INVESTIGATIONS AT AN ANTELOPE CREEK PHASE ISOLATED HOMESTEAD (41PT109)

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ABSTRACT

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The Antelope Creek Phase dates to A.D 1200-A.D 1500 and is well documented throughout the Texas and Oklahoma Panhandles. The bulk of this thesis deals with the analysis and interpretation of the data recovered during the 2004 excavation of an isolated homestead, site 41PT109, associated with the Antelope Creek Phase. The site consists of upright dolomite slabs outlining the remaining outer-walls of the house structure with a central internal hearth and several external occupational features including trash middens and a cooking pit. Artifacts found during excavation revealed

that a wide range of economic activities were taking place during the occupation of site 41PT109, such as hunting and small-scale agriculture.

Little work has been done to understand the patterns of use and abandonment of these isolated structures. This study seeks to further delineate the life-span of this particular single-family homestead in order to serve as a precedence for future studies of this kind.

CHAPTER I

INTRODUCTION

The archaeology of Texas has been seen, by outsiders, as being somewhat homogenous, consisting of primarily hunter-gatherer groups spanning from the Paleoindian to the Protohistoric Period. With the exception of the East Texas Caddo, there is no monumental architecture, few extravagant burials, and only a handful of sedentary cultures. The lifestyles of hunter-gathers can be very complex and incredibly interesting for archaeologists. However, their constant movement leaves little behind in the archaeological record. Evidence of familial relationships, cosmological worldviews, and traditional knowledge is ambiguous, if not completely absent from the archaeological record. In these cases, archaeologists are compelled to study the few remnants left behind by these cultures, such as chipped stone tools, bone artifacts, hearths, and the remains of temporary camps and shelters. Research is generally focused on identifying economic trends with cultural affiliations and regional variation closely tied to differences in projectile point styles.

The presence of a sedentary culture in the Texas Panhandle has provided the opportunity to study a group that is capable of adding new dimensions to understanding the prehistoric past of Texas. The Antelope Creek Phase dominated the Texas Panhandle from roughly A.D. 1200 to 1500 and subsisted off a combination of hunting and small

scale agriculture (Lintz 1986). The Plains Villager tradition was common throughout most of the Great Plains region during the Late Prehistoric Period. Other villager manifestations such as the Washita River Phase or the Upper Republican Phase utilized similar subsistence methods and tool technology with reliance on hunting or horticulture mainly dependent on the regional environment. The Antelope Creek Phase is apart of this rich and wide spread cultural phenomenon because of the presence of permanent villages and homesteads with stone slab architecture that were occupied for long periods of time and situated near major river systems. Bison tended to be the primary food source with maize and collected wild plant foods supplementing the diet. The tool technology at most Antelope Creek Phase sites is quite diverse and reflects a wide range of economic activities. An overwhelming percentage off the material used to make the stone tools is a locally mined silicified dolomite known as Alibates flint. Alibates flint was highly regarded not only because of its effectiveness, but because of its unique coloring. The brilliant color-banded flint comes in a variety of colors including red, blue, white, and brown and the largest outcropping is found at Alibates National Monument outside of Fritch, Texas.

The Antelope Creek Phase has been the subject of great interest since the early 1900's when T.L. Eyerly first excavated a large complex of ruins known as Buried City (Lintz 1986). Since then, numerous other archaeologists such as Floyd Studer, Warren Moorehead, Alex Krieger, Jack Hughes, and Christopher Lintz have defined the cultural parameters of the phase through the meticulous excavation of numerous sites found throughout the Canadian River breaks. The majority of these investigations were focused on large aggregated villages such as Saddleback Ruin, Landergrin Mesa, Alibates Ruin

28, and Black Dog Village. These multi-family compounds are generally associated with the Early Subphase of the Antelope Creek Phase that dates from A.D. 1200-1350, while the Late Subphase is mostly dominated by hamlets and isolated homesteads that date to A.D. 1350-1500 (Lintz 1986). This change in population dynamics has been attributed to a variety of related factors including environmental deterioration, population pressure, and major bison migrations.

The aim of this thesis is to provide a formal analysis of an isolated homestead attributed to the Antelope Creek Phase that address major regional research questions such as economic trends, intra-site relationships, and the organization of tool technology. More specifically, this study seeks to investigate the life-cycles of the isolated homestead with emphasis placed on identifying evidence related to site abandonment. Previous studies have found that the semi-permanent houses belonging to Northern Plains Villager groups as well as the Historic Witchita experienced permanent planned abandonment due primarily to the natural deterioration of the structure (Brooks 1993). The Antelope Creek peoples constructed durable semi-subterranean houses with stone-slab foundations and tunneled entryways. If the natural decay rate of these single-family homesteads is known, then models relating to settlement and migration practices could be applied directly to the phase as whole, giving additional support to issues such as architectural variation, population disbursement, and agricultural dependence.

The subject of this thesis is site 41PT109, which was the locale of a Texas State University fieldschool in the summer of 2004. Site 41PT109 is located 15 miles north of Amarillo, Texas in Potter County. It is currently owned and managed by the Bureau of

Land Management who occupy a portion of the Cross Bar Ranch which is comprised of 11,833 acres and extends to the southern bank of the Canadian River.

Thesis Organization

This thesis is divided into seven chapters with four subsequent appendices. Chapter two provides an overview of the study area including descriptions of local geology, soils, flora, fauna, and climate. Summaries of three other Plains Villager groups has also been included in order to provide a comparative view of other Late Prehistoric peoples who inhabited the Southern Plains. The Zimms Complex, Washita River Phase, and the Apishapa Phase all subsisted off a combination of small scale horticulture and hunting with considerable variations manifest in architectural styles.

Chapter three reviews the basic theoretical framework employed during the excavation of site 41PT109. Information gathered from the method of construction in conjunction with house features such as entryways, trash middens, hearths, and storage areas was applied directly to answering major research questions. A structured yet flexible research design was utilized so that the data could yield the greatest amount of relevant information. The primary research models were based on existing theoretical perspectives proposed archaeologists who have worked extensively in the Texas Panhandle and the Southern High plains such as Lintz (1986), Duffield (1970), and Brooks (1993).

Chapter four consists of a detailed explanation of the field and lab methodology used during the 2004 field season. Systematic excavations were conducted at site 41PT109 and all the recovered artifacts and data such as profiles, soil samples, photos,

and levels forms were taken to the Center for Archaeological Studies in San Marcos, Texas to be catalogued and analyzed.

Chapter five is divided into six separate sections in order to present all the data collected from the pedestrian survey and the excavation of site 41PT109 in a cohesive and organized fashion. This chapter provides data collected from the five peripheral sites found during pedestrian survey conducted on the adjacent ridges south of site 41PT109. Also included are descriptions of the 11 1x1 meter excavation units and their associated features, interesting finds, and artifact densities. Special attention was paid to the diagnostic tool assemblage, which include projectile points, bifaces, unifacial scrapers, and edge modified flakes. The last three sections present results from ceramic, faunal, and botanical analysis.

Chapter six presents my recommendation for the management and conservation of site 41PT109. In order for the site to receive comprehensive federal protection it must be deemed eligible for the National Register of Historic Places (USC 1966). Supporting arguments pertaining to the cultural significance of site 41PT109 are provided in this chapter so that eligibility can be accurately assessed. It is hoped that the ongoing research conducted at the site will spur additional excavations on the numerous other sites located on the Cross Bar Ranch.

The final chapter summarizes the data collected during the 2004 field season and discusses possible interpretations for the function and length of occupation of the site. Implications regarding the cultural significance of the site as well as the potential for future research is reviewed in order to ensure that a uniform and consistent long term investigation plan is followed. Finally, a table detailing the actual numbers of lithics,

shell fragments, ceramics, and bone fragments from each excavation unit is provided in Appendix A. Appendix B is the report and raw data composed by Christopher Lintz during the analysis of the entire ceramic assemblage recovered from site 41PT109. Appendix C consists of the report written by Barbara Meissner, who conducted the faunal analysis and identified all the vertebrate species found at site 41PT109. Appendix D provides the botanical data collected from soil samples which were floated, sorted, and plant remains identified by Phil Dering. The last appendix consists of a table that lists calibrated radiocarbon dates from the various Southern Plains Villager groups collected from previously published reports.

CHAPTER II

THE STUDY AREA: ENVIRONMENTAL AND CULTURAL BACKGROUND

This chapter provides a detailed account of the environmental and cultural setting of the Southern High plains with special emphasis placed on local conditions in Potter County, Texas. The physical description includes an overview of the geology, soils, climate, flora, and fauna of the study area. This section also reviews the modern environmental conditions at the Cross Bar Ranch. The Cross Bar Ranch is private property and trespassing is prohibited. However, the Canadian River, which is dry most of the year, is open to the public and is used frequently to ride dirt bikes or All Terrain Vehicles. This has caused obvious problems for the preservation and conservation of the numerous sites located along the banks of the Canadian River.

To further understand the cultural characteristics and adaptations of the Antelope Creek Phase peoples, a description of three distinct Plains Village cultures located in Southeastern Colorado, Western and Central Oklahoma have been examined. A comparative analysis of differing people groups over an expanded geographical area is often helpful in delineating causes responsible for changes in subsistence patters.

Geology

The Southern Plains is defined by a vast plateau known as the Llano Estacado with the Pecos River Valley creating the western boundary, and the Canadian River serving as the northern margin (Johnson 1990). Some might consider this area featureless, characterized only by gently rolling hills and scrubby vegetation. However upon closer examination, landforms created by meandering seasonal streams offer a vast array of hidden valleys, dramatic bluffs, and deep canyons.

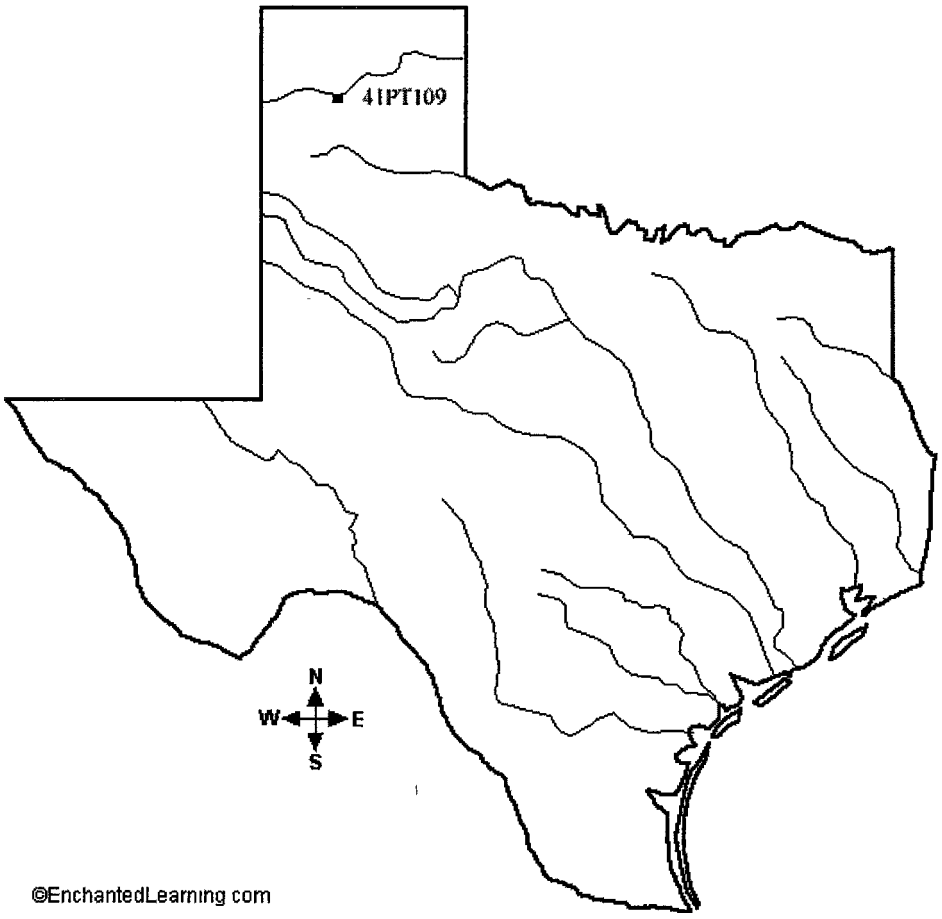

Figure 1: Location of Site 41PT109

This environment might seem harsh to modern Americans because of its high winds and semi-arid climate, however for prehistoric peoples it offered a plethora of sustainable resources. Most notably is the brilliantly color-banded outcropping of flint found at the Alibates quarry about 20 miles northeast of site 41PT109.

The Southern High plains and the Llano Estacado were created by the movement of massive amounts of sediment from repeated uplift and erosion of the Rocky Mountains to the West. Alluvial fans deposited sediment known as the Ogallala formation during the Tertiary period that eventually moved east and as far south as the Edwards Plateau in Central Texas creating a relatively featureless terrain (Hughes 1991). The Southern High Plains remains at a higher elevation than adjacent regions because the formation of a calcareous caprock that slowed the erosion of the eastern and western escarpments (Rathjen 1998). The Canadian River and its tributaries cross-cut the Texas Panhandle exposing Permian-age formations such as Alibates, which is characterized by dolomite deposits that in some places has silicified to form outcroppings of the well known Alibates flint. Additional indigenous lithic source including Tecovas chert, Tecovas jasper, Ogallala quartzite, granite, and some rhyolites and basalts (Lintz 2002). Quartzite and granite are not fine grained enough material to produce the most effective tools or weapons, but were used for grinding or expedient chipped stone tools. The dramatic topography of the study area has created a mosaic environment containing a combination of mixed grass prairies and riparian lowlands that provided enough diversity to support sedentary populations.

The Northward erosion of the Pecos River robbed many eastern flowing steams throughout the Texas plains of their waters, with the Canadian River serving as the only

exception. Because of this, the Canadian River has a powerful influence over the Texas Panhandle and is the only major river system that drains the Llano Estacado. Reddish waters flow seasonally due to high clay content of the soils located at the headwaters. Torrential summer rainstorms in conjunction with high evaporation rates often produce raging waters that facilitate ephemeral stream flow capable of transporting large amounts of sediment (Huckleberry 2001). The highly variable flow regime has caused the erosion of deep canyons, steep cut banks, and wide flood plains despite stubborn local caprock formations.

Riverine environments are often a great source of archaeological materials in arid climates because preservation is very high and people tend to gravitate towards water sources as a necessity for survival. The dynamic nature of the Canadian River does not provide a sustainable water resource, however its tributaries are fed by ancient Tertiary springs located deep in the canyonlands. It is these fossil springs that likely provided the majority of water for the Antelope Creek peoples who occupied site 41PT109.

Soils

The steep slopes that flank the Canadian River are dominated by Tertiary age alluvial deposits that are a dark brown color and friable at the surface and are classified as Burson-Quinlan soils (Pringle 1980). Site 41PT109 is located high on a Pleistocene terrace and has experienced high amounts of wind erosion without subsequent seasonal sediment deposition resulting in soils are predominately fine grained silty loams with high gravel content belonging to the Claremont Series (Pringle 1980). Sediments are compact at depth but are quite friable at the surface due to lack of moisture and are light brown in color. Stream rolled cobbles of varying size are common as well as large slabs

of dolomite exposed from the eroding Permian formation.

Climate

Little work has been done to reconstruct the paleoenvironment of the Texas Panhandle. In 1541, when Coronado's expedition traveled through the Southern High plains records indicate that the permanent villages were deserted and only mobile bison hunting groups inhabited the area (Bolton 1964). It is clear that a catalyst was responsible for the widespread abandonment of these permanent villages and homesteads. This dramatic shift in subsistence methods could be a product of a climatic drying trend during this time period.

The climate in the Southern High Plains is characterized as a semi-arid environment with sporadic rainfall and high evaporation rates. Summers can be very hot with temperatures rising to over 100° F and winters are quite harsh with strong artic air masses causing temperatures to drop below 0° F. The region is often subject to violent thunderstorms, tornadoes, and blizzards making this marginal environment even more difficult to survive in. The summer months experience the majority of violent weather and receive the most precipitation from May to July. For example, during the six-week 2004 field season we experienced two tornadoes and four raging thunderstorms. Skies turned black followed by intense electrical storms that caused booming thunderheads to drop sheets of rain and hail. Fortunately, these storms would often cause a delightful drop in temperature that would provide much needed relief from the oppressive summer heat. On average, 20 inches of precipitation are received annually with June being the wettest month. Droughts are relatively common and can be severe lasting for years crippling the local harvests. The growing season averages between 190-200 days each

year.

Flora and Fauna

The Texas Panhandle is dominated by a mixed grass prairie, with the study area characterized as a Bluestream Community. Over 400 species of native plants have been recorded in the area that are associated with differing topographic and soil classes characteristic of the Kansan biotic province (Rathjen 1998). Common tall grasses such as Indian grass (*sorghastum nutans*) and switchgrass (*Panicum virgatum*) are highly palatable and have a high forage value, but diminish under heavy grazing (Weaver & Albertson 1956). Short grasses such as blue grama (*Bouteloua gracilis*) and hairy grama (*Bouteloua hirsute*), on the other hand, thrive when heavy grazing occurs creating a thick blanketed prairie protected from wind erosion (Rathjen 1998). Small scrubby shrubs, trees, and cacti such as mesquite (*Prosopis glandulosa*), agave (*Agave deserti*), cholla (*Cylindropuntia acanthocarpa*), and yucca (*Yucca filamentosa)* are common in mesa top environments and served as important edible resources. The Canadian River valley and tributary headwaters supports larger riparian varieties such as cottonwoods (*Populus deltiodes*), hackberry (*Celtis reticulata*), and juniper (*Juniperus monosperma*) which were later displaced by the invasion of foreign species like Tamarisk trees (*Tamarix gallica*), introduced by white settlers in the early 1900's.

The abundance and diversity of animal species in the area directly affected the success of local prehistoric populations. The mixed grass prairie was particularly appealing to large grazing herds of buffalo (*Bison bison*) and pronghorn (*Antilocapra americana*) who served as primary food resources for Antelope Creek peoples because they produced high amounts of food and had low search costs (Duffield 1970). A high

frequency of smaller animals such as the prairie dog (*Cynomys ludovicianous*) and jackrabbit (*Lepus californicus*) also inhabited the high plains and provided a substantial amount of food despite their small size. The inner valley region supported a variety of animals such as mule deer (*Odocoileus hemionus*), bobcat (*Lynx rufus*), skunks (*Mephitis sp.),* ringtails (*Bassarisus astutus*), and elk (*Cervus canadensis*) who were adapted to the steep topography created by the Canadian River and its tributaries. The bottomlands are a more moist and aquatic habitat where opossums (*Didelphis marsupialis*), beavers (*Castor canadensis*), weasels (*Mustela spp.*), and whiletail deer (*Odocoileus virginiana*) take advantage of the fossils spring waters (Lintz 1986:62). Numerous reptile species also inhabit the Cross Bar Ranch including a growing population of the endangered horned lizards (*Phrynosoma cornutum)* as well as western diamondback rattlesnake (*Crotalusatrox*) and desert kingsnake (*Lampropeltis getulus splendida*) (Texas Parks and Wildlife Department 2003).

Figure 2: Horned Lizards are common on the Crossbar Ranch.

Cultural Background

The cultural chronology, synthesized by Alex Krieger (1946), focused on establishing a link between Southwestern and Southeastern archaeological traditions with

cultures residing in the Texas Panhandle as the central pivot point. Krieger's cultural chronology serves as an excellent comparative resource that gives fundamental information regarding relationships between the Antelope Creek Peoples their neighbors.

Almost 40 years later Christopher Lintz (1984) published his dissertation that concentrated exclusively on the architecture of various Antelope Creek Phase sites in order to identify variability and how the culture adapted to their environment. Lintz' (1984, 1986) research serves as an interpretative guide for the subsequent analysis of site 41PT109.

Site 41PT109 was originally recorded during survey by Jack Hughes in 1954 and later revisited by Meeks Etchieson in 1993 while conducting an archaeological assessment of the property located at the confluence of West Amarillo Creek and the Canadian River. Etcheison (1993) reports that the site consisted of a small clustering of stone slab ruins. Numerous artifacts such as lithics, bone fragments, shell, and ceramics were found clustered around what was interpreted as a midden. Although, the integrity of the midden had been badly disrupted by looters and the majority of the stone slab ruin was collapsed due to a combination of vandalism and physical weathering. Overall, the site was documented by both Hughes and Etchieson as being badly disturbed and, despite its rather remote location, had sustained a considerable amount of damage over the years.

In February of 2003, BLM Archeologist John Northcutt returned to site 41PT109 to assess the damage caused recently by a looter who was caught and prosecuted for digging a small trench through the site. Only a rough sketch of the site had been drawn before this incident and no formal measurements, photos, or maps existed that accurately recorded the contents or characteristics of the site. In order to comply with the

Archeological Resource Protection Act (USC 1979), mitigation procedures were pursued and a grant-in-aid was awarded to the Center for Archaeological Studies-San Marcos to excavate the site in 2004.

The cultural chronology of the Texas Panhandle is divided up in a similar manner as other chronologies established by Johnson and Holliday (2004) and Hughes (1991).

Paleoinidan Period: 12,000 B.C.-6500 B.C
Archaic Period: 6500 B.C-0
Late Prehistoric I Period: 0-A.D. 1000
Late Prehistoric II Period: A.D. 1000-A.D 1500
Protohistoric/Historic Period: A.D. 1500-A.D. 1950

Paleoindian Period: 12,000 BC - 6500BC

The Paleoindian Period is dominated by mobile hunter-gatherer groups who subsisted primarily on hunted Pleistocene megafauna like mammoth, bison, horse, and camel. The tool assemblage exhibits little regional diversity with long and broad lanceloate blades found littered throughout all of North America. These large fluted points are attributed to the Clovis and Folsom cultures, who, until recently were thought to have been the first peoples that inhabited North America. There is little evidence that accurately portrays the settlement patterns of these early hunters, but the plethora of sites throughout the Great Plains suggests that they were successful plains foragers. Although the origin of the Clovis and Folsom cultures is unclear, the termination of the culture was likely a direct product of a catastrophic warming trend about 10,000 years ago that caused the mass extinction of the megafauna in North America. Later Paleoindian groups in the Great Plains subsisted on bison, the only large herd animal that survived the end of the ice age. Tool technology adapted for hunting bison and the large conservative lanceolate points were replaced by a diverse regionally developed tool kits (Frison 1998).

The onset of the Holocene marked the beginning of significant social trends such as increased social complexity, widened resource bases, and regionally distinct culture groups.

Archaic Period: 6500 BC-AD1.

The Archaic period is often separated into three subcategories known as the Early, Middle, and Late Archaic. The Early Archaic generally dates to about 6500 BC-4500BC, the Middle Archaic dates from 4500 BC-2000 BC, and the Late Archaic dates from 2000 BC-AD1. These dates are of course regionally defined and change considerably once one ventures out of the Southern Plains. The warming trend of the Early Holocene spurred the creation of a mosaic environment across North America, which allowed archaic groups to have a more diverse resource base. This differed considerably from the homogenous environment characteristic of Pleistocene. However, sites from this period are poorly documented and dated and as a result, the period is not very well understood (Kay 1998).

For Texas, the Early Archaic Period is marked by replacement of lanceolate points with smaller stemmed and notched dart points, the appearance of groundstone technologies, gouges, and localized foraging practices (Hughes 1991).

The Middle Archaic has similar subsistence patterns with the addition of specialized bison hunting techniques as well as the use of wells at sites such as Blackwater Draw and Mustang Springs (Johnson, Holliday 2004). However, Hughes (1991) states that while the Middle Archaic is marked by the appearance of the Pedernales Point in Central Texas, there is little to no evidence of this transition on the Llano Estacado and adjacent regions.

The Late Archaic is highly represented in the panhandle-plains of Texas with thousands of sites found throughout the region The introduction of barbed dart points and a wide variety of site types ranging from open campsites to lithic scatters typically define the Late Archaic. Campsites are identified by the presence of fire hearths, bedrock mortars, and tool production areas. These sites tend to have been briefly occupied on a seasonal basis and located next to reliable water sources (Hughes 1991). Other artifacts associated with the period include knives, crude bifaces, unifacial scrapers, groundstone technology, and drills; most seem to be made of locally quarried materials.

Late Prehistoric I Period: AD1-AD 1000.

The Late Prehistoric I Period is marked by the appearance of ceramics which are mostly cord-marked or plain-ware showing influence from invading Mogollon groups from the West or Eastern Woodland groups. After nearly 2000 years of little change in subsistence and settlement patters during the Archaic Period, the shift to the Late Prehistoric is clearly evident by the introduction of the bow and arrow, corner-notched points, semi-permanent house structures, and rudimentary gardening practices. Archaeologically distinct culture groups such as the Lake Creek Complex and the Palo Duro Complex begin to emerge as well. The Palo Duro Complex is generally located along the Red River and Brazos River drainage systems and is, "characterized primarily by a combination of Mogollon plain brown pottery with a distinctive arrowpoint type called Deadman, often accompanied by Scallorn-like arrowpoints" (Hughes 1991:26). Sites are generally open camps composed of rock-lined hearths, middens, burials, and in several areas pithouses were used. The Palo Duro complex is often thought as a significant phase that marks the transition from mobile hunter-forager groups of the

Archaic to the sedentary Plains Villager groups of the subsequent Late Prehistoric II Period (Boyd 2004). Although, it is unclear if they are directly related to later Plains Villager groups.

Late Prehistoric II Period: AD 1000-AD 1500

The Late Prehistoric II period is often referred to as the Plains Villager tradition, which is the primary subject of this paper and will be given special attention. The Plains Villager tradition is defined by the presence of permanent houses and small villages occupied for long periods of time with an economy based on horticulture and hunting, particularly bison hunting; and a diverse artifact assemblage reflecting activities associated with a sedentary lifestyle (Drass 1998). The artifact assemblage consists of "slab-house ruins, Borger Cordmarked pottery, triangular Washita, Harrell, and Fresno arrowpoints, "guitar-pick" scrapers, large thin end scrapers, thick grinding slabs with deep oval basins, bison tibia, scapula, and rib tools, and mussel shell scrapers..." (Hughes 1991:31).

A comparative analysis of various other contemporary Great Plains villager groups such as the Zimms Complex, Washita River Phase, and the Apishapa Phase is offered to better understand the adaptive behaviors that allowed the Antelope Creek peoples to survive in the semi-arid climate of the Texas Panhandle. For example, there seems to be a gradual trend from west to east with lesser dependence on agriculture as one moves west towards the Rocky Mountains. Increased aridity in the Texas Panhandle caused farming to be a less reliable resource with bison serving as the primary food source. In contrast, Washita River Phase people of Central Oklahoma depended more on farming than the Antelope Creek People because the environment was more suited for farming. By examining these types of trends, the environmental and cultural influences

can be easier identified in the archaeological record.

Antelope Creek Phase

The Antelope Creek Phase is made up of a cluster of sites situated in the short-grass prairie of the Canadian River valley in the Texas and Oklahoma Panhandles. Some of the most extensive analysis of Antelope Creek Phase sites has been conducted by Christopher Lintz (1984, 1986). He has studied cultural variation manifest in architectural styles in order to identify why evidence of this culture seemingly disappeared around AD1450.

To adapt to the climatic conditions in the panhandle, the Antelope Creek peoples built semi-subterranean houses. Upright dolomite slabs were used in the construction of multi-room compounds or single-family homesteads. The Antelope Creek peoples were semi-sedentary, as is evidenced by the stone slab house structures generally located atop steep bluffs or high terraces overlooking major river valleys or tributaries. Structures generally contain a depressed central channel, a central heath, storage pits, and tunneled entrance way oriented to the east (Lintz 1986). Major sites include Saddleback Ruin, Landergrin Mesa, Alibates Ruin 28, Two Sisters, Black Dog Village, and many others scattered throughout the Texas and Oklahoma Panhandles. Most of these sites are made up of numerous houses and supported a larger population than is seen at the more isolated homesteads scattered throughout the Canadian Breaks. The material assemblage characteristic of this phase consists of Washita arrow points, small triangular Fresno points, diamond beveled knives, "guitar pick" scrapers, endscrapers, bison scapula hoes, bison tibia digging sticks, and manos and metates. The Antelope Creek phase is further defined by the almost exclusive use of the brilliantly color-banded flint from the nearby

Alibates quarry to create tools and weapons that had both functional and aesthetic value. The presence of small triangular side notched points associated with farming tools indicate that they subsisted off of a combination of small scale horticulture and hunting. The diversity of the tool kit suggests that hunted and farmed food were not the sole components of the diet; gathered wild plant foods were also likely regularly incorporated (Drass 1998). One of the lingering research issues facing archaeologist working in the region is how much the Antelope Creek peoples depended on farmed cultigens as a reliable food source. Artifacts recovered from numerous excavations have found that farming tools are generally conservative and multifunctional (Lintz 1986).

Zimms Complex

The Zimms Complex covers a rather small area in Western Oklahoma and is bordered on the west by the Antelope Creek Phase and to the Southeast by the Custer and Turkey Creek Phases. Because the geographic territory of the Zimms complex is so small, it is often thought to be an extension of either the Antelope Creek Phase or the Washita River Phase. The material assemblage bears close resemblance to Washita River Phase artifacts with high frequency of bifacial scrapers as well as small side-notched triangular points, beveled knives, drills, worked bone tools such as bison tibia digging sticks and bison scapulae hoes, and few ground stone tools (Flynn 1986). Plain shell tempered ceramics recovered from the Zimms Site (34RM72) exhibited significantly different characteristics than Antelope Creek Phase ceramics, which are predominately sand tempered and cordmarked. Major Zimms Complex sites include the Zimms Site and New Smith site located along the Quartermaster Creek (Flynn 1984), Lamb-Miller (Moore 1984), Chalfant (Briscoe 1993), and Wickham #3 (Wallis 1984). Sites are

typically found atop high terraces or overlooking tributary streams and are rather small containing only a couple of structures. The material assemblage for this complex has traits that were shared by surrounding people groups, however the distinct style of architecture and burial practices were a result of local adaptation.

The architectural pattern found at various Zimms Complex sites such as the New Smith Site and the Zimms Site seem to be stylistically related to the Antelope Creek Phase floor plan (Brooks, et al. 1992). Houses are semi-subterranean with a central depressed channel in between two raised platforms with several central support posts. The walls are generally constructed using waddle and daub instead of the stone slab masonry characteristic of Antelope Creek Phase architecture. Subsistence methods are similar to the typical Plains Villagers exploitation pattern consisting of the procurement of primarily hunted game such as bison and deer supplemented by the gathering of wild foods and small-scale horticulture. Population densities throughout Western Oklahoma during this time were considerably less than neighboring culture groups such as the Antelope Creek Phase or Washita River Phase (Flynn 1984). Settlements were more dispersed resulting in somewhat fragmented interpretation of the complex as a whole. The amount of dependence on agriculture is questionable because the only supporting evidence comes from a single bison scapula hoe, bison tibia digging stick, and few ground stone tools recovered from the Zimms Site (Flynn 1984). Burial customs were unique in that shallow pits were dug for the deceased individuals who where placed in a tightly flexed position and covered with a grass mat. An arbor was constructed over the burials and shallow pits for cooking were dug around the arbors where a mortuary feast could have been held (Brooks et al. 1992:74-75). These types of mortuary practices are

currently unreported in other Southern Plains Village cultures.

Washita River Phase

The Washita River Phase occupied a portion of the Washita River basin in Central Oklahoma. This culture group is believed to be an extension of the Paloli Phase, which has been attributed to the Plains Woodland Period dating from A.D. 900-1250 (Drass 1998). Growing population densities throughout the Washita River Valley are characterized by new adaptations in tool technology as well as larger continuously occupied villages, and a more intensive exploitation of the surrounding environment. The Red Bed Plains dominate Central Oklahoma and are made up of Permian age sandstones defined by gently rolling hills crosscut by major streams or rivers. The majority of Washita River Phase sites are located in the tall-grass prairie or Cross-timbers of Central Oklahoma, which is an environment where bison herds were not large enough to support growing populations. Instead, gathered seeds such as *chenopodum* and sunflower, and cultigens such as corn and beans were heavily relied upon as a more dependable food source (Drass and Flynn 1990). The floodplain was more productive than the surrounding highland prairie and provided fertile soil for farming and a rich diversity of wild grains. In contrast to Antelope Creek peoples who used small-scale farming to supplement hunted food sources, the Washita River peoples used a wider diversity of hunted game to supplement a cultigen-based subsistence structure. Brooks further supports this model in his study of village subsistence activity where he "discovered that the floodplain catchment diminished at sites situated further west, causing an increasing dependence on prairie resources such as bison" (1991:3). It is in the short-grass prairie of Western Oklahoma and the Texas Panhandle where bison and

deer herds were a more abundant and reliable food source.

This wide range of exploited resources necessitated a rather diverse tool kit made up of unifacial scrapers, diamond beveled knives, side and unnotched triangular points, bone tools, manos and metates, and grooved abraded stones. Specialized farming and food processing tools such as bison scapula hoes, tibia digging sticks, and ground stone tools have a high frequency at the Arthur site, Carpenter, Brown, Grant, and many others (Brooks 1987). Washita arrowpoints as well as Harrell and Fresno point types were often made from local cherts such as Frisco or from imported materials from Central Texas (Edwards), North-Central Oklahoma (Florence A), and the Texas Panhandle (Alibates). Pottery is predominately shell tempered and consists of plain globular jars with flat bottoms (Brooks 1987).

The majority of Washita River Phase sites exhibit a fair amount of architectural uniformity. Sites usually cover up to 15 acres and are made up of 20 or so structures accompanied by middens, hearths, storage pits, and cemeteries (Brooks 1987). Houses are typically rectangular with external wall posts and several internal central supports. The method of construction is a bit unclear, however Brooks (1987) postulates that either waddle and daub was used, or willow branches were applied to cover the exterior surface of the house in a manner similar to historic Wichita structures. Clay hearths are centrally located within the houses with food processing areas and storage pits residing in the southeastern quadrant of the house.

Apishapa Phase

The Apishapa Phase is the western most variant of the Plains Villager tradition located in Southeastern Colorado. Sites have been found aggregated atop mesas as well

as in the canyonlands surrounding the Apishapa and Purgatory rivers and on the Chaquaqua Plateau (Drass 1998). Occupation sites were identified as belonging to the Plains Village culture because of the presence of stone-slab structures, diamond-beveled knives, Washita arrowpoints, cordmarked pottery, and manos and metates. It is believed that the Apishapa phase is derived from a local Woodland culture known as the Graneros Phase, however it shares distinctive traits with the nearby Antelope Creek phase (Drass 1998, Lintz 1988). Very few sites have been adequately excavated and radiocarbon dates are lacking to confidently date this phase. However, some of the major Apishapa sites like Snake Blakeslee, Cramer, Trinchera Cave, and Medina Rockshelter produced radiocarbon dates indicating that the temporal span of the phase ranges from A.D. 900-1390.

A considerable amount of variation exists between the sites that occupy the highland plateaus, mesas, and canyonlands of Southeastern Colorado. An assortment of differing sites has been found ranging from open-air temporary camps and rockshelters, to multi-family compounds with barrier walls (Campbell 1976). The structures are typically above ground and were constructed using "wooden posts and brush as roofs, and vertical rock slabs as interior roof supports" (Drass 1998:423). The majority of stone-slab structures were found in the wide canyon areas where the accumulation of fertile silt deposits facilitated the cultivation of corn, beans, and gourds. The amount of dependence on agriculture, however, is only narrowly supported by few cultigens such as maize, that were preserved in excavated rockshelters. Lintz suggests that "the scarcity of trade materials from either the Southwest or adjacent Plains manifestations suggest that they maintained few alliances outside the region and were relatively isolated" (1986:29).

Protohistoric/Historic Period: AD 1500-AD 1950

The Protohistoric period in the Texas Plains is dominated mostly by mobile hunter-gatherer groups, some of which were documented by Coronado's expedition in 1541. The expedition encountered two separate groups who occupied the Panhandle-Plains regions: the Querechos and the Teyas (Boyd 2001). Both groups were documented as being semi-nomadic and roamed the Southern High Plains hunting bison and other indigenous game. The Querechos were likely Athapaskan speakers and were later known as the Apaches. Research conducted by Habicht-Mauche (1994) suggests that the Querechos and the Teyas correspond closely with the archaeological remains of the Tierra Blanca and Garza Complexes. Their tool technology is relatively similar to that employed by their predecessors, indicating a strong reliance on bison. There is, however, a significant shift in point types from the side-notched Washita points used in the Late Prehistoric II, to the usage of basal notched Garza and Lott points. The change in technology and settlement patterns is likely a product of an increasingly drier environment as well as substantial influence from Pueblo groups.

Conclusion

It is likely that the cultural adaptations of the various plains village cultures were in many respects a product of geographic and environmental differences. The many shared technological innovations such as the diamond beveled knife or the side-notched Washita Point indicates that these culture groups participated in similar economic activities, only on differing scales. The end of the Plains Villager tradition is well marked in the archaeological record at about A.D. 1500 (Lintz 1986). Table 1, below,

presents an average occupation date for the various Southern Plains Villager groups discussed above gathered from previously published reports. A complete listing of these calibrated radiocarbon dates can be referenced in Appendix E.

Table 1: Average Calibrated Radiocarbon Dates from Various Plains Villager Groups

Plains Villager Culture	**Average Calibrated Dates (A.D.), (Stuvier et al. 1998)**	**References**
Antelope Creek Phase	1249-1489	Lintz 1984
Site 41PT109	1400-1420	This report
Zimms Complex	1184-1385	Flynn 1986, Drass & Moore 1987
Washita River Phase	1160-1435	Bell 1984, Brooks 1987, Drass & Flynn 1990
Apishapa Phase	969-1273	Lintz 1984, Gunnerson 1989

CHAPTER III

THEORETICAL PERSPECTIVE

A number of theoretical avenues will be pursued in order to interpret the data recovered from the 2004 excavation season as well as create a foundation for future research. Generalized issues pertaining to the Antelope Creek Phase as a whole such as environmental deterioration and resource exploitation will serve as the framework for interpreting and identifying any patterns present in the recovered data. More specifically, the subsistence and settlement strategies of the people who occupied site 41PT109 are discussed in order to identify signs relating to the planned or unplanned abandonment of the site.

Environmental Deterioration

The Texas Panhandle is characterized as a semi-arid environment with sporadic rainfall, scrubby vegetation, and often dramatic weather conditions. Because this type of environment is marginal, short term or long term environmental change can immediately affect the local flora and fauna populations. It is generally believed that a climatic drying trend occurred in the Southern Plains around AD1400-AD1450 causing a gradual decrease in the available water supply (Duffield 1970, Hall 1988, Kibler 1998).

Little effort has been made to reconstruct the paleoenvironment of the Cross Bar Ranch during the Late Prehistoric period. However, paleoenvironmental studies from

adjacent regions can provide basic data to support the changing climatic conditions in the Texas Panhandle. Hughes (1991) provides a generalized climatic timeline for the Southern High Plains based the geologic evidence complied for the Southwest by Antevs (1955). This model presents a conservative breakdown of the three dominant climatic periods: the Anathermal from 8000-5500 BC, the Altithermal from 5500-2000BC, and the Medithermal from 2000 BC to the present (Hughes 1991). The Medithermal period persists during the Late Prehistoric period and is further defined as a warm and dry period with abundant bison populations. Also, Duffield (1970) attempted to identify climatic change Texas Panhandle by looking at the frequency of bison remains at excavated Antelope Creek Phase sites. Bison are known to feed primarily on lush grasses that are relatively high in fiber and protein. If a drought occurred during the 15th century, the lush grasses would likely have been replaced by more drought resistant xeric plants that have higher fiber content, but lower protein (Lintz 1986). Duffield found a marked decrease in bison remains at excavated Antelope Creek Phase sites after AD 1300 implying that changing environmental conditions caused bison herds to migrate to tall-grass prairies outside of the Texas Panhandle.

This drying trend is further supported by stratigraphic evidence collected by Hall (1988) in Western Oklahoma and Kibler (1998) in Boren Shelter No. 2 in Garza County, Texas. Hall (1988) states that the drying trend during the 15th century was identified when the local alluvial water table lowered, resulting in the decline of hickory tree populations in the Cross Timbers Region of Central Oklahoma. The decreased timber population was manifest in stratigraphic sequencing as an increase in the deposition of eolian sediments found just below modern soil layers. At Boren Shelter No. 2, a climatic

shift towards more arid conditions was identified as an increase in eolian sediments and a noticeable decline in slopewash sediments after A.D. 1250 (Kibler 1998). Xeric conditions were further recognized by the change from steady sedimentation to more erratic depositional patterns indicating an overall decrease in rainfall (Kibler 1998).

Increased aridity in the Texas Panhandle during the Late Prehistoric Period would likely have caused a decline in the availability of major food sources, and thus facilitated a wave of technological change brought about by a shift in subsistence activities. After AD1500, the Plains are clearly dominated by mobile hunter-gatherer groups such as the Teirra Blanca or Garza Complex peoples who continued to employ side-notched triangular points to hunt bison (Hughes 1991).

If this kind of climatic drying trend was occurring in the Southern High Plains during the time that site 41PT109 was occupied, then one would expect that the chances of failing to meet dietary needs would increase gradually over time, resulting in a behavioral shift of some kind (Torrence 1989). This behavioral shift could produce a number of outcomes that are visible in the archaeological record. For example, if the primary resources such as large game became threatened, then farmed cultigens could be stored and used during the lean season resulting in an intensification of agricultural practices. Or, if the sporadic rainfall caused crops to become too unreliable, then the population might choose to widen the resource base with heavy reliance on smaller game, more abundant game (MacArthur, Pianka 1966).

The evidence of the transition from villagers to mobile hunter-gatherers is ambiguous at best and it is likely that small groups were adopting this new mobile lifestyle at staggered rates. A collective large scale change in economy throughout the

Antelope Creek Phase is highly unlikely considering that there was little social hierarchy. Instead, local groups throughout the Canadian Breaks adapted to the microenvironment of their home region and only interacted regularly with people in the immediate vicinity.

Site 41PT109 represents only a snap-shot in the cultural history of the Antelope Creek Phase and does not possess the stratigraphic sequencing capable of defining these long term trends. However, by analyzing the faunal, botanical, and tool assemblages, it is possible to provide an accurate portrait of the economic activities that lends data for the support of paleoenvironmental trends. For example, if changing environmental conditions were causing desirable game to migrate out of the Texas Panhandle, the occupants of site 41PT109 would have to become more mobile resulting in an increased number of long-distance hunting trips.

The amount of time spent traveling to amass resources such as meat and gathered plants can be tested in a variety of ways. It is clear that hunting supplied a high percentage of food for the population living along the Canadian River. However, it is unknown if game was hunted locally or if long-distance travel was necessary to find desired game. Anatomical parts with large amounts of meat, such as the femur, have a higher value than those parts that carry relatively little meat such as the feet. Therefore, it is more efficient to butcher the animal in the field and carry the most valuable portions to the permanent homestead rather than haul the entire animal (Metcalfe and Jones 1988). The faunal assemblage found at the site will greatly aid in determining how far game was transported.

Agricultural Dependence

Food scarcity and economic risk are important limiting factors on human survival,

and the predictability of food has had a major impact on human adaptations, which can be recognized by changes in the style and function of tools. The complexity, quantity, and function of the tool kit can reflect how the Antelope Creek peoples made their living. The design, manufacture, and use of artifacts by their makers is strongly linked to the specific exploitation patterns. It is these patterns that we seek to uncover by determining whether the tools found are primarily expedient or maintained and reliable tools (Binford 1979, Bleed 1986).

Binford (1979) defines expedient lithic artifacts as those that can be produced quickly and have short periods of utilization. This type of technology is usually employed in areas where there is an abundance of raw material in close proximity. On the other hand, curated tools are generally labeled 'expensive tools' because they take longer time and greater effort to produce. Curated lithic assemblages are generally designed for re-use, are specialized, and easily transported. Bleed (1986) further elaborates on curated technology by establishing categories based on the maintainability and reliability of non-expedient tools. Reliable tools are generally over designed with redundant components and capable of withstanding heavy workloads. Maintainable tools can be multipurpose and made to work even after broken. They can also be used for tasks other than those for which they are originally designed (Bleed 1986).

Various methods will be employed in order to further understand and calculate the amount of agricultural dependence exhibited during the Antelope Creek Phase. Data concerning the prevalence of storage cysts, macrofloral remains from hearths, groundstone technology, and the abundance and complexity of farming implements will be used as preliminary evidence for the dependence on agriculture. The degree

complexity of farming and food processing tools should tell a great deal about the extent to which agriculture is practiced. If the tools are highly specialized, diverse, and designed for continual and efficient use, it can be postulated that farming produced the majority of food for the entire population. The work force would be clearly divided and the tool assemblage would be manufactured to coincide with predictable seasonal variations. Supplemental foods would be obtained opportunistically and exhibit a sporadic distribution.

If, on the other hand, farming tools are more generalized and only a couple of tools are used to perform numerous tasks, then it can be surmised that farming was a part-time activity. Reliance on domesticated foods would make up only a small portion of the overall diet. If this were the case, then it could be hypothesized that these people gained a substantial amount of their food by hunting and gathering and reduced the risk of seasonal food scarcity by filling in the gaps with a more reliable food such as corn, beans, or squash.

Household Abandonment

Large Antelope Creek Phase sites such as Alibates 28, Antelope Creek 22, or Saddleback Mesa supported numerous families made up of many structures that were often connected. Lintz (1986) places this type of habitation pattern in the earlier portion of the Antelope Creek Phase and characterizes the later phase as being dominated by isolated homesteads that are more widely dispersed throughout the Canadian Breaks and its tributaries. However, these categories are not mutually exclusive and isolated homesteads have often been found to be associated with the earlier subphase (Lintz 1986). The shift from large multi-family compounds to single family homesteads is

thought to be a buffering mechanism that was used in order to relieve population stress. As a result of changing environmental conditions, large village communities could no longer support a population that had grown beyond its carrying capacity. Aggregated settlements were abandoned and isolated and dispersed single family homesteads became the dominant architectural style (Lintz 1986). This loss of social cohesion and change in architectural patterns occurred around A.D. 1300 and continued until the termination of this phase at around A.D. 1450.

Site 41PT109 is a single family homestead that is located atop a very steep bluff overlooking the Canadian River. The motivation behind the abandonment of the house can be difficult to recognize. According to Brooks (1993), site abandonment can be episodic, seasonal, or permanent depending on the dynamic nature of various social or environmental factors. This study is concerned primarily with identifying the archaeological signatures of permanent household abandonment. Episodic and seasonal abandonment are excluded because the data does not support multiple occupations, but rather a single continuous occupation pattern.

Permanent household abandonment can be spontaneous resulting in the rapid desertion of the structure due to threatening or unexpected circumstances. More often, structures are abandoned in a systematic manner that requires planning in order to ensure the smooth transition to the new residence (Brooks 1993). Structures that are abandoned in this manner are usually the result of physical deterioration, where cost of repair is sometimes more expensive than relocating altogether. A residence's life-cycle typically involves three basic processes: construction, use and maintenance, and finally abandonment (Brooks 1993). During the abandonment processes, goods are scavenged

from the old house to be reused at the new residence. These goods can include construction materials such as posts or flagstone slabs as well as artifacts such as scrapers, knives, or ceramic vessels. The average life-span of an isolated Antelope Creek homestead can depend on the either the deterioration rate of the house structure or the difficulty in procuring a steady supply of edible resources. The nature and distribution of the faunal assemblage as well as the artifact assemblage will help to reveal the driving factor behind the abandonment of site 41PT109.

Conclusion

The extent to which environmental deterioration and agricultural dependence contributed to the eventual abandonment of site 41PT109 will depend greatly on results from faunal, floral, and lithic tool analysis. Data from these analyses have been presented and discussed in detail in Chapter 5.

The first step in analysis will be to determine what type of tools constitute the majority of the assemblage. If the majority of tools are expedient, then it can be said that the Antelope Creek people lived in a resource-rich environment. Raw materials were abundant and exploitable resources were relatively dependable and predictable. Expedient tools characterize a society that is somewhat mobile and extracts foods from a variety of resources.

If the tool assemblage appears to be made up of curated and highly specialized tools, then it can be hypothesized that the society is concentrating on exploiting a small number of predictable resources. A lot of time and effort is put forth to extract these critical resources and therefore the tools have to be sturdy, reliable, and specialized. Because the majority of food comes from only a few major sources, the risk of starvation

as a result of climatic or seasonal variation is greatly increased. In the case of a farming community, if the crops were to fail a dramatic change in the tool assemblage would be necessary to extract food from previously unexploited resources. The dichotomy of specialized and generalized tool assemblages can provides the basis for delineation between sedentary and mobile societies.

CHAPTER IV

METHODOLOGY

The goal for the project was to determine the depth of occupation, the temporal and spatial relationships with adjacent sites, and extent of looter damage. Fieldwork consisted of a pedestrian survey and the systematic excavation of site 41PT109. Before excavation began at 41PT109, the surrounding topography was surveyed to locate any additional sites. Pedestrian surveys had never been conducted in the region adjacent to the project area, so it was necessary to identify any archaeological sites that might be temporally related to site 41PT109 as well as any additional looter activity. Surface visibility in the Canadian Breaks was high with only scrubby vegetation sparsely covering the ground. Eroded cutbanks provided exposure of subsurface materials over a large area in the vicinity of site 41PT109. The crew conducted pedestrian survey in transects spaced at 30m intervals in the valley south of the Canadian River. The crew chief calculated the transect degree headings using a hand held compass. A total of five surface sites were found within the 159 acre survey area that extended along the ridges south of site 41PT109. Photos were taken and surface materials were recorded detailing the dimensions and characteristics of these peripheral sites. No shovel test pits were dug, however it is likely that the majority of the artifacts at these sites are contained on or near the surface. The lithic scatters might indicate the presence of temporary camps that could

have been used as butchering or hunting camps. Due to strong prevailing winds, evidence of these hunting camps are continually eroding out of the top soil exposing a substantial amount of cultural debris. The majority of artifacts found at the five field sites were granite manos, lithic debitage, and numerous exhausted cores.

Data Recovery at Site 41PT109

After the area was adequately surveyed, the excavation of site 41PT109 was initiated and the dimensions and characteristics of site 41PT109 were recorded. Landforms, flora, fauna, and a general physical description were documented including recent disturbances such as roads, excavation pits, and looters pits. Due to the nature of the extent of modern disturbances as well as physical weathering, the site has been altered considerably over the years. Surface materials as well as above ground architecture were carefully mapped and flagged so they could be integrated into later excavation activity. After preliminary dimensions and primary elements such as upright dolomite slabs and modern disturbances were recorded, a datum point was established for site as well as a site perimeter and a N-S grid. All surface materials and features were then formally mapped onto the grid and disturbances such as looters pits and eroded surfaces were added to the site map. Profiles were drawn of previously excavated pits and were used to gain an idea of the site's stratigraphy, soil types, and occupation levels. Data was collected using at Total Data Station in order to create a topographic map so that the eroding surfaces of the site and the immediately surrounding could be accurately recorded.

After several datum points were established on the sites periphery, eleven 1x1 meter excavation units were set up in designated areas with six units inside the house

structure and five units outside the structure. The excavation strategy was fashioned in order to find specific features such as hearths, doorways, food processing areas, and occupation floors in accordance with existing data recovered from numerous excavations at other Antelope Creek Phase sites. Students excavated the units in 10cm levels, all sediments were screened through a ¼ -inch wire mesh, and cultural materials were placed in plastic bags and labeled with unit number, depth, provenience, date, and name of excavator(s). All artifacts, features, and profiles were recorded on a daily basis. Photos were taken of all features as well as the individual excavated levels. Five features were found and were excavated separate of the unit by bisecting the feature so a profile could be drawn and associated artifacts accurately recorded. Very little of the original architecture of this structure remained intact as a result of many years of erosion and disturbance. Excavators working in units 1, 9, and 4, however, found intact upright dolomite slabs that further delineated the outline of the house structure.

Laboratory Analysis

All recovered artifacts as well as soil and macro-floral samples were taken to the Center for Archaeological Studies in San Marcos, Texas to be analyzed. Cultural materials such as chipped stone artifacts, bone fragments, shell fragments, and ceramics were organized, classified, and catalogued according to their provenience and type. Special attention was paid to the lithic assemblage, and artifacts were separated into functional categories such as projectile points, preforms, unifaces, scrapers, and debitage. Points were assigned to a specific projectile point typology based on the widely accepted categories delineated by Turner and Hester (1999). Other tools such as scrapers, unifaces, cores, and modified flakes were analyzed in terms of stages of reduction with

emphasis placed on use-wear and post depositional processes. The most common projectile point was the Washita point which is small and triangular with side-notches and slight basal curvature. Bifacial and unifacial tools were typed according to the manner and extent of retouching along the distal and lateral edges. All of the diagnostic tools were carefully measured and defining traits were systematically recorded to identify aspects capable of relating to specific subsistence activities (Appendix B). The lithic debitage was sorted into categories based on the presence or absence of defining features such as the bulb of percussion and striking platform.

The faunal collection was analyzed using the comparative collection at the Center for Archaeological Research at the University of Texas at San Antonio. A total of 3,258 bones were recovered, and despite the fragmented nature of the assemblage, many species were identified. The recovered ceramics were carefully inspected by Dr. Christopher Lintz in order to determine paste characteristics, vessel attributes, and method of construction. The physical traits were also recorded including dimensions and sherd type (i.e., rim, shoulder, body or base) of each of the 34 ceramic sherds collected. The soil samples and macro-botanical remains excavated from various features were analyzed by Phil Dering who floated each sample in a 5-gallon bucket and poured it through a chiffon fabric or a wire mesh screen. Plant remains were then sorted into categories based on their composition and identified using a binocular dissecting microscope or by comparing samples to the archeobotanical herbarium. The findings from these contributing analysts can be referenced in the appendix.

Curation Arrangements

All recovered artifacts as well as level forms, photos, field notes, profiles, and

maps will be sent to the Panhandle-Plains museum in Amarillo, TX to be curated. The Panhandle-Plains museum was chosen because of its close proximity to the Cross Bar Ranch and so that archaeologists conducting investigations on the Ranch in the future can easily access the materials.

CHAPTER V

RESULTS AND ANALYSIS

This chapter provides a detailed description of all the data collected during the 2004 field season. All the primary elements of the sites such as units, features, artifact frequency, location of soil samples, and faunal assemblages have been presented here. Special attention has been paid to the analysis of the diagnostic stone tool assemblage because of its relevance to the previously discussed research issues. A breakdown of the artifact densities of each unit has also been provided so that patterns regarding the depth of occupation and subsistence activities can be recognized. The prevalence of chipped stone artifacts, shell fragments, ceramic sherds, and bone fragments have also been simultaneously graphed to further show if any significant relationships exists between the various artifact frequencies present within and between excavation units.

This chapter is broken down into seven major sections in order to thoroughly present all of the data recovered from the 2004 field season in a coherent and organized fashion. The first section provides data gathered from the several surface sites found within close proximity of 41PT109. No artifacts were collected from these peripheral sites, however the dimensions, location, photographs, and density of surface artifacts was recorded. The second section gives a detailed description of each of the eleven

excavation units including the location of features and any associated interesting finds. The following section focuses directly on the diagnostic tool assemblage including points, scrapers, and utilized flakes. The data presented in section four is a summary of the analysis ceramic assemblage recovered from 41PT109. Findings from the faunal assemblage are reviewed in section five. Section six provides the botanical data collected from soil samples which were floated, sorted, and specific species or genus were identified. The final section provides a description of the architectural features present at site 41PT109.

Section 1: Survey Results

Field Site One is located on the high ridge overlooking the Canadian river southwest of site 41PT109. The site roughly extends 40m north-south, and 15m east-west based on the presence of artifacts found on the surface on the southeast side of an eroding basin. A total of 13 chipped stone artifacts made of Alibates flint and quartzite and a possible hearth were found. The deflated hearth consisted primarily of burned quartzite cobbles and was located on an eroding cut-bank facing the Canadian River.

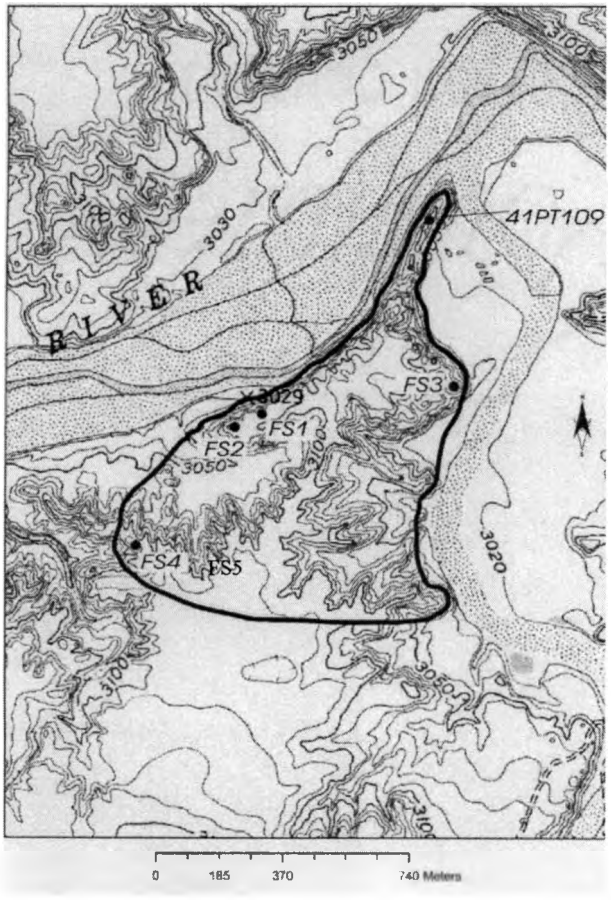

Figure 3: Topographic Map showing location of site 41PT109 and Field Sites.

Field Site Two was found on the

same set of ridges but was located about 100m west of FS-1. To the north of the site is the steep cutbank that drops roughly 30m to the Canadian River basin. To the west, the site overlooks a gully that eroded north-south and emptied into the Canadian River. Numerous flakes made of Alibates flint, quartzite, and agate were found concentrated in an area that measured 32m x 23m. About 60m southwest of the site a BLM survey marker was found, which is an excellent tool for relocating these sites in the future.

Field Site Three was found on the east side of a high ridge overlooking West Amarillo Creek. Three crude bifaces made of Alibates and quartz, several exhausted cores, and one granite mano were found. The cores were made of Alibates material are significant finds because they give insight into the hunting and tool production methods of the people who inhabited this valley. The main source for Alibates flint is located approximately 20 miles northeast of site 41PT109 and it was likely that it was highly valued because of its effectiveness in tool production as well as its unique appearance. This site is significantly larger than the other two and many more flakes were found scattered along ridge top. The higher density of flakes and tools suggest that this site experienced more activity, possibly as a convenient area for scouting game in the valley below. The site measured 110m by 75m.

Field Site Four is on top of a ridge south of 41PT109 overlooking the Canadian River. The site consists of five cores, several flakes, a crude biface made of Alibates flint, and three stone clusters. The three stone clusters each measured roughly 3m x 4m were mostly circular shaped and made up of large dolomite and quartzite cobbles. These features are situated approximately 40m apart from each other and could be interpreted as teepee rings, burial cairns, or the product of modern activity such as marine training or

ranching. The site visibility is about 50% with mainly scrubby grasses, mesquite, and yucca dominant in the area. The third circular feature has much smaller gravels scattered around it and my not be directly associated with the site as a whole because it is located on the far side of drainage that bisects the site. Overall, the site measured roughly 340m x 130m.

The last site found, Field Site 5, was located 100m Southwest of FS-4. Many flakes were found along the western side of the ridge. The site encompasses a rather large area that extends south for 400m. The artifact density was quite low with single isolated flakes being found every 3-5 meters. Although this site was recorded as a single site, it is likely that it is made up to several small sites.

Section 2: Excavation Units and Occupational Features

During the 2004 field season a total of 11 1x1 meter units were excavated and five distinct occupational features were located. The following section gives a brief description of the materials recovered from each of the hand-excavated units and provides a detailed account of additional artifacts that help to define the cultural activities occurring at site 41PT109 including construction methods, food processing areas, and living areas.

Table 2: Occupational Features Uncovered during 2004 Excavation

Feature No.	Unit	Depth	Description
1	6 & 10	70-80cm	Semi-circular pit feature that contained high artifact density and was likely a borrow pit and trash midden
2	2	100-133cm	Multi-purpose bell-shaped pit used as a cooking pit and trash midden
3	1	70-92cm	Dark patch of organic soil associated with charred gravels

4	4	50-78cm	A hearth located in central portion of house structure. The feature consists of rounded cobbles associated with abundant ash deposits.
5	3	7	Southeast corner of Unit 3, the feature consisted on a rectangular shaped clay stain. No artifacts were associated with the feature.
6	7	0-70cm	Unit produced high frequency of artifacts in all levels. Feature is likely a trash midden that was used throughout the occupation of the site.

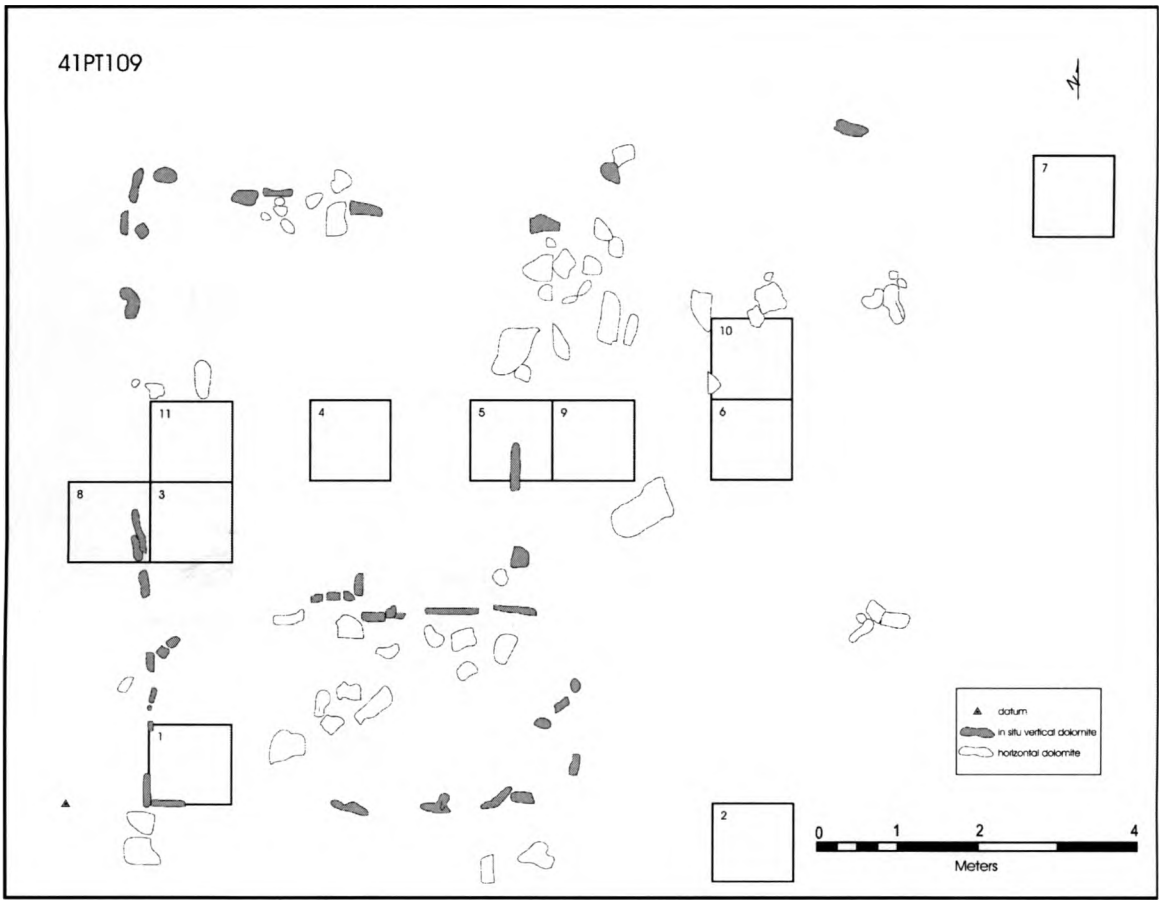

Figure 4: Site Map of 41PT109

Unit 1

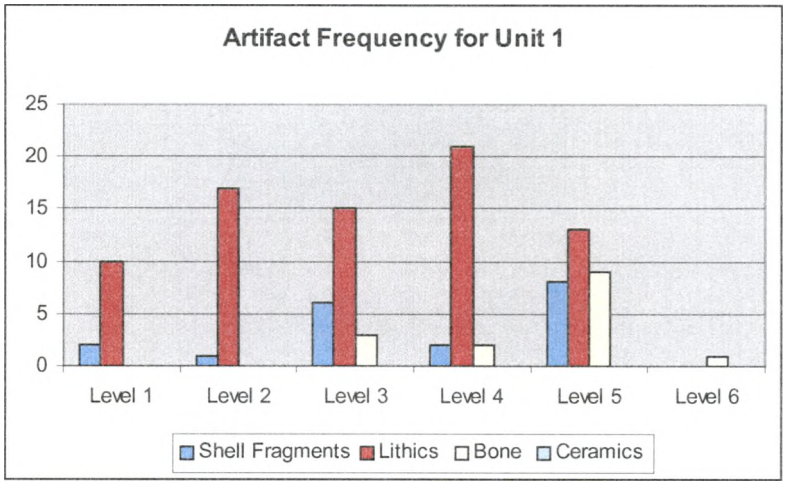

Figure 5

Many of the dolomite slabs that were used in the construction of the house structure have been disturbed due to modern looters or post-depositional processes. Several of the slabs, however were undisturbed especially in the southwest corner of the structure. This corner remained virtually intact and therefore became the location of the first excavation unit.

Figure 6: Plan View of Unit 1

The purpose for the placement of this unit was to determine the exact location of the house floor and better understand how the structure was built. Numerous other dolomite slabs were found during excavation, but were no longer intact because the majority of the walls have collapsed. Some charcoal deposits and gravel concentrations were found in levels 2 and 3. Considerable gopher activity throughout the unit caused some of the deposits to become co-mingled with the surrounding strata, however, these disturbances were excavated separately so that the materials could not be given an incorrect provenience. All uncontaminated charcoal samples were carefully collected to be used for radiocarbon dating and macro-floral analysis. Feature 3 was found at 80cm below the surface and extended to 92cm below the surface and was approximately 30cm in diameter. The feature consisted mainly of dark organic sediments intermixed with charcoal deposits. No artifacts were recovered from feature 3. Excavation ceased at level 6 (70-80cm).

Unit 2

Unit 2 was located 7 meters east of unit 1, which placed it outside the architectural structure. The topography slopes off dramatically to the east of the structure due normal erosion processes. Therefore, Unit 2 had a considerably lower elevation than the rest of the units that were situated within or around the house structure. Artifacts were consistently found in all levels, with the greatest amount of bone coming out of the lower-most levels and a sharp increase in lithics in levels 4 and 5.

At 100cm below the surface, a distinct soil discoloration occurred in conjunction with a high concentration of bone fragments indicating the presence of a feature.

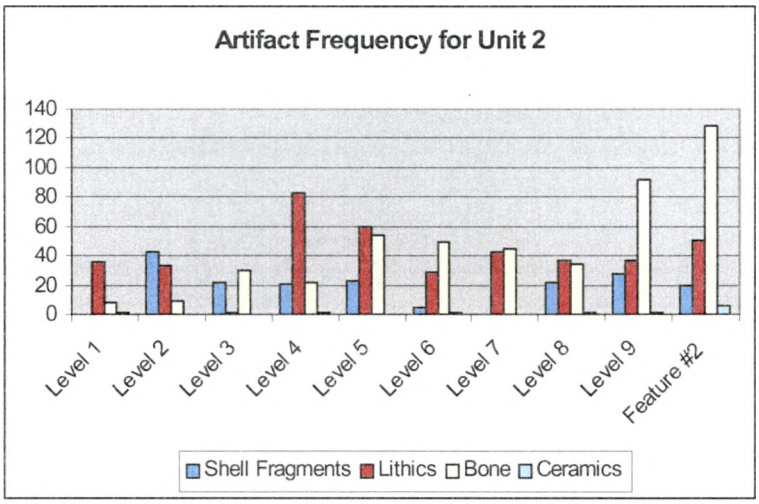

Figure 7

Feature 2 contained several large bone fragments as well as cord-marked ceramic sherds, and charcoal. The bottom of the pit extended to 133 cm and had several fire-cracked dolomite slabs as well as an ash layer mixed with charred pebbles. This feature could be either the remnant of a bell-shaped prehistoric cooking pit that was purposely located outside the house structure in order to separate food processing activities from other domestic chores. It could have been dug during the initial construction of the house and the excavated dirt was employed to fortify the stone slab walls. After the pit was dug, it was subsequently used as a cooking pit and later a trash depository. Excavation ceased at level 9 (90-100cm) because of sterile deposits.

Unit 3

Unit 3 is located three meters north of unit one with the western wall of the unit aligned with the western-most wall of the house structure. The purpose of the placement of unit 3 was to identify any evidence of construction of the outer wall.

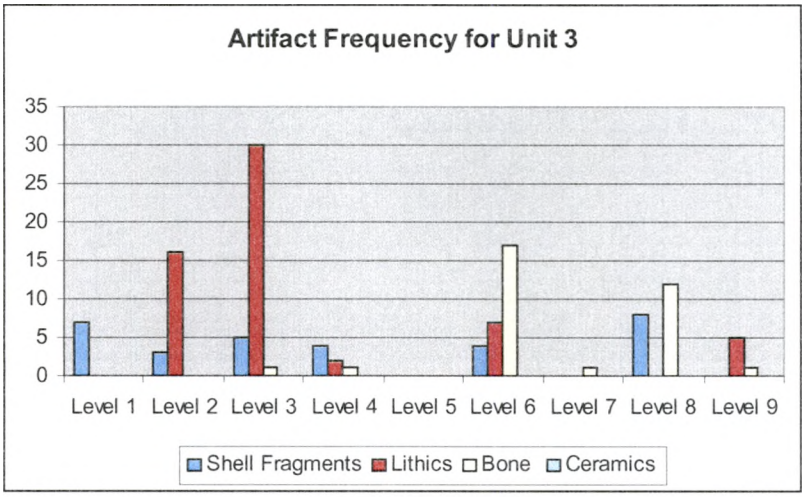

Figure 8

The unit was located just east of several upright dolomite slabs that were likely a product of the same construction episode as the dolomite slabs found in Unit 1. Unit 3 contained numerous rounded gravels in a matrix of light brown sandy loam with high frequency of lithic artifacts in levels 2 and 3. The gravel content steadily increased during the excavation of levels 4, 5, and 6. It is likely that this gravel layer was brought in during the initial construction of the house to form the floor. The gravel layer was mostly restricted to the western half of the unit and contained ash deposits as well as darker organic sediments associated with lithic, bone, and shell artifacts. An irregular shaped clay stain was uncovered in the southeast corner of Unit 3 at approximately 70cm below the surface. This soil stain, deemed Feature 5, consisted of clay loam soil with 5% gravel content. The unconformity represented in the western half of the unit is likely the result of construction fill used to fortify the walls of the house structure. Excavation ceased at level 9 due to sterile deposits.

Unit 4

Unit 4 was placed in the inner portion of what looked like the main room of the

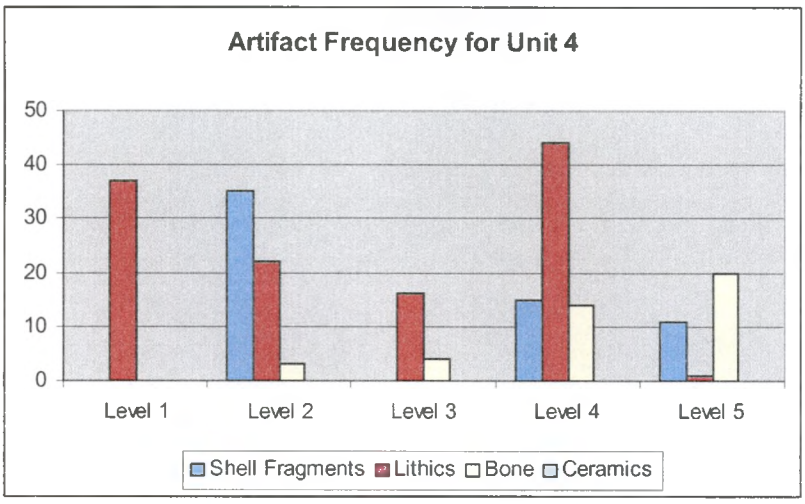

Figure 9

Figure 10: Central Hearth found in Unit 4.

house structure in order to find the central hearth. Previous investigations at other

Antelope Creek Phase sites revealed that the majority of hearths are centrally located within the residential areas in a depressed central channel. This unit was highly disturbed by gopher activity and was located 30cm east of a modern looter's pit. Despite the fact that the unit was quite disturbed, an important feature was found that greatly contributes to the understanding of the site as a whole. A hearth was located in the northern half of the unit and extends to 78cm below the surface.

The hearth, designated Feature 4, consisted of a foundation of stream-rolled cobbles with an average diameter of 2-8cm overlaid by an ash deposit between 57-78cm below the surface. Two soil samples were taken directly from the hearth and subsequently sent to Dr. Phil Dering for floatation and macrobotanical analysis. Very few artifacts were found associated with hearth, which is not uncommon considering that the areas surrounding the hearth are frequently swept clean by the inhabitants (Lintz 1986).

A bone awl was recovered from the western wall of Unit 4 at 40cm below the surface. The bone had pitting characteristic of post depositional processes caused by bacteria and fungi. Excavation was terminated at Level 5 except in the feature which was excavated down to 78cm below the surface. The feature extends into the north side wall of Unit 4, but it was not excavated due to lack of time.

Unit 5

Unit 5 was placed one meter east of Unit 4 in order to investigate the doorway of the house structure. Indications of the doorway were visible in the form of two vertical dolomite slabs that appeared to be part of the eastern wall one meter east of Unit five.

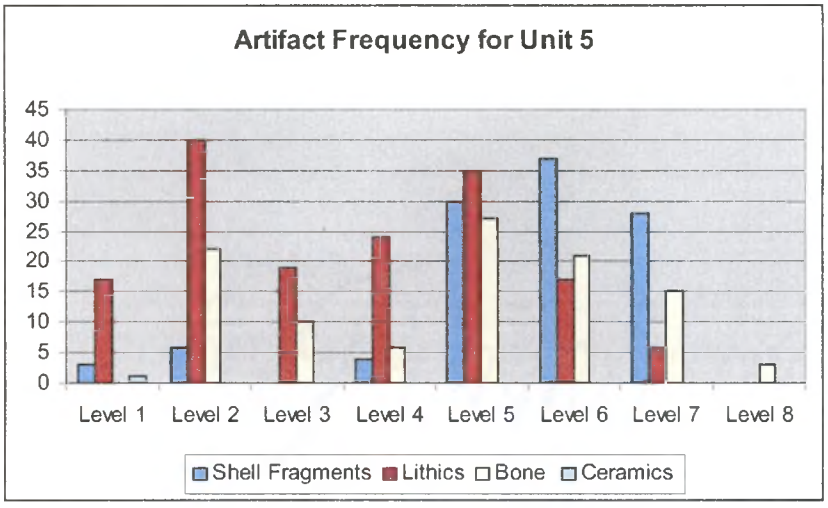

Figure 11

These slabs were adequately spaced so as to allow for passage in and out of the house and this space was also aligned with the central depressed channel of the house. Previous investigations have found evidence of tunneled entranceways at other Antelope Creek Phase sites, and it is likely that this structure had this feature as well (Lintz 1986).

A rather large vertical dolomite slab oriented north-south bisected unit 5. The western half of the unit had a considerably different composition than the eastern half. The eastern portion contained numerous pea-sized gravels and the soil was a very compact sandy loam. On the other hand, the soil of the western half was looser and contained less gravels. A diamond beveled knife was recovered in level 3 and is discussed in detail in appendix B.

A very thin layer of ash and charcoal was uncovered in the northern third of the unit at the bottom of Level 5. This ash layer was only a couple of centimeters thick; however it spanned the entire length of the unit and extended east into the neighboring unit.

Figure 12: Upright Dolomite Slabs found in Unit 5

This find was not designated as a feature, but its presence further supports the assumption that the entrance way partially extended into Unit 5. One possibility is that charcoal and ash residue from the central hearth was swept clean from the floor's surface through the entranceway creating this uniform and thin layer of ash found in Units 5 and 9. The ash layer could also have been the result of the roof being burned while the house was in the process of being abandoned (Brooks 1993). Beneath this ash layer, the soil became increasingly compact with high gravel content and excavation was terminated at this level due to sterile deposits.

Unit 6

Unit 6 was placed directly east of unit 9 and was considerably lower in elevation than the interior units. A steep slope that dropped a meter or so separated Unit 9 from

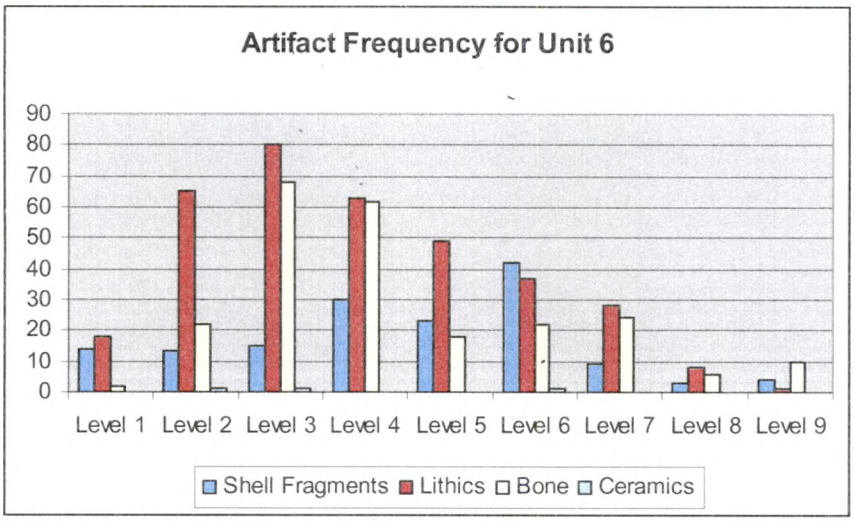

Figure 13

Unit 6. Artifacts found included lithics, bone fragments including turtle shell, and charcoal. There was a considerable amount of bioturbation, which is common throughout the entire site. There was a relatively high frequency of lithic and bone artifacts in levels 2, 3, and 4. The artifact density steadily decreased as the excavation proceeded deeper into the unit. The high number of chipped stone artifacts in level 3 could be contributed to the fact that the unit is located along an eroding surface where artifacts have

Figure 14: Profile of Unit 6 Showing Outline of Feature 1.

subsequently been moved by various geologic processes. On the other hand, this dense accumulation of artifacts could be the product of cultural activities that are significant to understanding the site as a whole. At 70cm below the surface a semi-circular pit feature was found in the northern half of the unit that was defined by an abrupt change in soil color. The southern half of the unit contained sterile sediments that were a light brown sandy loam dominated by numerous gravels. This pit was recorded at Feature 1 and is the location of an additional midden or storage pit because of the high number of artifacts associated with it. The bottom of Feature 1 was determined to be at approximately 80cm below the surface and excavation ceased at Level 9 due to extremely compact and sterile sediments.

Unit 7

Unit 7 is located four meters east and two meters north of unit 6. It is considerably lower in elevation than the rest of the site due to erosion that causes the majority of water runnoff to be channeled down the eastern slope of the ridge. Previous

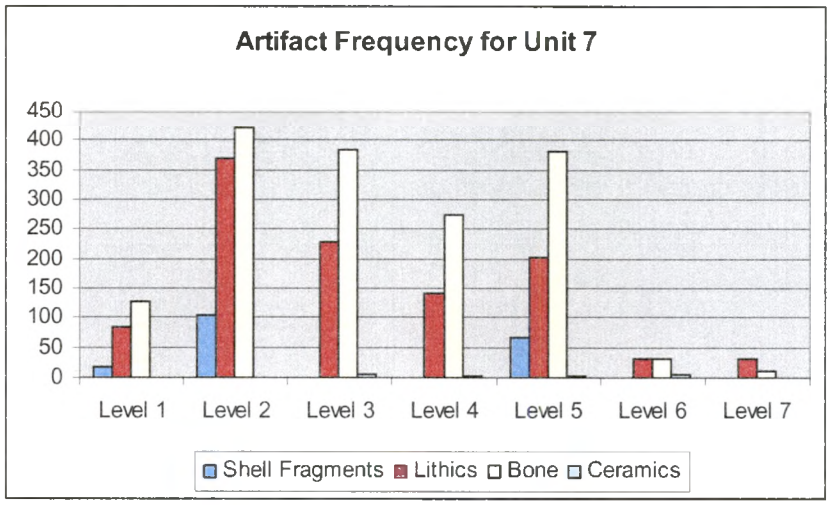

Figure 15

survey of site 41PT109 by Etchieson in 1993 revealed a dense cluster of artifacts around what was interpreted as a midden. Unit 7 was placed where the midden was thought to have been located, however intense modern vandalism prevented us from finding the exact parameters of the midden. Despite the years of looting, Unit 7 yielded the highest artifact density of the entire site and was recorded as feature 6. Each level uncovered a plethora of artifacts including large bone fragments, burned bone, shell fragments, and many chipped stone tools including several projectile points, cores, and end scrapers. The majority of the larger artifacts were point plotted with a Sokkia Total Data Station so that the patterns of cultural deposition could be systematically tracked.

Unfortunately, there was not strong evidence uncovered that provided the dimensions of the midden itself. However, at 50cm below the surface a noticeable change in soil color from a light brown sandy loam to a yellowish clay loam occurred as well as an increase in charcoal fragments. Levels 6 and 7 showed a marked decrease in the overall frequency of artifacts, which implies that the floor of the midden had been reached. Excavations were terminated at level 7.

Unit 8

Unit 8 is located directly west of unit 3 and was excavated to expose the outer portion of the western most wall. Sediments dug from this unit, especially the northwest corner, contained high gravel content with scattered dolomite slabs. Two rather large vertical dolomite slabs were uncovered on the border of Units 3 and 8 and appeared to be the inside surface of the western wall of the house structure. The western portion of the unit contained very compact sediments that were undisturbed. A substantial change occurred in the sediment composition in the middle portion of the unit, where the

sediment was considerably looser and contained numerous gravels and cobbles, yet

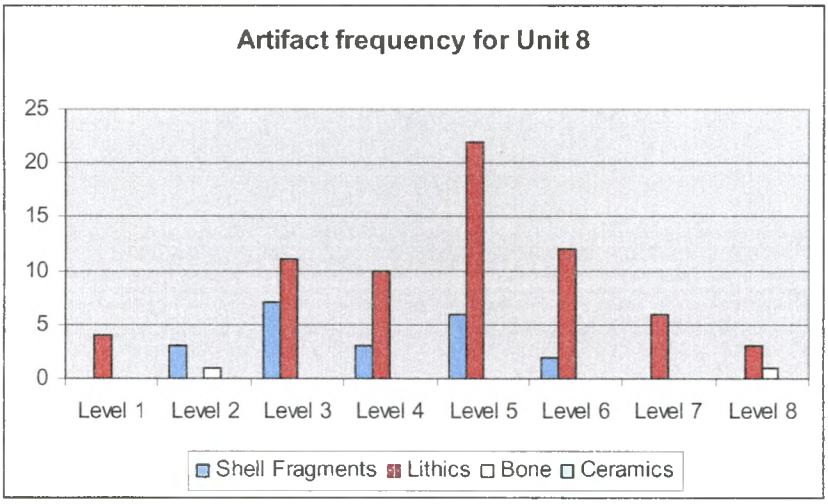

Figure 16

maintained the same color. The eastern portion of the unit was composed primarily of two large upright dolomite slabs surrounded by very loose silty loam. This progression from compact undisturbed deposits in the western half of the unit to loose gravel dominated sediments pressed up against upright dolomite slabs indicates that a builder's

Figure 17: Upright Dolomite Slabs forming Western Wall in Unit 8.

trench was cut into the original terrace deposits just west of the outer wall. This trench is visible in figure 17, where the compact undisturbed sediments in the western portion of the unit end abruptly and are replaced by a loose silty loam.

Once this construction methodology was discovered, excavation was limited to the eastern most half of the unit in order to uncover the floor of the house structure. The bottom of Level 7 contained a thin layer of charcoal and ash followed by an abrupt change in soil color from a tan sandy loam to a dark brown clay loam. It is likely that this soil disparity was the living floor of the house structure, because directly below this level were very compact sterile sediments with high gravel content. This floor was found at approximately 70cm below the surface. Excavations were terminated at 80cm below the surface due to sterile deposits.

Unit 9

Unit 9 is located directly east of Unit 5 and borders the eroding slope that flanks the eastern portion of the site. This unit was excavated in order to further investigate the

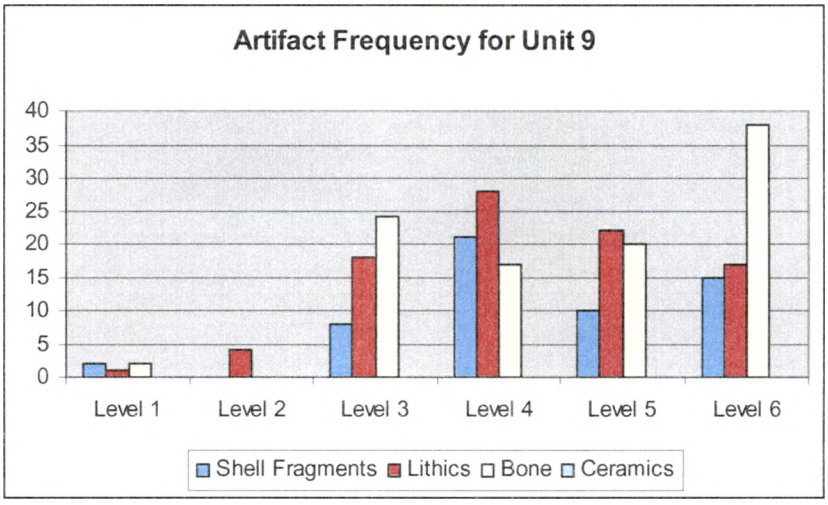

Figure 18

possible presence of an eastern-facing tunneled entryway as remnants of the outer wall of

the house structure. The western portion of the unit had a high concentration of gravels in compact sediments. This sediment composition is consistent with the sediments found in the eastern portion of the adjoining Unit 5. The Eastern half of the unit is dominated by large dolomite slabs with a relatively high frequency of bone fragments in Level 6.

The most significant find in Unit 9 was a metate uncovered in a vertical position extending to roughly 70cm below the surface. The metate was smaller compared to those found at sites where cultigens were more intensively exploited (Robinson 2001). Not only was the position of the metate peculiar, but the metate clearly was discarded by it users as is evidenced by the presence of an oval shaped hole indicating that the metate was worn through. The placement of the metate among several upright dolomite slabs indicates that it could have been incorporated into the structure of the eastern wall or as a fixture in the entryway. Several large bone fragments measuring up to 7cm in length were also found 5cm directly west of the *in situ* metate. The relationship between the metate and the large bone fragments is unclear, however both finds lend substantial

Figure 19: Upright Metate found in Unit 9

information regarding the habits and activities of the people who inhabited this site. One interpretation for the post-construction placement of the metate is that it served a non-functional role. Perhaps the exhausted metate had a ritualistic purpose and therefore was intentionally positioned within the walls of the structure in order to comply with traditional customs. Another interpretation could be that the metate was opportunistically employed to mend a structurally weak section of house and actually had no ritualistic function. However, the fragmented nature of the eastern wall lends little support for this interpretation.

Unit 10

Unit 10 was placed directly north of Unit 6 in order to further investigate Feature 1, which was the semi-circular pit first encountered at approximately 70cm below the

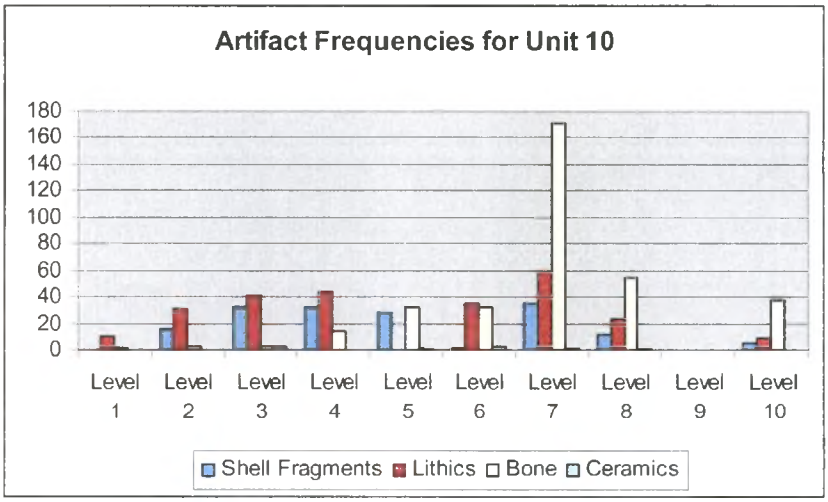

Figure 20

surface in Unit 6. The upper most levels contained only a small amount of artifacts. A marked increase in bone and mussel shell frequency was noticed in the southern portion of level 7, which is associated with the pit feature discovered in Unit 6. Sediments in the northern half of the unit were mostly a light brown compact silty loam with numerous

gravels and calcium carbonate inclusions. Feature 1 is nearly 1meter in length north-south and extends from 70cm-100cm below the surface. A high incidence of artifacts are associated with this feature, including bone, shell, and ceramic sherds. The sediment surrounding the pit are very compact with high gravel content and undisturbed, indicating that this pit was dug into the original terrace deposits into which the structure is set and perhaps was only used for a short period of time. Excavation ceased at 100cm below the surface, which was the bottom of Feature 1.

Unit 11

Unit 11 was placed directly north of unit 3 in order to further uncover remnants of the western wall. A rather large dolomite slab was found extending outward from the western wall of the unit and aligns nicely with the other dolomite slabs found in Units 3 and 1. No significant finds were discovered in unit 11 and there was a low density of artifacts. Excavation ceased at level 5 due to lack of time in the field season.

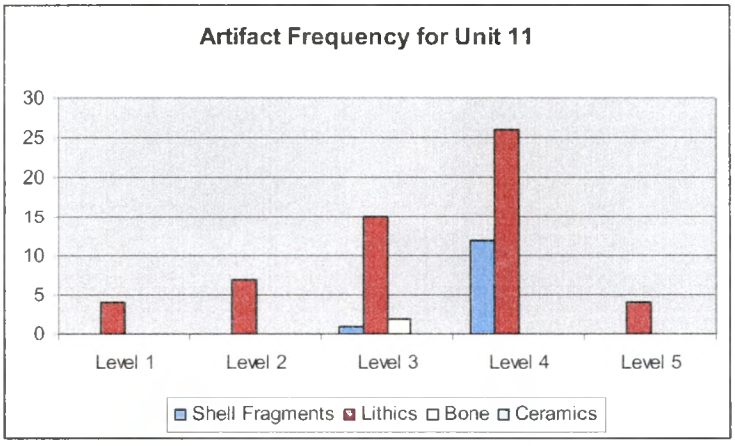

Figure 21

Section 3: Diagnostic Tool Assemblage

The majority of the chipped stone tools and artifacts recovered from the 2004 excavation were made of Alibates flint and exhibited a variety of colors including red, white, blue, and brown. Four distinct tool types were identified consisting of projectile points, bifacial tools, unifacial tools, and edge-modified flakes. All of the points found, except one, are typical Washita points with symmetrical side notching and a slight basal curvature. A small triangular stemmed point was found that was not made of Alibates flint with a battered tip and a contracting stem. The bifacial tools were mostly thin and triangular in shape with only slight edge working on the lateral edges. Several beveled knives were found including a diamond beveled knife that had considerable retouching and was clearly a maintained tool because the multiple working edges provided effective and available surfaces for executing numerous tasks. One diamond shaped drill fragment was found with roughly retouched and stepped lateral edges and an expanded base.

The majority of the unifacial tools were employed as either end or side scrapers. The end scrapers are larger in size with parallel steep flaking patterns present on the bit. The lateral edges show fairly non-invasive retouching occurring mostly on the dorsal surfaces. Several of the unifacial tools can be characterized as 'guitar-pick' scrapers, which are typically small and thin triangular unifacial scrapers that have slight retouching along the lateral edges. A few large flakes were found with minor to medium irregular edge working along the lateral and distal surfaces. The modified flakes were generally asymmetrical in shape and were likely employed for expedient usage.

Table 3: Diagnostic Tool Assemblage

I.D.#	Unit	Level	U.I.#	Length	Width	Thickness	Material	Tool Type
1	7	3		21 1mm	8 4mm	1 7mm	unknown	Small Triangular Stemmed Point
2	6	4		25 1mm	13 2mm	3 3mm	unknown	Triangular Biface
3	2	3		45 6mm	22 1mm	3 5mm	unknown	Triangular Uniface
4	9	2	1375	68 3mm	40 5mm	8 8mm	Alibates	Large Utilized Flake
5	9	2	1377	71 5mm	29 8mm	11mm	Alibates	End Scraper
6	6	2		23 6mm	13 1mm	2 7mm	Alibates	Triangular Biface
7	5	3	1263	83 3mm	30 8mm	5 4mm	Alibates	Diamond Beveled Knife
8	6	4		45mm	34 7mm	6 1mm	Alibates	Unifacial Scraper
9	9	4	1734	36 4mm	20 1mm	3 6mm	Alibates	Triangular Unifacial Scraper
10	5	6		20 7mm	12 2mm	2mm	Alibates	Small Bifacial Preform
11	7	7	3019	29 5mm	26 8mm	6 8mm	Alibates	Beveled Knife Fragment
12	2	6		14 2mm	11 9mm	1 8mm	Alibates	Washita Point
13	5	2		12 7mm	12 5mm	2 0mm	Alibates	Washita Point
14	7	4	1581	41 8mm	28mm	7 1mm	Agate	Edge Modified Bifacial Flake
15	7	3	1362	50 4mm	30 4mm	13 4mm	Alibates	Unifacial Scraper
16	1	5		19 9mm	12 4mm	2 5mm	Alibates	Small Triangular Point
17	2	9		10 7mm	13 6mm	1 7mm	Alibates	Washita Point
18	7	7		20 4mm	12 3mm	2 4mm	Alibates	Washita Point
19	8	6		23 5mm	8 4mm	5 8mm	Alibates	Bifacial Drill Fragment
20	8	3		23 3mm	17 1mm	2 3mm	Alibates	Small Triangular Uniface
21	8	3		27 6mm	16 8mm	2 2mm	Alibates	Small Triangular Uniface
22	5	2	1264	25 9mm	12 8mm	1 6mm	Alibates	Small Triangular Modified Flake

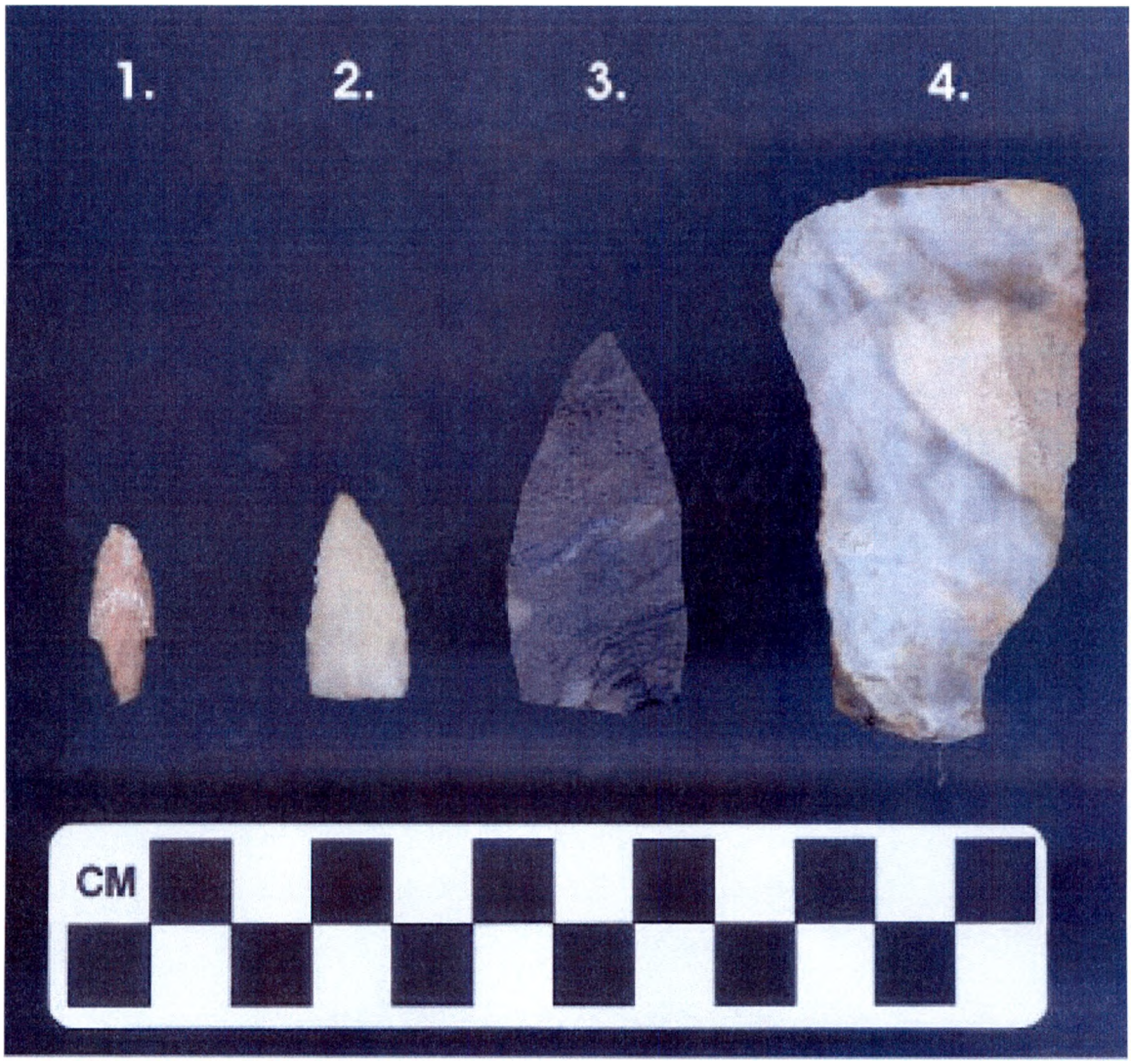

Figure 22: 1) Stemmed Projectile Point, 2) Triangular Biface, 3) Triangular Uniface, 4) Utilized Flake.

Figure 23: 5) End Scraper, 6) Fragmented Triangular Biface, 7) Diamond Beveled Knife, 8) Unifacial Scraper.

Figure 24: 9) Triangular Unifacial Scraper (Guitar-pick Scraper), 10) Bifacial Preform, 11) Beveled Knife Fragment, 12) Washita Point.

Figure 25: 13) Washita Point, 14) Edge Modified Bifacial Flake, 15) Unifacial Scraper, 16) Triangular Point.

Figure 26: 17) Washita Point, 18) Washita Point, 19) Drill Fragment, 20) Triangular Uniface.

Figure 27: 21) Triangular Uniface, 22) Triangular Modified Flake.

Section 4: Ceramics

All of the ceramics collected during the excavation were analyzed by Christopher Lintz (2005, Appendix B). Analysis focused on determining the methods of production including paste and temper characteristics and surface treatments. In most cases, the sherds were so small and fragmented that there was considerable difficulty establishing the vessel form such as rim, body, or base. However, the sherd color and composition were meticulously recorded so as to extract as much information as possible about how ceramics functioned in the lives of the people who used them.

The majority of the sherds had either a grit or grog temper, and the vessels were constructed using the coiling method. The vessel wall thickness ranged from 3.1 to 8.9mm thick, with an overall average thickness of 4.64mm (Lintz 2005). The majority of breakages are reasonably straight and cross manufacturing coils indicating that the while the vessels were thin, they were well fused during production.

The firing atmosphere was determined by analyzing the cross-section of the sherds and noting color changes. Very few sherds from the assemblage reflect exposure to a single firing episode, indicating the employment of complex firing practices that used a combination of methods such as oxidation, reduction and alternating environments to construct durable vessels.

Nearly 75% of the ceramic assemblage had surface treatments showing cord-markings caused by post-paddle smoothing occurring on exterior surfaces. This style is quite common throughout the Southern Plains during this period and is classified as Borger Cord-Marked pottery (Drass 1998). Of the 34 ceramic sherds collected, all seem to be relatively similar in composition and function and were once utilitarian jars or pots

that primarily served as cooking utensils.

Interestingly, all of the pottery collected came from the four excavation units located east of the house structure. The midden from Unit 7 contained the highest frequency of ceramic sherds with a total of 17 pottery fragments. The rest of the assemblage came from Units 2, 6, and 10. The lack of pottery found within the house structure might be the product of extensive modern looting. However, the high incidence of ceramics in features such as middens or storage pits strongly supports the assumption that the interior of the house was habitually swept clean of any trash or food related items.

Table 4: Ceramic Assemblage (Lintz 2005)

I.D. #	Unit	Level	Sherd Type	Sherd Size (cm)	Thickness (mm)
1	2	4	body	2x2	3.7-4.0
2	2	6	body-base	3x3	6.1
3	2	Feat.-2	body	1x1	IND
4	2	Feat.-2	body	1x1	3.7
5	2	Feat.-2	body	2x2	4
6	2	Feat.-2	body	2x2	4.8-5.0
7	6	2	rim	2x3	6.1
8	6	3	body	1x2	3.7
9	6	6	body	2x3	3.6
10	7	3	body	2x2	6.5
11	7	3	body	2x2	3.4
12	7	4	rim	2x2	3.6
13	7	4	body	2x3	3.6
14	7	5	body	3x3	3.9
15	7	5	body	2x3	3.5
16	7	5	body	4x5	3.9
17	7	5	base?	2x2	8.9
18	7	5	neck	2x2	5.7-6.7
19	7	5	body?	1x1	7.3
20	7	5	body	2x2	5.6
21	7	5	neck	2x2	IND
22	7	5	body	2x3	3.8-6.0
23	7	6	body	2x2	6.2
24	7	6	body	1x2	IND
25	7	6	body	2x2	IND
26	7	6	body	2x3	5.9

27	7	7	body	2x3	3.3
28	10	3	body	2x3	4.9
29	10	3	body	2x2	3.9
30	10	3	body	2x2	3.6
31	10	5	body	2x2	3.8
32	10	6	body	2x3	3.8
33	10	6	body	2x2	3.1
34	10	7	body	1x3	3.3

Section 5: Faunal Assemblage

The entire faunal assemblage consisting of a total of 3,258 bone fragments was analyzed by Barbara Meissner (2005 Appendix C). The majority of the bone fragments were very small and difficult to identify. The larger specimens had extensive surface pitting characteristic of post depositional processes. A total of twenty-two separate genera were identified that included a mixture of riverine species, plains adapted animals, and species that inhabit the open woodlands. Some of the identified riverine species were turtles, pond sliders, muskrat (*Ondatra zibethicus*), and catfish (*Ictalurus*). However, because most of the bones from these animals are so small, preservation is very poor and the assemblage may not accurately portray the actual contribution of riverine species to the overall diet.

Species adapted to the plains and prairie identified in the assemblage included Bison (*Bison bison*), Pronghorn (*Antilocapra americana*), prairie dogs (*Cynomys*), and jackrabbit (*Lepus*). Woodland species included White-tail Deer (*Odocoileus virginianus*), packrat (*Neotoma*), cottontails (*Sylvilagus*), box turtles (*Terrepene*), and the American Badger (*Taxidea taxus*).

It is clear that bison bones dominate the assemblage and were the primary food source for the people who lived at 41PT109. The analysis also revealed that a small percentage of the bone assemblage had been modified in some way. Approximately

8.3% of the bone has been heat treated, indicating that the burning of bone for fuel or trash disposal was not practiced. Two turtle shell fragments recovered from Unit 10 were altered into square shapes that had grooves scored into them. Also, a bone awl was recovered from western wall of Unit 4, however it appears as if the tool was unfinished and did not exhibit polish either on the proximal end or the tip.

Overall, bison clearly dominate the assemblage and made up the majority of the prehistoric diet. Other common animal resources that contributed to the diet were cottontails and prairie dogs.

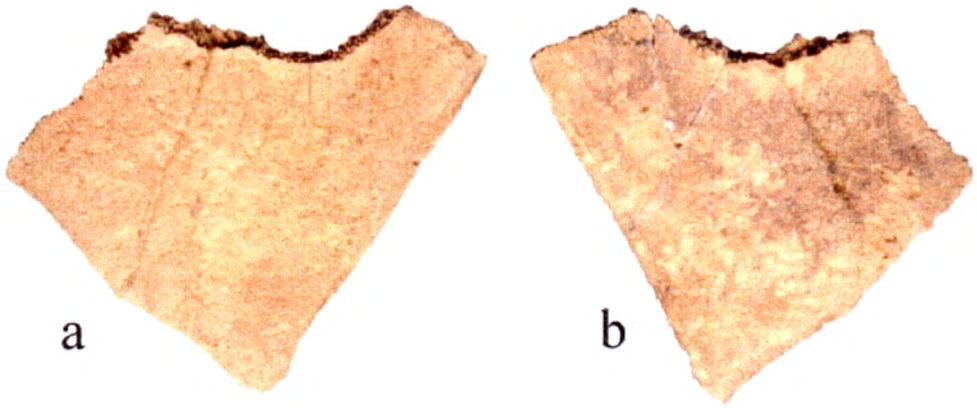

Figure 28: Modified Turtle Shell Fragments from Unit 10.

Figure 29: Bone Awl collected from Unit 4.

Table 5: Vertebrate Faunal Remains from 41PT109 (Meissner 2005).

Scientific Name	Common Name	Count
Anilocapra americana	Pronghorn	1
Bison Bison	Bison	11
Bovinae	Bison/Cow	33
Odocoileus virginiana	White Tail Deer	1
	Unidentified Artiodactyls	3
Canis cf. latrans	Coyote	1
Mephitis	Skunk	1
Taxidea tasus	American Badger	1
Lepus sp.	Jackrabbit	6
Sylvilagus sp.	Cottontailed Rabbit	32
Cynomys sp.	Prairie Dog	11
Geomys sp.	Gopher	11
Neotoma sp.	Packrat	3
Ondatra zithbethicus	Muskrat	1
Perognathus sp.	Deer Mice	1
Sigmodon sp.	Cotton Rat	3
Sciurus sp.	Tree Squirrel	6
	Unidentified Mammals	42
	Mouse/Rat-Sized	33
	Deer-Sized	345
	Cow/Bison-Sized	2,487
	Unknown	2,907
Anas sp.	Duck	6
Colinus virginanus	Bobwhite Quail	1
	Unidentified Galliforms	1
Crotalus sp.	Rattlesnake	12
Elaphe sp.	Rat Snake	5
Thamnophis sp.	Garter Snake	3
Anura	Frogs and Toads	8
Ictalurus sp.	Catfish	9
	Unidentified fish	21
	TOTAL BONE	**3,285**

Section 6: Botanical Analysis

The bulk floatation samples and macrobotanical samples were analyzed by Phil Dering in order to describe the plant materials so that inferences can be made about diet as well as local environmental conditions (2005 Appendix D). The majority of floatation and macrobotanical samples were taken from features such as hearths, middens, and cooking pits. Recovered plant remains include mesquite, cottonwood, juniper, maize, and oak. Mesquite, juniper, and oak are indigenous trees commonly found throughout the Southern High Plains. Cottonwood trees are characterized as a riparian species that are capable of growing very tall near permanent water sources. Because of their large size, cottonwood trees have often been employed in the construction of houses where the trunks are used for support posts and the green stems used for roof thatching (Dering 2005). Maize occurred in 80% of the floatation samples, and is quite significant given the fact that virtually no farming related tools were found during the 2004 field season. The other plant remains identified are indigenous species characteristic of grasslands, riparian environments, and upland slopes. There was no evidence of prehistoric wild grains found in the macrobotanical samples. The majority of charred plant material identified was cottonwood-willow, mesquite and juniper, which were used primarily for cooking in the external features or building material.

Although the sample size was small, the analysis produced significant results demonstrating, most importantly, the presence of maize in three of the exterior features and the central hearth.

Table 6: Ubiquity of Plant Resources from 41PT109. (Dering 2005)

Taxon	Common Name	Part	Samples Present	Ubiquity
Populus sp.	Cottonwood	Wood	3	60.00%
Quercus sp.	Oak	Wood	2	40.00%
Prosopis Glandulosa	Mesquite	Wood	4	80.00%
Juniperus sp.	Juniper	Wood	3	60.00%
Zea Mays	Maize	Cupule and Kernel Fragments	4	80.00%

Section 7: Architectural Features

The various architectural features uncovered at site 41PT109 are important to understanding the basic layout of the structure. Findings from Units 1, 3, and 8 revealed that the western wall was cut into the undisturbed Pleistocene terrace with a builder's trench outlining the western-most wall. Given the topography of the ridge on which site 41PT109 sits, with a downward slope extending off the eastern side of the house structure, it is likely that the remaining three walls were not dug as deep into the terrace. However, the fragmented nature of the other walls prohibited any assumptions to be made regarding their construction methods. The living floor was identified by the presence of a compact gravel layer that, in some places, have a thin veneer of ash deposits on top, produced by the central hearth. The living floor was likely habitually swept clean causing the ash to be evenly spread from the hearth to the eastward facing entryway. This ash layer is clearly evident in the northern portions of Units 5 and 9 at approximately 60cm below the surface. An upright and worn through metate was also found in Unit 9, which could be additional evidence marking the eastern-facing entryway characteristic of Antelope Creek Phase houses.

CHAPTER VI

RECOMMENDATIONS FOR THE PRESERVATION OF SITE 41PT109

One of the major goals for this project is to identify and interpret the cultural remains found at 41PT109 so that an accurate judgment can be made regarding its eligibility for the listing on the National Register of Historic Places, and a preservation plan can be implemented to protect the site from further damage. The property on which site 41PT109 is located is currently owned and managed by the Bureau of Land Management (BLM). This federal agency is responsible for the protection and conservation of the environmental and cultural resources present on all their lands under National Environmental Protection Act (USC 1969). The Cross Bar Ranch is actually the only BLM managed land in the state of Texas and is home to numerous plant and animal species that are indigenous to the Texas Panhandle. Many of these species are constantly threatened by the invasion of exotic varieties such as fire ants (Solenopsis) or Tamarisk trees (*Tamarix gallica*) as well as considerable human disturbance. The Cross Bar Ranch also contains many recorded and unrecorded archaeological sites, many of which have been attributed to the Antelope Creek Phase. Numerous archaeological surveys have been conducted on the Cross Bar Ranch by Briscoe (2000), Etchieson (1993), Haecker

(1998), Lintz (2002), and Northcutt (2000). These resource inventory surveys, presented in Table 6, uncovered archaeological sites ranging from lithic scatters and burned rock clusters to stone-slab architectural features located primarily along permanent water sources, overhanging shelters, or atop steep bluffs. It is likely that the Canadian River Valley is littered with Antelope Creek Phase sites; however the majority of the sites are located on private land and provide little potential for future CRM funded archaeological investigation. Therefore, the Cross Bar Ranch presents a unique opportunity for the study and conservation of these culturally and temporally related sites. Each new site offers additional resources that can contribute viable information to the existing data base.

As was discussed earlier in this report, site 41PT109 has experienced extensive damage due to modern looters who have dug trenches several trenches in the site searching for valuable artifacts. The most recent incident occurred in 2003 when a looter was caught by two BLM officials and later prosecuted for violating the Archaeological Resource Protection Act of 1979 (ARPA). ARPA "prohibits the unauthorized excavation, removal, or damage of archaeological resources on federal or Indian lands (King 2004:368, USC 1979). Any materials that are at least 100 years of age and are capable of providing scientific knowledge of past human cultures or related topics are considered archaeological resources and are protected under ARPA (USC 1979). ARPA permits can only be granted to professional individuals who plan to conduct survey or excavation for research or preservation oriented purposes. All cultural materials found must then be curated in an authorized facility so that future researchers have the opportunity to study the recovered resources.

Matters relating to site significance and integrity are not necessarily involved in the issuance of ARPA permits. In order for a site to receive comprehensive federal protection, it must be considered eligible for the National Register of Historic Places. As defined in the National Register of Historic Preservation Act of 1966, the National Register Criteria for Evaluation reads as follows:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design setting, materials, workmanship, feeling and association and,
>
> a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> b) that are associated with the lives of persons significant in our past; or
>
> c) that embody the distinctive characteristics of a type, period, or method of construction , or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> d) that have yielded, or may be likely to yield, information important in prehistory or history (Federal Register 1966: 60.4).

The eligibility of archaeological sites is usually based on criteria C and D. The standards for establishing the eligibility of site 41PT109 will be based on these government specifications, however the strength of the determination will be derived through the ability of 41PT109 to answer questions from regionally based theories complied by

archaeologists who have worked extensively in the Southern Plains (Duffield 1970, Gunnerson 1984, Lintz 1986).

In 1966 Congress passed the National Historic Preservation Act (NHPA), which "required agencies to identify and manage historic properties under their jurisdiction or control" (King 2004: 366, USC 1966: 470). This act was one of the most influential contributions to the world of CRM because it required all federal agencies to take a proactive stance in the preservation and study of historic properties. Any project that is considered a federal undertaking must be subjected to a Section 106 review, which deals exclusively with the protection archaeological, historic, and culturally significant properties. It is a rather complicated process that necessitates thorough scoping, consultation, evaluation, and assessment. Additionally, Section 110 of NHPA requires that,

> "historic properties under the jurisdiction or control of the agency are identified, evaluated, and nominated to the National Register, and that such properties under the jurisdiction or control of the agency...are managed and maintained in a way that considers the preservation of their...values in compliance with Section 106" (USC 1966:110a2).

The BLM is required to conduct an inventory of all the archaeological sites located on the property, and any future federal undertaking will require that a Section 106 review be conducted in order to minimize the affects of the proposed action. Due to the remote location of site 41PT109, it is unlikely that any federal construction project will affect the integrity of the site. However, this does not mean that once a site is eligible or listed on the National Register that it is forgotten until it is threatened by subsequent projects. If a

site is neglected and starts to loose its integrity because of disrepair, then the government agency is responsible for the loss of that significant cultural resource (USC 1966).

In the case of site 41PT109, the most harmful effect is caused by looters who illegally trespass onto BLM property in order to destroy and steal the contents of the site and many others in the vicinity. This type of harmful effect is very difficult to mitigate and is often beyond the ability of BLM personnel to control or prevent. Additional steps need to be taken to ensure the future protection and integrity of the site without the constant surveillance of BLM officials. Options are available and many have been implemented by the National Park Service or U.S. Forest Service in the past in order to protect sites from unnatural decay. These options, along with a preservation plan to be presented later in this chapter, are capable of meeting the needs of the BLM staff at the Cross Bar Ranch as well as satisfying federal regulations.

Before issues regarding site preservation can be addressed, it is necessary to ascertain the cultural significance of the site so that it can be officially nominated for the National Register. Several main research issues such as environmental deterioration, population pressure, and agricultural dependence were addressed during the excavation and analysis of site 41PT109. However, this type of broad approach is capable of only providing a minimal amount of interpretative guidance when determining eligibility. It is necessary to approach the analysis of the site with more specific research questions directed toward determining the temporally distinct adaptations unique to the site. These distinctions are often manifest in physical time markers such as point types, ceramic styles, architecture, or features. If these types of items are present at the site and the

sediments are found to be undisturbed, then the next step is to determine if the site will yield data that contributes considerably to the knowledge of the region or time period. The research issues below will provide the basis for determining the eligibility of site 41PT109:

First, the site was first recorded by Etchieson, where he found that "this site may have been largely destroyed by vandalism...if intact deposits are identified, the site would possibly be eligible" (1993: 47). No shovel tests were dug by Etchieson's team and therefore the depth and integrity of cultural deposits were unknown. It is clear from the data presented in Chapter 5 that the materials recovered during the 2004 excavation were largely *in situ* despite the damage accrued in the past. Numerous artifacts and features were found and enough evidence was gathered so that an accurate assessment of prehistoric activities can be intelligently interpreted.

Second, site 41PT109 is located at the confluence of the Canadian River and West Amarillo Creek atop a rather steep bluff. It is likely that numerous Antelope Creek Phase sites are scattered along the ridges adjacent to West Amarillo Creek. If 41PT109 is nominated for the National Register, it would be the beginning steps in establishing a database for isolated homesteads that are closely related within the Cross Bar Ranch. The environment of the Cross Bar Ranch is typical of the Southern High Plains, but also has unique characteristics that might have caused the prehistoric inhabitants to adapt differently than their counterparts in other areas of the Canadian River Valley. By focusing in on the cultural adaptations of the Cross Bar Ranch, the relationships and activities of the people who inhabited single-family homesteads can be better understood. The numerous other recorded types of sites such as lithic scatters, rock art sites, and open

camp sites are also critical in piecing together the data in order to identify economic trends. Lintz further supports this research need by stating that, "range of different open site types associated with various procurement and processing activities still needs to be delineated for the study area" (1986:236). By further outlining the changes from large multi-family compounds to isolated homesteads, it is possible to uncover why these large villages dispersed. The later manifestation of the Antelope Creek Phase is significant and is capable of providing evidence of adaptations that could reveal the determining factor behind changing settlement patterns that apply to the phase as a whole.

Table 7: Previous Archaeological Investigations Conducted at the Cross Bar Ranch.

Authors	Report Title	Year	Sites Found
James Briscoe	Archaeological Survey Report on the Sunlight Exploration Inc. Tecovas Creek Project, Potter County, Texas	2000	41PT239, 41PT240, 41PT241,41PT242, 41PT243, 41PT244
James Briscoe	Archeological Survey of the Bureau of Land Management Cross Bar Ranch Fire Lanes Project Potter County, Texas	2002	41PT105, 41PT243, 41PT269, 41PT272, 41PT273, 41PT275, 41PT279, 41PT280, 41PT281, 41PT282, 41PT283, 41PT284, 41PT285, 41PT286, 41PT287, 41PT288, 41PT289
Meeks Etchieson	An Archeological Survey of a Portion of Helium Operations Lands in Potter County, TX	1993	41PT90-41PT109, 41PT112, 41PT113
Charles Haecker and James Rancier	Damage Assessment, 41PT92 and 41PT93, on BLM Land (Previously Property of the U.S. Bureau of Mines, Helium Field Operation) U.S. Marines Reserve Training Area, North of Amarillo, TX (Draft).	1998	Two New Sites (No Trinomials)
Christopher Lintz	Cultural Resource Class II Survey of a 1,500 Acre Sample of the Cross Bar Ranch Complex, Potter County, Texas	2002	41PT174, 41PT175, 41PT247, 41PT251-41PT275

Christopher Lintz and Meeks Etchieson	Informal Reconnaissance of the Cross Bar Ranch	1997	41PT173, 41PT174, 41PT175
John Northcutt	An Archaeological Survey of Proposed Power Line R-O-W on the Cross Bar Property, Potter County, Texas	2000	41PT246, 41PT247, 41PT248
Abby Weinstein	Investigations at an Antelope Creek Phase Site (41PT109)	2005	FS1-FS5, Trinomials Pending

Third, there are currently no known modern Native American groups that claim to be the descendants of the Antelope Creek peoples. As a result, there are no ethnographic accounts that could provide details about their culturally and temporally distinct lifestyles. Therefore any archaeological site that dates to Late Prehistoric period would be significant by potentially having information that could help reveal the cultural history and perhaps identify living descendants (Gunnerson 1987).

Fourth, the preceding excavation results prove that site 41PT109 is capable of providing information that is important to the study of prehistoric lifeways and therefore satisfies criteria D of the National Register Criteria for Evaluation (Federal Register 1966: 60.4). It should also be noted that the architectural style exhibited at the site is consistent with the single family variation employed by the Antelope Creek Peoples throughout the Texas Panhandle. The use of stone-slab architecture to construct semi-subterranean structures is a technique that is unique the Antelope Creek Phase. Also, site 41PT109 has architecture that has not been previously documented at other Antelope Creek Phase sites.

The Zimms Complex was contemporary with the Antelope Creek Phase and was located directly east on the border of Texas and Oklahoma. The Zimms Complex

peoples build semi-subterranean structures, but used waddle and daub to fortify the walls instead of dolomite slabs (Flynn 1984). Further east was the Washita River Phase which consisted of fairly large sites extending up to 15 acres in size. Washita River Phase houses were rectangular with external and internal wall posts supported by waddle and daub construction (Brooks 1987). West of the Texas Panhandle in Southeastern Colorado was another Plains Villager manifestation called the Apishapa Phase. The majority of Apishapa structures were above ground and were constructed using "wooden posts and brush as roofs, and vertical rock slabs as interior roof supports" (Drass 1998:423).

The Antelope Creek Phase style of architecture is temporally and spatially distinct when compared to surrounding contemporary Plains Villager cultures. The single roomed structure that characterizes site 41PT109 is significant within the Antelope Creek Phase because not many of these structures have been thoroughly investigated. The majority of research has been invested in excavating the larger multi-room compounds such as Saddleback Ruin, Landergrin Mesa, Alibates Ruin 28, and Black Dog Village. It is therefore safe to assume that based on the architecture at site 41PT109, it is also eligible for the National Register under Criterion C.

The following figure shows the various Plains Villager house types that were predominately used during the Late Prehistoric Period. Each of these adjacent cultures shared various types of technologies such as Washita Points or bison scapula hoes (Drass 1998). However, the noticeable differences in architectural style indicates that, although there was a considerable amount of cultural diffusion, each individual culture was a

product of the peoples who came before them and had adapted to the specific environmental conditions of their indigenous regions.

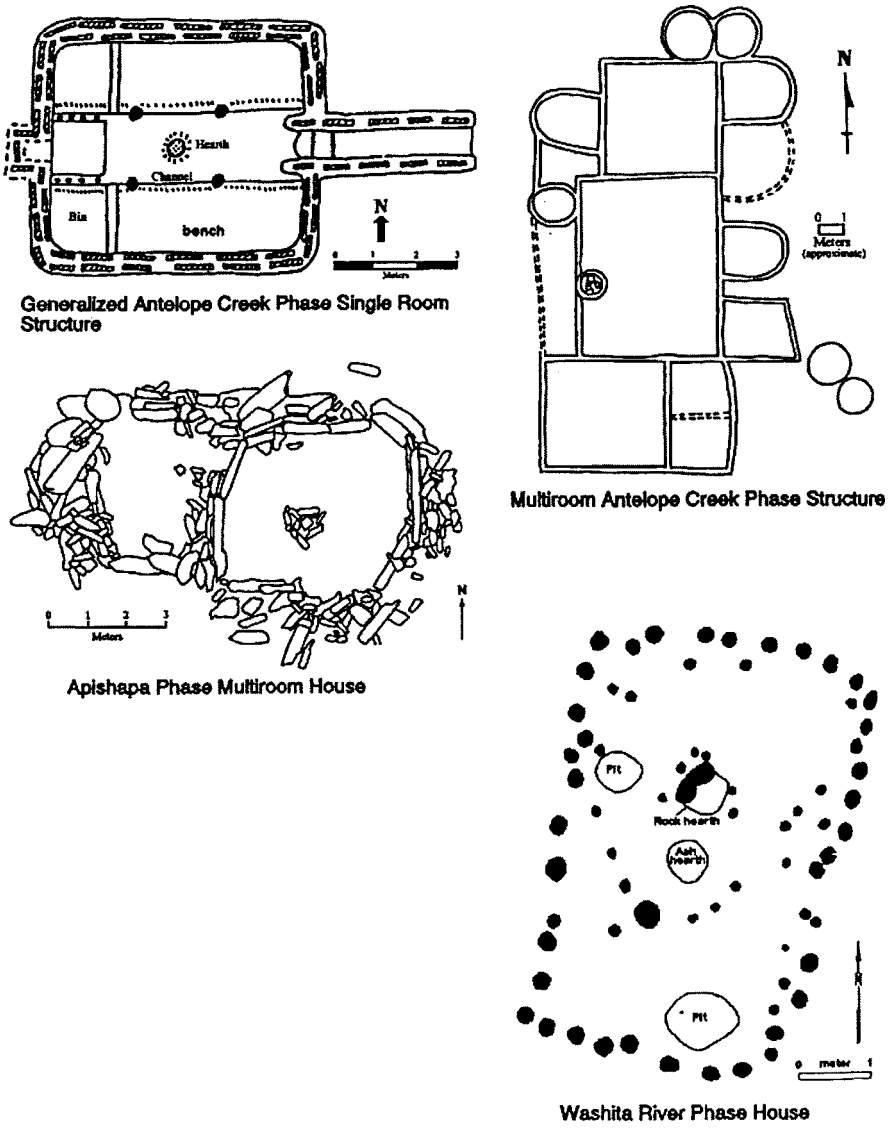

FIGURE 30: Southern Plains Village Houses. (After Drass 1998, Gunnerson 1989, Lintz 1986).

The site can be considered eligible under Criterion D as well as criterion C under the National Register's Criteria for Evaluation. Criterion D states that an archaeological site must yield information important in prehistory or history (Federal Register 1966: 60.4). The deposits are substantially intact at site 41PT109, and the 2004 field season produced not only artifacts, and features, but also soil samples, faunal samples, and macrofloral samples. The wide range of data collected is beneficial in creating a multi-dimensional picture of the prehistoric activities that took place at the site as well as provide insight into the function and context of peripheral sites. The status of the structure is also significant because it is capable of contributing needed information regarding the subphases of the Antelope Creek Phase, which have only been sporadically documented. Information gathered from the method of construction in conjunction with house features such as entryways, trash middens, hearths, and storage areas was applied directly to answering major research questions in the following chapter. A structured yet flexible research design was necessarily applied so that the data could yield the greatest amount of relevant information.

It is hoped that site 41PT109 will serve as a precedence and open the door for additional archaeological excavations on the Cross Bar Ranch. The property holds tremendous potential for research oriented projects and could become a region where a cohesive understanding of the Late Prehistoric occupation is fully recorded. A comprehensive picture of the cultural activity of the region could serve as an excellent research tool for future archaeologists who choose to study the adaptations of the Antelope Creek Phase. The opportunity to expand upon the archaeological data base for the Antelope Creek Phase in the Cross Bar Ranch could also benefit the Bureau of Land

Management by not only preserving significant cultural resources, but could also become an avenue for increasing public awareness. The presence of numerous known archaeological sites would draw public interest and education initiatives could then be taken that would offer the potential to decrease looter activity and generate support for preservation and conservation projects.

The development of a long term management plan would greatly facilitate the maintenance of the cultural resources located throughout the Cross Bar Ranch. This management plan would include procedures for handling government undertakings that invoke Section 106. If a standard list of protocols were in place, then the act of assessing the potential damage to an archaeological site would be streamlined and cultural significance could be evaluated based on regionally coherent issues, instead of based solely on artifact density or location. The management of recorded sites, such as those found on previous surveys, will also need to be included in the management plan so that their integrity can monitored. Sites located just south of the Canadian River are especially prone to vandalism and looting should be given the highest priority.

Several options are available that could derail looting activities in the area and cut down on the effort needed to secure the cultural integrity of the threatened sites. The illegal excavations that occurred in 2003 at site 41PT109 generated interest in the local community. The vandalism, although tragic, might have actually been an excellent deterrent for future looting activities because of the publicity it received. The case was published in the local newspaper and presented a detailed account of the fines were charged and the laws that were violated. It is critical that the public be aware that such laws exist, not only to prevent the destruction of non-renewable resources, but also to

create an interest in the prehistoric legacy of Texas that circumvents the illegal collection priceless artifacts. Similar actions such as informative articles published periodically in local papers and presentations given to local historical and archaeological societies could be very effective in notifying the public about the presence and context of the cultural resources at the Cross Bar Ranch.

It is also important to have on-site protection for some of the more exposed sites such as those with substantial architecture. The construction of fences or other boundaries around the sites might seem to be the most effective option. However, these types of prohibitive barriers might draw additional attention to the sites, instead of stopping people from looting them. The best way to protect the sites is the hide them from view as much as possible by planting shrubs and other indigenous plants in order to conceal the exposed structures as well as slow erosion. This type of preventative action would be relatively inexpensive and would cause little disturbance to the cultural materials located beneath the surface. Another alternative would be to construct a 10 foot fence along the northern-most boundary of the Cross Bar Ranch. The Canadian River is often used by the public as an area for recreational activities such as riding dirt bikes, all terrain vehicles, and hunting. The sites located along the Canadian River are at a risk to looting because of the traffic in the dry river bed below. If a 10 foot fence was built, it would highly restrict trespassing on BLM property and therefore greatly reduce the amount of vandalism to archaeological resources and sensitive environmental zones.

The final option would be to excavate the sites systematically so that all the cultural materials can be preserved in a curation facility and be available for future study. The Cross Bar Ranch will likely be the location of numerous Texas State University field

schools and the recovered data will be appropriately housed at the Panhandle-Plains Museum. Given the highly exposed nature of site 41PT109, it is a prime target for vandalism and the excavation of the intact cultural deposits is likely the best option available for preserving the resource. Even though the majority of the cultural remains will have been removed, the area will still be significant because of the context in which in the site is located. The presence of cultivated foods such as maize found within excavated features indicate that the people who occupied site 41PTT109 practiced small-scale farming. However, the gardens associated with the site have not yet been located. There is a strong possibility that these fields were located in the fertile flood plain located on the terraces directly east of the site adjacent to West Amarillo Creek. The area surrounding the site carries considerable cultural significance and will remain important to regional research issues even after the site has been excavated.

I recommend that site 41PT109 be nominated to the National Register based on the eligibility requirements discussed above. The nomination process is often quite extensive and entails a large amount of paper work. It is ultimately up to the BLM staff at the Cross Bar Ranch to make sure that this site receives federal protection under NHPA by devoting time to compile a nomination application. The continuing excavation of site 41PT109 in the upcoming field seasons by Texas State University will ensure that research persists in a dynamic manner. The nomination of the site to the National Register will also guarantee that the area will not be developed in the future, and therefore preserving the contextual integrity of the region as long as the BLM manages the property.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Understanding and identifying the elements relating to major regional research issues such as environmental deterioration and agricultural dependence from the data recovered at site 41PT109 presents many challenges. The analysis of the diagnostic tool assemblage, occupational features, stratigraphic profiles, as well as the botanical, faunal, and ceramic assemblages allowed for many opportunities to make correlations between the activities that took place at site 41PT109 and the overall cultural dynamics of the Antelope Creek Phase. In addition, this study seeks to clarify the theory presented in Chapter Three that site 41PT109 was systematically abandoned as a result of the natural decay of the residential structure. The inherent patterns that support the abandonment of the structure as well as the catalyst driving the need for relocation are fortunately noticeable in the recovered data.

Site 41PT109 obviously has a lot more information to offer. But, after only one season of excavation it is clear that:

1) The architectural style of the structure at site 41PT109 is consistent with the Antelope Creek phase house pattern that is defined by Lintz (1986). The location of the central

hearth in Unit 4 and the use of dolomite slabs in the construction rectangular shaped exterior walls affirms this conclusion. Additional evidence collected from Units 3, 8, and 11 confirmed that a builder's trench was constructed to further fortify the western wall. The use of a builder's trench is not clearly evident around the other three walls.

2) Previous excavations at other Antelope Creek sites have yielded farming implements such as bison scapula hoes or digging sticks. However, after one season of excavation no such farming tools were found. The exhausted metate found in Unit 9 indicates that grains, either farmed or collected, constituted a portion of the diet. The actual grinding surface is quite small, however, measuring only 20cm x 10cm. Metates with a broader grinding surface would imply that a higher amount of grains were being processed (Robinson 2001). The majority of tools collected were manufactured from chipped stone and consisted of Washita points and bifacial or unifacial scrapers.

3) The abundance of bone fragments as well as lithic debitage, shell fragments, and ceramic sherds indicate that Unit 7 is in fact a trash midden that was in use throughout the occupation of the site. However, the initial purpose behind the creation of the other two external features is more ambiguous. Feature 1 found in Units 6 and 10 is a circular pit east of the house structure that was dug into undisturbed compact sediments. Feature 2 was found 100cm below the surface in Unit 2. The high frequency of lithics, bone, shell fragments, charcoal, and ceramics indicate that these features were used for the discard of materials related to everyday economic activities. It is possible that these pits might have been dug originally to provide fill, or other material in the initial stages of the construction of the house. Then, in the case of Feature 2, was opportunistically used as an external cooking pit and finally a trash pit. Feature 1 also had a multi-functional

purpose being used first as a borrow pit and later employed as a trash midden.

4) No trade items such as obsidian, painted pottery, or beads were found at the site.

5) The results from a single radiocarbon date revealed that Site 41PT109 dates to the Later subphase of the Antelope Creek Phase. The period of occupation dates approximately to A.D 1400-1420.

5) The close proximity of several lithic scatters, designated as Field Sites 1-5, along the adjacent ridge top indicates that the people who occupied the area were consistently taking advantage of the resources throughout the entire valley.

Implications for Site 41PT109

It is fairly clear from the evidence collected during the 2004 field season that site 41PT109 was abandoned permanently by it's occupants in a systematic and orderly manner. The reasoning behind the abandonment of any structure is typically linked to a number of causes that are dynamically related to social and environmental factors. The exact nature of household abandonment was revealed by a close examination of the spatial relationships of the artifact assemblages. The composition of the external features plays an exceptionally important role in discerning the spatial patterning characteristic of planned abandonment. In the case of planned abandonment, the structure might be scavenged for valuable building materials all valuable tools would be taken to the new residence (Brooks 1993). Had the structure been spontaneously deserted because of threatening or unforeseen circumstances, then much more would have been left behind and the placement of the artifacts would have exhibited an entirely different signature. Unplanned abandonment can be identified by the abrupt interruption of the everyday economic activities taking place in and around the primary house structure. A higher

frequency of finished products and by-products would be found on the house floor in their original discarded location (Brooks 1993).

The most evident indicator of planned abandonment is the location and nature of the ceramic assemblage. It is assumed that the daily activities that took place within and around the house represented an uninterrupted cycle of use and subsequent discard. Periodic episodes of sweeping the interior living portion of the house would then result in the displacement of primary refuse (Brooks 1993). Only 34 very small and fragmented ceramic sherds were found during the entire excavation and all of them were found in the external units that were associated with features. There were absolutely no sherds uncovered within the house structure. Also, the lack of complete or nearly complete jars or bowls as well as the absence of refit scenarios within the trash middens suggests that the fully functional ceramic pots were taken to the new residence while the structure was being abandoned. The ceramic sherds found in Units 2, 6, 7, and 10 were likely the remnants of vessels that had been shattered or trampled during the occupation of site 41PT109 and had subsequently been swept into the trash middens.

The botanical analysis revealed a high percentage of maize remains in the soil samples collected from the various internal and external features. The presence of maize kernels and cupules prove that small scale agriculture was indeed being practiced at this site. However, no farming implements typical of Antelope Creek Phase sites such as bison scapula hoes or bison tibia digging sticks were found during the excavation. There are several explanations for the total deficiency of these necessary farming tools. There is a possibility that these tools did not get preserved in the archaeological record or perhaps they were deposited in contexts not directly associated with the house structure.

It is more likely, however, that the farming tools were highly valued and therefore were taken, along with various other significant tools, to the new residence so they could be used to their fullest extent. It is important to note that site 41PT109 was not fully excavated in 2004, and the upcoming excavation seasons might uncover further evidence of farming implements.

The distribution of the chipped stone assemblage consisting of diagnostic tools as well as numerous flakes was not as segregated as the ceramic assemblage. Lithic debitage and diagnostic tools were found scattered throughout the entire site with Unit 7 containing the highest frequency of lithics altogether. The majority of the diagnostic tools had sustained considerable use-wear damage and were likely discarded because of breakages including the beveled knives and some of the unifacial scrapers. However, the four Washita points recovered were still in peak condition and even retained their sharpness. All of these points were found in the trash middens associated with Units 2 and 7, suggesting that they were discarded unintentionally along with the remains of hunted game. The fragmented nature of the diagnostic tools provides additional support for the planned abandonment of site 41PT109, given that the unbroken and effective tools were also curated for future usage similar to the ceramic vessels and farming implements (Binford 1979). .

The wide range of economic activities practiced at site 41PT109 such as small-scale farming and hunting necessitated a fairly generalized, yet efficient tool kit. All types of animals were exploited including bison that roamed the grassland prairie, smaller species that inhabited the canyonlands, and aquatic animals that lived in the Canadian River and tributaries. Optimal foraging models such as the Diet-Breadth model

(MacArthur, Pianka 1966) are often applied in order to further understand the relative stress of certain population by ranking resources according to their search and handling costs. However, these models generally apply to hunter-gatherer populations and thus will not be used to gage the stress or mobility of the occupants of site 41PT109. Instead, a critical analysis of the tool assemblage in conjunction with the faunal assemblage will sufficiently aid in deducing the driving factor behind the permanent abandonment of the primary house structure.

It is clear that the diagnostic tool assemblage from site 41PT109 is made up of both reliable, maintainable tools and expedient tools (Binford 1979, Bleed 1986). The presence of maintainable and reliable tools such as projectile points or bifacial knives and expedient tools such as edge-modified flakes indicate that a wide range of economic activities was taking place. Examples of expedient tools are those that have an irregular shape that prohibits hafting of any kind and are typically made of local materials such as Tecovas jasper or quartzite. The more specialized reliable and maintainable tools such as Washita points were used exclusively for hunting and had to be reliable because the consequences of point failure is much greater. If the entire tool assemblage was highly specialized, consisting of only expedient or maintainable and reliable tools, then it could be postulated that the population subsisted solely off of one or two primary resources. However, the generalized nature of the tool assemblage from site 41PT109 suggests a multitude of economic activities were taking place that required a tool kit that was highly versatile and efficient. The primary material used to make the majority of tools was Alibates flint, which is located about 20 miles northeast of the site. Therefore, the value of the flint increased due to the amount of time it took to procure the resource and little to

no material was wasted. For example, tools such as the diamond beveled knife were essential because they made the most effective use of the material. The diamond beveled knife recovered from Unit 5 had four worked edges, once one edge became dull, one of the other three available edges could be used immediately to finish the job. This redundancy is a classic example of a reliable and maintainable tool as defined by Bleed (1986).

The vertebrate faunal collection showed a considerable variety with bison clearly dominating the overall diet. Bison, no doubt, was a significant resource because of its shear mass and availability. However, many other species such as deer, fresh-water clams, jackrabbits, turtles, and catfish were also incorporated into the diet. This wide range of exploited food sources indicates that the people who occupied site 41PT109 were well adapted to the area and took advantage of every available ecological niche. Had the region been experiencing drastic environmental change, I believe, the faunal distribution would have favored smaller species that characteristically survive off of xeric type plants with bison and deer only sparsely interspersed.

Given the high number of bison and deer bones, as well as the presence of expedient, specialized, reliable, and generalized tools, it is clear that the house was not abandoned due to any sort of climatic catalyst. It is more likely that the house was abandoned because it had reached the end of its life-span and was no longer inhabitable The semi-subterranean houses characteristic of the Antelope Creek Phase were substantial and likely had a life-span of 10-15 years as compared to the 7-10 year life-span of Washita River Phase houses which were constructed using less durable materials (Brooks 1986). The life-span of the house is not exclusive to the primary residential

structure. More specifically, the duration of the life-span encompasses the surrounding area including adjacent gardening plots and exploitable wild food resource areas. A combination of factors such as the physical deterioration of the residential structure as well the depletion of primary resources could have contributed to the final abandonment of site 41PT109.

I believe that site 41PT109 represents the activities of a single family over a period of no more than 20 years. A comparative study of additional isolated homesteads is needed to more accurately define the life-cycle period. There is no evidence of multiple occupations, so the inhabitants must have moved to an entirely new location where the food resources were undisturbed. Functional items such as stone tools, bone tools, ceramic vessels, and manos and metates would have been transported to the new residence.

Conclusion

Archaeologists often have difficulty reconstructing prehistoric behaviors from a fragmented archaeological record unless some sort of noticeable disparity occurs that provides a point of reference on which interpretations can be made about time periods that were more stable. The mobility patterns of the Antelope Creek Peoples during the Late Prehistoric period have significant implications for understanding the major shift in cultural and economic activities that occurred around A.D 1500. The latter time period, especially, holds the greatest amount of interest because its dynamic cultural adaptations can be related to specific environmental changes.

It is hoped that this study will provoke additional investigations into pin-pointing the life-span of other isolated homesteads associated the Antelope Creek Phase of the

Texas Panhandle. By determining the average life-span of these single family homesteads, it will then be easier to identify other variables that might have affected the population such as resource scarcity and cultural interaction. Establishing a constant or a known factor in any cultural system enables indeterminate factors to become less ambiguous and more tangible research subjects.

APPENDIX A

Artifact Frequency Table

Unit 1	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Totals				
Shell Fragments	2	1	6	2	8	0	19				
Lithics	10	17	15	21	13	0	76				
Bone	0	0	3	2	9	1	15				
Ceramics	0	0	0	0	0	0	0				
Unit 2	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**	**Level 9**	**Feat. 2**	**Totals**
Shell Fragments	0	42	22	21	23	5	0	22	27	19	181
Lithics	36	33	1	83	60	29	42	37	37	50	408
Bone	8	9	30	22	54	49	45	34	92	128	471
Ceramics	1	0	0	1	0	1	0	1	1	6	11
Unit 3	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**	**Level 9**	**Totals**	
Shell Fragments	7	3	5	4	0	4	0	8	0	31	
Lithics	0	16	30	2	0	7	0	0	5	60	
Bone	0	0	1	1	0	17	1	12	1	33	
Ceramics	0	0	0	0	0	0	0	0	0	0	
Unit 4	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Totals**					
Shell Fragments	0	35	0	15	11	61					
Lithics	37	22	16	44	1	120					
Bone	0	3	4	14	20	41					
Ceramics	0	0	0	0	0	0					
Unit 5	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**	**Total**		
Shell Fragments	3	6	0	4	30	37	28	0	108		
Lithics	17	40	19	24	35	17	6	0	158		
Bone	0	22	10	6	27	21	15	3	104		

Ceramics	1	0	0	0	0	0	0	0	1		
Unit 6	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**	**Level 9**	**Total**	
Shell Fragments	14	13	15	30	23	42	9	3	4	153	
Lithics	18	65	80	63	49	37	28	8	1	349	
Bone	2	22	68	62	18	22	24	6	10	234	
Ceramics	0	1	1	0	0	1	0	0	0	3	
Unit 7	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Total**			
Shell Fragments	17	105	0	1	65	0	0	188			
Lithics	83	369	228	142	201	33	31	1087			
Bone	128	422	385	273	380	33	12	1633			
Ceramics	0	0	7	4	2	7	1	21			
Unit 8	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**	**Totals**		
Shell Fragments	0	3	7	3	6	2	0	0	21		
Lithics	4	0	11	10	22	12	6	3	68		
Bone	0	1	0	0	0	0	0	1	2		
Ceramics	0	0	0	0	0	0	0	0	0		
Unit 9	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Totals**				
Shell Fragments	2	0	8	21	10	15	56				
Lithics	1	4	18	28	22	17	90				
Bone	2	0	24	17	20	38	101				
Ceramics	0	0	0	0	0	0	0				
Unit 10	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**	**Level 9**	**Level 10**	**Totals**
Shell Fragments	0	15	33	32	29	1	35	12	0	5	162
Lithics	11	31	42	44	0	35	58	23	0	9	253
Bone	1	3	2	14	32	33	171	55	0	38	349
Ceramics	0	0	3	0	1	2	1	1	0	0	8
Unit 11	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Totals**					
Shell Fragments	0	0	1	12	0	13					
Lithics	4	7	15	26	4	56					
Bone	0	0	2	0	0	0					
Ceramics	0	0	0	0	0	0					

APPENDIX B

Prehistoric Ceramic Assemblage from 41PT109, Potter County, Texas

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Introduction

The 2004 archaeological field school conducted by the Department of Anthropology at Texas State University at an Antelope Creek phase site in Potter County, Texas recovered 34 prehistoric ceramic vessel sherds. The present report provides a characterization of the pottery from 41PT109 recovered during the 2004 field school and offers insights into the ceramic manufacture technology as reflected by the small samples of sherds. The physical size characteristics of the sherds and their distributions are used to examine the nature of activities at the site. Finally, the report reviews specific attributes recorded in the assemblage to examine the age, affiliation and offer comments on the variability of cord-marked pottery from stone slab architectural sites in the Canadian River valley of the Texas panhandle. A brief summary of the archeological studies of the site, and the analytical methods are presented before examining each of the three research issues. Observations from each sherd are presented in Appendix A.

Site 41PT109 Background History of Investigations

Site 41PT109 was recorded by Jack Hughes (1954) and revisited and described in detail during a May, 1983 informal survey of portions of the Cross Bar Ranch by the Panhandle Archaeological Society (PAS; Etchieson 1993: 40-42). Hughes mentions that the slab-house rooms are "filled with reddish blows" and, but that "pitting (vandalism) has resulted in considerable gravel piled around the foundations" (cited in Etchieson 1993:41). He also notes the occurrence of a midden deposit east of the structure that contains bone fragments, flakes, mussel shell fragments, and tiny corded sherds. Although he doesn't describe the room layouts, Hughes does mention that "the slabs forming the interior of the foundations walls are exceptionally large and thin" (ibid). Records at the Panhandle-Plains Historical Museum indicate that Jack Hughes' visited the site on January 2, 1954. Among his comments is the following observation: "a few feet down a slope on the east side of the house, a small pit revealed a brown gravelly

earth bearing considerable midden materials, with bone fragments, flakes, and mussel shell fragments. A couple of corded sherds were found on this slope, and the flint was abundant along it." The museum retains only five artifacts from the site that consists of two retouched Alibates flakes, a small biface fragment, a biface knife fragment, and one cord marked body sherd with grit or sand temper and some mica on the exterior surface (Rolla Shaller, personal communications 2004).

Etchieson (1993) notes that the site is designated as 41PT109 in the State Archaeological Site files at the University of Texas, Austin, as site LAMR 37 in the National Park Service files at Lake Meredith, and site A133 in the records at the Panhandle-Plains Historical Museum, Canyon. Etchieson visited the site twice in 1983 and 1984 during the PAS survey and completed the site records on file at the Texas Archeological Research Laboratory. He mentions that the site is on the narrow, northwestward extension of the west rim of West Amarillo Creek near the confluence with the Canadian River. The site is reportedly a small cluster of contiguous Panhandle Aspect slab-house ruins and an associated midden. The prehistoric houses are along the crest of the spur and are roughly oriented north to south. Surficial stone slabs suggest that three rooms may have been present, with the northern two rooms having a rectangular form, each measuring about six meters (east-west) by five meters (north-south). The third room is the southern-most in the single contiguous structure, and appears to be D-shaped. Etchieson (ibid) notes that the midden contains lithic debris, bone scrap, mussel shell and Borger cord-marked ceramics.

Etchieson says that the vandalism described by Hughes in 1954 has continued and that by 1984, most of the interior areas of the structure and the midden have been-well churned. He believes that the floors in all structures have been largely destroyed by vandalism. He does say that if further examination of the site found intact cultural deposits, then the site might be regarded as eligible for the National Register of Historic Places (NRHP). But based on the 1983-84 surficial evidence, insufficient integrity is present and the site is not eligible for NRHP listing. His site form recommends that the structures should be mapped before the rooms are completely destroyed (Etchieson 1983)

The 2004 Texas State University field school was intended as a student-training program in the methods of excavation and analysis (Weinstein 2004). Dr. Britt Bousman directed the student excavations under an ARPA permit issued by the Bureau of Land Management, Oklahoma. The field school established a 1 m grid over the house ruins and adjacent midden and excavated 11-spaced test units were excavated to sterile sediments. Archaeologists at the Texas State University are preparing a detailed report on the stratigraphy, features and material remains. For present purposes, seven of the units were placed inside the structure, and four units were placed in exterior areas to the east of the building. The following is a synopsis of the unit placement on site (Figure 1); the placement of these units is critical for interpreting the pottery distributions on site, as discussed below:

Structure Interior Units

Unit 1: Southwest corner of the south abutting room used to investigate room corner.

Unit 3: 2 m north of Unit 1, along west interior wall of main room.

Unit 8: West of and abutting Unit 3 used to cross the west wall of the room.

Unit 11: North and abutting Unit 3 along west wall of the main room.

Unit 4: 1 m east of Unit 11, used to investigate central hearth of room.

Unit 5: 1 m east of Unit 4, used to locate entryway and east wall of room.
Unit 9: East of and abutting Unit 5, used for same purpose as Unit 5.
Structure Exterior Units
Unit 2: located about 2 m southeast of structure, used to investigate roasting pit or oven.
Unit 6: 1 m east of Unit 9, used to sample exterior area near entrance.
Unit 10: North and abutting Unit 6, used to investigate a "storage pit."
Unit 7: 3 m east and 1 m north of Unit 10, used to investigate midden deposits.

Figure 1: Site map showing excavation distributions.

Methods of Analysis

The following analysis is restricted to the pottery recovered by Texas State University archaeologists in 2004 and does not include the single piece of pottery on file at the Panhandle Plains Historical Museum. The sherds were in 21 zip-loc bags labeled with provenience information, excavation dates, and excavator's names. Each bag had been assigned a sequential lot number. Initial inspection of the assemblage found the bags to contain predominately pottery, but other items, including charcoal, bone, shell and rock were also present. The sherds appeared to have been dry-brushed clean, and one note indicated that a charcoal piece had been exposed to tap water, but most of the sherds were covered with sediments especially along the edges and within the cord-marked depressions, and some had calcium carbonate encrustations from being buried in arid land sediments. None of the sherds was individually labeled or catalogued.

The materials were sorted into separate materials classes and each sherd was placed in an individual zip-loc bag labeled with the site number, provenience data, the lot number and a newly assigned unique specimen number. The assignment of unique lot and specimen numbers was the only steps taken to ensure that observations could be repeated on specific sherds. The non-ceramic materials were separated from the sherds and sent back to the University for dispersal to other analysts.

A cursory inspection of the sherds found that none had shell or bone tempering inclusions that might be susceptible to disintegration from exposure to dilute acids necessary to remove the caliche encrustations. In about 8 to 10 cases, individual sherds were soaked in an acidic vinegar or very dilute HCl, usually for less than two minutes, then submerged in water for a comparable period of time to dilute the acid exposure, then dried. This step was necessary to remove the caliche covering one or more surfaces that obscured accurate observations of paste, surface color and firing atmosphere pattern attributes. As a further aid in the documenting paste characteristics, corner of the sherds was removed with a set of pliers to obtain a fresh exposure of the paste. The sherd crumbs from such activities were saved in the specimen bags, in the event that further studies are desired on pieces of pottery from the collection.

An attribute analysis was conducted on the sherds to gather systematic information about the ceramic assemblage from the site in order to provide insights into the modes of production and to provide a comparative basis for assessing the cultural affiliation of these remains with indigenous cultures to the panhandle. Initial observations focused on collecting information about the physical size of the sherds, their thicknesses, and weight. To record physical size, each sherd was placed on a piece of 1 cm graph paper, and the dimensions were recorded for the cells that contained any portion of the sherd. Thickness

was measured to the nearest tenth of a millimeter using a vernier calibers, and weight was recorded to the nearest tenth of a gram on an electronic scale. To collect vessel diameter data, rim sherds were placed on a chart of concentric circles marked in 1 cm intervals and the sherd moved outward, until the arc of the rim coincided with the circles on the chart; a piece of aluminum foil was pressed into the inside diameter of body sherds to obtain a mold of the internal vessel curvature and this was used with the chart in the same manner as the rim sherds to obtain the body curvature data.

Observations also focused on attributes of vessel portion (i.e., rim, shoulder, body, or base), and rim and lip forms (cf. Brown 1996:Figure 2-12). Due to their small size, most of the sherds have indeterminate vessel forms. In general, the presence of a finished edge determined lips, whereas cord marking was presumed to be the exterior surface, and vessel portion is based on curvature, thickness of sherds, and the presence of organic residues, when present. Vessel form categories noted include open containers (bowls) and restricted containers (jars). Other form attributes include rim profile (out-flaring, s-shaped, or everted, vertical or direct, and inverted), lip profile (rolled to the exterior, rounded, flat/square, or thinned), and base shape (flat or rounded).

A series of observations were also made on the paste and temper characteristics. Initially the fracture shape of each sherd was examined to determine whether or not the breakage was crisp and straight, or irregular and crumbly, and whether or not the fractures coincided with manufacturing coils from improper welding of coils (Shepard 1968). Paste and temper characteristics were based on a microscopic examination of a freshly broken edge and an cursory examination of older broken edges. A 14x hand lens was used to examine temper. Temper is regarded as the deliberate addition of aplastic, hard materials to the plastic clay paste (Rice 1987:411; Colton 1953:16). Temper may include grog (crushed clay sherds), rocky grit (sands, or crushed rock) and/or organic materials (bone, shell, wood fragments). These materials are intentionally added to the clay to disrupt the clay platelets and allow the moisture to escape and the vessel to dry and expand or contract properly during firing, cooking and use. In most cases, large pieces of grit temper were easy to see and identify, since most sherds used white or clear quartzite. Much of the quartz grains were subangular in shape. If the grains showed rounded edges, then they were regarded as sand grains; otherwise, if they appeared to be angular under magnification, then the grit was scored as crushed rock. Many sherds contained angular clay bodies that often protruded unexpectedly above the surrounding surfaces, and/or had flat finished "interior/exterior" surfaces within the body of the vessel, or were differentially oxidized or reduced from the surrounding pastes. Sometime such bodies also contained pieces of grit temper. However, if the bodies seem to disrupt the platy structure of the paste, then they were regarded as grog or crushed sherd temper inclusions. Grog temper is not usually reported in ceramic assemblages from the region (Suhn Krieger and Jelks 1954). In regards to the use of organic temper, no bone or shell was found in any of the sherds, but periodically, small pieces of charcoal occurred in the paste that were surrounded by "carbon halos." The scarcity of such items suggests that the organic materials may be incidental inclusions from the clay source, and that the pottery was fired at relatively low temperatures, since carbon loss upon ignition typically occurs by 550^{o} C (Stein 1984: 241).

A set of spreading vernier calibers was used to measure the size of the larger grit inclusions, which were more readily apparent than the grog particles in the thin walls of

the sherds. Further microscopic observations were made of the interior and exterior sherd surfaces to search for the occurrence of temper particles protruding from the sherds, and provide information about possible vessel wear and function.
Observations were also collected on the colors of the exterior, interior and core characteristics of each sherd (Shepard 1968; Rice 1987). The sherd colors were collected using a Munsell Soil Color Chart[1] (Munsell 2000). Care was exercised to ensure that the caliche adhering to selected sherds did not provide misleading or artificial colors. Also considered were attributes of ceramic "firing atmospheres", which provides general insights into conditions of firing, the relative temperature of the kiln, duration of firing, clays with different organic contents, or the amount of oxygen available at the time of firing (Colton 1953:22-27). The firing atmosphere is based on the identification of oxidation patterns evident in the cross section colors of the sherds as defined in Teltser (1993:535-536), and as depicted in Figure 2.

Figure 2. Schematic diagram for modes to describe oxidation patterns expressed in the cross sections of pottery sherds. Black refers to reduced and white refers to oxidation portions of the sherd. The top of each diagram refers to the exterior surface, and the bottom refers to the interior surface (after Teltser 1993). A, fired in high oxidation environment; B, fired in low oxidation or reduction environment; C-E, fired in incomplete oxidation environment due to either low firing temperature, maximum temperature not sustained, and/or partially oxidized environment; F-H, fired in reduced environment with vessel removed while hot to oxidized environment; I-J fired in oxidized environment then reduced; K-L, fired in oxidized environment with fire cloud, smudge, or post-firing (use) residues later staining surfaces.

The next series of attributes collected pertains to surface finish on the outside and inside of sherds. The primary method of finishing the exterior surfaces of prehistoric vessels in the Plains region during the past 2000 years consists impressions from a cord, fiber, or cloth-wrapped paddle (Suhm, Krieger and Jelks 1954). Microscopic examination of the impressions on sherds from the Texas panhandle shows impressions of cordage fibers probably made from scraped yucca plant leaves (Tainter 1979). The purpose for using paddles in ceramic manufacture is traditionally regarded as a means of melding together and bonding coils of clay. A least four functional, rather than decorative, explanations have been advanced to explain the use of fiber wrapped wooden paddles on clay. These include 1) cord wrapped paddles add sufficient texture to prevent the smooth, bone or wooden paddle surface from sticking to the moist clay vessel surfaces and prevent the tearing the wet surface of the vessel away from the body of the pot; 2) the vertical cord impressions create vertical ribs that strengthen the thin vessel walls; 3) the depressions and ridges increased the exterior surface area of the vessel and hence increase cooking heating or cooling efficiency of the vessels; and 4) the rough corded surfaces enhances the ability of people to grasp the vessels when they are covered with bison grease during rendering processes (Lynn 2004). The use of a cord wrapped paddle while the vessel was wet and plastic tend to retain fine impressions of fibers, but melding of coils in less plastic states do not retain fine impressions. Furthermore, fine impressions may be obliterated during subsequent wiping or smoothing actions.
The fine impressions in the clay sometimes can be used to derive information about the ancient fibers and textile industries (cf. Hall 1950; Hurley 1974). Single ply fibers tend

to be twisted in a right or left-hand manner to convert short fibers into long cords. Conventions of multi-ply fibers dictate that the twist direction of multiple fibers must be opposite of the twist direction of each ply, otherwise, the strings tend to come undone. Right handed twists, produces an "S-ply cord"; whereas a left handed twist produce a "Z-ply cord", which reflect the orientation of the diagonal line along a vertically oriented piece of string. The clay impressions are, or course, the mirror image of the actual object, so that the impressions are just opposite of kinds of twist that made the cord. Sometimes a single cord will be deeply impressed and can be traced for several centimeter across the surface of a sherd; other times, the impressions catch only the tip of each ply, and appear to be off-set dimples in the clay. If the paddle was wrapped with a piece of woven fabric, then the impressions may catch short impression segments as they pass over and under the weft (horizontal) elements. The identification of cords, and fabrics from impressions in clay can be tricky. During analysis, I used a 14x jeweler's loop to search for minute fiber orientations within individual impressions and also took a meso-scale examination of the impression patterns in an attempt to identify and trace twisted cords, or woven patterns from cloth and open nets. A set of spreading vernier calipers was also used to measure the width of individual impressions.

Smoothing generally creates "a finer and more regular surface...[and] has a matte rather than a lustrous finish" (Rice 1987:138). Burnishing, on the other hand, creates an irregular lustrous finish marked by parallel facets left by the burnishing tool (perhaps a pebble or bone). A polished surface treatment is marked by a uniform and highly lustrous surface finish, done when the vessel is dry, but without "the pronounced parallel facets produced by burnishing leather-hard clay" (Rice 1987:138). Clear evidence of smoothing is present usually on the interior surface of Plains vessels. But smoothing is also evident on the exterior surface, in instances where the low ridges and projections next to impressions show rounding, and flattening. Such smoothing can occur when the vessel is wiped with a hard object when the clay is leather hard. In addition, both the interior and exterior surfaces may show a series of fine parallel striations that occur when the vessel surface is wiped by a coarse cloth or frayed stick when the clay is wet.

A final series of surface treatment observations pertain to the occurrence of fire clouding, smudging, sooting or crusty organic residues from cooking use (Skibo 1992). Here again, the surfaces were examined under 14x magnification for evidence of organic residues that typically occur on the inside base and outside shoulders and rims of vessels. When present, the organic cooking residues range from thin, discontinuous traces in cord-mark depressions, to thick crusts. The location and nature of the residues provide information on vessel function.

Ceramic Assemblage from 41PT109

The ceramic assemblage from 41PT109 consists of 34 potsherds from an unknown number of ceramic vessels. No figurines, sherd discs, clay beads, modified sherds, pieces of baked daub or burned clay fragments were present in the collection submitted for analysis. All sherds are from cord marked and smoothed-over cord marked vessels, which indicates that they have Plains cultural affinities. The 4PT109 ceramic assemblage consisted of 34 sherds, which include two rim sherds, two neck sherds, 28 body sherds and two possible vessel base sherds (Table 1).

Table 1. Ceramic Sherd Types by Provenience Units from 41PT109.

Provenience Unit	Level/Feature	Rim	Neck	Body	Base	Total Cnt	Total Wt	Lot and Specimen Numbers
Unit 2	Level 4			1		1	2.0	18-1
Unit 2	Level 6				1	1	5.4	12-1
Unit 2	Feature 2-East			1		1	0.3	11-1
Unit 2	Feature 2			3		3	3.3	13-1 through 13-3
	Unit 2 Total					**6**	**11.0**	
Unit 6	Level 2	1				1	2.4	6-1
Unit 6	Level 3			1		1	0.5	7-1
Unit 6	Level 6			1		1	1.7	8-1
	Unit 6 Total					**3**	**4.6**	
Unit 7	Level 3			2		2	2.1	20-1, 20-2
Unit 7	Level 4	1		1		2	3.1	17-1, 19-1
Unit 7	Level 5		2	6	1	9	24.1	9-1 through 9-3, 10-1, 21-1 through 21-5
Unit 7	Level 6			4		4	4.3	15-1 through 15-4
Unit 7	Level 7			1		1	1.1	16-1
	Unit 7 Total					**18**	**34.7**	
Unit 10	Level 3			3		3	4.7	1-1 through 1-3
Unit 10	Level 5			1		1	0.9	2-1
Unit 10	Level 6			2		2	3.5	3-1, 3-2
Unit 10	Level 7			1		1	1.3	4-1
	Unit 10 Total					**7**	**10.4**	
	Site Total	**2**	**2**	**28**	**2**	**34**	**60.7**	

The ceramic assemblage physically consists mostly of very tiny potsherds. Less than ten sherds appear to have been damaged during excavation, but none could be restored and overall, the small size of the present ceramic assemblage appears to be due to the prehistoric conditions and is not attributed to excavation procedures. Approximately two-thirds of the excavated collection (n=22; 64.7%) has maximum dimensions of less than 2x2 cm, and 97.0% (n=33) of the ceramic assemblage measure less than 3x3 cm. Only one sherd is larger, but still it measured less than 4x5 cm. The total ceramic assemblage weight is only 60.7 g, with individual sherds weighting from 0.3 to 9.1 grams apiece, although all but two sherds weight less than 3.0 g each. The average weight of the sherds is only 1.79 g. In many regions, sherds smaller than 2 cm are regarded as "sherdlets," which are too small to provide reliable information about surface conditions. But due to the sparsity of sherds in the site assemblage all sherds were examined in

detail. The small size of the sherds obviously limits the confidence of observations of such standard categories as vessel size and vessel form, and number of vessels.
The following offers general observations about vessel form; vessel size; paste and temper characteristics; the color variability of the interior, exterior and paste core; firing atmosphere and conditions; treatments on the exterior, and interior surfaces. Following characterization of the ceramic assemblage, discussion focus on the distribution of materials and implications for cultural affiliations.
Vessel Form: Very little information is available to derive inferences about the range of vessels present at 41PT109. Based on the exclusive occurrence of cord marking on the exterior of the vessels, it seems that most are probably from jars. The two neck/shoulder sherds (specimen 21-1, 21-4) are from a constricted neck jar with s-shaped or excurvate rims.
The two rim sherds are from distinctly different vessels. One (specimen 6-1) is from the orifice of a vessel with a straight or vertical neck; its manner of attachment to the vessel is unknown. From the lower portion of the rim, the width of the sherd contracts slightly towards the lip, which is squared with a slight slope towards the vessel exterior. The outside of the rim and the lip surfaces are cord-marked, which are oriented vertically on the vessel. The ridges between cord-marked impressions are flattened and smoothed. The interior of the vessel is smoothed and has some horizontal wiping striations.
The second rim (specimen 17-1) includes the neck portion of a slightly out-flaring, everted, or s-shaped neck-rim vessel. The neck sherd is relatively thick along and below the curvature of the sherd with the vessel body, and contracts within 5 mm of the lip. The lip is rounded and plain; an irregular bead of clay 4 mm wide from rounding the lip is lapped onto the exterior of the rim. Both the rim and the bead of clay are cord-marked, but no cord-marking is present on the lip or interior surfaces, which are smoothed.
Vessel Size: The small size of most sherds precludes reconstruction of the vessel diameters and heights. The largest body sherd (specimen 9-3) has a projected maximum body diameter of 28 to 32 cm. Rim sherd specimen 6-1 tenuously has an orifice diameter in the same range, 28-32 cm, whereas rim 17-1 has an estimated orifice diameter of around 22 cm. These sizes are comparable to the range of vessels found on other Antelope Creek phase sites (Lintz, n.d.; Suhm, Krieger and Jelks 1954).
The vessels have relatively thin walls that range from 3.1 to 8.9 mm thick, with an average thickness of 4.64 mm. The thicker sherds tend to be located at the base (6.1, 8.9 mm), or near the neck-shoulder areas (indeterminate, varied from 5.7-6.7 mm). The thickness of the two rims varied from a moderately thick 6.1 to 3.6 mm. The 28 body sherds ranged from 3.1 to 7.3 mm thick, and have an average thickness of only 3.86 mm. The relative thinness of the vessel walls coupled with the observation that all but one sherd (specimen 10-1) broke across manufacturing coils suggest that the paste coils are welded and fused pretty thoroughly. The vessels clearly accommodate certain use stresses despite the thin vessel walls. The thickening of the vessel walls at the base and below the out-flaring necks were likely designed to strengthen weaknesses in heavy use areas. Use stresses on the base should be obvious. The thickening of the vessel walls below the out-flaring rims possibly relate to the manner of handling the vessels, or perhaps even the suspension by thongs or cords around the neck of the vessels.
Paste and Temper Characteristics: The paste in most sherds seems to contain relatively sparse amounts of clay relative to the quantity of grit and grog temper. One possible

basal sherd (specimen 10-1) is a segment of a clay fillet that broke along both edges of the coil. The coil was about 1 cm in diameter, although the thickness of the sherd was only 8.9 mm. Portions of the surface smeared down the exterior of the adjacent coil. Evidently there was insufficient effort to weld or fuse the clay coils and during vessel use, strain caused vessel failure along the weak coil margins. The occurrence of organic residues inside the vessel clearly shows that this vessel was successfully manufactured and used. In all other instances, the sherds tend to be well fused, as indicated by relatively straight breaks that crosscut manufacturing coils.

All of the sherds are tempered with grit (n=8), grog (n=1), grit-grog (n=21), or combinations of the above with carbon organic remains (n=4). The few sherds that contain organic remains (n=4; 11.7%) tend to have sparse inclusions that show a carbon "halo" in the surrounding paste; most likely these pieces of carbon are incidental pieces of roots or other organic matter that accidentally became mixed in the wet paste. Their presence suggests that some vessels are fired at relatively low temperatures, below 550° C, which ordinarily burn off such carbon inclusions.

The grit-temper materials (n=32; 94.1%) are clear and frosted quartz sand grains. These rock particles, which were probably gathered from the local streams and sand dunes, are sub-angular, with rounded edges; but in a few instances (sherds 1-2, 16-1, etc.) the pieces of rock are angular and may be finely crushed quartz rock cobbles. Sherd number 21-1 has a rather large piece of sandstone temper mixed in with the fine quartz grain temper particles. The quartz temper particles are very small and range from 0.5 to 3.0 mm in the limited sample measured. Near all (n=31, 91.2%) cluster between 0.5 and 1.6 mm in diameter. In many of the sherds, the quantity of sand temper is so great, that there seems to barely be sufficient clay in the paste to hold the sherd together. In other instances, grit is very sparse.

The grog temper materials (n=24; 70.5%) occur most often in conjunction with grit temper. Only one sherd, 12-1, does not show associated grit materials. Due to the similarity of the past color of the grog temper and the surrounding paste, no dimensions of grog were collected. In many cases, the grog temper appears as clay bodies, sometimes tempered with sand and sometimes without, that protrude from the broken edge of the sherd, or from interior eroded surface of the vessels. They can be angular-to-rounded, and sometimes they retain the furrowed cord-marked surface from the crushed vessel source of the temper. In rare instances, the clay bodies differ in oxidation or reduction colors that contrast with the surrounding clays. Cursory inspection of the paste often fails to recognize the presence of grog particles since they are much less obvious than the white to clear quartz grit inclusions. The recognition of grog as a temper source is rarely mentioned in the ceramic literature of the panhandle, but I suspect that as analysts examine sherds under magnification, the documentation of burned clay will occur more often.

Microscopic examination of the interior and exterior surfaces of the sherds found that temper protrusion on the surface is a relatively rare event. Most sherds (19 exterior, 18 interior surfaces; 54.4 1%) show no appreciable signs of any temper. This is quite understandable, since if the vessel is smoothed or paddled while the paste is wet, the hard temper particles are pushed into the clay and the finer particles float to the surface, much in the manner a finisher prepares concrete. Temper occurrence on surfaces was judged to be rare (7 exterior, 11 interior; 26.24%) or common (2 exterior, 3 interior; 7.35%) in a

few instances. Some of these sherds had eroded or deflated surfaces due to heat damage use spalling, or perhaps wear abrasion of the vessel on the ground. The rest of these sherds (6 exterior, 2 interior; 11.76%) had indeterminate values, since the pertinent surfaces were missing.

Exterior Color Variability: The exterior surface colors are dominated by hues in 2000 Munsell Color scheme of 7.5YR (n=24; 70.58%), 5YR (n=5; 14.71%), 2.5YR (n=3; 8.82%), and indeterminate colors (n=2; 5.88%). The values (white to black) and chromas (color intensity) tend to focus on in the darker shades, although a wide range of named colors are represented. The darker values, in the range of 2 to 3, are represented by 15 specimens (44.12%) and include black, very dark gray, very dark brown, and dark reddish brown. Nearly a comparable amount (n=14; 41.18%) are classified into the middle value ranges of 4 to 5, and include dark gray, gray, brown, light brown, and reddish brown. Very few sherds (n=3; 8.82%) are within the lighter value range of 6 to 7; these include pinkish grays and light reddish brown. The dominance of exterior sherd colors with lower values is a clear reflection of pottery firing under reduced oxygen atmospheres and the presence of organic residue the have permeated into the surface of the sherds. The extent of this will be obvious when the firing atmospheres are discussed, below.

Interior Color Variability: The interior surface colors are dominated by hues in 2000 Munsell Color scheme of 7.5YR (n=27; 79.41%), 5YR (n=4; 11.76%), 2.5YR (n=2; 5.88%), and indeterminate color (n=1; 2.94%) due to a missing interior surface. As with the exterior colors, the values (white to black) and chromas (color intensity) tend to focus on in the darker shades, and again, a wide range of named colors are represented. The darker values, in the range of 2 to 3, are represented by 21 specimens (61.76%) and include black, very dark gray, and dark reddish brown. The middle value ranges of 4 to 5 comprise only 11 sherds (32.35%) and include dark gray, gray, dark reddish gray, brown, and reddish brown. Only a single sherd (2.94%) is within the lighter value range of 6-7; it is classified as a light reddish brown sherd. The dominance of dark interior surface sherd colors may represent the presence of organic residues in the near surface layers of the sherd.

Paste Core Color Variability: The sherd core colors are dominated by redder hues than found in the exterior surfaces of the sherds. According to the 2000 Munsell Color scheme, the 7.5YR hues are less common (n=20; 58.82%), than either the 5YR (n=8; 23.53%), or the 2.5YR (n=6; 17.65%) hues. In contrast to the surface colors, the values of the core colors, the values (white to black) and chromas (color intensity) tend to be considerably lighter. Only 8 sherds (23.53%) reflect the darker values in the range of 2 to 3; they include very dark gray, black, and dark reddish brown. The middle value ranges of 4 to 5 are very common and represent nearly three-fourths of the collection (n=25; 73.53%). The most common colors within this range are dark gray, brown, and reddish brown; but less common colors include gray, reddish gray, red, and yellowish red. As with the interior surface colors, only a single sherd (2.94%) is within the lighter value range of 6-7, and it is a light reddish brown sherd. In summary, the sherd colors suggest that core colors are lighter and brighter than either the inside or outside surfaces. The patterns reflect the manufacture firing and subsequent thermal use of these ceramic vessels.

Firing Atmosphere and Conditions: The significance of the core and surface colors is more apparent when the pattern of firing atmospheres is considered (Teltser 1993). The interpretations are based on the cross section patterns of colors in the sherds, in which darker colors are either poorly fired, or heated in a reducing or oxygen starved environment. In contrast, lighter and especially redder colors are fired in an oxygen rich or oxidizing environment. The data from 41PT109 indicate that very few sherds reflect exposure to a single firing environment. Instead the sherd colors reflect complex firing and/or use episodes.

Three basic classes of firing/use atmospheres are evident in the assemblage: oxidation, reduction, and alternating environments. Oxidation environments are reflected by relatively light colors in the sherd cores, and include Teltser's type A (solid oxidation), I and J (with thin to thicker dark colors on the surfaces. Oxidation environments tend to reflect hotter or longer firing environments above the 550^{o} C, which is the general temperature for carbon to be burned out of clays. In the latter instances with thin to thick dark colors near the surface, vessels fired in an oxidizing atmosphere may have been smudged by being buried in an organic-poor or suffocating environment, or they may have had organic cooking residues penetrate into the sherds after the vessel was in use. A total of 17 sherds (50%) from 41PT109 appear to have been fired in an oxidizing environment. Only one specimen (2.94) was classified as Teltser's type A and having a reddish interior and exterior color. Nine sherds (26.47%) are classified as Teltser's type I with thin organic residues on both surfaces; whereas seven sherds (20.59%) are Teltser's type J with thicker resides on both surfaces.

Sherds with dark or black cores are regarded as being fired in a reduced, or oxygen-starved environment, although sometimes these sherds are fired at lower temperatures. Sherds fired in reduced atmospheres include Teltser's type B (all black), and type G (dark core with oxidized surfaces. The latter case arises when hot vessels fired in a reduced atmosphere are removed from the kiln and exposed to oxygen, but such must not involve too rapid cooling, least thermal shock fractures the pot. A total of seven sherds (20.59%) have been fired in a reduced environment. Four sherds (11.76%) are classified as belonging to Teltser's type B, and three others (8.82%) are assigned to type G.

Ten other sherds (29.41%) have firing colors reflecting uncertain conditions. Three of these (8.82%) cannot be assigned to a firing class, since they do not contain both inner and outer surfaces. But seven sherds (20.59%) are assigned to Teltser's type E, which has a thick reduction rind on the inside the vessel, and a thick oxidation rind on the outside of the vessel. It may be that these sherds were fired in an reduced atmosphere and removed in an inverted position from the fire into an oxidizing environment; or else the vessels may have been fired in an oxidizing environment and removed hot and filled with dry grass to smudge the inside surface. Some of the darkening on the interior may be due to the penetration of organic cooking residues into the porous clay walls.

Exterior Surface Treatment: A total of five sherds (14.71%) are either missing their exterior surfaces or are too small to provide observations about the exterior surface treatments. All of the remaining 29 sherds appear to be cord-marked, as indicated by irregular, narrow, linear depressions and adjacent ridges. Microscopic examination observed small fiber impressions in the cord-marked depressions of 16 sherds (47.06%). For the most part, the fibers did not appear to be twisted to make distinct cords, but rather, most fibers were parallel to the long axes of the depressions. The absence of fine

fiber twist patterns raises serious doubts about whether formal twisted cordage was used to impress the sherds, although clearly fibers are involved. The sherds with fibers ranged from those with few or faint fibers (n=3; 8.83%) those with some to unspecified fine fibers (n=9; 26.47%), or those with many fine fiber impressions (n=2; 5.88%). Another 13 cord-marked sherds (38.24%) did not show fine fiber impressions, which suggests either that the impressions were not made with fibrous materials, the clay was not sufficiently plastic enough to preserve the fine impressions, or that they were obliterated from subsequent use-wear or smoothing efforts.

Most of the sherds showed clear evidence of post-paddle smoothing. A total of 25 sherds (73.53%) had clear evidence of rounded, and sometimes even polish on the crests of the clay adjacent to cord impressions. In addition, six cord-marked and smoothed sherds (17.65%), also had a series of parallel striations, which appear to be marks in the clay made by wiping the vessel with a coarse cloth. Two sherds (5.88%) with clear cord-marked impressions show no evidence of exterior smoothing.

A macro-scale examination of the cord-marked patterns proved to be frustrating to discern the manner of application and material used. Many of the sherds were simply too small to trace cord marks out over the body of the vessels. There was insufficient regularity in the cord impressions to convincingly ascertain twine twist, or even to discern whether the paddles were wrapped by wound string, or a woven piece of cloth. In 26 instances (76.47%), measurements were made on the width of cord impression on the exterior surfaces. These resulted in determination of a mean cord width of 2.66 mm and a minimum-maximum range of 1.5 to 4.5 mm. Four had impressions less than 2 mm wide; 13 more had fiber impressions between 2 and 3 mm wide. Seven more had fiber impressions between 3 and 4 mm wide, and only two had fiber impressions wider than 4 mm. Thus, nearly two-thirds of the sherds with measurable cord impressions were less than 3 mm wide.

Exterior Carbon Residues. Carbon residues in the form of faint traces of carbon in cord-mark depressions to thick carbon crusts on the exterior surfaces are present on 11 (32.35%) sherds. Rare carbon residues are apt to occur in the depressions of the cord impressions; but at least six sherds have abundant carbon or carbon crusts that even obscures the surface characteristics of fiber impressions. One more sherd (specimen 20-2) has carbon on both the inside and outside surfaces of the sherd. It is likely that the organic resides found on the outside of the vessels are probably from the upper body, shoulder, and rims, and that the carbon crusts are likely residues from bone grease rendering, or the cooking of soup, mush, stew or gruel (Lintz, 1976; DeMarcay 1986). No carbon residues are seen on the exterior surfaces of 20 sherds.

Interior Surface Treatment: Microscopic examination of the inside surface find that nearly all sherds have been smoothed with a matte finish. The interior sherd surface is missing from one sherd (specimen 21-4) and in only two other instances, specimens 12-1, and 19-1, are the interior surfaces pitted or exfoliated from possible thermal spalling. Three other sherds with smooth interiors have varying degrees of caliche or calcium carbonate encrustations. Detailed examination of the 31 sherds with smoothed interiors found few to many parallel striations probably from wiping the inside of the jars with a cloth or stick before firing.

The wall thicknesses vary markedly in two sherds, specimens 21-1 and 21-5, by as much as 1.0 and 2.2 mm, respectively, over a span of less than 2 x 3 cm. These vessel wall

thickness changes may be indicative of interior anvil impressions that were used in conjunction with the cord wrapped paddles. Such anvil marks are rarely reported in Plains Village ceramics in Texas, in part because sherd irregularities may have been scraped away before firing. However, multiple clear anvil marks have been found on sherds from the Roper site near the Sanford Dam at Lake Meredith (Lintz, n.d.). Alternatively rapid changes in sherd thickness may be due to the potter's decision to strengthen heavy-use areas, such as the base or near the neck, to reduce various stresses placed on the vessels.

Interior Carbon Residues. Organic carbon residues on the inside of vessels were also seen on three sherds (specimens 1-2, 10-1, and 20-2). One of these is regarded as a vessel base sherd. And it is likely that the other two sherds with interior organic residues are from the lower portions of the vessels. Presumably the residues are charred food remains.

41PT109 Ceramic Assemblage Summary

The 34 small potsherds are all seemingly from utilitarian jars or pots that primarily served as cooking or grease extraction utensils. None of the sherds are painted with the red wash or decorated using standard punctuates, incised lines, lip pinching or other forms of decoration commonly found on Plains Village sites in the Texas Panhandle (Lintz 1978). Even though the assemblage is small, the present study noted a number of attributes that provides information about the methods of manufacture and use. The variations in the attributes studied herein add to the growing corpus of information that refines an understanding of the characteristics of the Plains village ceramics. Further detailed studies are needed in order to document and understand the variability present in the Plains Village sites. The next sections briefly examine the distribution of pottery from 41PT109, and draws comparisons with reported ceramics from the region.

Pottery Distribution and Activity Correlates at 41PT109

All 34 potsherds recovered from the 2004 excavations at 41PT109 came from four of eleven test pits, and all of these are from midden and external activity areas located east of the house structure. That no pottery was found in the five to six excavation units placed inside the house suggests either the areas have been extensive vandalized and collectors rigorously retrieved every conceivable artifact, or that the interior house areas were well maintained, with virtually no trash and debris left inside the structure. In light of the small size of the sherds in the collection, and the carelessness of most vandals in retrieving small bland-colored sherds, the latter possibility is more likely.

Since all sherds are relatively small, it is likely that prehistoric pedestrian traffic reduced the sizes of sherds. All exterior units with pottery occur within six meters from the front of the structure and this region is undoubtedly one of the areas experiencing extramural activities and intense foot-traffic during the occupation.

Six sherds (11.0g) were recovered from Unit 2, which is the locus of an exterior cooking pit about 3 m southeast of the structure. Units 6 and 10 are adjacent units dug to investigate a pit feature located within 3 m of the structure just in front of the entrance; these two units yielded a total of 16 sherds weighing only 15.0 g. It is likely that both pits represent adobe mortar quarries used initially to mine sediments to make the upper walls of the house; subsequently these depressions may have been used for other

purposes during the occupation of the site. Most pottery (18 sherds, 34.7 g) came from Unit 7, which was placed in the midden deposit located some 6 m east of the structure. The scarcity of pottery from the 2004 excavations points to the following three suggestions. First, the interior of the house did not serve as a dumpsite for later residents at the site. Indeed the scarcity of materials from inside the structure suggests that the house was reasonably well maintained and the occupation at 41PT109 likely represents a single component, possibly occupied briefly as a residential location that was not reused at later times.

Second, the recovery of only 34 tiny pieces of pottery from excavations encompassing 11 m^2 reflects a relatively low density of 3.1 sherds by count (or 5.52 g by weight) per square meter. The significance of these values must be interpreted in the context of comparative information from other excavated sites in the region. The weight density figure is probably the more objectively comparable value, since sherd sizes and hence counts can vary depending upon the reduction of sherds due to a range of factors, including the intensity of pedestrian traffic in excavation areas. Unfortunately to date, few other studies provide weights of the ceramic assemblage. But sherd count information is available for 15 Antelope Creek sites in the region and provides comparative data for evaluating the density information from 41PT109.

An examination of available data shows that ceramic count densities range from 0.14 to 16.43 sherds per square meter excavation area (Table 2). Furthermore, four clusters of sherd densities are reflected. These consist of 1) 0.1 to 1.1/m^2 (n=5 sites), 2) 2.4 to 3.1/m^2 (n=4 sites), 3) 4.7 to 4.9/m^2 (n=3 sites), and 4) 6.5 to 16.5/m^2 (n=3 sites). The density clusters seemingly do not correlate with functional site types (Lintz 1986). Those of the lowest density cluster include simple subhomestead sites (cf. Conner, Pickett) to complex hamlets (cf. Arrowhead Peak). Whereas those from the highest ceramic density cluster are from complex sub-homesteads (Chicken Creek) and simple homesteads (41MO-7). These ceramic density patterns suggest a potentially complex relationship involving the length of settlement duration, the number of components or episodes of site reuse, the community reuse of earlier areas, and the sampling of maintained areas or dump/middens.

The ceramic density from site 41PT109 is 3.09 sherds/m^2 and is at the upper end of the second sherd density cluster. Unless this relatively low density of pottery has been biased by the removal of significant pottery during the previously reported vandalism, the data suggest that the rooms were well maintained and the occupation of the residential site may be relatively brief, and/or was used by people possessing few vessels. The ceramic density score is 2-AaII, which indicates that the site has a medium ceramic density, and a probable single component occupation for a relatively short duration and the sampling of non-maintained areas.

Table 2. Ceramic Densities from Antelope Creek Period Sites along the Canadian River

Site Name		Excavated area m^2	No Sherds	Density/ m^2	Density Implications*	Reference
Simple Sub-Homestead						
Conner	41HC7	28 00	4	0 14	1-AaI	Duffield 1964
Pickett	A116***	26 00	4	0 15	1-AaI	Carter and Carter n d

Complex Sub-Homestead						
Roper Site	41HC6	70 10	436	6 22	4-BbIII	Lintz n d
Turkey Creek	41PT8	44 00	211	4 80	3-CcII	Green 1967, 1986
Zollars	41HC34	35 00	107	3 06	2-BcII	Smith and Smith 1982
Chicken Creek	A1156**	48 64	799	16 43	4-BbIII	Couzzourt-Schmidt 1983
Simple Homestead						
41MO-7	41MO7	109 00	901	8 27	4-CcIII	Green 1967, 1986
Jack Allen	A654***	66 75	69	1 03	1-AaI	Harrison n d
Complex Homesteads						
41PT109**	**41PT109 ****	**11.00**	**34**	**3.09**	**2-AaII**	**This Paper**
Cottonwood Creek	A119/120 ***	29 30	80	2 73	2-BaII	Lintz 1979
Medford Ranch	41HC10	113 00	535	4 73	3-BbII	Duffield 1964
Spring Canyon	41HC20	81 00	394	4 86	3-BbII	Duffield 1964
Black Dog Village	41HC30	180 00	106	0 59	1-BbI	Keller 1975
Simple Hamlet						
Footprint	41PT25	115 00	285	2 48	2-CbI	Green 1967, 1986
Complex Hamlet						
Arrowhead Peak	41HC19	140 00	139	0 99	1-BbI	Green 1967, 1986
Notes						
* Ceramic Density Implication Codes						
1	Low Density	A	Single Component			
2	Medium Density	B	Multiple Component			
3	Medium-High Density	C	Unknown Component			
4	Highest Density					
a	Short Term Duration	I	maintained areas			
b	Long Term Duration	II	non-maintained areas			
c	Unknown Duration	III	dump areas			
** Rooms only partially excavated						

*** No site number registered at TARL, designation used by the Panhandle-Plains Historical Museum

Third, the scarcity of ceramics and complete absence of burned earth and daub from the assemblage suggests that the structure did not burn, nor did it contain an intact occupational assemblage. More likely, the site experienced a planned and orderly abandonment in which usable items were carried off to subsequence residential places. It is also likely that the abandoned structure was periodically visited by others passing by

and that usable items were salvaged and hauled away to be recycled whereas the remaining artifacts were smeared and broadcast around the site (Ascher 1968). These patterns suggest that the archaeological remains from 41PT109 are apt to be small, lost items, or discarded broken and worn-out implements. Comparable pattern of use were noted for one of the outlying ruins at the Cottonwood Creek site (Lintz 1997). The value of these kinds of sites lies in the materials possessing what is apt to be a brief occupation and the dating of specific components so that the complexity of occupations along the Canadian River is unraveled.

Comparisons Cultural Affiliations and Age

The sherds collected from 41PT109 are from a slab house structure site, which is usually regarded as indicative of the Antelope Creek phase of the Plains Village or Middle Ceramic Period (Baugh 1994; Brooks 2004; Boyd 1997; Drass 1998; Lintz 1986). However, insofar as none of the sherds comes directly from inside the structures, it is possible that the pottery may from earlier or later components that utilized the ridge-spur at the confluence of the Canadian and West Amarillo Creek. In addition, few investigators have considered how much diversity exists within the cord-marked traditions of the region and how one can identify intrusive visitors from outside the local area (cf. Lintz and Reese-Taylor 1997).

The indigenous Late Prehistoric pottery, called Borger Cordmarked, is described as having large thin walled globular pots with minimal decorations and temper consisting of crushed quartz, sand and mica (Suhm, Krieger and Jelks 1962). Others however, insist that the defining tempering constituents of Borger Cordmarked are crushed quartose rock (with naturally-occurring mica inclusions), crushed plagioclase feldspar (which also contains mica) or quartz and mica (unspecified whether sand or crushed rock are involved; Hughes et al. 1977; Hughes et al. 1978). Still others have simply reduced the temper variability of Borger Cordmarked to "sand and grit temper", with occasional additions of crushed quartz and bone (Duffield 1964:46). Indeed, based on the pottery at the Spring Canyon Site, Duffield (ibid:67) suggests there are two closely related varieties of Borger Cordmarked consisting of 1) relatively thick wall vessels tempered with large angular particles of crushed quartzite mixed with sand, and 2) a thinner wall vessel tempered with sand, and in one instance, sand with bone. In contrast, Wulfkuhle (1984), who conducted a detailed analysis of 194 sherds from Landergin Mesa (34.1% of the 569 surface clay assemblage of the 1981 project), identified the presence of sand in 192 sherds, many mixed with other combinations of mica (51%), ferrous particles (50%), bone (17%) and fiber (4%) inclusions; the temper in two sherds was undetermined (non-tempered or unidentified tempered?).

Unfortunately, no comprehensive, detailed ceramic synthesis exists for the three ceramic periods in the Texas panhandle region. However, the studies cited for Antelope Creek Phase sites above and general surveys document a broad range of surface treatments (cord-marked, corn-cob impressed, plain), and tempering materials. Due to the small size of the sherds from 41PT109, the temper data is more informative. The reported range of temper from Texas panhandle sites include crushed plagioclase feldspar, crushed quartose rocks, quartz and mica, sand, mica, scoria, ferrous particles, fibers, calcite, limestone, shale with fossil shells, shell, bone, various combinations of these ingredients and even untempered sherds (Hughes, et al.1978, Hughes, et al. 1977; Moore 1984; Flynn

1984; Hughes and Hughes-Jones 1987). Most of these studies are silent on the cultural significance of the paste and surface diversity of the ceramic manufacturing constituents. Some authors suggest associated affiliations, such as the use of scoria during Woodland or Early Ceramic Period times (Hughes et al. 1977:198) , but rarely have these notions been supported by radiocarbon dates or detailed studies of ceramics from carefully excavated sites.

None of the published ceramic studies from the panhandle region have mentioned grog or sherd temper, like that reported for 41PT109, especially from Late Prehistoric sites. Such materials were also commonly observed in the Roper site assemblage, which was associated with four circular structures with stone slab foundations (Lintz n.d.). Why then, has grog temper not been recorded? The scarcity of grog temper reporting is likely a function of the attention of analytical observation and the relative ease of seeing white grit particles next to or even embedded within dark brown grog temper. However if analysts pay attention to the angularity of the breaks, especially unusual projections in the snap surface of the sherd, which are not a function of adjacent temper particle impressions, and they watch for the occurrence of "finished" exterior or interior surfaces along the walls of these projecting bodies, and occasionally observe firing color gradients along the surfaces of the temper particles, then I think the incidence of reported grog temper will increase.

At this time, the frequency of grog temper use and its cultural significance remain poorly known. The occurrence of such materials as a frequent temper among the Roper site materials suggests that grog-grit temper is a Late Prehistoric tempering material. Whether this represents Borger Cordmarked, or a new type is presently unknown. Except for grog temper, the sherd sample from 41PT109 compares most favorably with the attributes for Borger Cordmarked Pottery, in general vessel form, grit particle temper, sherd thickness and paste. (Suhm, Krieger and Jelks, 1954; Suhm and Jelks 1962). All lines of evidence suggest that the pottery from the site is compatible with the architectural structure, and both are attributed to the Antelope Creek phase. Previous studies of architectural diversity suggest that contiguous room structures tend to be relatively early in the Antelope Creek Phase sequence (Lintz 1986). The recognition of a contiguous room building at 41PT109 would suggest that the site may date during the span A.D. 1200 and 1350. Of course independent radiocarbon dates are needed to verify this suggestion.

Summary

The recent test excavations at 41PT109 covered only 34 sherds from utilitarian cord-marked vessels. An attribute analysis of this small assemblage, suggests that the ceramics are likely associated with the nearby contiguous room structure, which in turn is affiliated with the early subphase of the Antelope Creek Phase, of the Middle Ceramic or a Plains Village Period. Furthermore the small physical size and their occurrence in exterior areas around the entryways to the structures suggest that the sherds were reduced by pedestrian foot traffic. The absence of burned daub and the small broken size of the assemblage suggests that the site was left as part of a planned abandonment. The recovery of only 34 sherds from the excavation of 11 square meters area suggests that the occupation may have been fairly brief. The reasons for such abandonment are unclear.
Notes:

1. Both the 1988 and 2000 editions of the Munsell Soil Color Charts were consulted in this study; comparisons show that the color names have shifted for select Munsell color designations between these two editions; I have used the 2000 version throughout this study.

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Appendix A: Ceramic Sherd Assemblage from 41PT109.

Table 1. Ceramic Sherd Types by Provenience Units from 41PT109.

Provenience		Rim	Neck	Body	Base	Total		Lot and Specimen Numbers
Unit	Level/Feature					Cnt	Wt	
Unit 2	Level 4			1		1	2.0	18-1
Unit 2	Level 6				1	1	5.4	12-1
Unit 2	Feature 2-East			1		1	0.3	11-1
Unit 2	Feature 2			3		3	3.3	13-1 through 13-3
	Unit 2 Total					**6**	**11.0**	
Unit 6	Level 2	1				1	2.4	6-1
Unit 6	Level 3			1		1	0.5	7-1
Unit 6	Level 6			1		1	1.7	8-1
	Unit 6 Total					**3**	**4.6**	
Unit 7	Level 3			2		2	2.1	20-1, 20-2
Unit 7	Level 4	1		1		2	3.1	17-1, 19-1
Unit 7	Level 5		2	6	1	9	24.1	9-1 through 9-3, 10-1, 21-1 through 21-5
Unit 7	Level 6			4		4	4.3	15-1 through 15-4
Unit 7	Level 7			1		1	1.1	16-1

	Unit 7 Total					**18**	**34.7**	
Unit 10	Level 3			3		3	4.7	1-1 through 1-3
Unit 10	Level 5			1		1	0.9	2-1
Unit 10	Level 6			2		2	3.5	3-1, 3-2
Unit 10	Level 7			1		1	1.3	4-1
	Unit 10 Total					**7**	**10.4**	
	Site Total	**2**	**2**	**28**	**2**	**34**	**60.7**	

APPENDIX C

Vertebrate Faunal Remains from Crossbar Ranch (41PT109)

Barbara A. Meissner

The vertebrate faunal collection from Crossbar Ranch analyzed for this report consisted of a total of 3,258 bones weighing 2675.69 g. The bone recovered was identified to the extent possible, using the comparative collection at the Center for Archaeological Research at the University of Texas at San Antonio, which was used with the kind permission of Dr. Steve A. Tomka, the Director. Reference material used included Balkwill and Cumbaa (1992), Boessneck (1970), Cohen and Serjeantson (1996), Gilbert (1990), Hildebrand (1955), Hillson (1986), Olsen (1960, 1964, 1968), and Sobolik and Steele (1996).

Identifications were conservative. For example, bison-sized bone was not labeled *Bison bison* unless it could be positively differentiated from cattle (*Bos taurus)* and horse (*Equus caballos*). After examination, specimens were bagged by taxon, and then by Unit/Level. Acid-free paper tags containing provenience information and bone identifications were placed in each bag.

Results

In general, the bone was highly fragmented, with few intact bones even of fairly small animals such as rabbits. Most of the larger bones exhibited the surface pitting caused by the microbiologic activity of bacteria and fungi. There was, however, little to no evidence of the type of atmospheric weathering seen when bone lies on the surface for some time. It appears that this bone was, for the most part, buried soon after deposition.

Twenty-two genera were identified (Table 1). Because of the degree of fragmentation, only 115 bones (3.6 percent) could be identified to the genus taxonomic level. The identified taxa are a mixture of riverine species, animals adapted to a plains/prairie environment, and species more at home in open woodland settings. Riverine species include turtles, such as soft-shell turtles (*Trionyx* sp.) and probably pond sliders (Emydidae). One of the more surprising riverine species present was the muskrat (*Ondatra zibethicus*), positively identified from a single tooth. Although Davis and Schmidly (1994) show Potter County just outside the known range of muskrats, marshy areas along the Canadian River would have provided a typical environment for this animal (Davis and Schmidly 1994).

Small numbers of bones of ducks (*Anas* sp.) were also present. The only identified fish genus was catfish (*Ictalurus* sp.), but small, unidentifiable fish bones were present in most units. Bones of both turtles and fish were quite small and unless there were a great many more deposited at the site that did not survive taphonomic processes, these species probably do not represent a significant percentage of the diet.

Species adapted to the plains/prairie environment included Bison (*Bison bison*), Pronghorn (*Antilocapra americana*), prairie dogs (*Cynomys* sp.), pocket gophers (*Geomys* sp., probably *G. bursarius*, the Plains Pocket Gopher), and jackrabbit (*Lepus* sp.). Birds included Bobwhite Quail (*Colinas virginianus*), and a member of the order Galliformes that was, given the size of the bone and the location of 41PT109 (Rappole and Blacklock 1994:70), probably a Lesser Prairie Chicken (*Tympanuchus pallidicinctus*).

Species more common in open woodland or brushy environments include White-tail Deer (*Odocoileus virginianus*), packrats (*Neotoma* sp.), cotton rats (*Sigmodon* sp.), cottontails (*Sylvilagus* sp.), skunks (*Mephitis* sp.), box turtles (*Terrepene* sp.), tree squirrels (*Sciurus* sp.), and the American Badger (*Taxidea taxus*). It should be noted that only a single bone of each of the above woodland species except the rodents was identified in this collection. The single deer bone identified was a fragment of a deciduous molar. Even if all the unidentified artiodactyl bone was deer, this species clearly did not represent a significant resource at the site.

In fact, it is clear that bison was the main source of meat at this site. We can use bone weight as a rough estimate of the amount of meat that the bone represents (Meissner 1999:289-290). In general, heavier bones carry more meat per gram than lighter bones, but the relationship is not linear and varies, sometimes a great deal, among classes (Reitz and Wing 1999:222-231). However, use of bone weight does provide a fairly reliable estimate of the relative importance in the diet of mammalian species.

All bovid bones plus the bison-sized bone (N=385) represent 58.9 percent of the total bone weight. Even assuming that none of the mammal bone that could not be identified to size due to fragmentation was bison (an unreasonable assumption, given the degree of fragmentation seen in this collection), the meat of bison still clearly dominates the diet. In contrast, other large mammals such as deer and pronghorn, including unidentified artiodactyls and deer-sized bone (N=37), represent only 2.6 percent of the bone weight.

Modified Bone

Only 8.3 percent (N=272) of the bone showed evidence of being heat altered. This suggests incidental burning and that the practice of burning bone as a fuel and/or for trash disposal was not practiced at the site. A few bones showed evidence of small chops and thin cuts, probably made by tools in the process of defleshing bone, but these were not common, which is not unexpected given the degree of fragmentation.

Two fragments of turtle shell from Level 7 of Unit 10 showed evidence of having been worked. Both pieces are very similar in size and shape, and were shaped into rough squares by scoring a groove and then snapping the shell (Figure 1). These snapped edges were then rubbed to a smooth finish. Each piece once had another part of the shell in one corner, but in both cases this portion broke away at a natural suture and this edge was not

smoothed. The purpose of these small pieces is not known, nor is it known if the fact that they are mirror images of each other is significant.

One other piece of worked bone from Level 5 of Unit 4 appears to be an unfinished awl-like tool, probably made from the metapodial of an artiodactyl (Figure 2). Although the rough shape had been carved, the proximal end is unfinished. Although the bone is too heavily pitted to be sure, it does not appear that there is any polish on the tip and it does not look as if it had been smoothed after the initial shaping.

Summary

The bone from this collection represents a fairly broad range of taxa, from three general environmental zones: riverine, prairie/plains, and open woodlands. Identified genera included several rodent species, several snake species, rabbits, both deer and pronghorn, and three carnivores. The most common identified genera were cottontails, followed by bison, prairie dog, and pocket gopher (Table 1). Comparison of bone weight suggests that bison were by far the most important part of the meat diet represented in this collection. Smaller artiodactyls appear to have provided very little to the diet. Rabbits and rats were common in the collection, but they probably do not represent a large percentage of the diet.

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TABLE 1

Scientific Name	Common Name	Ct.	Wgt. (g)
MAMMALIA			
Artiodactyla			
Antilocapra americana	Pronghorn	1	1.25
Bison bison	Bison	11	438.79
Bovinae	Bison/Cow	33	335.13
Odocoileus virginiana	White-tail deer	1	0.51
	Unidentified Artiodactyls	3	7.09
	Total Artiodactyls	49	782.77
Carnivora			
Canis cf. latrans	Probably coyote	1	0.36
Mephitis sp.	Skunk	1	0.49
Taxidea taxus	American Badger	1	0.27
	Total Carnivores	3	1.12
Lagomorphia			
Lepus sp.	Jackrabbit	6	3.45
Sylvilagus sp.	Cottontailed Rabbit	32	9.01
	Total Rabbits	38	12.46
Rodentia			
Cynomys sp.	Prairie dog	11	6.85

Geomys sp.	Gophers	11	3.69
Neotoma sp.	Packrats	3	0.72
Ondatra zithbethicus	Muskrat	1	0.29
Perognathus sp.	Deer mice	1	0.09
Sigmodon sp.	Cotton rats	3	0.43
Sciurus sp.	Tree squirrels	6	1.32
	Unidentified Rodents	13	2.6
	Total Rodents	49	15.99
Unidentified Mammals			
	Mouse/Rat-Sized	42	6.83
	Deer-sized	33	61.91
	Cow/Bison-Sized	345	816.38
	Unknown	2,487	889.19
	Total unidentified Mammals	2,907	1,774.31
TOTAL MAMMALS		**3,046**	**2,586.65**
AVES			
Anserformes			
Anas sp.	Ducks	6	2.36
	Total Ducks/Geese	6	2.36
Galliformes			
Colinus virginianus	Bobwhite quail	1	0.19
	Unidentified Galliforms	1	0.74
	Total Galliforms	2	0.93
Strigiformes			
	Unidentified owls	1	0.28
	Total owls	1	0.28
Unidentified Birds			
	Unidentified birds	62	16.6
TOTAL BIRDS		**71**	**20.17**
REPTILIA	**Reptilia**		
Squamata			
Crotalus sp.	Rattlesnakes	12	1.99
Elaphe sp.	Rat Snakes	5	0.72
Thamnophis sp.	Garter Snakes	3	0.32
	Unidentified lizard	1	0.06
	Total snakes and lizards	21	3.09
Testudines			
Terrepene sp.	Box turtles	2	2
Trionyx sp.	Softshell Turtles	9	35.4
Emydidae	Box/Slider Turtles	15	10.01
	Unidentified Turtle	81	35.4
	Total Turtle	107	82.81
TOTAL REPTILES		**128**	**85.9**

AMPHIBIA			
Anura	Frogs and toads	8	0.69
TOTAL APMPHIBIANS		**8**	**0.69**
OSTEICTHYES			
Ictalurus sp.	Catfish	9	1.22
	Unidentified fish	21	3.74
TOTAL FISH		**30**	**4.96**
	Unidentified Bone	2	0.21
TOTAL BONE		**3,285**	**2,698.58**

FIGURE 1: Modified Turtle Shell

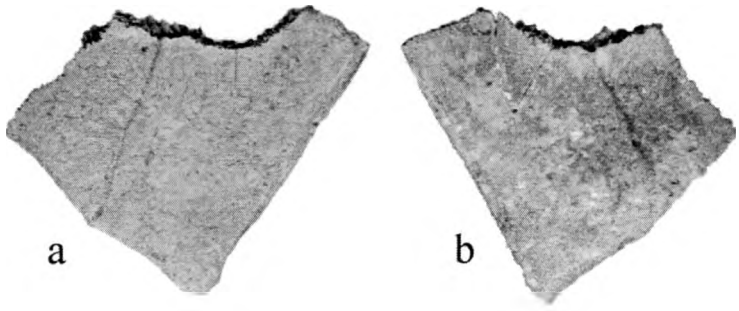

FIGURE 2: Bone Awl

APPENDIX D

Plant Remains from 41PT109, Potter County, Texas
Phil Dering
Shumla Archeobotanical Services

Plant Remains from 41PT109, Potter County, Texas
Phil Dering
Shumla Archeobotanical Services

The purpose of this analysis is to provide botanical data that will contribute to an understanding of Late Prehistoric Period land use along the western area of the Canadian River. The site is situated in an area from which very little data has been collected. A total of five flotation samples and 75 macrobotanical samples were recovered and analyzed from 41PT109. The botanical data will be utilized to describe plant utilization at the site and to infer local environmental conditions.

METHODS

There are two types of samples in the current study – flotation samples and macrobotanical samples. Flotation is a method of recovering organic remains from archeological sediments by using water to separate heavy or soluble inorganic particles from plant parts and small animal bone. The material floating to the surface is called the light fraction, and this is caught on a fine mesh screen or strainer. The material that sinks to the bottom is the heavy fraction and it is also caught on a fine mesh screen. Most of the soil including clay and silt is suspended in water and passes through the screens and is either recycled or discarded. In most cases, only the light fraction is submitted for analysis after the heavy fraction has been examined for plant materials.

Macrobotanical samples are carbonized plant remains that are separated from the rest of the artifacts or ecofacts by hand. Macrobotanical samples are collected either from an excavator's screen or are point-collected and plotted individually in the field. They are often labeled ^{14}C or radiocarbon samples.

The analysis followed standard archeobotanical laboratory procedures. The volume of each matrix sample was recorded and each was floated in a 5-gallon bucket using the swirl and pour technique. The light fraction was poured through a chiffon fabric and the heavy fraction through 1/16th-inch screen. A total of 7.1 liters of site matrix was floated.

After drying the samples, the light fraction is passed through a nested set of screens of 4mm, 2mm, 1mm, and 0.450mm mesh and examined for charred material, which is separated for identification. Heavy fractions are examined for carbonized plant material and the two fractions were combined prior to identification.

Plant remains were sorted into categories –wood fragments, seed/fruit fragments, and including maize cob fragments. Identification of carbonized wood was accomplished by using the snap technique, examining the fragments at 8 to 45 magnifications with a hand lens or a binocular dissecting microscope, and comparing the material to samples in the archeobotanical herbarium. All seed identifications were made using seed manuals and reference collections at Shumla Archeobotanical Services. Only charred plant material was included in the analysis, because uncarbonized material is consumed by insects, fungi and bacteria and does not survive more than a few years in the deposits of open sites.

Counts and weights from each are presented in tabular format. The data from the taxa counts is also presented as presence values. Presence value or ubiquity is defined as the percentage of all analyzed samples, both productive (with seeds) and unproductive (wood charcoal only or no charcoal), in which a particular taxon is present. I have used this method primarily to evaluate the occurrence of the major food plant resources identified in the samples. Presence value provides a means of determining how widespread a taxon is throughout the samples recovered from a site. These data may have some utility in establishing the nature of subsistence patterns in the study area.

Results

Overview of the Assemblage

Results of the analysis are presented in Tables 1, 2, and 3. Table 1 lists the identifications and counts of plant material recovered from each sample, Table 2 the presence value of each taxon in the flotation samples, and Table 3 the results from the macrobotanical samples. Although the recovery of charred plant material was modest, the results netted maize fragments in 4 of the five flotation samples and in two of the macrobotanical samples. In the 7.1 liters of flotation samples examined, all charcoal types weighed approximately 0.7 grams. In the 75 macrobotanical samples examined, all charcoal types weighed approximately 26.6 grams.

Seven wood taxa were identified in the samples -- mesquite, oak, cottonwood, hackberry, sycamore, pine, and juniper. Maize was the only food resource recovered from the samples. Kernels, cupules, cob fragments, and possibly stalk fragments were noted. Uncarbonized seeds included *Mammillaria* sp. cactus, and Chenopodium sp. (goosefoot) seeds. Both of these seed types were black, and resembled carbonized material, however closer examination proved them to be of modern origin. In the current study some differences in wood types were observed between the flotation and macrobotanical samples. The discrepancy most likely results from the fact that the flotation samples came from two heating features and some trash features, while some of the macrobotanical samples came from broader, less defined contexts. While emphasizing analysis of features, especially heating features, allows for a better chance for recovery of charred plant

Table 1. Plant remains identified in flotation samples, 41PT109.

Sample	Feature	Unit	Level (cm)	Taxon	Name	Part	Count	Wt (g)
3	2	2	9 (101-106)	Prosopis sp	Mesquite	Wood	4	0 1
3	2	2	9 (101-106)	Salicaceae	Cottonwood-willow	Wood	9	0 2
3	2	2	9 (101-106)	Juniperus sp	Juniper	Wood	1	+
3	2	2	9 (101-106)	Indeterminate	NA	Wood	3	+
3	2	2	9 (101-106)	Monocot-Indeterminate	NA	Stalk	1	+
3	2	2	9 (101-106)	Zea mays	Maize	Cupule	3	+
9	5	3	9	Prosopis sp	Mesquite	Wood	6	0 1
9	5	3	9	Indeterminate	NA	Wood	3	+
9	5	3	9	Juniperus sp	Juniper	Wood	1	+
14	4	4	5	Prosopis sp.	Mesquite	Wood	7	0 2
14	4	4	5	Juniperus sp	Juniper	Wood	5	+
14	4	4	5	Quercus sp	Oak	Wood	2	+
14	4	4	5	Indeterminate	NA	Wood	2	+
14	4	4	5	Zea mays	Maize	Cupule	3	+
14	4	4	5	Zea mays	Maize	Kernel	2	+
17	1	6	8	Salicaceae	Cottonwood-willow	Wood	3	0 1
17	1	6	8	Indeterminate	NA	Wood	4	0 1
17	1	6	8	Prosopis sp	Mesquite	Wood	19	0 2
17	1	6	8	Zea mays	Maize	Kernel	1	+
18		7	6(60-65)	Salicaceae	Cottonwood-willow	Wood	4	+
18		7	6(60-65)	Quercus sp	Oak	Wood	2	+
18		7	6(60-65)	Indeterminate	NA	Wood	2	+
18		7	6(60-65)	Zea mays	Maize	Cupule	6	+

Table 2. Ubiquity of plant resources in the 41PT109 flotation samples.

Taxon	Common	Part	Samples Present	Ubiquity
Salicaceae	Cottonwood-willow	Wood	3	60.0%
Quercus sp.	Oak	Wood	2	40.0%
Prosopis glandulosa.	Mesquite	Wood	4	80.0%
Juniperus sp.	Juniper	Wood	3	60.0%
Zea mays	Maize	Cupule and kernel fragments	4	80.0%

Table 3. Screen and point-collected macrobotanical and C-14 samples.

Sample	Feature	Unit	Level	Taxon	Name	Part	Count	Wt (g)
MB-19	--	1	3	Indeterminate	NA	Wood	5	+
MB-20	--	1	4	Platanus occidentalis	Sycamore	Wood	5	+
MB-20	--	1	4	Prosopis glandulosa	Mesquite	Wood	2	+
MB-21	--	1	5	Salicaceae	Cottonwood-willow	Wood	4	0 2
MB-22	--	1	5	Salicaceae	Cottonwood-willow	Wood	1	+
MB-23	--	1	6	Salicaceae	Cottonwood-willow	Wood	11	0 3
MB--8	--	2	1	Juniperus sp	Juniper	Wood	2	+
MB--8	--	2	1	Prosopis glandulosa	Mesquite	Wood	2	+
MB--8	--	2	1	Salicaceae	Cottonwood-willow	Wood	2	+
MB-9	--	2	4	Juniperus sp	Juniper	Wood	7	0 2
MB-9	--	2	4	Prosopis glandulosa	Mesquite	Wood	4	0 2
MB-10	--	2	5	Non-botanical	--	--	--	--
MB-11	--	2	6	Juniperus sp	Juniper	Wood	16	0 5
MB-12	--	2	6	Juniperus sp	Juniper	Wood	5	0.2
MB-13	--	2	6	Juniperus sp	Juniper	Wood	3	0 9
MB-11	--	2	6	Quercus sp	Oak	Wood	2	+
MB-11	--	2	6	Salicaceae	Cottonwood-willow	Wood	13	0 4
MB-18	--	2	7	Indeterminate	NA	Wood	2	+
MB-14	--	2	7	Juniperus sp	Juniper	Wood	12	0 3
MB-15	--	2	7	Non-botanical		Bone	4	--
MB-14	--	2	7	Pinus sp.	Pine	Wood	1	0 1
MB-14	--	2	7	Prosopis glandulosa	Mesquite	Wood	11	0 2
MB-14	--	2	7	Salicaceae	Cottonwood-willow	Wood	8	0 2
MB-16	--	2	8	Juniperus sp	Juniper	Wood	6	0 2
MB-17	--	2	8	Juniperus sp	Juniper	Wood	4	0 1
MB-16	--	2	8	Prosopis glandulosa	Mesquite	Wood	2	0 1
MB-16	--	2	8	Salicaceae	Cottonwood-willow	Wood	8	0 3
MB-17	--	2	8	Salicaceae	Cottonwood-willow	Wood	4	0 1
MB-2	2	2	24-Jun	Prosopis glandulosa	Mesquite	Wood	(20ml)	5 5
MB-2	2	2	24-Jun	Salicaceae	Cottonwood-willow	Wood	9	0 7
MB-3	2	2	26-Jun	Juniperus sp	Juniper	Wood	2	0 1
MB-3	2	2	26-Jun	Prosopis glandulosa	Mesquite	Wood	11	0 6
MB-3	2	2	26-Jun	Zea mays	Maize	Cob fragment	7	0 5
MB-3	2	2	26-Jun	Zea mays	Maize	Kernel	1	+
MB-1	2	2	5(50-60)	Juniperus sp	Juniper	Wood	6	0 4
MB-1	2	2	5(50-60)	Salicaceae	Cottonwood-willow	Wood	5	0 7

MB-6	--	2	9 100-110	Juniperus sp	Juniper	Wood	4	0 2
MB-5	2	2	9 100-110	Platanus occidentalis	Sycamore	Wood	2	+
MB-5	2	2	9 100-110	Prosopis glandulosa	Mesquite	Wood	6	0 1
MB-6	--	2	9 100-110	Prosopis glandulosa	Mesquite	Wood	14	0 6
MB-7	--	2	9 100-110	Prosopis glandulosa	Mesquite	Wood	11	0 2
MB-6	--	2	9 100-110	Salicaceae	Cottonwood-willow	Wood	13	0 9
MB-7	--	2	9 100-110	Salicaceae	Cottonwood-willow	Wood	15	0 3
MB-4	2	East	24-Jun	Indeterminate	NA	Wood	10	0 3
MB-4	2	East	24-Jun	Juniperus sp	Juniper	Wood	7	0 2
MB-4	2	East	24-Jun	Salicaceae	Cottonwood-willow	Wood	8	0 3
MB-4	2	East	24-Jun	Zea mays	Maize	Cob fragment	1	+
MB-24	--	3	3	Indeterminate	NA	Flecks	--	--
MB-25	--	3	4	Juniperus sp	Juniper	Wood	2	+
MB-27	--	3	6	Juniperus sp	Juniper	Wood	2	0 1
MB-26	--	3	7	Prosopis glandulosa	Mesquite	Wood	8	0 9
MB-28	--	3	8	Salicaceae	Cottonwood-willow	Wood	6	0 1
MB-29	--	3	9	Indeterminate	NA	Wood	1	+
MB-70	--	4	2	Indeterminate	NA	Wood	3	+
MB-71	--	4	3	Juniperus sp	Juniper	Wood	5	0 2
MB-72	--	4	4	Salicaceae	Cottonwood-willow	Wood	2	0 1
MB-75	--	4	5	Indeterminate	NA	Wood	10	+
MB-74	--	4	5	Prosopis glandulosa	Mesquite	Wood	2	0 1
MB-73	--	4	5	Salicaceae	Cottonwood-willow	Wood	3	+
MB-30	--	5	2	Salicaceae	Cottonwood-willow	Wood	4	+
MB-31	--	5	3	Juniperus sp	Juniper	Wood	9	1 1
MB-31	--	5	3	Salicaceae	Cottonwood-willow	Wood	3	+
MB-32	--	5	4	Prosopis glandulosa	Mesquite	Wood	3	+
MB-32	--	5	4	Salicaceae	Cottonwood-willow	Wood	3	0 1
MB-33	--	5	5	Juniperus sp	Juniper	Wood	8	0 1
MB-34	--	5	6	Juniperus sp	Juniper	Wood	1	+
MB-35	--	5	7	Salicaceae	Cottonwood-willow	Wood	7	0 1
MB-36	--	6	2	Quercus sp	Oak	Wood	2	0 1
MB-37	--	6	3	Salicaceae	Cottonwood-willow	Wood	7	0 2
MB-38	--	6	4	Juniperus sp	Juniper	Wood	3	0 2
MB-38	--	6	4	Salicaceae	Cottonwood-willow	Wood	5	0 1
MB-39	--	6	4	Salicaceae	Cottonwood-willow	Wood	2	+
MB-40	--	6	5	Salicaceae	Cottonwood-willow	Wood	3	0 2
MB-41	--	6	6	Prosopis glandulosa	Mesquite	Wood	4	0 1
MB-42	--	6	7	Salicaceae	Cottonwood-willow	Wood	5	0 2
MB-43	--	6	8	Salicaceae	Cottonwood-willow	Wood	2	+
MB-44	--	6	9	Celtis sp	Hackberry	Wood	4	0 1
MB-65	--	7	1	Juniperus sp	Juniper	Wood	1	+
MB-62	--	7	2	Juniperus sp	Juniper	Wood	4	0 2

MB-63	--	7	3	Salicaceae	Cottonwood-willow	Wood	6	0 1
MB-64	--	7	3	Salicaceae	Cottonwood-willow	Wood	10	0 4
MB-66	--	7	4	Juniperus sp.	Juniper	Wood	7	0 4
MB-67	--	7	5	Juniperus sp	Juniper	Wood	10	0 4
MB-68	--	7	6	Juniperus sp	Juniper	Wood	9	0 6
MB-68	--	7	6	Salicaceae	Cottonwood-willow	Wood	12	0 4
MB-69	--	7	7	Juniperus sp	Juniper	Wood	1	+
MB-59	--	8	5	Quercus sp	Oak	Wood	2	+
MB-60	--	8	7	Indeterminate	NA	Flecks	--	--
MB-61	--	8	8	Prosopis glandulosa	Mesquite	Wood	2	+
MB-53	--	9	3	Salicaceae	Cottonwood-willow	Wood	4	0 4
MB-54	--	9	4	Quercus sp	Oak	Wood	2	0 1
MB-54	--	9	4	Salicaceae	Cottonwood-willow	Wood	2	0 1
MB-55	--	9	5	Salicaceae	Cottonwood-willow	Wood	3	0 1
MB-56	--	9	6	Salicaceae	Cottonwood-willow	Wood	4	0 1
MB-45	--	10	3	Juniperus sp	Juniper	Wood	4	0 1
MB-47	--	10	4	Juniperus sp	Juniper	Wood	2	0 2
MB-47	--	10	4	Salicaceae	Cottonwood-willow	Wood	4	0 4
MB-46	--	10	5	Indeterminate	NA	Wood	1	+
MB-48	--	10	6	Prosopis glandulosa	Mesquite	Wood	4	0.1
MB-49	--	10	7	Prosopis glandulosa	Mesquite	Wood	9	0 4
MB-49	--	10	7	Salicaceae	Cottonwood-willow	Wood	21	0 8
MB-51	--	10	8	Juniperus sp	Juniper	Wood	4	0 1
MB-50	--	10	8	Salicaceae	Cottonwood-willow	Wood	5	0 4
MB-51	--	10	8	Salicaceae	Cottonwood-willow	Wood	6	0 2
MB-52	--	10	10	Salicaceae	Cottonwood-willow	Wood	4	0 4
MB-57	--	11	3	Indeterminate	NA	Wood	3	+
MB-58	--	11	4	Indeterminate	NA	Wood	4	+

materials in general and fuel and food resources in particular, it is apparent that at this site at least there was more diversity outside the feature contexts.

Ubiquity figures from the flotation samples provide a rough idea of how widespread specific plant resources are across the site. Mesquite was present in 80% of the flotation samples, cottonwood-willow and juniper were noted in three of the samples (60%), and oak in two (40%). That is, mesquite, juniper, and cottonwood-willow were the most commonly occurring wood types in the flotation samples. The macrobotanical samples provided slightly different results, with cottonwood-willow the most abundant and frequently occurring wood type followed by juniper and mesquite. A single pine wood fragment was recovered from level 7 of Unit 2, a few fragments of sycamore from Units 1 and 2, and hackberry from Unit 6. Oak occurred in four samples, one each from Units 2, 6, 8, and 9.

Despite the small quantity of charcoal recovered from the flotation samples, maize was well represented, occurring in 80% of the flotation samples. A total of 12 cupule fragments and three kernel fragments were noted in flotation samples. Maize was

found in three extramural units, Unit 2 a large roasting pit, Unit 6, a borrow pit, and Unit 7, a trash midden that apparently accumulated on the living surface. Two macrobotanical samples collected from Feature 2 also contained maize in the form of cob fragments and a single kernel. An intramural hearth, Feature 4, also contained maize.

Botanical Remains by Feature

Feature 2 was the most productive feature in the project, based on the samples submitted for analysis. It was a roasting or cooking facility that had been filled with trash. Macrobotanical samples recovered from Feature 2, and areas immediately adjacent to the feature (all located within Unit 2) contained 16.3 grams of charcoal which accounted for 59.1% of the charcoal identified from all the samples, which includes material from 10 other units. Mesquite, juniper, cottonwood-willow, pine, sycamore, and oak were noted in the samples. The feature also contained more maize than any other context, including cob fragments, cupules, and a kernel.

Feature 4 was an interior hearth. Three maize cupules and two kernels were noted in a flotation sample from this feature. Wood charcoal weighed a total of 0.4 grams and wood types included mesquite, juniper, and oak.

Unit 6/Feature 6 was an exterior pit, possibly a borrow pit located just outside the structure wall, that had been filled with trash after the structure had been completed. Wood types included cottonwood-willow, mesquite, oak, juniper, and hackberry. The very diverse wood charcoal content of this pit is probably due to its use as a trash pit, and to its proximity to the structure wall. Many times when structures are repaired the material, which often includes rotten wood, is pushed into a pit and burned. Or, alternatively, some of the wood component of the vertical elements may have burned and fallen into the pit. Flexible cottonwood or willow branches probably made up much of the vertical elements of the structure.

Unit 7 was a midden deposit that yielded many of the artifacts and ecofacts recovered during the excavations. Six maize cupules were noted in the flotation sample from this context. The wood charcoal identified from the unit included cottonwood-willow, mesquite, juniper, and the only occurrence of pine. Pine was distinguished from juniper by the presence of resin ducts and a gradual, but distinct transition from early wood to late wood visible in the transverse view of the specimen.

The macrobotanical samples from Unit 10, which was excavated into borrow/trash pit, consisted of an abundance of cottonwood-willow, mesquite, and juniper charcoal. No food resources were recovered from this pit. Much of this material could have been part of the superstructure of the building.

The remaining units were excavated within or immediately adjacent to the structure. They contained wood charcoal but no other types of food resources.

Discussion and Conclusion

Much of the charred plant material identified in the analysis was used for fuel or to build the structure. Mesquite is one of the most common wood types identified in archeological sites in the western half of Texas. It is particularly dominant in plant assemblages that have been severely affected by poor conditions of preservation, because it is durable, and is a preferred structural and fuel wood, making up the vertical elements

in many pithouses and surface structures throughout the Southwest (Dering 1998; Dering et al. 2000).

The slender green stems of cottonwood, a common riparian tree, are often woven through roof supports to provide a framework for weaving thatch. Cottonwood trunks and larger stems are also used as posts (Bohrer 1962).

Juniper, a common component of both terraces and upland valley slopes, is often used for roof and wall support posts. At Hank's Site 41RB109 in Roberts *County*, juniper accounted for the majority of the vertical structure in a burned pithouse (Dering 2003). Oak, present in small quantities at 41PT109, was not recovered from Hank's Site.

Local vegetation consisted of a mix of riparian or streamside elements and more upland adapted plants. The cottonwood-willow type was most abundant and widespread wood type in the macrobotanical samples, a reflection of the proximity to a stream and the use of this wood as building material. Juniper, a tree or shrub that often grows in valleys, valley margins, and uplands, was also abundant. The presence of mesquite wood, a tree that would have grown in upland areas as well, provides more evidence that this tree was present on the Canadian River long before European contact. A single pine charcoal fragment suggests that pine was present in the area during the time the site was occupied, but not in abundance. Pine is a preferred and convenient wood used in many applications, including as fuel and as a building material. If it were abundant in the region during Antelope Creek times, we would have found a lot of it in the plant assemblage.

The samples processed in the current study have yielded a modest recovery of plant materials that belies the significance of the findings. The matrix samples processed for the current study averaged 1.5-liters. Despite the small size of the samples, the analysis achieved interesting results, demonstrating that the site as a whole has a potential to yield significant botanical data. Analysis of the macrobotanical samples supports this prediction by adding four wood charcoal types to the list of taxa. In addition, larger fragments of maize were recovered from the screen and identified in the macrobotanical samples.

The presence of maize in 80% of the flotation and two of the macrobotanical samples suggests that the small terrace adjacent to the structure may have been heavily invested in maize-based agriculture, practicing at the least a mixed economy that was to a great extent reliant on plant production. The presence of maize in three samples recovered from features located outside the walls of the structure indicates the presence of trash accumulations that have the potential to provide substantial subsistence and land-use information. Botanical data recovery may be enhanced by increasing the matrix flotation sample size to 4-liters.

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APPENDIX E

Calibrated Radiocarbon Dates From Various Plains Villager Groups

Antelope Creek	Date (B.P.)	Calibrated Date (A.D), Stuvier et al. 1998	Reference
A439-housefill	440+/-75BP	1390-1650	Lintz 1984b
floor	600+/-85BP	1250-1460	
S.E. corner post	620+/-70BP	1270-1430	
Alibates 28, unit 1, rm1	600+/-75BP	1280-1440	
unit 1, room19	630+/-70BP	1270-1440	
unit 1, room 19	770+/-75BP	1340-1400	
unit 2, rm24	600+/-70BP	1280-1440	
unit2,rm24	480+/-80	1550-1640	
Arrowhead Peak	620+/-70BP	1270-1430	
Black Dog Village			
F. 13, structure 2	250+/-150	1400-2000	
F. 17, structure 3	420+/-70BP	1400-1640	
F. 17, south of Structure 3	350+/-90BP	1400-1850	
F. 17 (bone apatite)	500+/-70BP	1290-1530	
F. 17 (bone collagen)	1110+/-200BP	550-1300	
F.6, structure 4	510+/-60BP	1290-1490	
F. 6, structure 4	470+/-60BP	1380-1640	
F. 6, structure 4	460+/-60BP	1390-1640	
F. 6, structure 4	390+/-50BP	1430-1640	
Structure 5	980+/-170BP	650-1300	
alter area, structure 5	610+/-50BP	1290-1420	
floor fill, structure 5	590+/-60BP	1290-1440	
structure 5	300+/-50BP	1460-1670	
Canyon co. Club Cave			

N2/N-S, lv 1	400+/-60BP	1420-1640	
N1/W1, lv 1	300+/-50BP	1460-1670	
N1/W1 lv 2	670+/-50BP	1260-1410	
N-S/N1, lv 2	700+/-60BP	1210-1400	
E-W/W1, lv. 3	1260+/-55BP	660-890	
N1/W1, lv. 3	620+/-45BP	1290-1410	
Coetas (Ruin 55)			
Room 1	800+/-75BP	1030-1390	
Room 1	520+/-70BP	1290-1510	
Room 1	430+/-80BP	1390-1650	
midden	690+/-60BP	1220-1410	
Room 2, fill	490+/-70BP	1300-1530	
Room 2, fill	520+/-85BP	1280-1530	
Currie Ruin			
House fill	830+/-100BP	1000-1310	
House fill	670+/-75BP	1220-1420	
House Fill	480+/-90BP	1300-1640	
Footprint (41PT25)			
Room 1, floor	420+/-80	1390-1650	
Room 1, floor	520+/-80	1280-1530	
Room 2, post hole 2	520+/-70	1290-1510	
Room 3	660+/-70	1240-1420	
Handley			
midden	640+/-70	1260-1430	
midden	740+/-80	1150-1410	
midden	350+/-75	1420-1670	
Palisades Shelter			
Test Pit 5	465+/-85	1380-1640	
Test Pit 5	630+/-75	1260-1440	
Test Pit 5	600+/-75	1280-1440	
Test Pit 5, hearth	330+/-75	1400-1700	
House 1, NW hearth	870+/-70	1020-1280	
Pickett Ruin			
Exterior or midden	710+/-70	1180-1410	
Roper			
composite	650+/-70	1250-1430	
composite	580+/-70	1280-1450	
Roy Smith			
Test Pit B, feature 3	750+/-70	1150-1400	

N3-R13, feature 2	730+/-70	1160-1410	
Room A	730+/-75	1150-1410	
Room G, N36-R1 (disturbed)	570+/-60	1290-1440	
Room I, N36-R5 Ash	700+/-50	1220-1400	
Room I, N37-R4 Ash	700+/-70	1210-1410	
Room I, N37-R5 Ash	730+/-65	1160-1400	
Sanford Ruins			
Midden North of Room 4	700+/-90	1150-1430	
Spring Canyon			
Midden NE of Main structure	550+/-90	1270-1520	
Stamper			
Exterior Refuse, Trench NE of Tr.3	650+/-70	1250-1430	
Interior House 3, SE corner	650+/-80	1220-1440	
Two Sisters			
Feature 9, Room 5, structure A	890+/-50	1020-1250	
Feature 6, Room 5, structure A	510+/-50	1300-1480	
Floor, Room 1, structure B	545+/-55	1300-1450	
Feature 13, Room 1, structure A	600+/-50	1290-1420	
Zimms Complex			
34RM72			
structure 1, charred wood	900±50	1020-1250	
structure 1, charred wood	1065 ± 60	780-1050	
structure 1, charred wood	580 ± 50	1290-1430	
structure 1, charred wood	550 ± 50	1300-1450	
structure 1, charred wood	290 ± 50	1470-1680	
New Smith 34RM400			
Structure 1, charcoal	620 ± 50	1280-1420	
Structure 2, charred post	730 ± 90	1150-1420	
Washita River Phase			
Brown Site			
test pit 1 charcoal	700+/-70BP	1210-1410	Bell 1984
Lacy Site			
House post charcoal	800+/-150BP	900-1450	
McLemore			
feature 4, pit, Charcoal	950+/- 150	700-1400	

McLemore			
feature 17,pit charcoal	575+/-50BP	1290-1440	
McLemore			
Grid B, charcoal	630+/-55BP	1280-1420	
Arthur Site 34GV32			Brooks 1987
Pit 1	665+/-75BP	1220-1420	
Pit 2	550+/-90BP	1270-1520	
N. Center Post	580+/-70BP	1280-1450	
N. Center Post	680+/-60BP	1240-1410	
34WA5			
(C-1245)	950+/-150BP	700-1400	Drass, Flynn 1990
R-829/2	630+/-55BP	1280-1420	
R-829/1	575+/-50BP	1290-1440	
34CU27			
Beta 7526	530+/-50BP	1300-1450	
Beta 9011	520+/-50BP	1300-1460	
Apishipa Phase			
Medina			Lintz 1984
rockshelter, trench A	1140+-85	680-1030	
Pyeatt			
rockshelter, trench m	1135+-125	660-1160	
Umbart			
cave, upper 1/4 fill	1360+-110	400-950	
Steamboat Island			
fort, structure 2	1175+-85	680-1020	
Cramer Site (5PE484)			
Room B, N side, bone	540+-90	1270-1530	Gunnerson, 1989
Room A, SE Side, Bone	660+-60	1260-1410	
Room A, hearth: charcoal	830+-60	1030-1290	
Room B, SW side: charcoal	880+-80	1010-1280	
Room B, N side:charcoal	930+-50	1010-1220	
Room A, SE side: charcoal	1100+-70	770-1040	
Room A, NE side: bone	1160+-70	690-1020	
Juan Baca (5LA1085)			
Barricade: wood	280+-60	1450-1680	
Room E, west wall: wood	60+-50	1690-1920	

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