5-7. Tools Recovered from Testing of 41WN120

Analytical Unit	Unit	Level	Depth (cmbs)	Point	Adze	Drill	Graver	Biface	Uniface	Retouched Flake	Utilized Flake	Total
1	1	3	13-23					1		2		3
	2	3	14-24								1	1
		5	34-44								1	1
	3	7	44-54								1	1
	4	5	36-46	2				1		1		4
		6	46-56								2	2
	Total			**2**	**0**	**0**	**0**	**2**	**0**	**3**	**5**	**12**
2	1	6	43-53	1							1	2
		7	53-63	1			1			1		3
		8	63-73	1							1	2
		9	73-83							2		2
		10	83-93				1			3		4
		11	93-103			1						1
		12	103-113				1	1		1		3
		13	113-123					1			1	2
	2	8	64-74				1	1			2	4
		9	74-84		1							1
		10	84-94							2		2
		11	94-104					1		1		2
		12	104-114							1		1
		13	114-124					2		1		3
	3	8	54-64					1		1	1	3
		9	64-74					1		1		2
		11	84-94							1		1

Table 5-7. Continued...

Analytical Unit	Unit	Level	Depth (cmbs)	Point	Adze	Drill	Graver	Biface	Uniface	Retouched Flake	Utilized Flake	Total
2	4	7	56-66								2	2
		8	66-76					1				1
		9	76-86		1							1
		10	86-96							1	1	2
		11	96-106				1	1				2
	7	7	51-61						1			1
	BHT 1	8	65					1				1
		9	76					1				1
	BHT 4	13	117	1								1
	Total			**4**	**2**	**1**	**5**	**12**	**1**	**16**	**9**	**50**
Grand Total				**6**	**2**	**1**	**5**	**14**	**1**	**19**	**14**	**62**

Figure 5-9. *Selected points and tools: clockwise from top left – Marcos (TU 4, Level 5); Untyped (similar to Pandale; BHT 4, 117 cmbs); and a Guadalupe adze (TU 4, Level 9).*

Figure 5-10. *Selected points and tools from TUs 1 and 2: clockwise from top left – Early Triangular (Level 6); Untyped (Level 7); Angustura (Level 8); graver (Level 8); biface (Level 13); hafted adze (Level 9); and a graver (Level 10).*

ground indicating that it was hafted (see Figure 5-10). Four gravers were removed from Levels 7, 8, 10 and 12 of the 1-x-2.5 m unit (see Figure 5-10). The fifth graver was found in Level 11 of TU 4 20 cm below a fragment of a Guadalupe adze (see Figure 5-9). Guadalupe tools date to the Early Archaic period (5450 BP or earlier; Turner and Hester 1999).

Fourteen bifaces were recovered from 41WN120, two from BHT 1, seven from the 1-x-2.5 m unit, two from TU 3, and three from TU 4 (see Table 5-6). Of the 14 tools, 8 are complete. Five of the eight, from AU 2, retain cortex and have width/thickness ratios ranging from 1.8 to 2.7. The presence of cortex and the small width/thickness ratio suggests an early reduction stage tool (Callahan 1979). The remaining three complete specimens, recovered from Levels 3, 8, and 13 of the 1-x-2.5 m unit, are later reduction stage tools, with no cortex and width/thickness ratios of 3.0, 2.6, and 3.0, respectively (see Figure 5-10). The remaining six bifaces all exhibit breaks caused from manufacturing mishaps. Three retain cortex and have width/thickness ratios ranging from 2.6 to 2.7 suggesting early stage reduction, and three are cortex free, one with a ratio of 5.3 suggesting late stage reduction. Measurements could not be obtained from the remaining two tools but the relative thinness of the bifaces suggest late reduction stage tools. One complete uniface was collected from Level 7 of the 1-x-2.5 m unit. The tool has cortex covering less than 50% of its surface and has a width/thickness ratio of 1.5.

In addition to the formal tools, including points, adzes, the drill, bifaces, and the uniface, AU 1 produced expedient tools consisting of three retouched and five utilized flakes (3.2 edge modified flakes/m^3). The modified flakes were recovered from TUs 1-4. Sixteen retouched and nine utilized flakes were collected from TUs 1-4 as part of AU 2 (7.3 edge modified flakes/m^3).

Groundstone

Two specimens of quartzite groundstone were uncovered during the testing of 41WN120, both in Level 8 (54-64 cmbs) from TU 3 immediately under the transition from Sediment 2 to Sediment 3. While no diagnostic artifact was removed from TU 3, in TU 4 both a Marcos point (2550-1750 BP) and a Guadalupe tool (5450 BP or earlier) were removed from Sediment 2 and from the transition from Sediments 3 to Sediment 4, respectively (Turner and Hester 1999). The stratigraphy is composed of the same sediments in both test units (see Figures 4-2 and 4-3). Logically, then, the groundstone can be relatively dated to somewhere between 2550 BP and 5450 BP. Figure 5-11 presents one of the tools, a metate fragment. The fragment has a maximum length of 92.7 mm and is 31.4 mm thick. The presence of a metate suggests that plant resources requiring grinding may have been a focus of activities at various points on 41WN120.

Using comparative sites in Northeast Texas, Central Texas, and South Texas Mauldin and Figueroa (2006) developed two groundstone indices to attempt to determine the importance of grinding associated with plant foods at a location. The first index is the ratio of the number of manos

Figure 5-11. *Fragment of a metate from TU 3, Level 8.*

or metates relative to the number of projectile points. The second is the ratio of the manos or metates relative to the number of other lithic tools. The variables are then plotted, the first on the Y-axis, the second on the X-axis. Mauldin and Figueroa suggest that if a site has higher scores on both axes that, by implication, grinding associated with plant processing was likely a major activity at that location (Mauldin and Figueroa 2006). Calculating the indices for 41WN120, using 1 metate, 56 other tools, and 7 points produces an X variable of 0.02 and a Y variable of 0.14. Figure 5-12 plots this point along with Mauldin and Figueroa's site and comparative sites. The low value on the X-axis indicates that grinding was probably not a major activity at 41WN120.

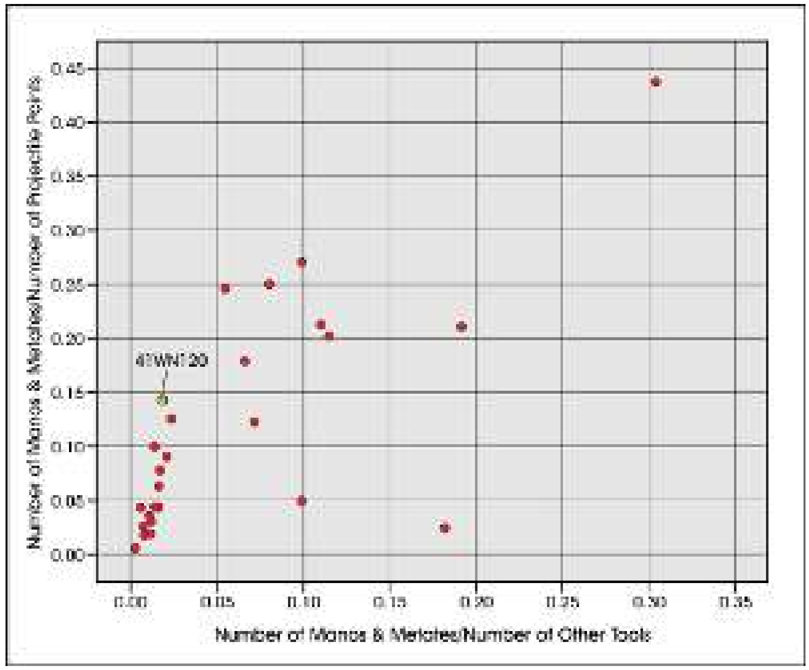

Figure 5-12. *Comparison of two groundstone indices from 27 Texas archaeological sites (after Mauldin and Figueroa 2006).*

Faunal Material

Faunal material consisting of 444 gm of bone (74.6 gm/m^3) and 1, 367 gm of mussel shell (229.8 gm/m^3) was recovered from 41WN120. Snail shell was present in all levels. Analytical Unit 1 and 2 contained 75.2 gm/m^3 and 74.2 gm/m^3 of bone and 347.9 gm/m^3 and 144.5 gm/m^3 of mussel shell, respectively.

Summary

This chapter presented descriptive data for the cultural material recovered during Phase II Testing of 41WN120. Test unit excavations resulted in the removal of 2.50 m^3 and 3.45 m^3 of sediment from AUs 1 and 2, respectively. Sixty-one hundred and thirty-seven grams of burned rock were collected at the site with a density of 1,154 gm/m3 from the upper component, AU 1, and 926 gm/m^3 from the lower component, AU 2. Because burned rock is associated with thermal features, its presence in the components suggests the probability of buried cultural features in the target area.

Eight hundred and ninety-four pieces of debitage were retrieved from 41WN120 with a density of 83 specimens/m^3 in AU 1 and 199 specimens/m^3 in AU 2. The vertical distribution of lithic debitage evident from test unit levels points to the presence of two prehistoric components one occurring in the upper levels in Sediment 2, and another in the lower levels, in Sediments 3-5, and 7. The horizontal distribution explored with the excavation of six BHTs suggests a large drop in artifacts away from the bluff on the plowed field. Sixty-two lithic tools, including bifaces, a uniface, adzes, a drill tip, gravers, projectile points, retouched flakes, and utilized flakes, were identified in the collection. Two groundstone fragments, one a metate fragment, were identified in the lower component.

In addition to the descriptive data, the chapter discussed the results of a lithic debitage and tool analysis. The purpose of the analysis was to attempt to determine the lithic technology practiced at the site and to determine accessibility to and quality of raw material. Based on the assumption that both early stage reduction and core reduction produce large flakes with some percentage of cortex on the dorsal surface and on the assumption that both late stage reduction and tool manufacture produce smaller, tertiary flakes, the debitage assemblage from AU 2 of 41WN120 appears to represent late stage tool manufacturing. Also supporting the probability of tool manufacturing are the percentages of flake types in the assemblage. Flake breakage patterns in both analytical units correspond closest to patterns produced from experimental studies on tool production.

The high percentage of tertiary flakes recovered from AU 2 point to a site with access to moderate to high sources of raw material. Wilson County falls in the southernmost reaches of the area of Texas Mauldin and Figueroa (2006) designated as having high chert availability (see Figure 2-1). The county is near the Edwards Plateau and near deposits associated with river systems and chert gravel deposits. Because the majority of the specimens do not contain cortex, it is expected that high quality raw material was accessible. A resource base made up of small cobbles would produce flakes with large amounts of dorsal cortex simply as a function of raw material size. However, with one exception from the upper component, the cores recovered from 41WN120 appear to be remnants of small cobbles suggesting poor access to high quality stone. Along with the small cores, 20 specimens of debitage, all from the lower component, were not produced from chert; 18 were made from quartzite and 2 from petrified wood.

Chapter 6: Summary and Recommendations

Summary

The Center for Archaeological Research at the University of Texas at San Antonio was contracted by the SARA to conduct limited NRHP Eligibility testing at 41WN120. The project focused on the portion of the site that contained deeply buried prehistoric material identified previously by Munoz (2010). This report discussed the test excavations conducted January 18 through January 31, 2011. The excavations were conducted in advance of proposed improvements to the park. Phased in improvements planned for the target area of 41WN120 include a park road, a turnaround, a scenic overlook, a pavilion, and an education center.

The principal goal of the eligibility testing of 41WN120 was to better define the depth and horizontal extent of the boundaries of the high-density artifact distribution and to explore details of the stratigraphy and character of the deposits. The testing included backhoe trenching, magnetic soil susceptibility testing, hand augering, and the hand excavation of test units. The fieldwork was limited to the southwestern portion of the 41WN120. Six backhoe trenches were excavated. They measured approximately 10 meters in length, 1 meter in width and extended to roughly 1.4 meters below surface. The trenches were place roughly evenly across the target area. Twelve auger bores were hand-excavated using a 3 inch (7.6 cm) auger bit. The bores were dug in 10 cm levels to 1 meter below the termination of BHTs 1-6 to determine whether culture deposits extend below the base of the trenches (below ~140 cm). One-hundred and thirty-five soil samples were collected for magnetic soil susceptibility testing from BHTs 1-5 from the surface to termination at 5 cm intervals. Because samples were previously obtained from BHT 6 during the survey (see Munoz 2010), additional samples were not collected from the trench. Finally, based on the results of the backhoe trenches, magnetic soil susceptibility, and the 2010 survey, four 1-x-1 m, two 0.5-x-0.5 m, and one 0.5-x-1 m test units were hand excavated in 10 cm arbitrary levels to obtain more fine-grained information on the vertical distribution of cultural materials. Four of the units adjoined backhoe trench walls (BHTs 1-4), and three were dug contiguously as a 1-x-2.5 m unit over ST 77, the location of a possible buried thermal feature (see Munoz 2010).

As a result of magnetic soil susceptibility analysis and test unit artifact distribution, the boundary of the high-density cultural material was refined from the boundary previously defined in the site survey (see Figure 4-15 and Munoz 2010). The lack of artifacts or other materials suggesting cultural surfaces in BHTs 5 and 6 and the low artifact densities in TU 5 off of BHT 4 and TU 6 off of BHT 1 resulted in a boundary reduction of the high density area, from approximately 3,927 m^2 to 1,086 m^2, towards the bluff.

The vertical distribution of cultural material at 41WN120 strongly suggests the presence of two prehistoric components, AU 1 occurring in the upper sediments (Sediment 2) with an artifact peak at approximately 11-54 cmbs and AU 2 in the lower sediments (Sediments 3-7) with a peak at roughly 65-105 cmbs. One diagnostic was recovered from AU 1, a Marcos projectile point (2550-1750 BP; Turner and Hester 1999) suggesting a Late Archaic date for the upper component. An Early Triangular point (5650-5550 BP; Turner and Hester 1999), an Angustura point (8805-7278 BP; Turner and Hester 1999), and a Guadalupe adze (5450 BP or earlier; Turner and Hester 1999) were excavated from AU 2. One radiocarbon sample, obtained from an isolated piece of charcoal in AU 2, produced a calibrated date of 5610-5570 BP and 5540-5480 BP. The date and the diagnostics suggest use of the lower component of the site during the Early Archaic.

Excavations at 41WN120 produced 893 pieces of debitage from a volume of 5.95 m^3 of matrix representing 150 pieces of debitage/ m^3. The analytical units include 83 specimens/m^3 in AU 1 and 199 specimens/m^3 in AU 2. The analysis of a number of attributes on the debitage produced a late reduction pattern suggesting a tool reduction strategy. In addition, 62 lithic tools were identified, 12 (4.8 tools/m^3) in AU 1 and 50 (13.9 tools/m^3) in AU 2. The tool assemblage includes bifaces, a uniface, adzes, a drill tip, gravers, projectile points, retouched flakes, and utilized flakes. Burned rock was retrieved from the site (6,137 gm), 1,154 gm/m^3 in AU 1 and 926 gm/m^3 in AU 2, pointing to the possibility of thermal features in the unexcavated matrix. Despite the recovery of burned rock, no features were identified during the excavations.

Recommendations

Phase II archaeological testing of the area of high-density cultural material on site 41WN120 on the Helton Nature Park project area was completed in accordance with State Historic Preservation laws and the mandates of the Antiquities Code of Texas. The high density of cultural materials, diagnostic artifacts in good context in conjunction with a radiocarbon date, intact sediments, and the depth of buried prehistoric material suggest that the southwest portion of 41WN120, near the bluff overlooking Calaveras Creek, possesses high potential for future research. Two components were identified during the testing project, an upper component containing one diagnostic dart point of the Late Archaic period and a lower component with three diagnostics of the Early Archaic period and a calibrated radiocarbon date of 5610-5570 BP and 5540-5480 BP. It is the CAR's assessment that the integrity of deposits dating to the Early Archaic occupation of 41WN120 is good.

Because Early Archaic period sites are an underrepresented component of the prehistory of Texas, and are not commonly found in south/central Texas, the CAR recommends that the redefined area of high-density cultural material at 41WN120, approximately 1,086 m^2, be considered as eligible for the National Register of Historic Places (NRHP) under criterion D of 36CRF 60.4, in that the site has and is likely to yield information significant in prehistory. The CAR also recommends listing as a State Archaeological Landmark (SAL) under criterion 1, 2, and 3 of 13TAC26.8. We recommend that this portion of 41WN120 remain off limits with regard to any construction activities and that SARA develop a plan to protect the area. If this portion of 41WN120 cannot be avoided, then the CAR recommends the development of a plan to recover significant data from the area of high-density artifact concentration. We further recommend that the remainder of site 41WN120, the area off of the high-density artifact concentration, does not contribute to the eligibility of the site and therefore, proposed improvements may proceed as planned off the high-density concentration. SARA and the THC have concurred with these recommendations, and SARA has adjusted construction and development plans to avoid the high density concentrations. In addition to the recommendation of eligibility, as a result of the 2010 survey of the Helton San Antonio River Nature Park property, the CAR recommended, that the historic brick ruin adjacent to the high-density artifact area be protected (see Munoz 2010). The THC and SARA concurred with the CAR's recommendation to protect of this historic building.

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Appendix A:

Radiocarbon Results

Darden Hood
Beta Analytic Inc.
4985 S.W. 74 Court
Miami Florida, 33155

Appendix A: Radiocarbon Results

BETA

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Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

March 16, 2011

Ms. Cynthia Munoz
University of Texas
Center for Archaeological Research
1 UTSA Circle
San Antonio, TX 78249
USA

RE: Radiocarbon Dating Result For Sample WN120TU2char

Dear Ms. Munoz:

Enclosed is the radiocarbon dating result for one sample recently sent to us. It provided plenty of carbon for an accurate measurement and the analysis proceeded normally. The report sheet contains the method used, material type, and applied pretreatments and, where applicable, the two-sigma calendar calibration range.

This report has been both mailed and sent electronically. All results (excluding some inappropriate material types) which are less than about 20,000 years BP and more than about ~250 BP include a calendar calibration page (also digitally available in Windows metafile (.wmf) format upon request). Calibration is calculated using the newest (2004) calibration database with references quoted on the bottom of the page. Multiple probability ranges may appear in some cases, due to short-term variations in the atmospheric 14C contents at certain time periods. Examining the calibration graph will help you understand this phenomenon. Don't hesitate to contact us if you have questions about calibration.

We analyzed this sample on a sole priority basis. No students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analysis. We analyzed it with the combined attention of our entire professional staff.

Information pages are also enclosed with the mailed copy of this report. If you have any specific questions about the analysis, please do not hesitate to contact us. Someone is always available to answer your questions.

Our invoice has been sent separately. Thank you for your prior efforts in arranging payment. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood
Digital signature on file

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD

4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Ms. Cynthia Munoz — Report Date: 3/16/2011

University of Texas — Material Received: 2/21/2011

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 294176	4830 +/- 40 BP	-25.4 o/oo	4820 +/- 40 BP

SAMPLE : WN120TU2char
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 3660 to 3620 (Cal BP 5610 to 5570) AND Cal BC 3600 to 3520 (Cal BP 5550 to 5480)

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

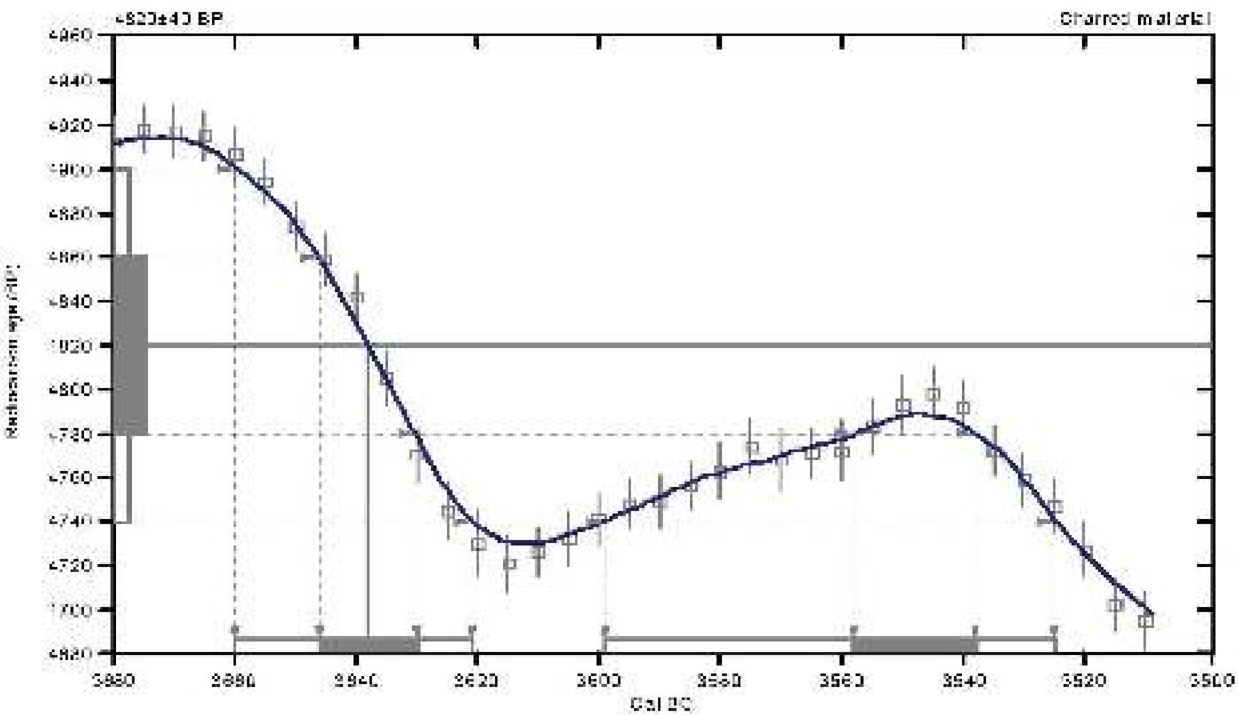
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.4:lab. mult=1)

Laboratory number:	**Beta-294176**
Conventional radiocarbon age:	**4820±40 BP**
2 Sigma calibrated results: (95% probability)	**Cal BC 3660 to 3620 (Cal BP 5610 to 5570) and Cal BC 3600 to 3520 (Cal BP 5550 to 5480)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal BC 3640 (Cal BP 5590)
1 Sigma calibrated results: (68% probability)	Cal BC 3650 to 3630 (Cal BP 5600 to 5580) and Cal BC 3560 to 3540 (Cal BP 5510 to 5490)



References:

Database used

INTCAL04

Calibration Database

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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