

**ARCHAEOLOGICAL TESTING AT 41BP679,
BASTROP COUNTY, TEXAS**

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TEXAS ANTIQUITIES PERMIT NO. 4117

PREPARED FOR
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Abstract

During the spring of 2006 (May 11 through May 18, 2006), the Center for Archaeological Research (CAR) at The University of Texas at San Antonio conducted testing at 41BP679, a site formally listed as a State Archaeological Landmark. Site 41BP679 is located in Bastrop County at the confluence of the Colorado River and Spring Branch Creek, one of its tributaries. The site is on land that is the proposed location for the City of Bastrop Wastewater Treatment Plant. The installation of outflow pipes will impact the northern portion of 41BP679. The testing was conducted under Texas Antiquities Permit No. 4117, with Kristi Ulrich serving as Principal Investigator and Cynthia Moore Munoz serving as the Project Archaeologist. The testing involved mechanical auger borings, backhoe trenching and the hand-excavation of a limited number of test units.

Testing confirmed that 41BP679 is likely to be a single component site (30-70 cm below surface) dating from the Paleoindian to Archaic period. One temporally diagnostic artifact, a Clear Fork tool, was recovered. Testing efforts failed to encounter features, and the low density cultural materials consist primarily of lithic debitage, burned rock and a handful of lithic tools. A detailed debitage analysis of the samples from the site suggests that the debitage collection represents a focus on tool production.

The low density cultural remains have been impacted by bioturbation and vegetation clearing or plowing and their research potential is limited. The portion of the site tested during the investigations reported herein, along with the materials recovered, do not contribute to the State Archeological Landmark eligibility of 41BP679. We therefore recommend that the planned construction be allowed to proceed. We also recommend that the portion of the site located to the south of the area tested by CAR remain protected.

The Texas Historical Commission (THC) concurred with the conclusions and recommendations reached by the CAR. In addition, the THC requested that the portion of 41BP679 not assessed by CAR be protected from potential construction-related impacts by a fence. The desired location of the fence would be furnished by CAR to insure that intact portions of the site are not adversely affected by the fence's construction. Furthermore, if significant archaeological deposits are uncovered during plant construction, the THC requested that all work should stop in those immediate areas and the City of Bastrop should immediately contact the THC.

CAR staff informed the City of the THC request. City representatives have indicated to CAR that fencing will be installed around the perimeter of the construction area both to keep people out of the construction area and keep construction impacts limited to the designated area. The fence will be a five-strand barbwire fence.

All artifacts collected during this project are curated at the Center for Archaeological Research according to Texas Historical Commission guidelines.

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Chapter 1: Introduction

This report discusses the test excavations of site 41BP679 that occurred May 11 through May 18, 2006. The site was identified in 2004 during an intensive pedestrian survey of a 26.5-acre property owned by the City of Bastrop (Moses 2004). Two archaeological sites were documented during the survey, 41BP678 and 41BP679. In 2005, the Texas Historical Commission, in accord with the City of Bastrop, formally listed both sites as State Archaeological Landmarks (SALs).

The Center for Archaeological Research of the University of Texas at San Antonio (UTSA) was contracted by the City of Bastrop to conduct limited archaeological testing at

41BP679. The site and project area are located just east of the Colorado River (Figure 1-1). The excavations were conducted in advance of the proposed construction by the City of Bastrop of a water treatment facility that would impact approximately 4.47 acres of the 26.5-acre tract (Figure 1-2) including parts of 41BP678 and 41BP679 (see Figueroa 2006). The proposed wastewater treatment plant will consist of an entrance drive and parking areas, a lift station, a maintenance building, and primary, secondary, and tertiary treatment facilities to be constructed in the northwestern portion of the property (Figure 1-2). An additional 430-m-long outfall pipe will be installed across the central and eastern portions of the property to empty

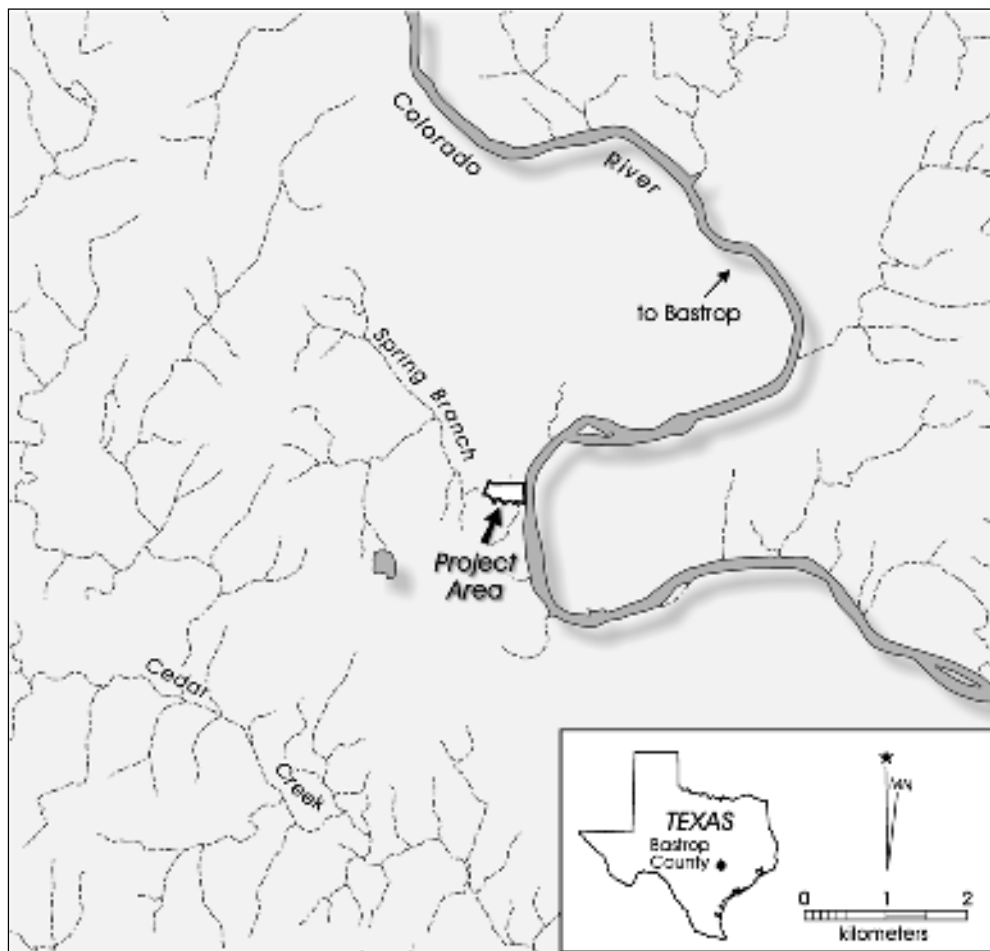


Figure 1-1. Location of project area in central Bastrop County.

effluent discharge into the Colorado River near its intersection with Spring Branch Creek, a small tributary creek bordering the tract along its southern margin.

The Area of Potential Effect (APE) includes two circular clarifier tanks, a Parshall flume, and an outfall pipe. The construction of the two circular clarifier tanks will require extensive excavation ranging from 4 feet (1.2 m) for the southern tank to 12 feet (3.67 m) at the concrete wall of the northernmost tank. The construction of the Parshall flume, a small rectangular structure used for flow measurement, will require excavation approximately 3 feet deep (0.9 m). The outfall pipe will originate at the flume and will require a maximum excavation to about 5 feet (1.5 m). This discharge pipe will be 18 inches in diameter (0.45 m) and is expected to extend for approximately 700 feet (213 m). A water well and associated piping will be installed parallel to the Colorado River at the eastern edge of the property.

While the entire APE of the facility construction measures roughly 4.5 acres, 41BP679 will be directly impacted by the installation of the western one-third of the outfall line and the construction of the easternmost clarifier tanks and associated building (Figure 1-3).

Because the site is listed as an SAL, the eligibility of 41BP679 is not in question. However, the proposed work will impact portions of the site. Therefore, the City of Bastrop contracted with CAR to design and conduct excavations to determine if the portions of 41BP679 that will be impacted by the planned construction of the water treatment plant contained deposits that contributed to the eligibility of the site. A secondary goal of the investigations was to better define the boundaries and temporal affiliation of the components noted at 41BP679 during its survey. The testing involved a combination of mechanical augering, backhoe trenching, and the hand excavation of test units. The archaeological testing of 41BP679 was performed under Texas Antiquities Permit No. 4117, with Kristi Ulrich serving as the Principal Investigator and Cynthia Moore Munoz serving as the Project Archaeologist.

The testing of 41BP679 included the mechanical excavation of 48 auger test bores, four backhoe trenches and four 50-x-50-cm test units. The auger bores, backhoe trenches and test units were positioned along the northern site boundary and along the route of planned outfall pipes to better define site boundaries, inspect the locations that will be directly impacted by the proposed development, and

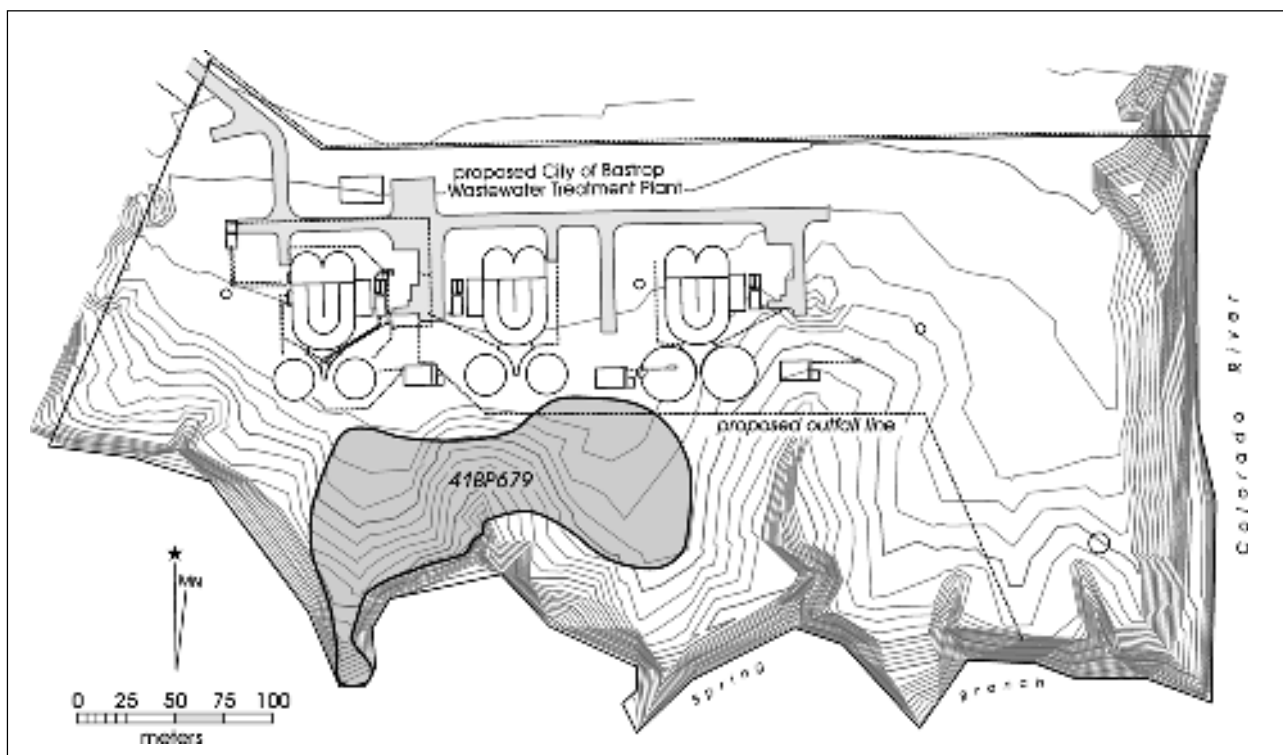


Figure 1-2. Project area showing the proposed City of Bastrop Wastewater Treatment Plant and related impacts to 41BP679.

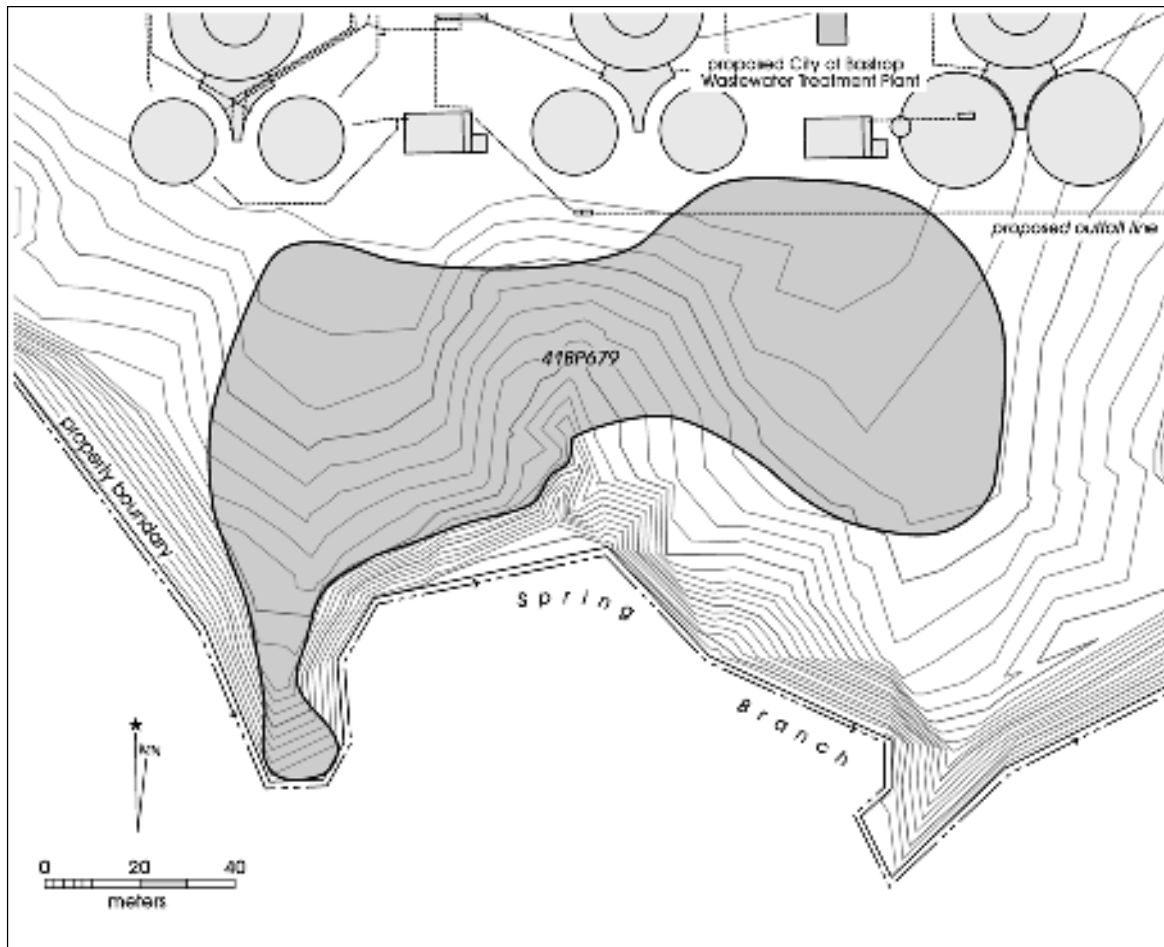


Figure 1-3. Detailed construction schematic for water treatment facility showing potential impacts to 41BP679.

define the horizontal and vertical distribution of cultural materials. The southern half of the site was not investigated because it is outside the building restriction line and will not be directly impacted by any proposed construction activities.

The results of testing efforts conducted at 41BP679 showed that the site likely contains a component dating to the Late Paleoindian or Early Archaic based on tool forms. A single peak in artifacts from 30-70 cm below surface (cmbs) is present in the testing data, though that peak cannot be associated with any diagnostic artifacts. Cultural material was present to a depth of 100 cmbs, the terminal depth of the test units. Survey-level excavations at the site identified no cultural deposits below this depth. The site produced low densities of lithic debitage, burned rock, and chipped lithic tools. No intact cultural features were identified on site although the recovery of burned rock does potentially suggest their presence.

The low density of cultural materials, when combined with the absence of features and the bioturbation of the upper 30 to 35 cm of the site, limits the research potential of the upper deposits. While the single cultural component in the lower deposits does not appear to be turbated and contains a temporally diagnostic tool, artifact densities are low and no features were observed. Therefore, CAR argues that the materials recovered from the portion of the site tested during the fieldwork do not contribute to the SAL eligibility of 41BP679. We recommend that the northern portion of the site be cleared for planned construction. As the southern portion of 41BP679 has not been tested, we further recommend that this southern portion remain off limits with regard to any construction activities.

Upon review of the draft technical report, the THC concurred with the conclusions and recommendations reached by CAR. In addition, the THC requested that the

portion of 41BP679 not assessed by CAR be protected from potential construction-related impacts by a fence. The desired location of the fence would be furnished by CAR to insure that intact portions of the site are not adversely affected by the fence's construction. Furthermore, if significant archeological deposits are uncovered during plant construction, the THC requested that all work should stop in those immediate areas and the City of Bastrop should immediately contact the THC.

CAR staff informed the City of Bastrop of the THC request. City representatives have indicated to CAR that fencing will be installed around the perimeter of the construction area both to keep people out of the construction area and keep construction impacts limited to the designated area. The fence will be a five-strand barbwire fence.

The report is organized into seven chapters. Chapter 2 discusses the environment of the project area. Chapter 3 provides an overview of the cultural chronology of the area and summarizes previous research in Bastrop County, Texas. Chapter 4 discusses field and laboratory methods employed during the testing of 41BP679. The results of excavations are presented in Chapter 5. Chapter 6 presents descriptions of the artifacts and the results of their analyses. Chapter 7 summarizes the testing phase and provides recommendations for the site.

Chapter 2: Project Area Environment

This chapter contains a description of the environmental setting of the project area, including climate, vegetation, geology, and soils. Portions of the environmental material were adopted from the archaeological survey report of sites 41BP678 and 41BP679 (Moses 2004).

Environmental Setting

The project area is located on the 1982 Bastrop 7.5-minute USGS quadrangle map, just southeast of the Edwards Plateau below the Balcones Escarpment along the Colorado River. Climate in this region is typically humid and subtropical with cool winters and hot summers (Baker 1979). Rainfall distribution is almost even throughout the year with a slight increase between April and June and again in September. Average annual rainfall for Bastrop County is 37.18 inches (Baker 1979). Temperatures range from an average low of 58.2°F to an average high of 78.9°F (Baker 1979). The annual growing season in Bastrop County is 206 days (The Handbook of Texas Online 2004).

The region is largely classified as a Post Oak Savannah floral province (Gould 1969). In this regime, non-pastured area vegetation consists largely of post oak (*Quercus stellata*) and blackjack oak (*Quercus marilandica*) with some black hickory (*Carya texana*) dominating the upper story (Gould 1969:11). The understory consists of flora typical of tall grass prairies, which are dominated by little bluestem (*Schizachyrium scoparium*). Also present in the understory are switchgrass (*Panicum virgatum*), purpletop (*Tridens flavus*), silver bluestem (*Bothriochloa saccharoides*), and Texas wintergrass (*Stipa leucotricha*). Portions of the project area nearer to the Colorado River floodplain include more water-tolerant hardwoods such as ash (*Fraxinus americana*), pecan (*Carya illinoensis*), water elm (*Ulmus* sp.), hackberry (*Celtis laevigata*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), cottonwood (*Populus deltoides*), and black willow (*Salix nigra*; Figure 2-1).

Bastrop County falls within the Texan biotic province (Blair 1950). The common mammalian species found in this region include white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), opossum (*Didelphis*

virginiana), and fox squirrel (*Sciurus niger*). There are also numerous bird species common throughout the county including the northern bobwhite (*Colinus virginianus*), eastern meadowlark (*Sturnella magna*), mourning dove (*Zenaida macroura*), killdeer (*Charadrius vociferous*), field sparrow (*Spizella pusilla*), red-tailed hawk (*Buteo jamaicensis*), and belted kingfisher (*Ceryle alcyon*).

The geologic strata exposed within the project area consist primarily of fluvial terrace deposits laid down during the late Pleistocene. The Colorado River's winding dendritic pattern of tributary streams has filled the river valley with as much as 70 feet (21 m) of sediment in some places. Combinations of gravel, sand, silt and clay in varying proportions overlying older Cretaceous and Tertiary strata generally characterize these alluvial sediments (Barnes 1974). Along the Colorado River, these gravels include dolomite, limestone, chert, and quartz from the Edwards Plateau as well as various igneous and metamorphic rocks from the Llano region. Approximately 1.5 km west-northwest of the survey area, outcroppings of Calvert Bluff Formation, a Tertiary mudstone with varying amounts of sandstone and lignite, are common. Rocks from the Simsboro Formation are also present to the northwest and are composed of mostly sand, some mudstone, clay, and mudstone conglomerate (Barnes 1974). Chert nodules and plates are common in Edwards limestone outcroppings located some 50 km to the northwest.

Large quantities of lithic material are present in Spring Branch Creek and in the unnamed ephemeral drainage that is located to the immediate southeast of 41BP679 (Figure 2-2). This particular drainage may not have been exposed during prehistoric times but it is likely that other drainages with similar resources may have been present in the area. A small sample of chert nodules was collected from the area in 2004. On average the maximum size of the nodules measured was 17 cm in length and 5 cm in thickness. Based on current research conducted in Parker County (Mauldin and Figueroa 2006), 41BP679 is located in an area of high to moderate raw material availability (Figure 2-3).

The project area is primarily composed of Bosque and Shep series soils associated with the lower terraces and flood



Figure 2-1. Typical vegetation within 41BP679 in the Colorado River floodplain.

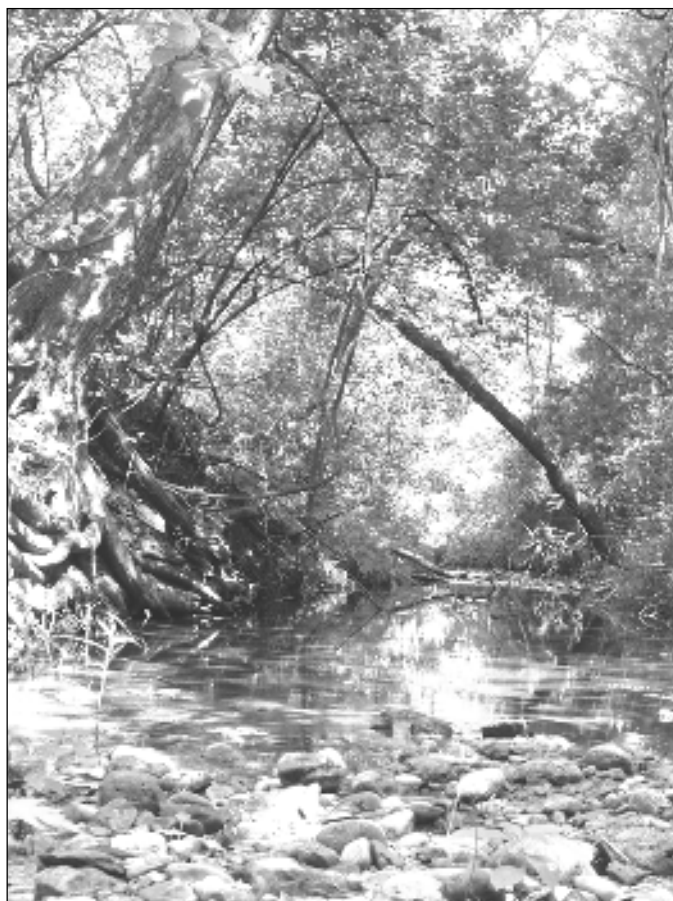


Figure 2-2. Chert material in the stream bed of Spring Branch Creek.

plains of the Colorado River. Bosque soils occur on relatively flat but dissected terraces averaging 40 to 50 feet (12-15 m) above the current river level (Baker 1979). The upper portions of Bosque series soils are composed of loam and transition to clay loam with depth. Shep soils are found on uplands near major drainageways and consist of deep, gently sloping to sloping, well-drained, loamy soils (Baker 1979). These Mollisols have a dark-colored surface layer that is high in organic matter and are commonly found beneath prairie grass in North America.

Topographically, the proposed wastewater treatment facility will be situated on the T2 terrace of the Colorado River on the western bank (cutbank side) of Haupt Bend. Elevations in the project area range from 315 to 365 feet AMSL. A large portion of the 26.5-acre area (approximately 50.7%)

shows evidence of recent plowing, and at the time of the initial survey, was overgrown in sunflower (*Helianthus annuus*). The area was cleared of sunflower prior to the 2006 test excavations.

Paleoenvironment

Several studies conducted in the counties adjacent to the project area have contributed to a reconstruction of the paleoenvironment of the region. A number of different data sets are used to document the paleoenvironment of Texas. These include geomorphic observations, fluvial system observations, organic carbon, pollen and faunal remains. This section relies on information taken from various studies located in Central, South and East Texas (Abbott 1994;

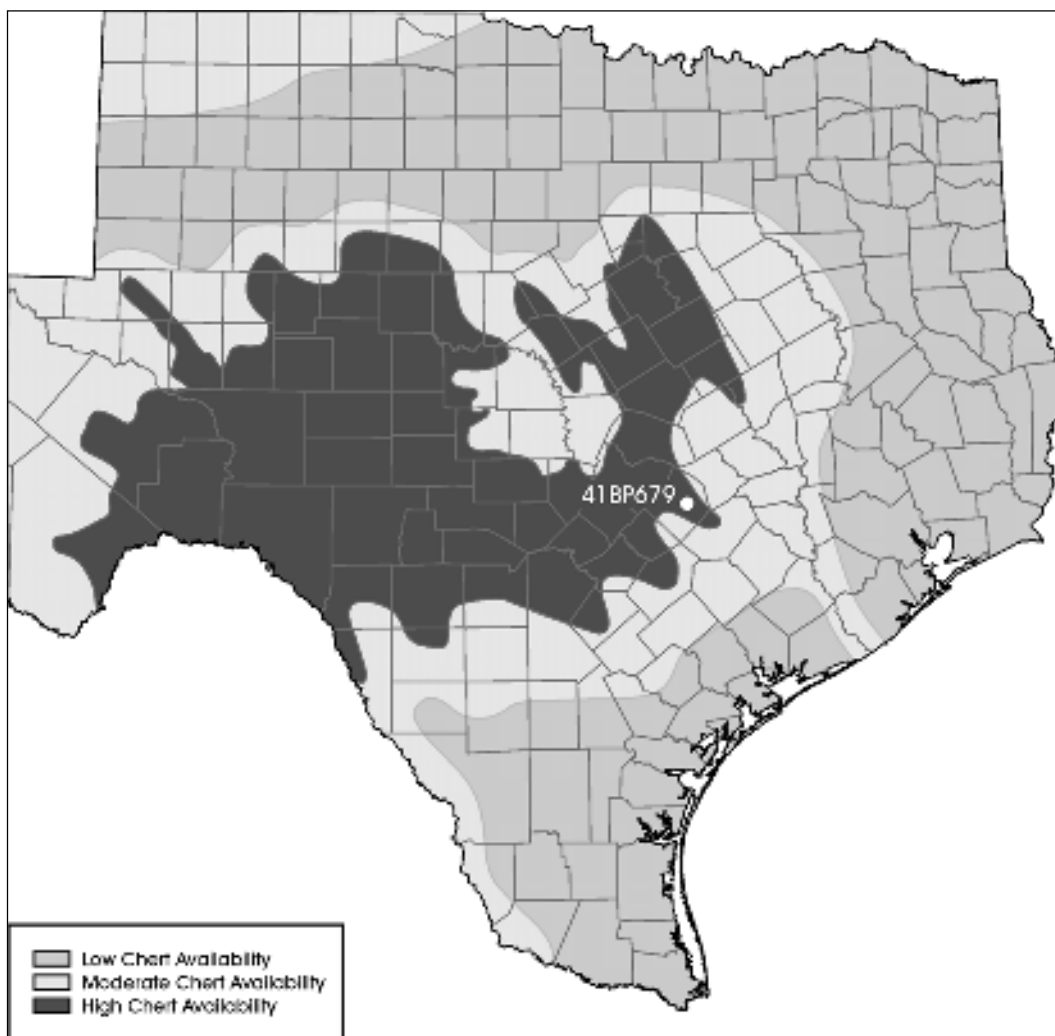


Figure 2-3. Distribution of chert availability throughout Texas (after Mauldin and Figueroa 2005).

Blum et al. 1994; Bousman 1998; Gadus et al. 2006; Johnson 1994; Mahoney et al. 2003; Nickels and Mauldin 2001; Ricklis and Collins 1994; Robinson 1982; Toomey 1993). Figure 2-4 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 Edwards 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 postulated that between 17,000 BP and 15,000 BP, “a cool grassland environment may have been present” (Nickels and Mauldin 2001:35). 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 to 11,000 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 (accumulation of soil) 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 42.8°F (6°C) cooler than present averages, and that by 13,000 BP

(or 12,500 BP [Toomey and Stafford 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 1994).

Early Holocene (ca. 10,000-8000 BP)

Pollen samples from the Llano Estacado and the dry caves of the Trans-Pecos region prompted Bryant 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 Coletto Creek drainage of the coastal plain of South Texas shows that, at least since the Early Holocene, climatic 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 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 1994). The opal phytolith records from the Wilson-Leonard site (Fredlund 1994) and two sites on Coleta 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 Edwards 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).

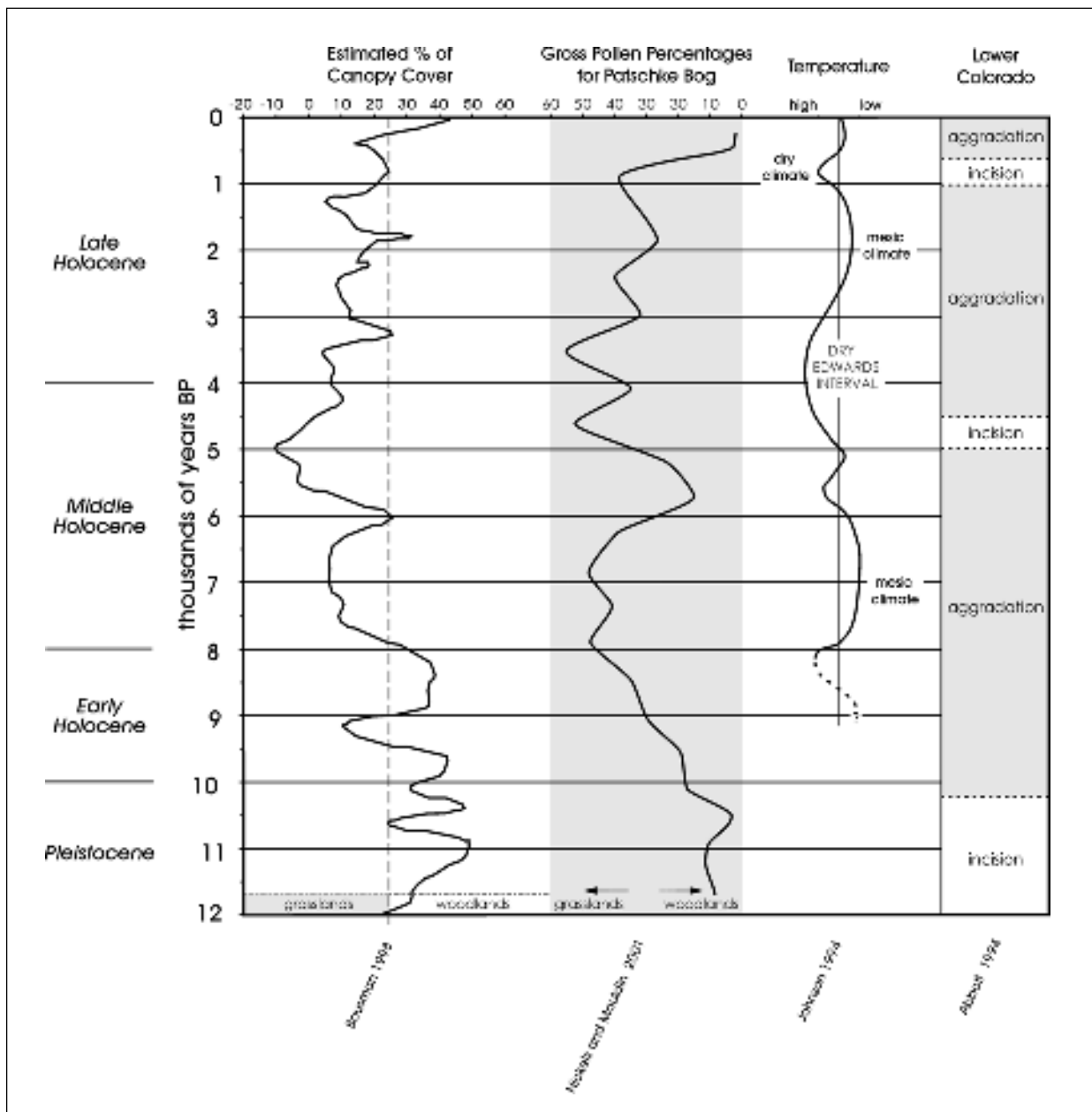


Figure 2-4. Paleoenviromental data for the portion of Texas encompassing the project area.

In contrast to this 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 (Robinson 1982). Between 5300 and 4300 BP, a cool, mesic climatic regime existed that returned to a more arid period after 4300 BP. The data then indicate 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 and 3000 BP, with the next thousand years dominated by open grasslands (Mahoney et al. 2003). Oxygen and carbon isotope analysis of snail shell from 41MM341 suggests 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 from 1500 to 1300 BP and from 500 to 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.

Chapter 3: Cultural Chronology and Previous Research

This chapter presents a review of the culture history of the region. The chapter concludes with a discussion of previous archaeological work conducted in the area and with a detailed description of the findings at 41BP679 during the initial survey conducted in August 2004. A majority of the background material was adopted from the archaeological survey report of 41BP678 and 41BP679 (Moses 2004).

Culture Chronology

In Central Texas, researchers have been able to document a long prehistoric sequence that can be broken down into four major time periods: Paleoindian, Archaic, Late Prehistoric, and Historic (Black 1989; Collins 1995; Prewitt 1981). These periods are further divided into subperiods that correspond to changing material cultures. Each of these time periods is briefly discussed here to illustrate the general archaeological potential of the region.

Paleoindian

The Paleoindian period (11,500-8800 BP) is often divided into early and late subperiods, each corresponding with changes in projectile point styles. Clovis and Folsom point types, and bifacial Clear Fork tools and finely flaked end scrapers characterize the early Paleoindian period (Black 1989). The first stemmed points (e.g., Wilson), as opposed to lanceolate points (e.g., Angostura and Golondrina), begin to appear during the late Paleoindian period. It is often assumed that the earliest Native Americans were hunter-gatherers subsisting primarily on large game including mastodon, mammoth, and *Bison antiquus*. However, recent research from the Wilson-Leonard site in Central Texas (Collins 1998) and new perspectives on Paleoindian adaptations (Tankersley and Isaac 1990) indicate that the diet of these early inhabitants may have been much broader.

In Central Texas many of the sites containing Paleoindian materials are found on high terraces, valley margins, and upland locations (Black 1989). 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). Common Paleoindian locations include camp, kill, quarry, cache, ritual, and burial sites. Projectile points are also often recovered as isolated finds from a variety of landforms (Hester 1995).

Archaic

The Archaic period (8800-1200 BP) is identified as a period of intensification of hunting and gathering and a move toward greater exploitation of local resources (Collins 1995). As a result, a broadening of the material culture is evident, including the “extensive use of heated rock” in cooking (Collins 1995:383). Food processing technologies appeared to have broadened as features such as hearths, ovens, and middens increase in frequency during this time (Black and McGraw 1985). Large cemeteries also appeared during this period signaling the likely establishment of regional “territories” (Black and McGraw 1985).

The Early, Middle, and Late Archaic subperiods correspond with changes in climatic conditions (see previous summary) and resource availability and are distinguished by differences in diagnostic projectile points (Collins 1995). During the Early Archaic (8800-5000 BP), a variety of Early Corner-Notched (Uvalde, Martindale, Baker) and then later Early Basal-Notched (Bell, Andice) points appeared across Central Texas. Early Archaic sites are often recorded on river terraces or on hills overlooking valleys (Hester 1995:439). A new set of temporally diagnostic artifacts are associated with the onset of the Middle Archaic (5000-2400 BP) including Pedernales, Langtry, Kinney, and Bulverde point types as well as triangular bifaces and tubular stone pipes (Black 1989; Hester 1995). In addition to the upland setting, Middle Archaic campsites are commonly located on floodplains, low terraces, and natural levees. The Late Archaic (2400-1200 BP) is characterized by the presence of Shumla, Montell, and Marcos point types and a diminution of projectile point types near the end of the subperiod (e.g., Ensor, Ellis, Figueroa). Late Archaic sites are usually located near modern stream channels and occur in all topographic settings (Black 1989; Hester 1995).

Late Prehistoric

The Late Prehistoric period (1200-350 BP) in Central Texas marks a distinctive shift from the use of the atlatl and dart to the use of the bow and arrow (Black 1989). This period is further subdivided into two phases termed the Austin and Toyah.

The Austin Phase occurred between 1200 BP and 650 BP (Prewitt 1981) and is marked by several temporal diagnostics including Scallorn and Edwards arrow points. The introduction of ceramics to Central Texas coincides with the beginning of the Toyah Phase, which spans the final three centuries of the Late Prehistoric (Black 1989). Perdiz and Clifton points are diagnostic points of the Toyah Phase.

Historic

The Historic period in Central Texas commenced with the arrival of Europeans in the late seventeenth century. The Central Texas region quickly became a focal point of conflict as the northward expansion of Spanish influence began to clash with the southward push of the Comanche and later the Apache. The result of this conflict was the displacement of many indigenous groups including, ultimately, the Tonkawa Indians of Central Texas. Decimated by disease brought by Europeans, many of the remaining groups sought refuge in the numerous Spanish missions established early in the eighteenth century (Moses 2004).

Mission life had a significant impact on the beliefs, lifeways, and material culture of the hunter-gatherers. The European influence can be seen in the artifact assemblages from this time and includes ceramics, metal and glass. However, pre-Hispanic Goliad ware and lithic artifacts (arrow points and scrapers) are also evident in the archaeological record (Moses 2004). In Bastrop County, the early Historic period was highlighted by Spanish *entradas* across the region including those by Domingo Teran de los Rios in 1691, Pedro de Aguirre in 1709, and Louis Juchereau St. Denis in 1714 (Foster 1995). In 1804 a small Spanish fort, Puesta de Colorado, was constructed at the Camino Real crossing of the Colorado River approximately 4 km from the current project area (Leffler 2001).

Previous Archaeology

Among the earliest attempts to document prehistoric life in the region is A. M. Wilson's (1930) unsystematic survey of Bastrop and Wilson counties. Unfortunately, Wilson's

sketchy descriptions and lack of reliable provenience data make it all but impossible to relocate many of the sites accurately on the state site file maps (Bement 1989; Klinger et al. 1999). In 1953, T. B. Campbell and E. R. Jelks, both of the University of Texas at Austin, excavated two Late Prehistoric burials at 41BP1 (Skelton and Freeman 1977:21). Seventeen additional sites were recorded and tested in Bastrop County between 1962 and 1968 by the University of Texas at Austin (Moses 2004). The most notable of these recorded sites are the McCormick Site (41BP3), the Pease Site (41BP5), and several sites near the Powell Bend Prospect along Big Sandy Creek (Kenmotsu 1982). In 1972, Paul Duke located the Thunderbird Lake Site (41BP78) near Smithville and recorded an extensive lithic concentration with diagnostic artifacts that included Paleoindian and Late Prehistoric specimens (Duke 1977). A number of cultural resources studies have also been carried out at Camp Swift in the northern portion of the county. These archaeological studies have contributed a comprehensive record regarding all stages of Bastrop County prehistory (Nickels et al. 2003; Robinson et al. 2001; Schmidt and Cruse 1995; Skelton and Freeman 1977).

In 1985 and 1986, David G. Robinson and Solveig A. Turpin, in association with the Texas Archeological Survey of the University of Texas at Austin, carried out an archaeological survey of selected lowland riverine zones in Bastrop County as a part of the Bastrop County Historical Commission's Sesquicentennial Project (Robinson 1987). That project included the current project area. Although no archaeological sites were observed within the current project boundary, four archaeological sites were identified to the south of the project area on the banks of the Colorado River (Moses 2004). Site 41BP311 is the largest and closest of these sites to the project area. It is located on the southern bank of Spring Branch Creek. The site consists of copious amounts of lithic debitage, burned rock, deer bones and shell scattered across approximately 10 acres. A single shovel test was placed within the site boundary. Cultural materials were observed to a depth of 30 cm in gravel pit profiles (Texas Historical Commission 2004). A single looter's excavation pit was observed on site. The site is assumed to be of Archaic age, although no temporally diagnostic artifacts have been recovered. Immediately south of 41BP311, a second prehistoric site was recorded, 41BP50. Here, a buried midden was exposed in a gravel pit excavated by a bulldozer. Choppers, cores, debitage, finished bifaces and a Clear Fork gouge were reported as having been recovered from 41BP50. Site 41BP51 was identified farther south of 41BP50. This is also a buried

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gradual slope. Due to the dense vegetation and poor visibility across the area, only two artifacts, a large bifacial preform and a core, were observed on the surface during the reconnaissance (Moses 2004).

Two shovel tests were excavated within the site boundary, and both were positive. Cultural material consisting of chipped stone debitage and burned rock was recovered from Shovel Test (ST) 27 between 10 and 20 cmbs. ST 23 contained materials at all depths from the surface to 30 cmbs. Six additional negative shovel tests were placed to the north and east of the site and aided in delineating the site boundaries (Moses 2004; Figure 3-1).

Two backhoe trenches were excavated at 41BP679 (Figure 3-1). Backhoe Trench (BHT) 5 was placed on the brow of the eastern rise and four pieces of lithic debitage were observed in the backdirt. A single flake was recorded in the wall of the trench at 15 cmbs. BHT 6 was excavated on the western knoll and cultural debris was abundant at that location. Due to the amount of cultural material present in the backdirt artifacts were collected from BHT 6. The artifacts include two bifaces, 15 pieces of lithic debitage, eight burned rock fragments, two bone fragments and a mussel shell fragment. Two flakes were also observed in the wall of the trench, one at 75 cmbs and the other at 92 cmbs. The two bifaces recovered from BHT 6 are heavily patinated. The parallel flaking pattern on one of the specimens (see Moses 2004: Figure 4-8) is reminiscent of some late Paleoindian artifacts, such as Angostura points (Turner and Hester 1999:73-74). However, the broken nature of the item prevents a positive assignment to any time period (Moses 2004).

Summary

The 2004 survey and shovel testing on 41BP679 produced chipped stone tools and debitage, as well as burned rock, from the surface down to 30 cmbs. Deeper archaeological deposits (ca. 75 to 92 cmbs), minimally consisting of debitage, are reflected in the material from BHT 6. No features were recorded at the site, though burned rock is present. While no diagnostic artifacts were present, a broken biface was recovered from backhoe trench backdirt. The parallel flaking on the highly patinated biface is reminiscent of late Paleoindian (cf. Angostura) forms (Moses 2004). The 2004 survey concluded that there was insufficient information to make a determination on eligibility for listing on the National Register of Historic Places (NRHP) or for State Archaeological Landmark designation of 41BP679

(Moses 2004). It was recommended that if the wastewater treatment facility could not be moved a testing phase would be necessary to determine the eligibility status of the site. Following the survey, the City of Bastrop, in conjunction with the Texas Historical Commission formally listed 41BP679 as an SAL. Because the site is listed as an SAL, the purpose of this testing is not to determine eligibility but to determine if the portions of 41BP679 that will be impacted by the planned construction of the water treatment plant contain deposits that contribute to the eligibility of the site.

Chapter 4: Field and Laboratory Methods

The proposed construction of the water treatment facility and associated piping will impact 41BP679. The previous survey indicated that 41BP679 had probable intact deposits and subsequently the Texas Historical Commission, in accord with the City of Bastrop, designated the site a State Archaeological Landmark. While 41BP679 may contain a late Paleoindian component, this has not been established. In addition, the temporal affiliation of the materials in the upper 30 cm of the deposits is not known. Furthermore, because of time constraints, the initial survey (Moses 2004) performed only minimal work on determining site boundaries. Consequently, the scope of work was designed to (1) determine if the portions of 41BP679 that will be impacted by the planned construction of the water treatment plant and associated facilities contain deposits that would contribute to the eligibility of the site, and (2) better define spatial and temporal boundaries for 41BP679. This chapter presents the field and laboratory methods used during the archaeological investigations of 41BP679.

Field Methods

A combination of excavation techniques were used during the testing of 41BP679 including auger boring, backhoe trenching and test units. Mechanical auger boring was employed prior to backhoe trenching and test units in order to determine the horizontal distribution of cultural material, including features, on the site. Based on artifact densities revealed by the auger tests and on known areas of potential impact, four backhoe trenches were excavated, followed by four 50-x-50-cm test units.

Mechanical Auger Boring

The first phase of investigations consisted of the mechanical excavation of 48 auger bores using a 12-inch (30.5-cm) auger bit. These were excavated to a depth of 120 cmbs to establish the presence/absence and density of cultural deposits in the area. The initial survey identified two sets of deposits, with material located from 0 to 30 cmbs, and deeper deposits located from 75 to 92 cmbs. Based on these depths the auger tests consisted of bore excavations in two levels, with the first level from 0 to 60 cmbs, and the second from 60 to 120 cmbs. This effectively documented the vertical distribution of the two components. Figure 4-1

presents the spatial distribution of the auger bores. All sediments from these bores were screened through ¼-inch mesh and all artifacts were returned to the CAR laboratory for processing and analysis. Overall, the auger placement and screening strategy were to (1) clarify the boundary of the site; (2) clarify the spatial distribution of the two components within the site; and (3) identify deposits that may be impacted by the construction of the outflow pipe along the northern edge of the site. Following the auger boring, artifact densities were examined to determine the horizontal and vertical distribution of cultural materials and identify and prioritize areas associated with the proposed construction for additional testing (i.e., backhoe trenches and test units).

Backhoe Trenching

Based on the results of the auger bores, four backhoe trenches were excavated on 41BP679 (Figure 4-1). The purpose of the four backhoe trenches was to expose stratigraphic profiles and potential features. Furthermore, backhoe trenches were used to guide the positioning of subsequent hand-excavated test units. Backhoe trenches were roughly 10 m in length, 1 m in width, and, because deeper deposits were not noted during the 2004 survey, no more than 1.2 meters deep. After the excavation of each backhoe trench, the project archaeologist entered the trench to examine the stratigraphy and artifact density indicated by the trench walls. Based on these observations locations were determined for 50-x-50-cm test units.

Test Units

Finally, as a more fine-grained exploratory and documentation strategy, four 50-x-50-cm units were excavated. Each test unit was placed off one of the four backhoe trench walls. The goal of these excavations was to recover detailed information on the vertical distribution of cultural materials. All test units were excavated in arbitrary 10-cm levels and all matrix recovered during excavations was screened through ¼-inch mesh. The depth of the test units did not exceed 100 cmbs. All artifacts recovered were bagged and referenced to the appropriate provenience. Material collected was returned to the CAR laboratory for processing and detailed analysis. Matrix

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Artifacts processed in the CAR laboratory were washed, air-dried, and stored in archival-quality bags. Acid-free labels were placed in all artifact bags with a provenience and corresponding lot number. Tools were labeled with permanent ink and covered by a clear coat of acrylic. In addition, a small sample of unmodified debitage from each lot was labeled with the appropriate provenience data. Other artifacts were separated by class and stored in acid-free boxes. Boxes were labeled with standard labels. Field notes, forms, photographs, and drawings were placed in archival folders. Photographs, slides, and negatives were placed in archival-quality sleeves. All archival folders were stored in acid-free boxes. Documents and forms were printed on acid-free paper. A copy of the survey report and all computer disks pertaining to the investigations were stored in an archival box and curated with the field notes and documents. Upon completion of the project all cultural materials and records will be permanently curated at the CAR facility.

Chapter 5: Results of Testing at 41BP679

Phase II testing of 41BP679 occurred between May 11 and May 18, 2006. The site was initially subject to auger boring (n=48), followed by backhoe trenching (n=4), and the excavation of 50-x-50-cm test units (n=4). The placement of backhoe trenches and test units was determined based on the results of the auger bore excavations. As a result of the auger boring the site boundary was better defined. The auger boring and test unit excavations of 41BP679 revealed a light distribution of cultural material both vertically and horizontally. This chapter discusses the results of the auger bores, backhoe trenches and test units excavated at the site.

Auger Boring

Forty-eight mechanical auger bores were excavated during the testing phase of 41BP679 (Figure 5-1). Initially 47 auger bores were excavated followed by the placement of one additional auger bore (see Figure 4-1). Of the 48 auger bores, 42% were positive (n=20). As discussed in Chapter 4, the auger tests were excavated in two levels (0-60 and 60-120 cmbs). Fifty-eight artifacts were recovered from

the auger test excavations, 22% (n=13) of the artifacts from Level 1 and 78% (n=45) from Level 2 (Table 5-1). Burned rock was the most frequent artifact type recovered from auger tests (45%), followed by lithic debitage (40%), mussel shell (10%) and lithic tools (5%).

Table 5-1. Auger Test Results from 41BP679

	Level 1	Level 2	Total	
Burned Rock	6	20	26	45%
Debitage	5	18	23	40%
Tools	2	1	3	5%
Mussel Shell	0	6	6	10%
Total	13	45	58	
	22%	78%		100%

Backhoe Trenches

Based on the artifact distribution encountered in auger boring, four backhoe trenches were excavated on site 41BP679 (Figure 5-2). Backhoe trenches were placed in



Figure 5-1. Mechanical auger in use on site.



Figure 5-2. Backhoe trench excavation at 41BP679.

areas of potential disturbance by pipe installations for the facility and in the vicinity of positive auger tests (see Figure 4-1). BHT 1 was excavated on the western portion of the site, while BHTs 2, 3 and 4 were placed on the eastern portion of the site. The backhoe trenches revealed homogenous soils that consisted of brown to dark brown silty clay and heavy clay. Profiles were not drawn of the backhoe trenches but were drawn for each test unit and are discussed in the following section.

No features were identified during the backhoe trench excavations, but some artifacts were encountered. The south wall profile of BHT 1 contained a concentration of charcoal (65 cmbs), six pieces of lithic debitage (five from 52 to 67 cmbs and one from 115 cmbs) and two specimens of burned rock (55 and 67 cmbs; Figure 5-3; Table 5-2). All the material except one piece of debitage was concentrated from 50 to 70 cmbs pointing to the possibility of a single component. These artifacts were not collected. Two lithic tools, seven pieces of burned rock and seven pieces of lithic

debitage were collected from the backdirt associated with BHT 1. No artifacts were identified in the profile of BHT 2, but two pieces of lithic debitage, a piece of burned rock and a mussel shell were collected from the backdirt. BHT 3 contained a piece of lithic debitage in the north wall profile (90 cmbs) and one piece in the associated backdirt. No artifacts were encountered in the profile of BHT 4. Five pieces of lithic debitage and two pieces of burned rock were collected from the backdirt. In summary, 37 artifacts were associated with BHTs 1-4: Twenty-eight were collected from the backdirt, and nine were evident in the profiles of BHTs 1 and 3 (Table 5-2). The majority of the artifacts (65%) were found in BHT 1, followed by 19% in BHT 4, 11% in BHT 2, and 5% in BHT 3.

Test Units

Four 50-x-50-cm test units were placed off of selected backhoe trench walls (see Figure 4-1). Based on artifact

density, two units were placed off BHT 1, and one each off BHTs 3 and 4. Test units were excavated to a depth of 100 cmbs, in 10-cm increments.

Varying amounts of material were recovered from each test unit (Table 5-3). Seventy-nine artifacts were recovered from the test unit excavations. The excavations of Test Units (TUs) 1 and 2 produced the greatest number of artifacts (70%; n=55) recovered from all the test units. When examining the vertical distribution of cultural material, Level 5 contained the highest frequencies (n=20) with Levels 4 and 6 following (n=10 each) (Figure 5-4). All levels produced artifacts with Levels 3 and 9 having the lowest frequencies.

Soil samples (1 liter) were taken from each level of TUs 1, 3 and 4. Because the stratigraphy was identical in TUs 1 and 2, a decision was made to forego sampling soil in TU 2. Water screening of soil samples resulted in one piece of burned rock from TU 3, Level 9.

Test Unit 1

Test Unit 1 was located off BHT 1 on the south side of the trench. The datum was located at the midpoint of the south wall of the unit. The soils from TU 1 were fairly homogenous only varying slightly and consisted of compact silty clays with roots and rootlets (10YR 3/1 very dark gray) in the upper 30 cm and hard heavy clays with roots (10YR

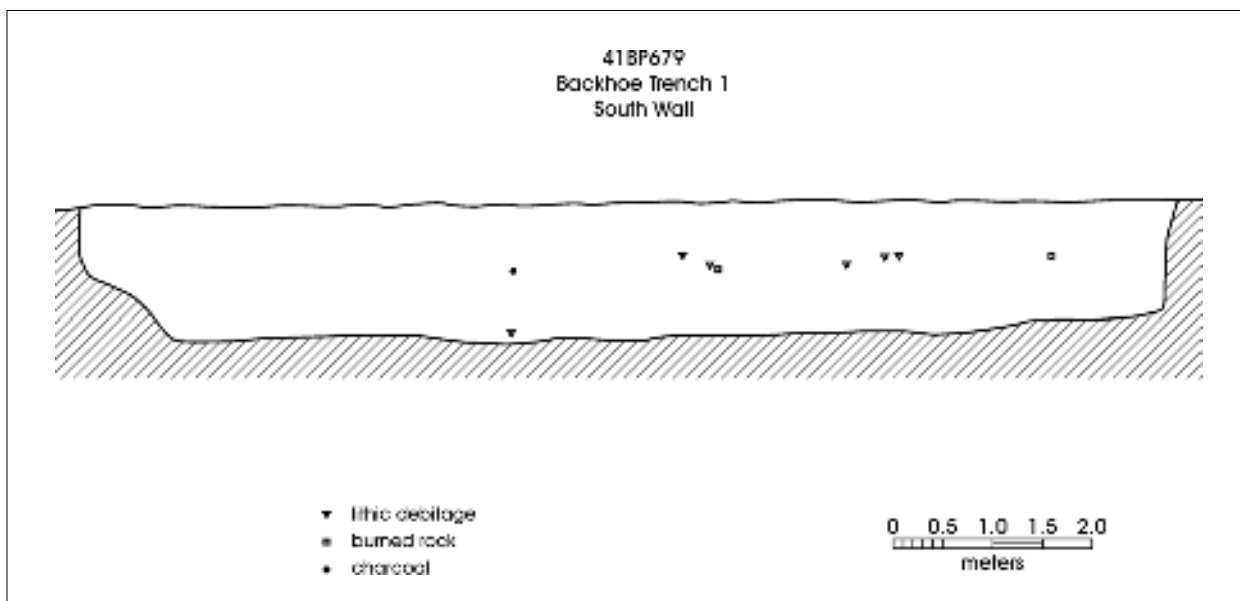


Figure 5-3. South wall profile of Backhoe Trench 1 showing artifacts in situ.

Table 5-2. Auger Test Results from 41BP679

	BHT 1 Backdirt (Profile)	BHT 2 Backdirt	BHT 3 Backdirt (Profile)	BHT 4 Backdirt	Total	
Burned Rock	7 (2)	1	0	2	12	32%
Debitage	7 (6)	2	1 (1)	5	22	60%
Tools	2	0	0	0	2	5%
Mussel Shell	0	1	0	0	1	3%
Total	24	4	2	7	37	
	65%	11%	5%	19%		100%

Table 5-3. Test Unit Results from 41BP679

Test Unit	Level	Tools	Burned Rock	Debitage	Mussel Shell	Total
1	1		1	1	1	3
	2			3		3
	3					0
	4		2	2		4
	5	1	2	2	1	6
	6		4			4
	7			4		4
	8		2	1		3
	9			1		1
	10		2			2
Total		1	13	14	2	30
2	1		2	1		3
	2					0
	3		1			1
	4		1	2		3
	5			9		9
	6			2	1	3
	7			2		2
	8			2		2
	9			1		1
	10			1		1
Total			4	20	1	25
3	1					0
	2					0
	3					0
	4					0
	5			1		1
	6					0
	7			1		1
	8					0
	9					0
	10		3	1		4
Total			3	3		6
4	1			1		1
	2					0
	3		1			1
	4			2	1	3
	5			4		4
	6			2	1	3
	7		1	1		2
	8			1	1	2
	9			1		1
	10				1	1
Total			2	12	4	18
Grand Total		1	22	49	7	79

3/1 very dark gray) in the lower 70 cm (see Figure 5-5). The lower 70 cm contained two layers of calcium carbonate threads and small nodules between 70 and 80 cmbs and between 90 and 100 cmbs. The cultural material retrieved from this unit included lithic debitage (n=14), burned rock (n=13), mussel shell (n=2), and a lithic tool (n=1). The highest density of artifacts was from Level 5 (20%), followed by Levels 4, 6, and 7 (13% each). The artifact density in Levels 4 through 7 comprises 60% of the total unit artifacts. The remaining artifacts are found fairly evenly throughout Levels 1, 2, 8, 9, and 10 (Table 5-3). Snail shell fragments were present but were not collected.

The lithic tool was recovered in the screened matrix from Level 5, 40-50 cmbs. The tool is an early reduction stage biface and is discussed in more detail in Chapter 6.

Test Unit 2

Test Unit 2 was positioned off BHT 1, on the south side of the trench approximately 1.5 m east of TU 1 (see Figure

4-1). The datum was located at the midpoint of the south wall of the unit. The soil in TU 2 was identical to that of TU 1 (Figure 5-5). Cultural material recovered in this unit included lithic debitage (n=20), burned rock (n=4), and mussel shell (n=1). The highest density of artifacts was from Level 5 (36%) and 60% of Unit 2 artifacts were found in Levels 4 through 6. The remaining levels, with the exception of Level 2 (n=0), contained a fairly even distribution of artifacts (Table 5-3). Snail shell fragments were present but not collected.

Test Unit 3

Test Unit 3 was located on the north side of BHT 3 (see Figure 4-1). The datum was located at the midpoint of the north wall of the unit. The soil in TU 3 consisted of four stratigraphic layers (Figure 5-6). The first layer was comprised of a brown compact silt with roots (10YR 3/3 dark brown) extending from 0-14 cmbs. The second layer consisted of a silty clay matrix approximately 33 cm thick (10YR 3/2 very dark grayish brown). The third matrix layer

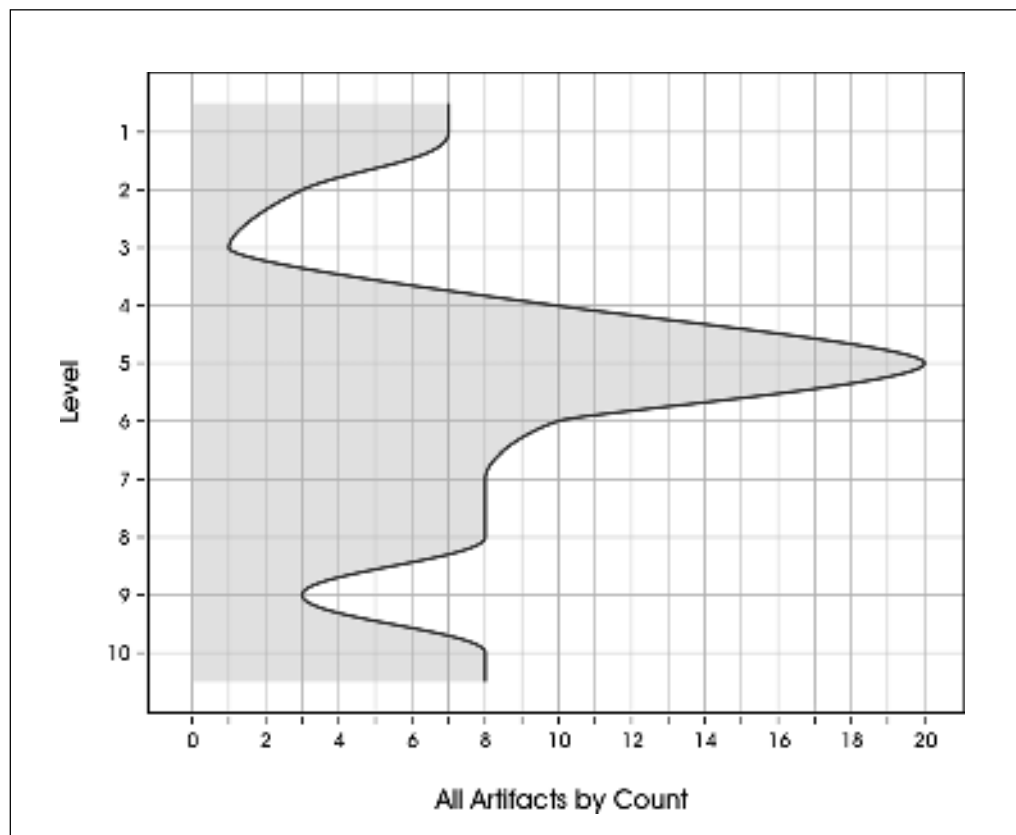


Figure 5-4. Vertical distribution of all artifacts recovered from excavation units at 41BP679.

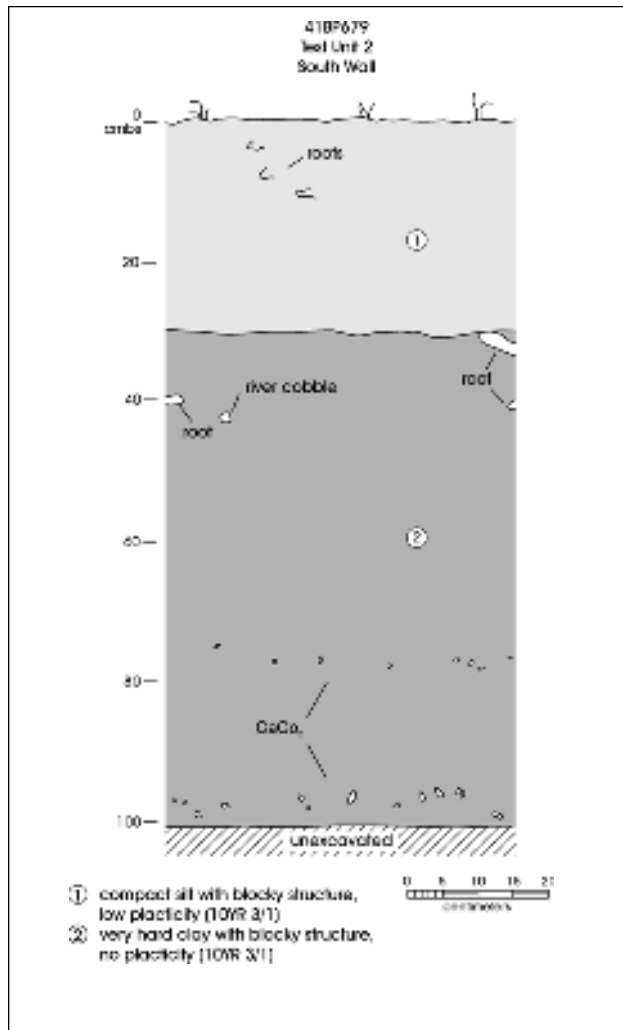


Figure 5-5. South wall profile of Test Unit 2.

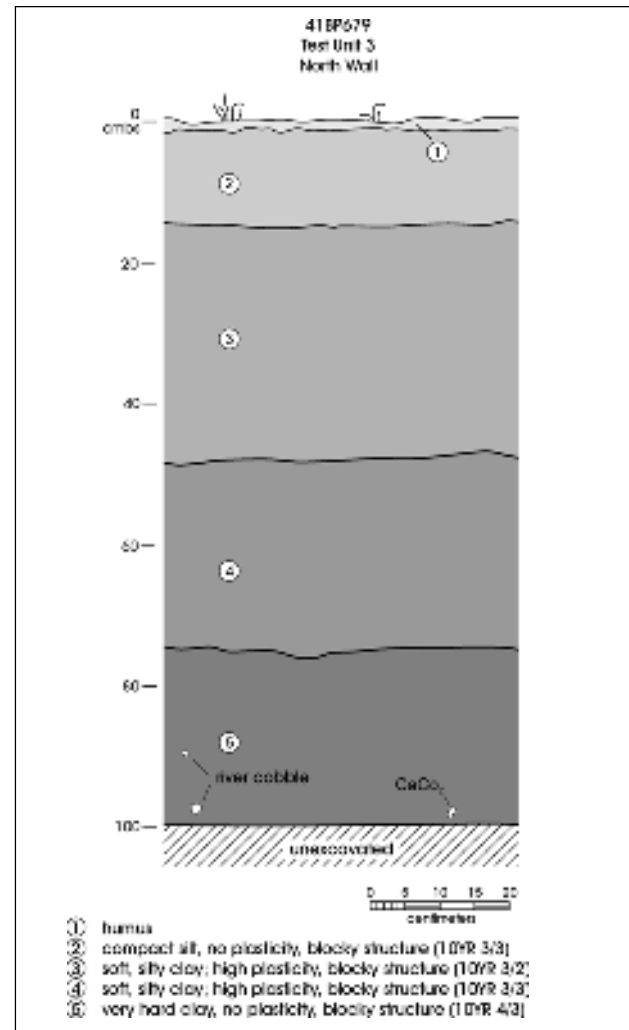


Figure 5-6. North wall profile of Test Unit 3.

contained a slightly darker brown silty clay matrix 27 cm thick (10YR 3/3 dark brown). The fourth layer consisted of hard, heavy clay (10YR 4/3 brown) (Figure 5-7). Six artifacts, three pieces of lithic debitage and three specimens of burned rock were recovered from this unit (Table 5-3). The highest density of artifacts (67%) was from Level 10, 90-100 cmbs. Other levels containing cultural material were Levels 5 and 7 with one specimen of debitage each. Snail shell fragments were present but not collected.

Test Unit 4

Test Unit 4 was excavated off the west wall of BHT 4 (see Figure 4-1). The datum was located at the midpoint of

the west wall of the unit. This unit contained four matrix layers (Figure 5-8). The first layer of matrix consisted of a silty clay extending from 0-10 cmbs (10YR 3/3 dark brown). The second layer was comprised of silty clay approximately 40 cm thick (10YR 4/3 brown). The third matrix layer contained higher clay content than the previous layers and was a dark yellowish brown (10YR 3/4). The final layer was a hard heavy clay (10YR 3/3 dark brown). Roots and rootlets were found throughout the unit (Figure 5-9). Cultural material recovered in TU 4 included lithic debitage (n=12), burned rock (n=2), and mussel shell (n=4). The highest density of artifacts was from Level 5 (22%), followed by Levels 4 and 6 (17% each). The artifact density in Levels 4 through 6 comprises 56% of the total unit artifacts. The remaining artifacts are distributed fairly evenly



Figure 5-7. North wall of Test Unit 3.

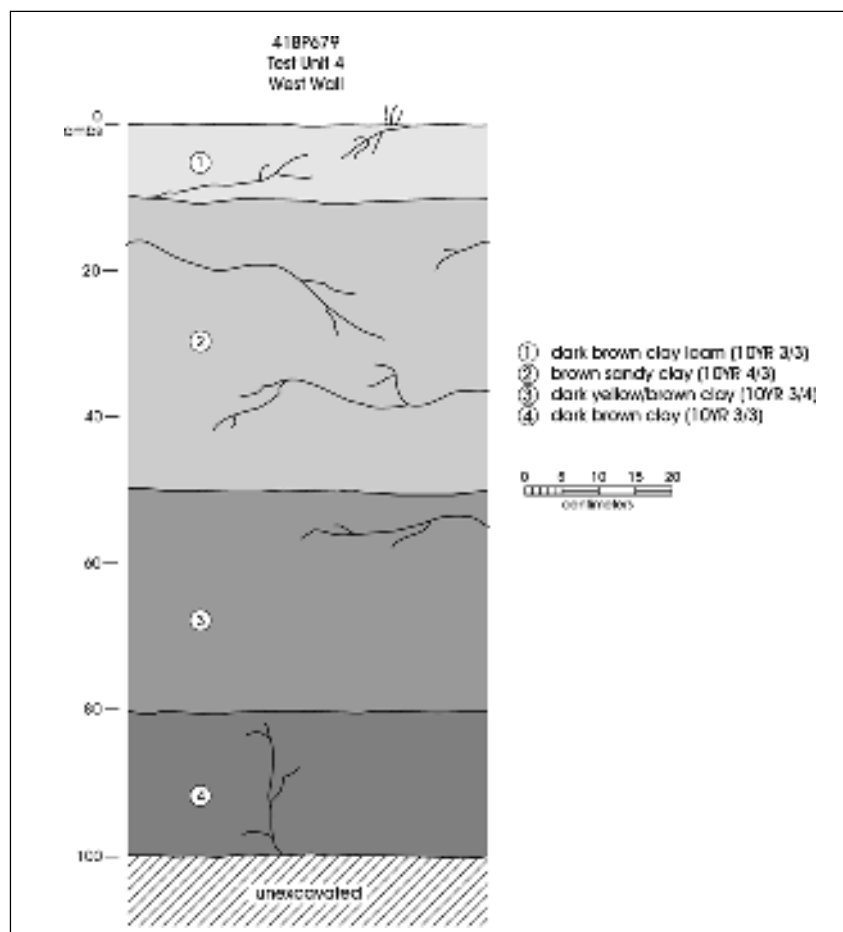


Figure 5-8. West wall profile of Test Unit 4.



Figure 5-9. West wall of Test Unit 4.

throughout the remaining levels with the exception of Level 2 (n=0) (Table 5-3). Snail shell fragments were present but were not collected.

Summary of Test Unit and Auger Bore Excavations

The testing of 41BP679 used auger boring, backhoe trenching and hand-excavated test units to investigate the boundary of the site as well as the vertical and horizontal distribution of cultural material. The site boundary was refined from the boundary previously defined in the site survey (Moses 2004) as a result of auger bore artifact distribution (see Figure 4-1). Due to positive Auger Tests 1, 2, and 48 the boundary was extended to the northwest on the western side of the site. Positive Auger Tests 35, 44 and 47 resulted in a boundary extension to the north and east on the eastern side of the site. Negative Auger Tests 12, 19, 20, 21, and 22 resulted in a boundary reduction to the south on the western and middle portions of the site.

Seventy-nine artifacts were recovered from test unit excavations (Table 5-3). The vertical distribution of cultural material in TUs 1, 2, and 4 strongly suggests the presence of a prehistoric component occurring between 30 and 70 cmbs. The possibility of a second component commencing at 90 cmbs is based solely on the artifact distribution in TU 3.

This unit contained minimal artifacts (n=6). However, four of the six (67%) were recovered from Level 10. The artifacts consisted of three specimens of burned rock and one piece of debitage. Test Unit 3 was placed along the location of the proposed outfall pipe. The possibility of a deep prehistoric component at this location may be of importance during construction of the wastewater facility. This is discussed in detail in Chapter 7. No features were observed at this site, though burned rock was present. One temporally diagnostic artifact was recovered from BHT 1 (see Figure 4-1). A distally beveled biface, identified as an adze based on use-wear, was recovered from the backdirt associated with this trench. The biface appears to be a Clear Fork tool. Clear Fork tools are diagnostic of Early Archaic components (8800 to 6000 BP) (Collins 1995:383).

A comparison of artifact counts recovered from auger tests relative to test units reveals an auger test recovery rate of 13.4 artifacts per cubic meter and a test unit recovery rate of 79 artifacts per cubic meter. The disparity in recovery rate is most likely due to the placement of test units. Test unit placement was based on the location of positive auger tests, areas where cultural material was known to occur. In contrast, auger tests were placed in a gridlike pattern across the northern portion of the site with the intention of full coverage within this area. Auger tests were not placed in areas where cultural material was known to occur.

Chapter 6: Artifact Descriptions and Analysis

This chapter presents descriptive data for the cultural material recovered during Phase II testing of 41BP679. Excavated artifacts include burned rock, lithic debitage, and lithic tools. A small amount of faunal material was encountered consisting of mussel and snail shell. In addition to the descriptive data, the results of a lithic debitage and tool analysis are discussed.

Burned Rock

Burned rock is indicative 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 indicative of cultural use (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 41BP679, burned rock was recovered. Fifty-eight pieces of burned rock were collected from the site, 26 from auger bores, 10 from backhoe trenches and 22 from test units. Burned rock was encountered throughout the excavation levels. In the auger bores the majority of the burned material (77%) was associated with the lower level (60-120 cmbs; Figure 6-1). The test unit level with the highest density of burned rock was Level 10 (90-100 cmbs, 23%), followed by Level 6 (50-60 cmbs, 18%; Figure 6-2). For purposes of comparison the auger and test unit levels were combined resulting in a screened volume of 7.3 specimens per cubic meter from the upper 0-60 cmbs, and 10.9 specimens per cubic meter from the lower 60-120 cmbs. Because burned rock is associated with cultural features, its presence in the lower levels may indicate a higher probability of features in the lower deposits.

Lithic Debitage

Lithic debitage recovered from controlled stratigraphic contexts at 41BP679 consisted of 87 specimens. Twenty-three were collected from auger bores, 15 from backhoe trench profiles and 49 specimens from test units. Specimens were recovered from all levels. In the auger bores, the majority of debitage (78%) was associated with the lower level (60-120 cmbs; Figure 6-3). The test unit level with the highest density of lithic debitage (33%) was

Level 5 (40-50 cmbs), followed by Level 7 (60-70 cmbs, 16%), Level 4 (30-40 cmbs, 12%), and Levels 6 and 8 (50-60 cmbs and 70-80 cmbs, 8% each; Figure 6-4). Test unit Levels 4-8 (30-80 cmbs) contained 78% of the debitage recovered. When auger bores and test units were combined a screened volume of 13.4 specimens per cubic meter was associated with Level 1 (0-60 cmbs) and 13.7 specimens per cubic meter with Level 2 (60-120 cmbs). This vertical distribution of lithic debitage points to the presence of a prehistoric component occurring between 30 cmbs and 70 cmbs.

Lithic Debitage Analysis

An analysis was conducted on the lithic debitage recovered from 41BP679 in an attempt to determine the probable reduction/production strategy used at the site (late stage versus early stage/tool manufacture versus core reduction). The results of the analysis should also allow conclusions to

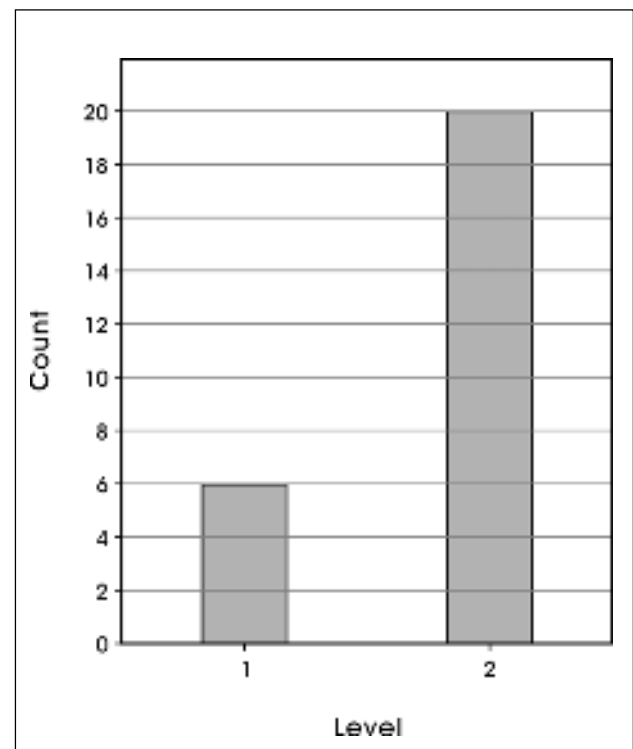


Figure 6-1. Auger test burned rock distribution by level.

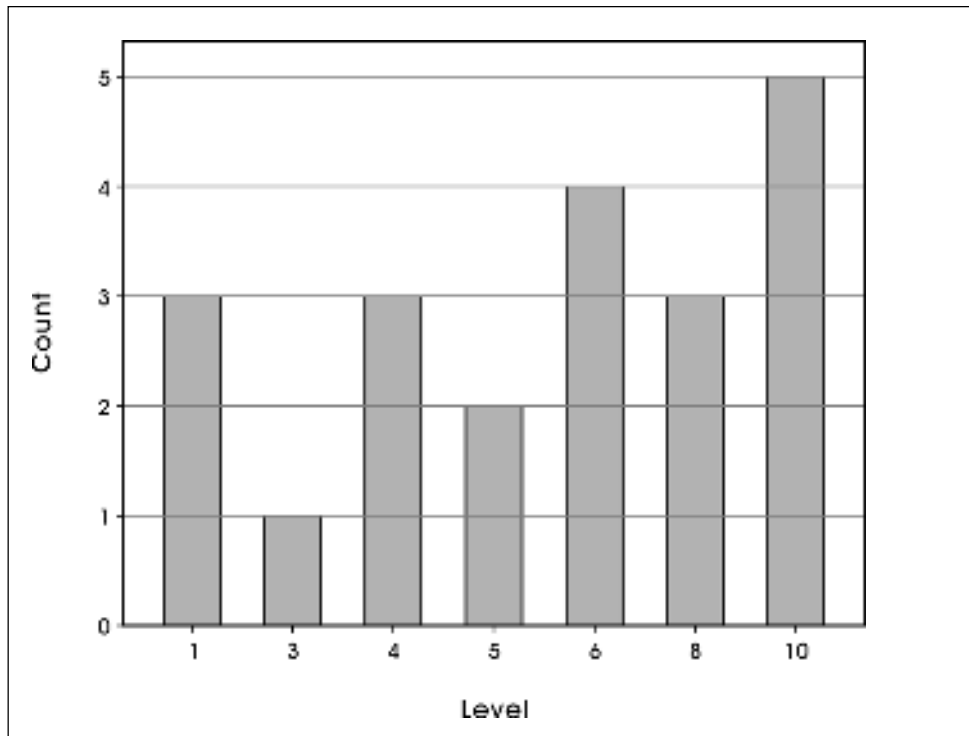


Figure 6-2. Test unit burned rock distribution by level.

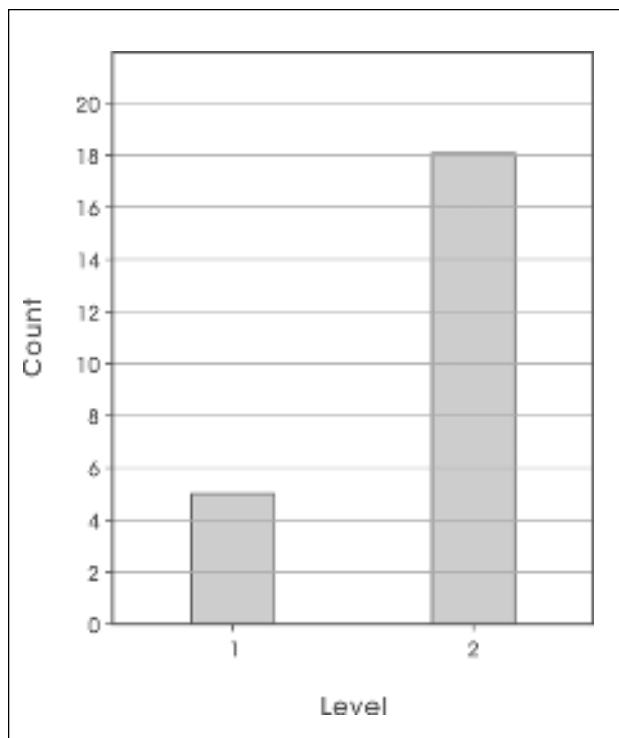


Figure 6-3. Auger test debitage distribution by level.

be drawn regarding raw material availability in the area. In addition, the presence/absence of patina on the lithic debitage was noted in an attempt to correlate patterns of patinated artifacts to excavation level. Debitage recovered from 41BP679 was analyzed by technological attributes, including presence/absence of cortex, presence/absence of heat treatment, and flake condition (breakage pattern). Additionally, the flakes were measured for maximum length and thickness and the presence/absence of patina was noted. The following discussion on the debitage analysis is organized by attribute.

Cortex

The most 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

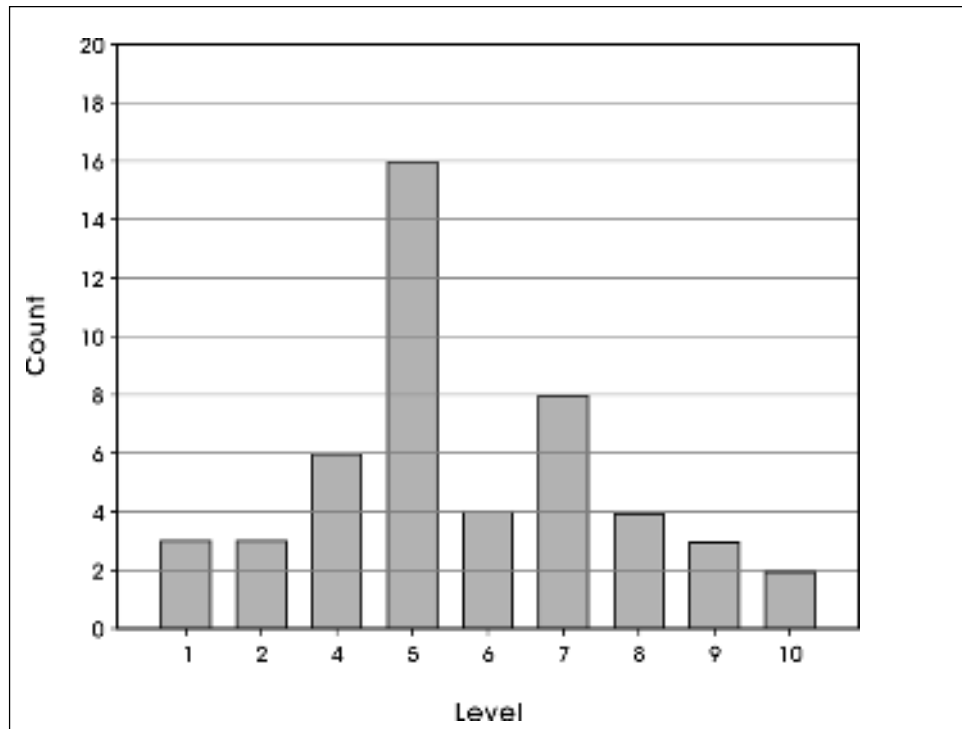


Figure 6-4. Test unit debitage distribution by level.

amount of cortex should be less on late reduction specimens and greater on early reduction pieces (Andrefsky 1998; Maudlin and Amick 1989; 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 (1989:109). 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 of the 87 specimens of lithic debitage was examined to determine the percentage of dorsal cortex present. The debitage was coded as (1) 0% cortex, (2) 1-50% cortex, and (3) 51-100% cortex. Of the 87 specimens recovered, 70% (n=61) are tertiary (0% cortex), 30% (n=26) are secondary (1-99% cortex), and none had 100% cortex (Table 6-1). The high percentage of tertiary flakes appears to reflect a late reduction stage, probably indicative of tool manufacture or refurbishing.

Current research investigating the relationship between cortex percentage and raw material availability suggests that sites in areas with low raw material availability have a

Table 6-1. Cortex Percentages

Cortex %	BHT Backdirt	0-60 cmbs	60-120 cmbs	Total	
No cortex	8	31	22	61	70%
1-50%	7	5	12	24	28%
51-100%	0	1	1	2	2%
Total	15	37	35	87	
	17%	43%	40%		100%

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). Site 41BP679 is in an area with moderate to high raw material availability (see Figure 2-3). The amount of tertiary flakes (70%) at the site correlates with expectations of greater amounts of tertiary flakes in areas with moderate to high raw material resources (Figure 6-5).

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. This is further supported by the presence of cobbles in the Spring Branch Creek and in the unnamed ephemeral drainage that is located to the immediate southeast of 41BP679 (see Figure 2-2). This particular drainage may not have been exposed during prehistoric times but it is likely that other drainages may have been present in the area with similar resources. A small sample (n=8) of chert nodules was collected from the area in 2004. On average the maximum length of nodules measured is 17 cm in length and 5 cm in thickness.

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 flake thickness and reduction trajectory. 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 87 specimens of lithic debitage using digital calipers

(Table 6-2). The mean thickness of the assemblage was 4.6 mm. A comparison of midpoint thickness to cortex percentage suggests a statistically significant relationship. Specimens without cortex, tertiary flakes, are relatively thin (mean=3.6 mm), specimens with cortex in the range of 1-50% are thicker (mean=6.8 mm), and specimens with cortex in the range of 51-100% are the thickest (mean=7.8 mm; Figure 6-6). These data support 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.

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 versus incomplete flake). Maximum length was measured for each of the 87 specimens of lithic debitage using digital calipers (Table 6-3). The mean maximum length of the assemblage was 25.7 mm. A comparison of maximum length to cortex percentage suggests a significant relationship between specimens with no cortex and specimens with cortex. The relationship between flakes with 1-50% cortex (n=24) and flakes with 51-100% cortex (n=2) is not

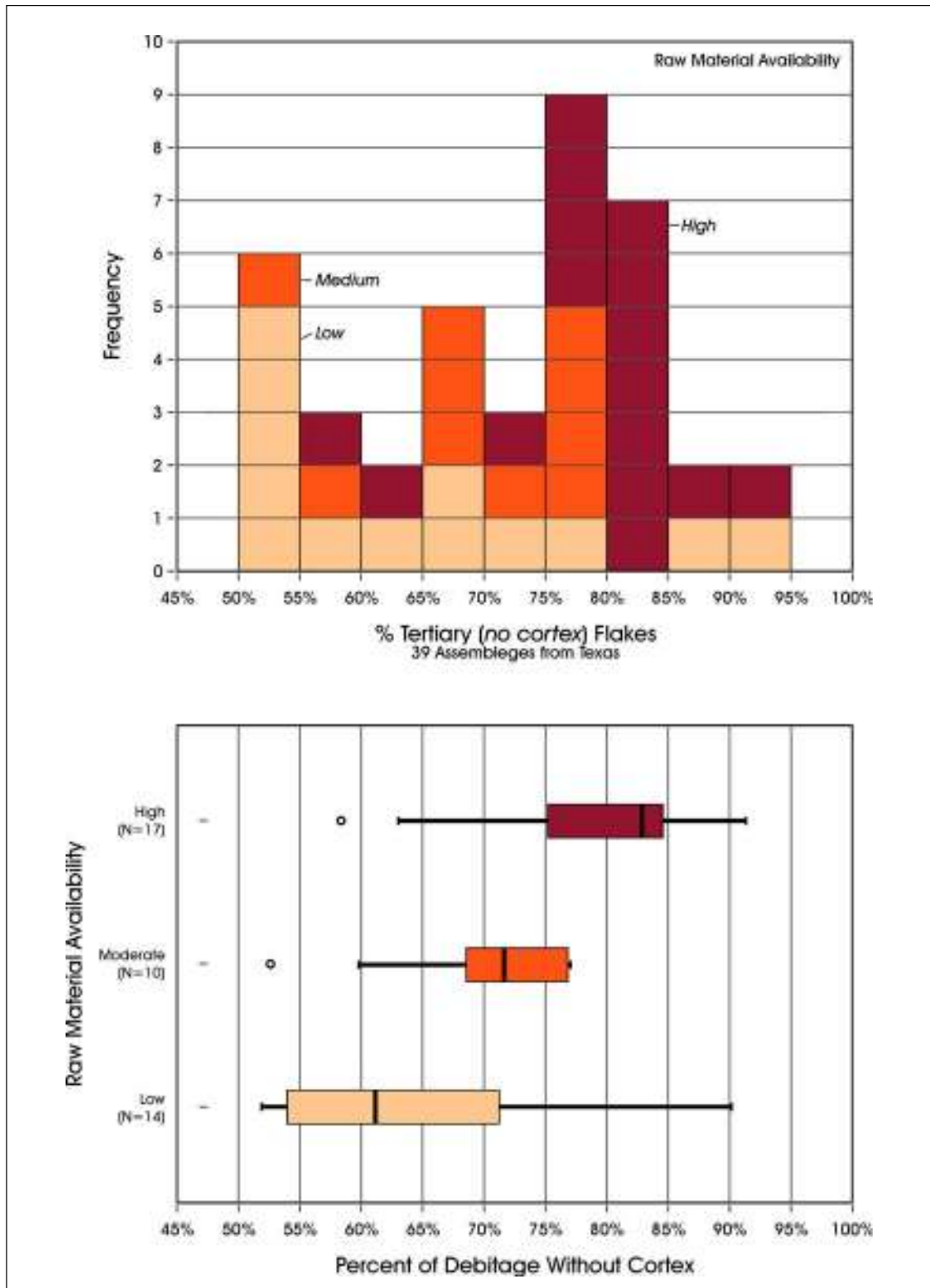


Figure 6-5. Variability in percentages of non-cultural debitage by raw material availability in selected chipped stone assemblage (from Mauldin and Figueroa 2006).

Table 6-2. Comparison of Cortex Percentages to Midpoint Thickness

Cortex %	<4 mm	4-8 mm	>8 mm	Total	
No cortex	43	15	3	61	70%
1-50%	6	13	5	24	28%
51-100%	0	1	1	2	2%
Total	49	29	9	87	
	56%	33%	11%		100%

statistically significant (Figure 6-7). Specimens without cortex, tertiary flakes, are relatively short (mean=22.6 mm), specimens with cortex in the range of 1-100% are longer (mean=32.9 mm). These data support 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.

Heat Treatment

The analysis of lithic material for indications of heat alteration can be used as a further indicator of site specific reduction/production strategies and raw material availability. The thermal alteration of siliceous stone prior to flaking is evident in various regional lithic technologies from the Paleoindian period to the Historic period (Davis and Shutler 1969; Hester 1972; Sollberger and Hester 1972). Macroscopic indications that lithic material has been heat treated include evidence of color change, altered flake scar quality, and patterns of luster change. Thermally altered chert often changes color to various shades of red or purple dependent on the temperature attained during heat treatment. The presence of any of these indicators may be evidence of thermal treatment; however, the heating may or may not have been intentional (Hester and Collins 1974). Luster change refers to the presence of a vitreous sheen and a “greasy” feel (Hester and Collins 1974). Frederick and Ringstaff (1994) explored the workability of 15 material variants of Edward’s chert using

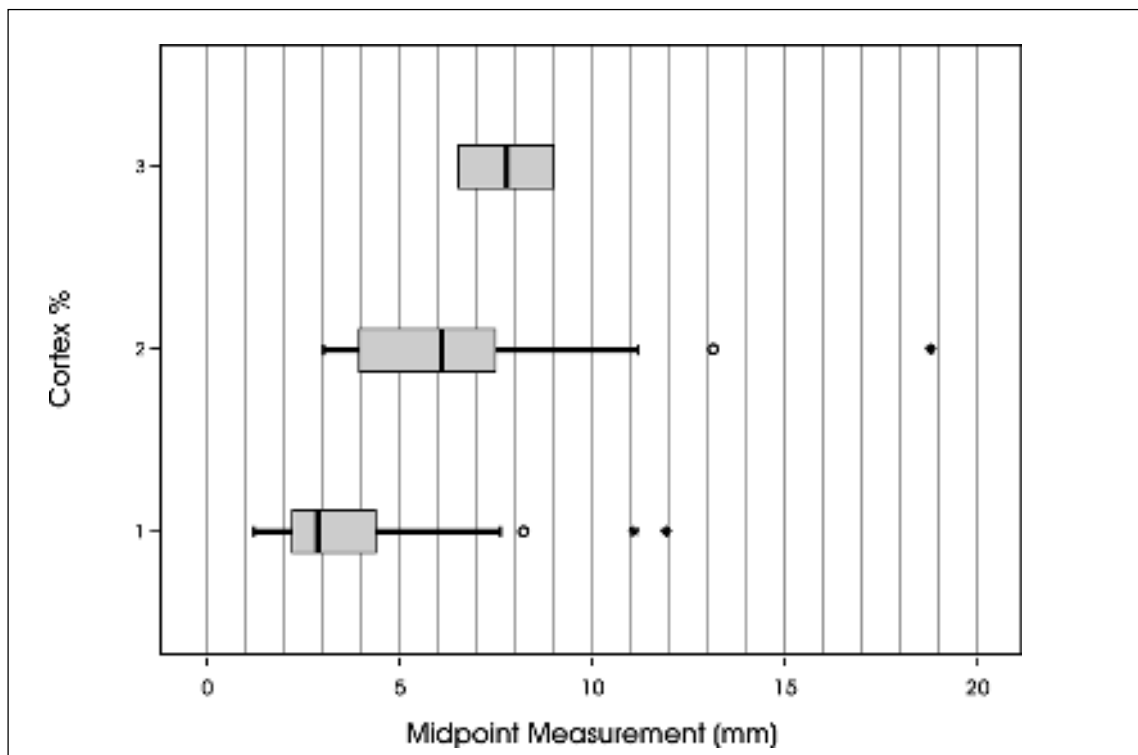


Figure 6-6. Boxplots comparing cortex percentage to midpoint measurement.

Table 6-3. Comparison of Cortex Percentages to Maximum Length

Cortex %	< 30 mm	> 30 mm	Total	
No cortex	52	9	61	70%
1-50%	11	13	24	28%
51-100%	0	2	2	2%
Total	63	24	87	
	72%	28%		100%

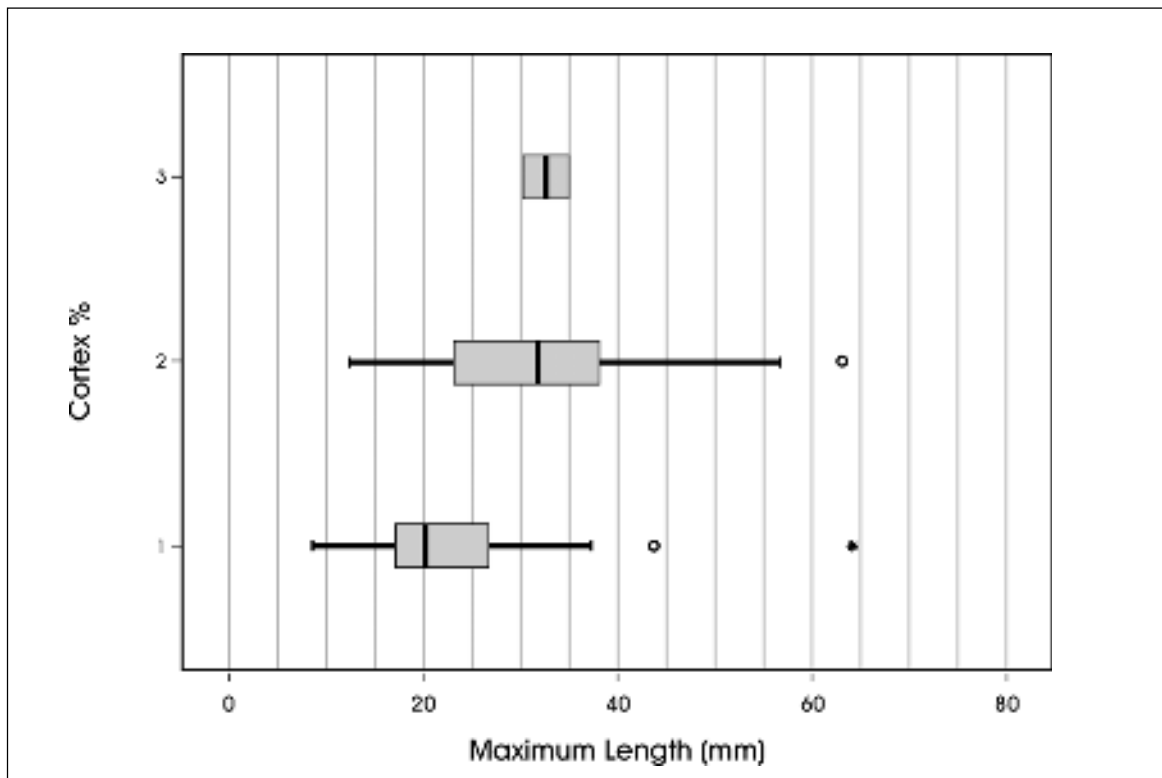


Figure 6-7. Boxplots comparing cortex percentage to maximum length.

experimentation consisting of knapping unaltered, water treated, and heat treated chert specimens. The study concluded that the workability of most types of Edwards chert improves upon heating. The improvement of lithic material through thermal alteration enables tool manufacturers to utilize lower quality cherts. Thus, heat treatment appears to limit the necessity of long-distance travel to obtain high quality chert for tasks that require high workability (Frederick and Ringstaff 1994). Evidence of intentional heat treatment can also be used to infer reduction stage. Thermal alteration may be evident in late stage reduction flakes due to the lower tolerance of breakage risk at this point in manufacture. After investing a considerable amount of time and effort reducing lithic material towards

the ultimate goal of tool manufacture, heat treatment of this reduced material should improve the workability and thus ensure expected fracture patterns. If heat treating is evident in the late stages of reduction, then the resulting heat treated lithic debitage should be smaller and should have less cortex than materials that were not heat treated.

Each debitage specimen was examined for the presence or absence of heat treatment evident from a luster or sheen and/or by a color change. Heat treated chert often changes to a color in the red/pink/purple range. Of the 87 specimens of lithic debitage 30% (n=26) exhibited signs of thermal alteration. As mentioned earlier heat treated lithic material improves the workability of the material and is often

indicative of a late stage reduction. Other attributes suggesting late stage reduction are small flake size and the absence of cortex. As discussed previously the data point to correlations between cortex percentages and flake size supporting the conclusion that 41BP679 is a probable late stage reduction tool production site. Ideally the assemblage should show a correlation between heat treated flakes and flake size, and a correlation between heat treated flakes and cortex percentage. Debitage that is heat treated should be smaller and should have less cortex than debitage that is not heat treated. The results of a comparison between heat treated flakes and flake size were, however, not significant. Flakes with evidence of heat treatment had a mean midpoint measurement of 4.9 mm and a mean maximum length of 26.7 mm, whereas flakes without evidence of heat treatment had a mean midpoint measurement of 4.5 mm and a mean maximum length of 25.3 mm (Figures 6-8 and 6-9) The analysis suggests that the heat treated debitage was slightly larger in both length and thickness than the non-heat treated debitage. A comparison of the 26 heated treated specimens to cortex percentages resulted in 17 flakes (65%) with no cortex and 9 flakes (35%) with 1-50% cortex, thus, the majority of heat treated flakes were tertiary. Analysis of the attribute of heat treatment did not clearly support the previously drawn conclusion that 41BP679 was a late stage reduction tool manufacture site. The analysis may also suggest that perhaps some of the heat treatment was incidental (e.g., surface fires or discard into a hearth) rather than purposeful. The majority of the flakes were not heat treated and no significant relationship exists between heat treated flakes and flake size. However, it is possible that the scarcity of heat altered flakes is a result of access to high quality raw material that did not require heat treatment to improve workability. If available raw material was high quality based on the cortex and size data presented above, the site may well have been a late stage reduction tool production site.

Patina

Analysis of the presence/absence of patina on lithic debitage as a method to determine dating is a subject of debate in the archaeological literature. The term patina is used to indicate a light colored weathering rind noticeable on the outside of an artifact (Purdy and Clark 1987). The patination process is a result of environmental factors and various attributes of the parent material. Environmental variables include soil pH, permeability, chemistry, subsurface water exposure, alkaline versus acidic composition, exposure to ultraviolet and infrared radiation, and temperature (Benedict 1992).

Characteristics of the parent material also affects patination, including porosity, structure, permeability, mineralogy, nonsilica impurities, and thermal alteration (Purdy and Clark 1979; VanNest 1985). Archaeologists working with lithic materials have repeatedly concluded that chert patination is related to material age. Patination appears to be progressive (Frederick et al. 1994). Archaeologists opposed to this correlation argue that the large number of factors involved in patination “effectively negate the possibility of obtaining useable temporal information from patina observations” (Frederick et al. 1994:6). Frederick et al. (1994) explored the existence of a measurable temporal component to chert patination using archaeological artifacts from three temporal groups from Fort Hood, Texas. Fort Hood is located in the upland environments of the Edwards Plateau in Central Texas. The results of this study demonstrate that the formation of patina is progressive in both frequency and amount through time. However, the study also concludes that the lack of patina on an artifact is meaningless. Frederick and colleagues suggest that chert patination is not a reliable dating technique. Although time and patination are clearly related, the lack of a patina says nothing about age (Frederick et al. 1994).

The presence or absence of patina was another attribute included in the analysis. Each debitage specimen was examined for evidence of patination. The amount of patination was not noted, only the presence or absence. Of the 87 pieces of debitage 76% were patinated to some degree. Patination occurs throughout the various levels excavated at 41BP679. Of the 23 specimens of debitage excavated in auger bores 60% of the flakes from Level 1 (0-60 cmbs) and 78% of the flakes from Level 2 (60-120 cmbs) were patinated. Of the 49 specimens of debitage excavated from the test units no correlation of patination presence to matrix level is evident (Table 6-4). Combining the auger levels with the test unit levels resulted in a screened volume of 10.1 specimens per cubic meter from Level 1 (0-60 cmbs) and 9.8 specimens per cubic meter from Level 2 (60-120 cmbs) having evidence of patination. In conclusion, patination does not appear to be indicative of age in the assemblage recovered from 41BP679.

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 (1985:755) developed a typology composed of “interpretation-free and

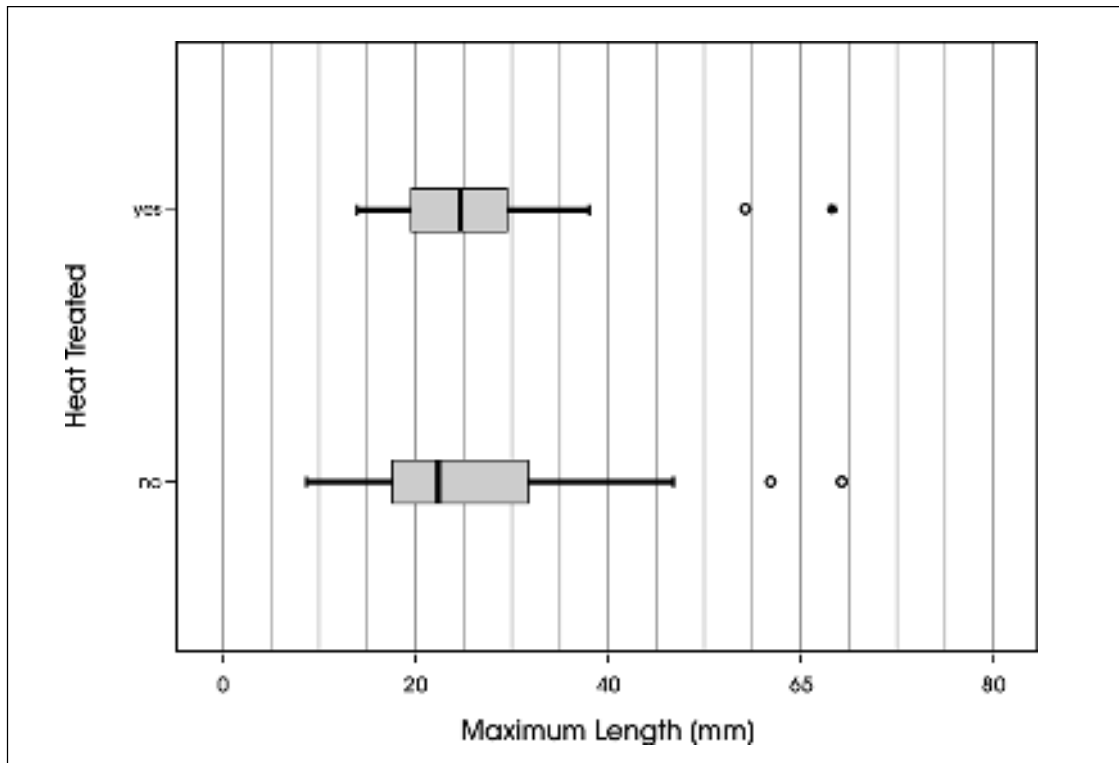


Figure 6-8. Boxplots comparing heat treated flakes to maximum length.

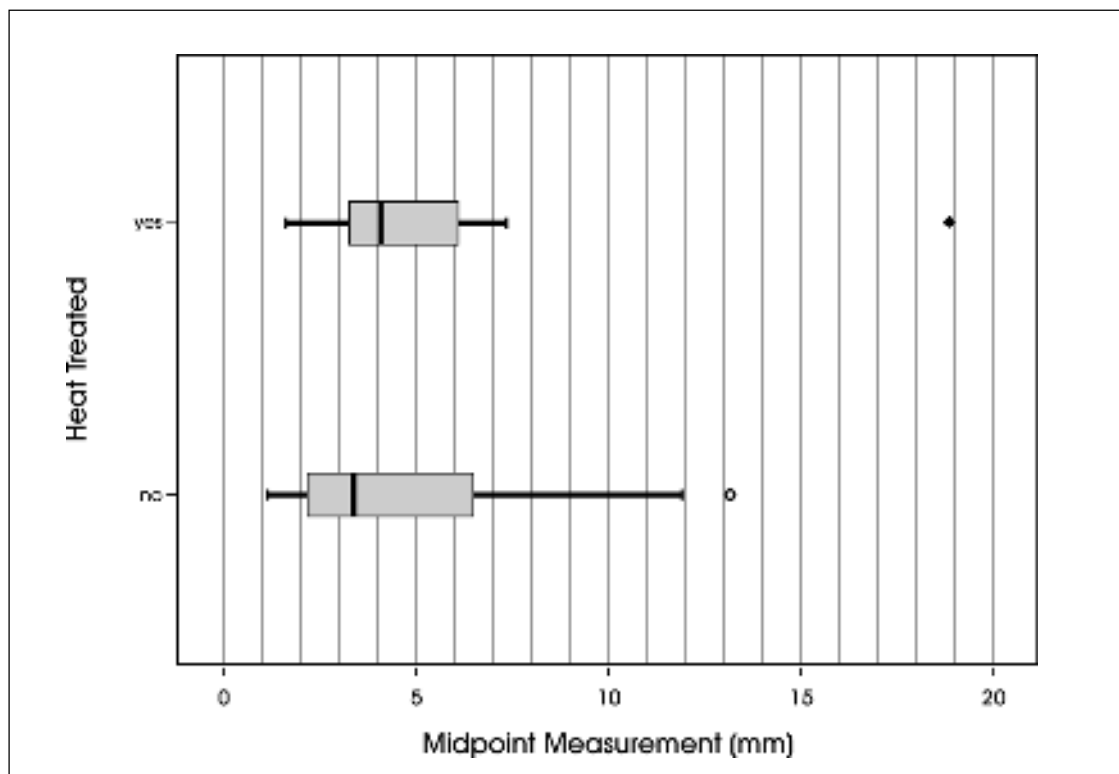


Figure 6-9. Boxplots comparing heat treated flakes to midpoint measurement.

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 versus 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 (PRB), medial/distal flakes (MDF), and non-orientable fragments (NF) (Amick and Mauldin 1997; Prentiss and Romanski 1989; Sullivan 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). All of the debitage from 41BP679 except for one specimen was produced from chert. This specimen was not included in the condition analysis.

Each of the 86 chert lithic debitage specimens recovered at 41BP679 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 contained 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 86 flakes 46% were classified as complete, 13% as platform remnant bearing, 41% as medial/distal, and 0% as 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 (Table 6-5). The pattern evident at 41BP679 appears to reflect Amick and Mauldin’s tool reduction data (Figure 6-10).

Lithic Debitage Analysis Conclusions

The purpose of the analysis of the lithic debitage from 41BP679 was to attempt to determine the lithic technology practiced at the site, to determine accessibility and quality of raw material, and to explore the correlation between patina and the relative age of the matrix levels.

To attempt to determine what type of technology was utilized at the site (core reduction versus tool production, early versus late stage reduction), cortex percentage, heat treatment presence/absence, 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 that the material most likely would not be heat treated, and on the assumption that both late stage reduction and tool manufacture produce smaller, tertiary flakes possibly heat treated, the debitage assemblage from 41BP679 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 correspond closest to patterns produced from experimental studies on tool production.

The high percentage of tertiary flakes recovered point to a site with access to moderate to high sources of raw material. Most of the flakes with cortex present were larger than the

Table 6-4. Comparison of Patination Percentage by Level

Level	Total Flakes	Patinated Flakes	Percent Patinated
1	3	1	33%
2	3	2	66%
3	0	0	0%
4	6	5	88%
5	16	15	94%
6	4	2	50%
7	8	7	88%
8	4	3	75%
9	3	1	33%
10	2	0	0%
Total	49	36	73%

Table 6-5. Comparison of Flake Breakage Patterns at Site to Experimental Data

Assemblage	CF	PRBF	MDF	NF
41BP679	46%	13%	41%	0%
Amick and Mauldin (1987) Core Reduction	36%	21%	41%	2%
Amick and Mauldin (1987) Tool Reduction	42%	19%	38%	1%

tertiary flakes pointing to a raw material source consisting of good size cobbles. Finally the presence/absence percentage of patinated debitage was compared to the debitage location in the matrix. No significant correlation was apparent between patination and relative age of the sediment containing the specimens of debitage.

A Comparison of Debitage Assemblages from 41BP679 and 41BP678

The lithic debitage assemblage from 41BP679 was compared to the debitage recovered from 41BP678 (Figuroa 2006). Site 41BP678 is on the same project area to be impacted by the City of Bastrop Wastewater Treatment Plant. The site is less than 200 m to the east. Testing efforts at 41BP678 were similar to the methods employed at 41BP679. On 41BP678, 79 auger bores were excavated to a final depth of 80 cmbs, four backhoe trenches were excavated to a depth of 1 m, and four 50-x-50-cm test units were excavated to a depth of 80 cmbs. Fifty-four specimens of debitage were recovered from these efforts. A slightly higher volume of dirt was removed from 41BP678 (5.41 m³) than from 41BP679 (5.32 m³). 41BP679 has a higher density of debitage (16/m³) than 41BP678 (10/m³). Debitage was analyzed at both sites using the same set of attributes (Table 6-6).

A comparison of debitage maximum length and midpoint thickness between the two sites resulted in little variance. Mean maximum length and mean thickness equaled 23.3 mm and 4.4 mm, respectively, for 41BP678, and 25.7 mm and 4.6 mm for 41BP679, respectively. Cortex, heat treatment, and patination percentages vary between the two sites. Site 41BP679 has 70% tertiary, 30% secondary, and 0% primary flakes. Site 41BP678 has 54% tertiary, 37% secondary, and 9% primary flakes. Thirty percent of the flakes at 41BP679 were heat treated compared to 56% at 41BP678. 41BP679 contained 76% patinated flakes compared to 37% at 41BP678.

Breakage patterns of the debitage varied between the two sites. 41BP679 contained 46% complete flakes, 13% platform remnant-bearing flakes, 41% medial/distal flakes, and no non-orientable flakes. 41BP678 contained two distinct cultural components. The upper component contained 35% complete flakes, 10% platform remnant-bearing flakes, 39% medial/distal flakes, and 16% non-orientable flakes. The lower component contained 22% complete flakes, 13% platform remnant bearing flakes, 52% medial/distal flakes, and 13% non-orientable flakes. A comparison was made of the two site assemblages to experimental assemblages (Amick and Mauldin 1997; Prentice and Romanski 1987; Figure 6-11). The 41BP678 upper component assemblage is similar to the tool

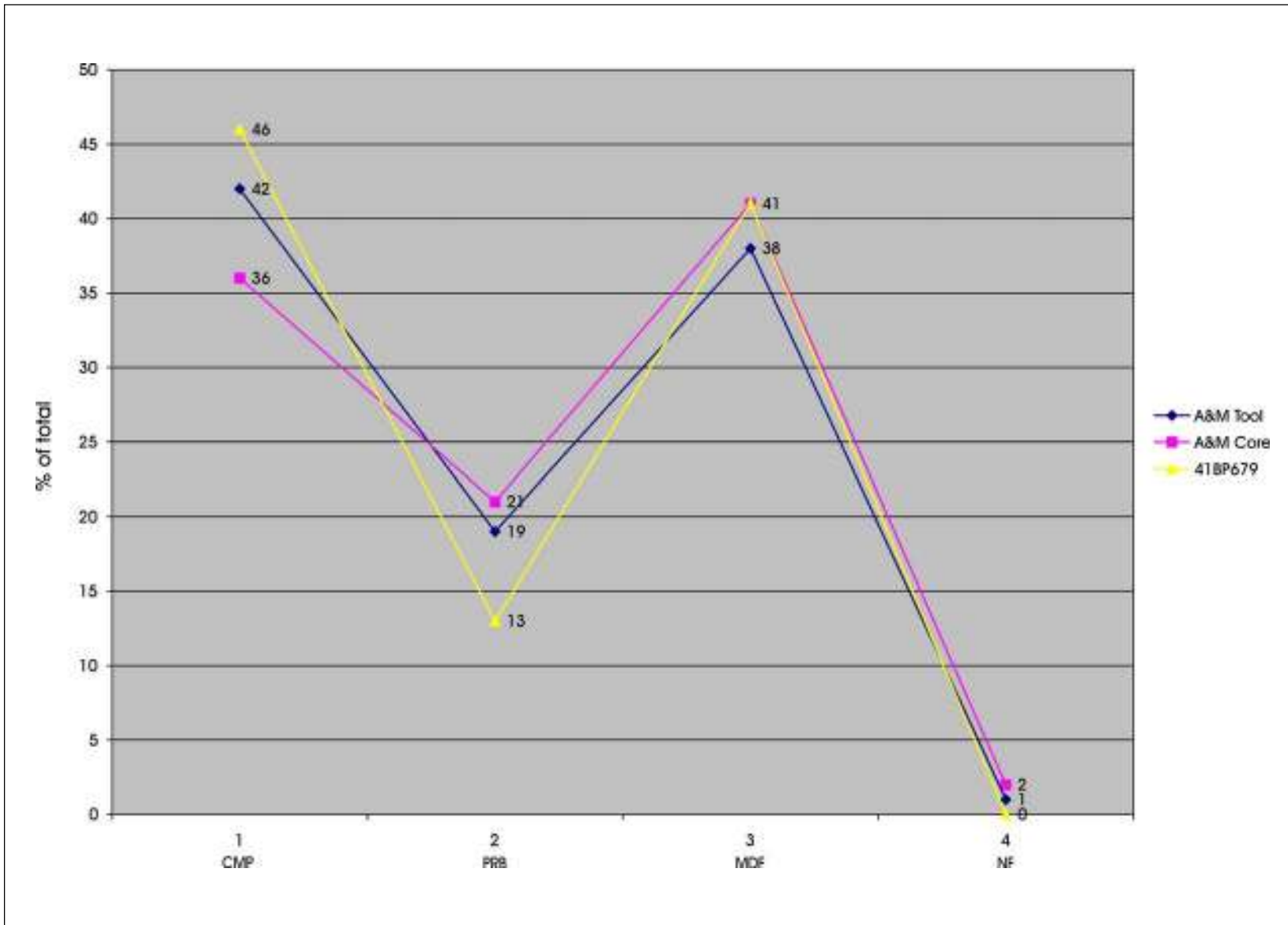


Figure 6-10. Comparison of 41BP679 flake breakage patterns to experimental data from Amick and Mauldin 1997 (A&M).

Table 6-6. Comparison of Debitage Attributes between 41BP678 and 41BP679

Attribute	41BP678 (Both Components)	41BP678 Lower Component	41BP678 Upper Component	41BP679
Mean maximum length	23.3 mm			25.7 mm
Mean midpoint thickness	4.4 mm			4.6 mm
Cortex-tertiary	54%			70%
Cortex-secondary	37%			30%
Cortex-primary	9%			0
Heat treatment	56%			30%
Patination	37%			76%
CF		22%	35%	46%
PBRF		13%	10%	13%
MDF		52%	39%	41%
NF		13%	16%	0

production assemblage produced by Prentice and Romansky, while the lower component is similar to Amick and Mauldin's core reduction assemblage (Figure 6-12). The 41BP679debitage assemblage is comparable to Amick and Mauldin's tool production assemblage.

The two collections ofdebitage from 41BP678 and 41BP679 appear to represent differing lithic technologies. Based on various lines of evidence (cortex, flake measurements, and flake breakage patterns) 41BP679 reflects probable tool manufacturing. Thedebitage analysis for 41BP678 suggests that the upper component (0-40 cmbs) represents tool manufacturing, whereas the lower component (41-80 cmbs) represents core reduction. This variance in site-specific lithic technology may be attributed to spatial and/or temporal scenarios. Spatially, the sites are close, yet far enough apart to have been utilized for different purposes. Temporally, 41BP679 appears to have been used as a tool manufacturing location in the Paleoindian or Archaic period, whereas the upper component of 41BP678 appears to have been used as a tool manufacture site in the Late Prehistoric period.

Lithic Tools

Six lithic tools were identified in the 41BP679 collection. The tool assemblage consists of three bifaces, one uniface, one burin, and one edge-modified flake. Two of the tools were discovered in the backdirt of BHT 1, one was uncovered in TU 1 (40-50 cmbs), and three were found in auger tests (two from 0-60 cmbs and one from 60-120 cmbs).

One of the bifaces was recovered from the backdirt of BHT 1 and, thus, has no vertical provenience (Figure 6-13a). This tool measures 66.24 mm (maximum length) by 43.26 mm (width) by 13.39 mm (thickness) and has an edge angle of 66 degrees. The edge angle was computed as an average of three measurements. The biface contains no cortex. It is distally beveled, contains step fractures on both sides of the working edge, and has evidence of polish on its smooth ventral face. Based on macroscopic evidence of use-wear this tool appears to have been used as an adze. Morphologically, it appears to be a Clear Fork tool. Clear Fork tools have been dated from the Late Paleoindian period to the Early Archaic period (Turner and Hester 1999).

Two of the bifaces appear to be early reduction stage specimens. The biface excavated from Level 5 of TU 1 retains cortex and measures 24.37 mm wide by 51.72 mm thick, with a width to thickness ratio of .5. The presence of cortex and the small width/thickness ratio suggests an early reduction stage tool (Callahan 1979). The biface recovered from Level 2 of Auger Test 25 contains cortex and measures 23.54 mm in thickness. Because the tool is broken, a measurement of width was not taken. The presence of cortex and the relative thickness of the biface suggest an early reduction stage tool.

The uniface tool was recovered from backdirt associated with BHT 1 and thus, as in the case of the adze, has no vertical provenience. This uniface is fractured and contains cortex. It appears that following its failure an attempt was made to modify the uniface into a biface. Modification of a fractured uniface into a biface may be a response to raw

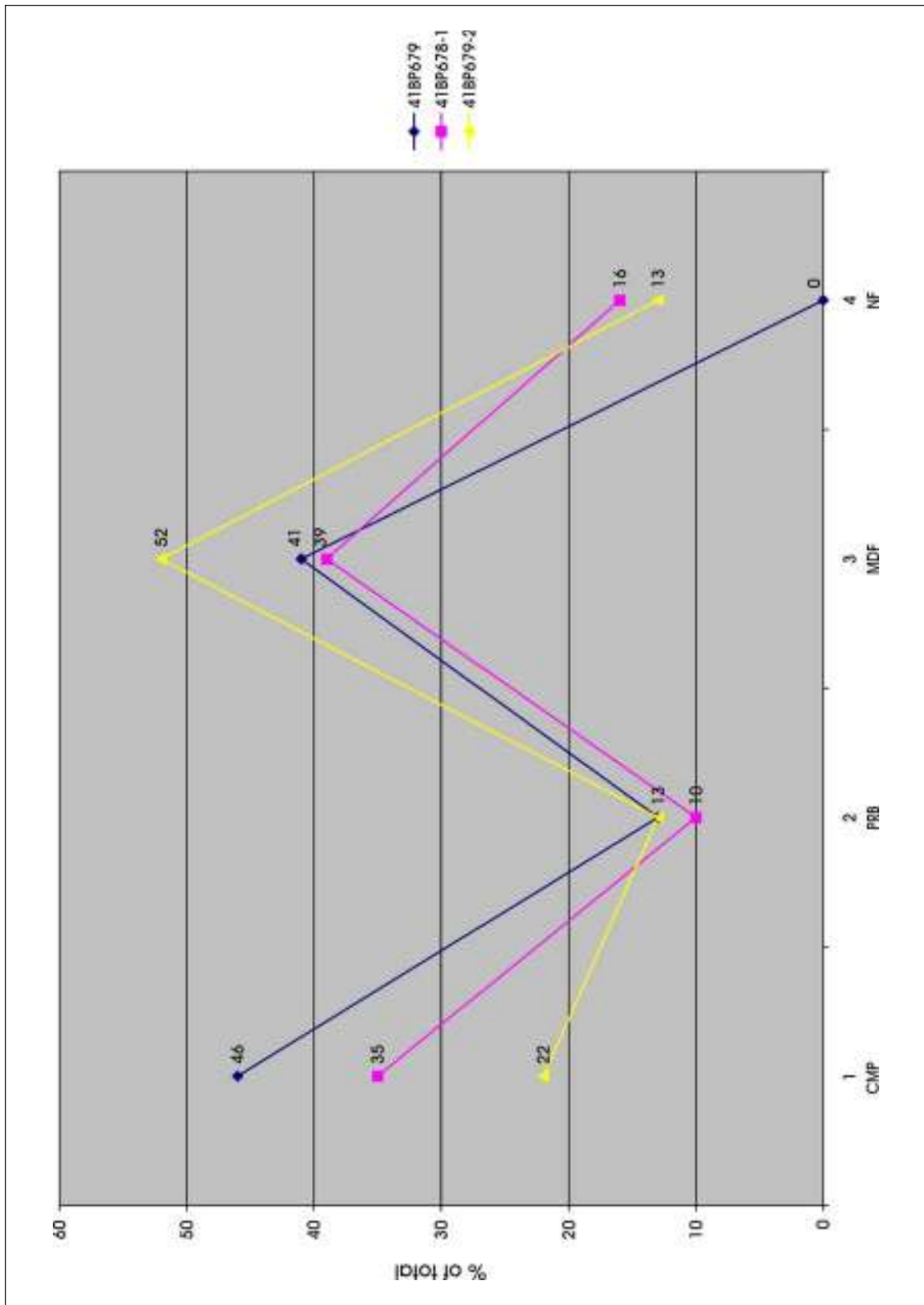


Figure 6-11. Comparison of 41BP679 flake breakage patterns to 41BP678 patterns.

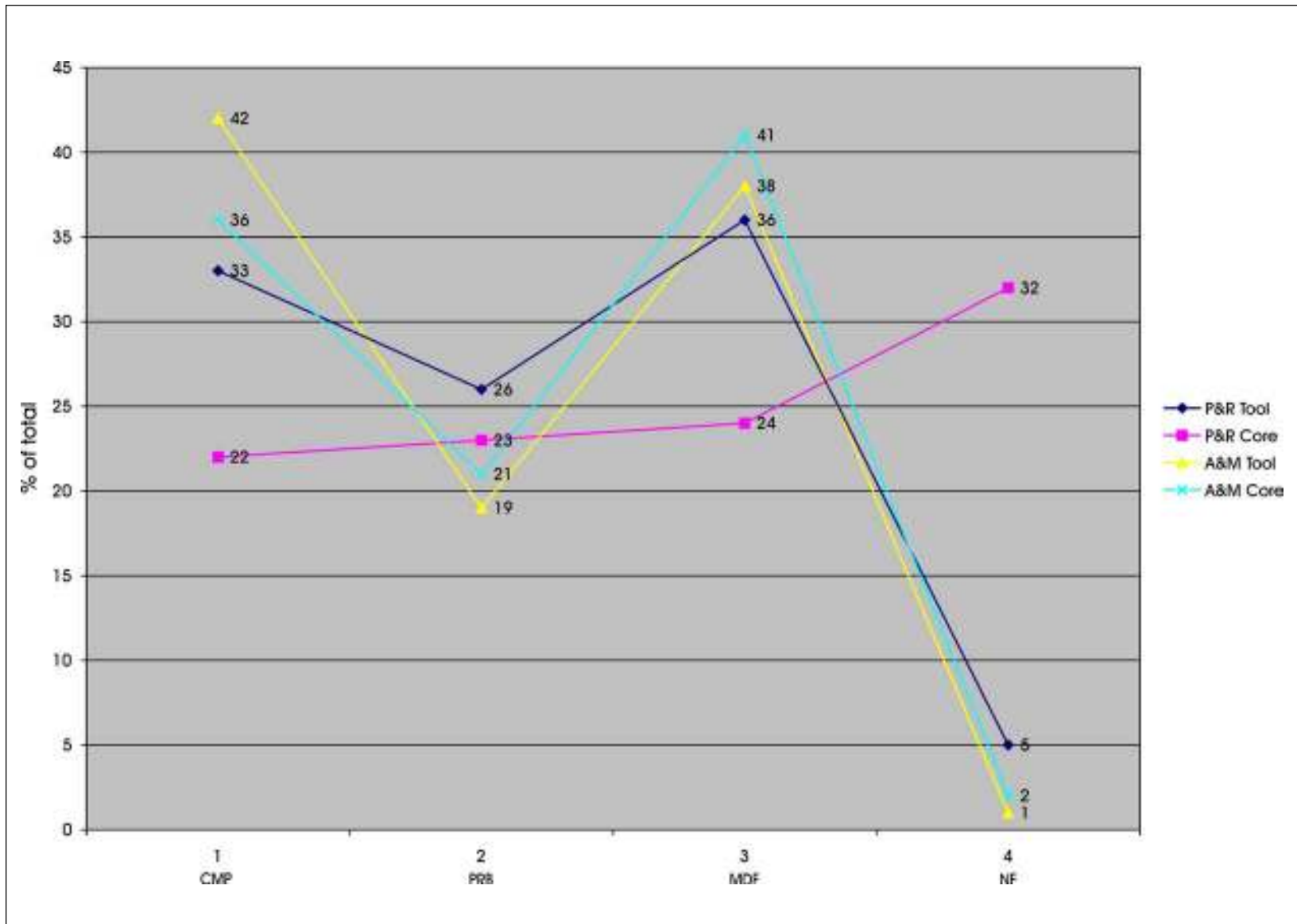


Figure 6-12. Comparison of flake breakage patterns between experimental data (Amick and Mauldin 1997 [A&M]; Prentiss and Romanski 1989 [P&R]).

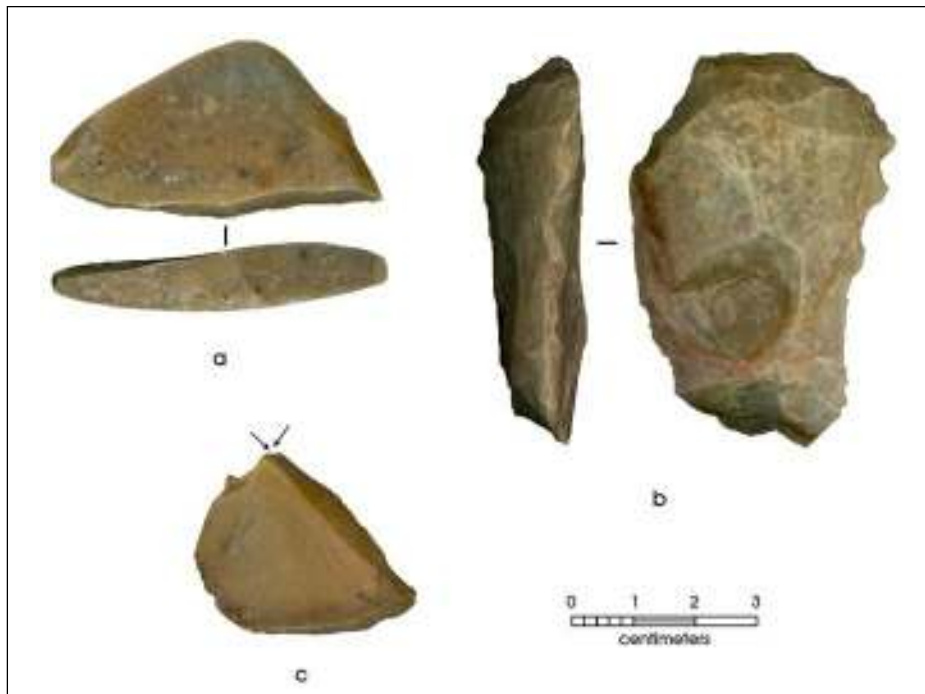


Figure 6-13. Tools encountered during testing: (a) edge modified flake; (b) biface; and (c) burinated engraver.

material scarcity. Another possibility is that the tool is an example of curated gear. It may have been manufactured off site in an area of raw material scarcity.

The burin was excavated from 0-60 cmbs in Auger Test 35 (Figure 6-13b). This tool was originally a flake that was subsequently modified. It contains two burin scars with microscopic flake scars on one corner of the intersecting burin scars. This use-wear suggests that the tool functioned as an engraver. The edge modified flake was recovered from Auger Test 4, 0-60 cmbs (Figure 6-13c). This tertiary flake tool exhibits unifacial use retouch consistent with its use as a scraping tool.

Four of the tools associated with 41BP679 were recovered from the northwestern edge of the site, in association with TUs 1 and 2. The edge-modified flake was found 0-60 cmbs in an auger bore located on the northeast corner of BHT 1. The unifacial tool and the adze were both recovered from BHT 1 backdirt and one of the early reduction bifacial tools was retrieved from Level 5 of TU 1 located off the southern wall of BHT 1. It appears that this portion of 41BP679 has a concentration of cultural material indicative of a tool manufacturing location dating to the Paleoindian or Archaic

period (based on the presence of the Clear Fork tool). Further supporting this time range was the excavation during the 2004 survey (Moses 2004) of a biface with a parallel flaking pattern reminiscent of some late Paleoindian artifacts, such as Angostura points (Turner and Hester 1999:73-74). The early reduction biface found in the lower level of Auger Test 25 is located on the northwest corner of BHT 4 in close association with TU 4. This area of the site also appears to contain a concentration of cultural material. The engraver was retrieved from 0-60 cmbs in Auger Test 35. This test was located along the far northeast section of the site, in possible association with the cultural material retrieved from TU 3.

Summary

This chapter presented descriptive data for the cultural material recovered during Phase II testing of 41BP679. Fifty-eight specimens of burned rock were collected at the site with a screened volume of 7.3 specimens per cubic meter from the upper 0-60 cm and 10.9 specimens per cubic meter from the lower 60-120 cm. Because burned rock may be associated with cultural features, its presence in the lower levels may indicate a higher probability of features in the

lower deposits. Eighty-seven pieces of debitage were retrieved from 41BP679 with a screened volume of 13.4 specimens/m³ associated with Level 1 (0-60 cmbs) and 13.7 specimens/m³ with Level 2 (60-120 cmbs). The vertical distribution of lithic debitage evident from test unit levels points to the presence of a prehistoric component occurring between 30 and 70 cmbs. Six lithic tools, consisting of bifaces, a uniface, a burin and an edge modified flake, were identified in the collection.

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, to determine accessibility and quality of raw material, and to explore the correlation between patina and the relative age of the matrix levels.

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 that the material most likely would not be heat treated, and on the assumption that both late stage reduction and tool manufacture produce smaller, tertiary flakes that are possibly heat treated, the debitage assemblage from 41BP679 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 correspond closest to patterns produced from experimental studies on tool production.

The high percentage of tertiary flakes recovered point to a site with access to moderate to high sources of raw material. 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 and good sized cobbles are present on the site, it is probable that high quality raw material was accessible.

Finally the presence/absence percentage of patinated debitage was compared to the debitage location in the matrix. No significant correlation was apparent between patination and relative age of the sediment containing the specimens of debitage.

The lack of lithic cores along with the distribution of tools, debitage, burned rock and the biface recovered in 2004 suggests that the northwestern portion of 41BP679 has a concentration of cultural material indicative of a tool manufacturing location dating to the Paleoindian or Archaic

period. The western edge of the eastern portion of 41BP679 also appears to contain a concentration of cultural material but no temporally diagnostic artifacts were recovered. An engraver (0-60 cmbs) and a light scattering of artifacts were retrieved from the far northeastern section of the site.

Chapter 7: Conclusions and Recommendations

Steven A. Tomka and Cynthia
Moore Munoz

The Center for Archaeological Research at the University of Texas at San Antonio was contracted by the City of Bastrop to conduct limited archaeological testing at two previously recorded sites in Bastrop County, 41BP678 (see Figueroa 2006) and 41BP679. This report discussed the test excavations of one of the sites, State Archaeological Landmark 41BP679, conducted May 11 through May 18, 2006. The City of Bastrop will be constructing a water treatment facility within a 26.5-acre tract that includes 41BP678 and 41BP679. While the 4.5-acre facility is planned primarily to the north of the 41BP679 site boundary, the installation of an outfall line and the close proximity of clarifier tanks to the site boundary will impact portions of the site. The installation of the outfall pipeline for discharge may extend to a maximum of 5 feet in places.

Site 41BP679 is listed as a State Archaeological Landmark. Consequently, the eligibility of the site is not in question. The archaeological work was conducted to determine whether the cultural deposits and materials found in the portions of the site that would be impacted by the planned construction contributed to the eligibility of 41BP679. Secondary goals of the fieldwork were to more accurately determine the northern boundary of the site and establish the ages of the two components identified on this site during the earlier survey (Moses 2004).

Testing of 41BP679 included mechanical auger borings, backhoe trenching and the hand-excavation of four 50-x-50-cm test units. The testing fieldwork conducted on site was limited to the northern half of the site. Forty-eight auger bores were excavated. They were roughly 30 cm in diameter and extended to a depth of 120 cm below surface. The borings were excavated in two layers, 0-60 cmbs and 60-120 cmbs. The survey-level investigations of the site indicated that cultural materials did not appear to extend below 92 cm in depth. The main goal of this exploratory technique was to establish the presence/absence of cultural materials, their gross vertical distribution and horizontal patterning. Four backhoe trenches were excavated. They measured approximately 10 m in length, 1 m in width and extended to roughly 1.2 meters below surface (mbs). We excavated these trenches following the review of the

material distributions obtained from the auger units. We placed them in areas of higher material density and in the hopes of exposing site stratigraphy in different parts of the site and searching for features. Secondly, the backhoe trenches also helped investigate deposits that fell within the easement of the proposed outfall line. Finally, we employed four 50-x-50-cm test units excavated in 10-cm arbitrary levels to obtain more fine-grained information on the vertical distribution of cultural materials. These units adjoined the backhoe trench walls.

Excavations at 41BP679 produced 87 pieces of debitage from a volume of 5.32 m³ of matrix representing 16 pieces of debitage per cubic meter. In addition, six tools, including three bifaces, a uniface, a burin and an edge modified flake, also were recovered from testing. Burned rock was retrieved from the site (n=58) in addition to a few mussel shell umbos. Despite the recovery of burned rock, no features were identified during the excavations. The stratigraphy of the deposits appears to be relatively homogenous with a 30-35 cm thick disturbed zone near the top and silty to heavy clay below it with calcium carbonate nodules increasing in frequency in the lower portions of the profile. The analysis of a number of attributes on the debitage suggests a similarity to experimental debitage assemblages derived from tool reduction.

The vertical distribution of cultural material in Test Units 1, 2 and 4 strongly suggests the presence of a prehistoric component occurring between 30 and 70 cmbs. An adze that morphologically fits a Clear Fork tool and a unifacial tool were found in the backdirt associated with Backhoe Trench 1, which in turn is associated with TUs 1 and 2. A flake tool was found in an auger bore associated with these test units. In addition, a bifacial tool was retrieved from Level 5 of TU 1. This northwestern portion of 41BP679 contains a concentration of cultural material that can be dated, based on the Clear Fork tool, to a range from the late Paleoindian to the Early Archaic period. Further supporting this time range was the excavation during the 2004 survey (Moses 2004) of a biface with a parallel flaking pattern reminiscent of some late Paleoindian artifacts, such as Angostura points (Turner and Hester 1999:73-74). No features were uncovered during the test excavations of the area, but burned rock was retrieved pointing to the possibility of thermal features in the unexcavated matrix.

This portion of 41BP679 is near the far southern impact area of the plant treatment buildings and a portion of the outfall pipe (Figure 7-1). Because Auger Test 48 contained a specimen of lithic debitage, the possibility exists that cultural materials and features extend further northward of the site.

A portion of the wastewater treatment plant's outfall pipe is currently proposed to run along the north/northeastern edge of the site. Two backhoe trenches and a test unit were placed along the path of the proposed pipe. Although recovered artifacts were sparse and none were temporally diagnostic, three specimens of burned rock and one piece of debitage were recovered from the lowest level (90-100 cmbs) of TU 3. Because TU 3 was placed along the location of

the proposed outfall pipe, there is the possibility of a deep prehistoric component in the vicinity of the outflow pipe. The pipe is expected to be buried at a depth of 5 feet (1.5 mbs) in a portion of this area. Due to the presence of cultural material 0.9 to 1 mbs and because the backhoe trench was excavated to 1.2 mbs and TU 3 was excavated to 1 mbs, there is the possibility of unexcavated cultural material and thermal features in the unexcavated matrix (1.2-1.5 mbs) along the pipe's course (Figure 7-1).

Auger Test 35, located at the far northeast boundary of 41BP679, lies directly adjacent to a proposed treatment building (Figure 7-1). One cultural artifact, a burin tool engraver, was uncovered 0-60 cmbs. This tool is not temporally diagnostic.

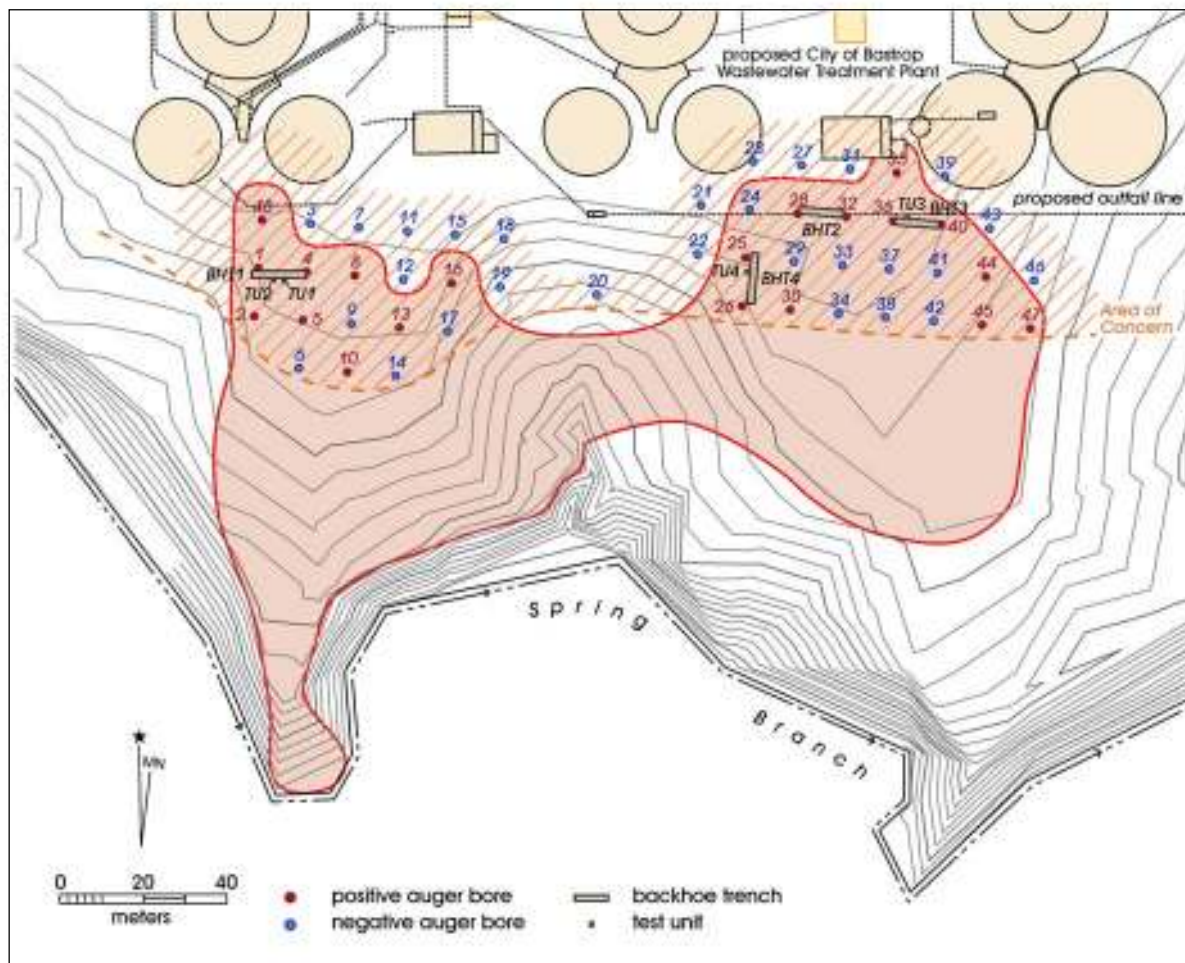


Figure 7-1. Highlighted area showing portion of site 41BP678 not contributing to the eligibility of the site.

The low density of cultural materials, when combined with the absence of features and the turbation of the upper 30 to 35 cm of the site limits the research potential of the deposits. While the cultural component does not appear to be turbated and a temporally diagnostic tool was recovered, artifact densities are low and no features were observed. The few temporally diagnostic artifacts found range from late Paleoindian to Early Archaic in age but no clearly definable temporal components have been encountered during our investigations. Therefore, CAR argues that the materials recovered from the portion of the site tested during the fieldwork do not contribute to the SAL eligibility of 41BP679. We recommend that the northern portion of the site (Figure 7-1) be cleared for planned construction. As the southern portion of 41BP679 has not been tested, we further recommend that this southern portion remain off limits with regard to any construction activities.

As a final note, upon review of the draft technical report, the Texas Historical Commission concurred with the conclusions and recommendations reached by CAR. In addition, the THC requested that the portion of 41BP679 not assessed by CAR be protected from potential construction-related impacts by a fence. The desired location of the fence would be furnished by CAR to insure that intact portions of the site are not adversely affected by the fence's construction. Furthermore, if significant archeological deposits are uncovered during plant construction, the THC requested that all work should stop in those immediate areas and the City of Bastrop should immediately contact the THC.

CAR staff informed the City of Bastrop of the THC request. City representatives have indicated to CAR that fencing will be installed around the perimeter of the construction area both to keep people out of the construction area and keep construction impacts limited to the designated area. The fence will be a five-strand barbwire fence.

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