Bulletin of the TEXAS ARCHEOLOGICAL SOCIETY Volume 83/2012

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TEXAS ARCHEOLOGICAL SOCIETY

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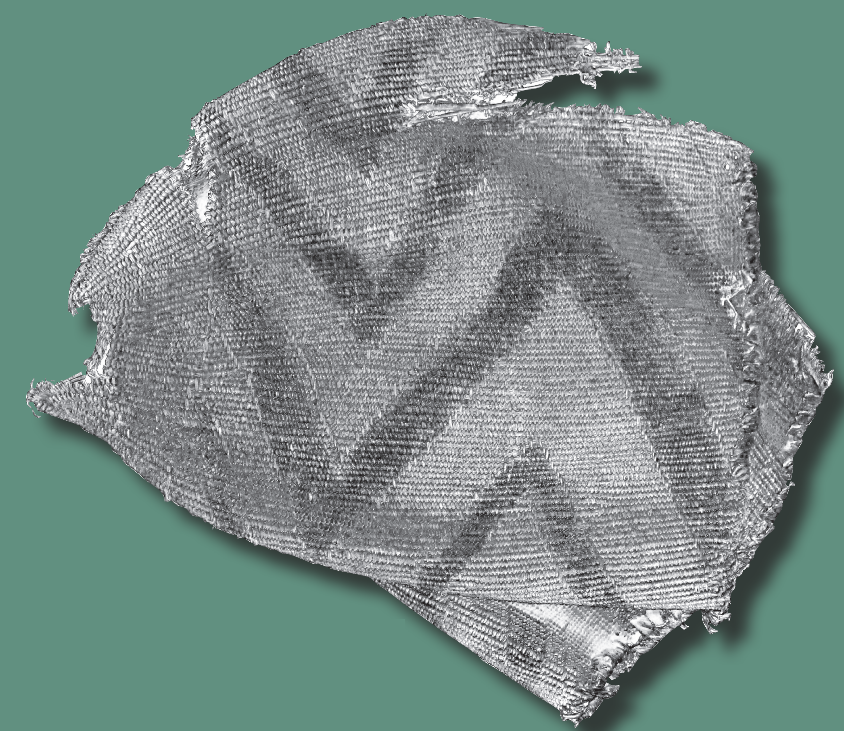

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TEXAS ARCHEOLOGICAL SOCIETY

The Society was organized and chartered in pursuit of a literary and scientific undertaking: the study of man's past in Texas and contiguous areas. The *Bulletin* offers an outlet for the publication of serious research on prehistory, archeological theory, and history. In line with the goals of the Society, it encourages the scientific collection, study, and publication of archeological data and findings.

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Tamra Walter, Editor

Timothy K. Perttula, Assistant Editor

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Foreword

I would like to dedicate this volume of the *Bulletin of the Texas Archeological Society* (BTAS) to Timothy Perttula, who preceded me as BTAS editor for the past six years. Tim not only provided generous support but also patience as I battered him with emails and pestered him with endless questions. He also volunteered to review several of the manuscripts submitted to the *Bulletin* so he is still a very big part of this year's publication. I am not sure that I will be able to fill Tim's shoes in this role but if I can do half of what he has done for the BTAS I will be greatly pleased. Rest assured I will continue to seek his advice and counsel as the need arises as the new editor. So thank you Tim for your dedication and commitment to the *Bulletin* and the Texas Archeological Society—you have set the bar high!

Tamra L. Walter
Editor, *Bulletin of the Texas Archeological Society*
July 2012

A Mass Grave of Mexican Soldiers from the Resaca de la Palma Battlefield (41CF3): Demography and Battle-Related Injuries

Daniel J. Wescott, Lori E. Baker, D. Clark Wernecke, and Michael B. Collins

ABSTRACT

The Battle of Resaca de la Palma, the second battle of the Mexican-American War, was fought on May 9, 1846 near the Rio Grande in southern Texas. The battle was won decisively by United States troops and resulted in the death of hundreds of Mexican soldiers who were subsequently buried in mass graves. One of the mass graves (41CF3) contained the skeletal remains of 27 to 36 adult male soldiers, including those from the Seventh and Tenth Infantry companies. The skeletal remains were examined for battle-related injuries. The anatomical location of each wound was documented and each lesion was inspected to determine the timing, type of wound, and the direction of the force. More than half of the individuals exhibited osteological evidence of battle-related trauma. The wound distribution pattern and type of wounds present demonstrates that traditional battle tactics, as well as hand-to-hand combat, occurred at Resaca de la Palma.

BATTLE OF RESACA DE LA PALMA

In 1845, the Mexican government perceived the annexation of Texas by the United States (U.S.) Congress as an intrusion onto their sovereign lands, setting in motion the Mexican-American War that lasted from May 1846 to February 1848. The Battle of Resaca de la Palma, fought on May 9, 1846, was the second major battle of the war. The decisive victory of this battle by U.S. troops is thought by many historians as having established the U.S. as a dominant military power (Smith 1919; Bauer 1974; Eisenhower 1989).

Although there had been a few skirmishes between U.S. and Mexican troops before May 1846, the war did not begin officially until Mexican soldiers, commanded by General Mariano Arista, attacked the U.S. Army at Palo Alto in Texas on May 8, 1846 (Haecker and Mauck 1997). While the Battle of Palo Alto was generally inconclusive, the smaller U.S. Army (approximately 1700–2200 U.S. soldiers versus 3200–3700 Mexican soldiers), commanded by General Zachary Taylor, held a tactical advantage, and the Mexican Army withdrew the following morning to find a more strategic position (DePalo 1997). The new defensive position was established at a dry channel of the Rio Grande, known as Resaca de la Palma, approximately eight kilometers (5 miles) south of Palo Alto and just north of the Rio Grande in present-day Brownsville, Texas. Arista's artillery took up positions on both sides of the road to Matamoros, while his infantry regiments took cover along the channel walls and soldiers concealed themselves in the thick chaparral north of the channel.

On the afternoon of May 9, 1846, General Taylor ordered his troops to strike. United States artillery, infantry, and cavalry units attacked the Mexican center. The U.S. infantrymen were armed with Springfield 0.69 caliber (cal.) muskets or 0.52 cal. flintlock rifles. In addition, there may have been a few Texas volunteers accompanying the U.S. troops that were equipped with shotguns and muskets (Haecker 1994), though the Texas volunteers probably did not play a significant role in the battle. The U.S. artillery included the first highly mobile horse unit known as the "flying artillery" (Haecker and Mauck 1997; Miksche 2002), and used cannons that fired round shot, canister, and explosive shell (Haecker and Mauck 1997). However, the dense chaparral surrounding the channel prevented an organized offense by U.S. infantry or full use of the superior U.S. artillery. Consequently, fierce hand-to-hand combat using swords, sabers, and bayonets were reported (Frost 1848; Grant 1885). Later in the battle, U.S. soldiers made their way across the Resaca between the Mexican center and left wing, which caused panic among the Mexican soldiers. In the end, the Mexican left wing and center disintegrated, forcing the army to flee the battlefield and retreat across the Rio Grande.

Hundreds of Mexican soldiers died on the battlefield, and in all probability, more likely died crossing the Rio Grande (DePalo 1997). On May 10, U.S. military personnel were assigned to retrieve supplies and documents left behind by the Mexican Army and to bury the dead. The corpses of the Mexican soldiers were interred in large pits containing as many as 50 to 100 individuals (Jarvis 1907).

Mass Grave at the Resaca de la Palma Archeological Site (41CF3)

One of the mass graves (41CF3) from the Resaca de la Palma battlefield site was discovered in 1967 during earthmoving activities at a residential construction site in northern Brownsville, Texas. The grave was subsequently excavated by a team of archaeologists from the Texas Archeological Salvage Project in April 1967. During the excavation, archeologists identified approximately 30 primary burials along with numerous bones (mainly hand and foot bones) and bone fragments that could not be convincingly associated with the primary burials. Each of the primary burials was assigned a burial number in the field, but burial numbers six and seven were not assigned for unknown reasons (Table 1).

The deceased Mexican soldiers in the grave pit at 41CF3 appear to have been heaved into the burial pit, resulting in overlap and commingling of the skeletons (Figures 1 and 2). Most of the articulated remains were in a supine position and laid out in pseudo-rows with the bodies lying side by side in each row and the heads of the soldiers in each subsequent row placed between the legs of the soldiers in the preceding row (Figure 2). Three primary clusters (north, central, and south) of skeletons were discovered during the excavation (Table 1, and Figure 1). There were as many as 12 individuals in the southern third of the grave pit with most in an extended position and their heads directed east. At least two individuals (Burial No. 19 and Burial No. 20) in the southeastern portion were represented by lower limb bones only (Table 1, and Figures 1 and 2). The upper halves of the bodies were most likely destroyed by construction activity at the time of discovery. In addition, Burial No. 13 was comprised of a skull only, Burial No. 10 was represented by a skull and right upper limb bones, and Burial No. 22 consisted of the left upper limb bones and right and left lower limb bones. In the center of the grave were two skeletons (Burial No. 4 and Burial No. 11) lying

Table 1. Curation, Inventory, and Demographic Data for the Possible Primary Burials from 41CF3.

Burial No.[a]	Cat No.[b]	Location[c]	Sex[d]	Age Group[e]	Inventory and Comments[f]
?[g]	2224	Unknown	F	OA	skull, partial pelvis, upper and lower limb bones; probably not from 41CF3
2	2260	South	M	YA	partial cranium, partial postcranium
3	2280	Central	M	YA	complete skull, left femur diaphysis
3?[h]	2273	Unknown	M	YA	nearly complete skull and several long bones
4	2259	Central	M	YA	nearly complete skull, nearly complete postcranium
5	2245	South	M	YA	skull, nearly complete postcranium – pelvis missing
8	2256	South	M	MA	partial skull, nearly complete postcranium; commingling
9	2275	South	M	YA	partial cranium, partial postcranium; pelvis, tibia, and sternum of second individual
10	2279	South	M	YA	skull, right upper limb bones
11	2246	Central	M	YA	nearly complete skull; partial postcranium
12	2266	North	M	YA	partial skull, partial postcranium; commingling
13	2229	South	M	YA	skull
14	2267	North	M	YA	partial cranium; lower limb bones, pelvis, right thoracic cage

Table 1. *(Continued)*

Burial No.[a]	Cat No.[b]	Location[c]	Sex[d]	Age Group[e]	Inventory and Comments[f]
15	2258	North	M	MA	partial postcranium – right femur and upper limb bones missing; commingling
16	2248	North	M	YA	partial postcranium – pelvis and left lower limb bones missing; commingling
17	2263	North	M	OA	partial skull, partial postcranium
18	2230	North	M	MA	nearly complete skull
19a	2278	South	M	YA	partial postcranium – axial skeleton missing
19b	2278	South	M	YA	partial postcranium – axial skeleton and some long bones missing
20	2269	South	M?	UA	hand and lower limb bones
21	2276	North	M?	YA	partial cranium, right upper limb bones, and thoracic cage
22	2271	South	M	YA	left distal humerus
23	2262	North	M?	UA	lower limb bones and left forearm and hand bones
24	2270	North	M	YA	left upper limb bones and lower limb bones
25	2283	South	M?	UA	lower limb bones; commingled
26	2282	South	M?	UA	lower limb bones
27	2261	Central	M	UA	left forearm, lower limb bones
28	2265	North	M?	YA	right upper limb, lower limb boness
29	2257	North	M	UA	right humerus, lower limb bones
30	2268	North	M	UA	lower limb bones
31	2277	North	M	UA	left upper limb bones, lower limb bones
32	2272	North	M?	MA	left lower limb bones

[a]Burial number assigned in the field
[b]University of Texas Catalog Number
[c]Location within grave pit
[d]F = female, F? = probable female, M = male, and M? = probable male
[e]YA = young adult (20-34 years), MA = middle adult (35-49 years), OA = older adult (50+ years), UA = adult of undetermined age
[f]general inventory; commingling indicates that elements from two or more individuals are present
[g]Burial 1 in Ratliff (1993) but not found on field map or in Wesolowsky's (1969a-c) original description of the skeletal remains
[h]Burial 3 in Ratliff (1993)

side by side in an extended position with their heads south (Figure 1). A third partial skeleton (Burial No. 27) was lying extended with the feet pointing west and the legs overlapping the other two skeletons (Burial No. 4 and No. 11). An isolated skull and several long bones (Burial No. 3) were also recovered from the center of the grave (Figure 1). Wesolowsky (1969a) suggested that bones from the center of the burial pit had been disturbed by a previous human activity, but there is no record of previous construction, archeological excavations or looting at the site.

In the northern portion of the grave were approximately 13 articulated and partially articulated skeletons lying in an extended position with their heads east or southeast. Like the southern section, several individuals at the northeastern edge of the site were missing bones, possibly due to construction activity. The skulls of Burial No. 14 and Burial No. 15 were absent. In addition, Burial No. 18 in the north-central section of the grave pit was composed of a skull only, and there were several isolated bones that could not be confidently associated with the primary burials. Ratliff (1993,

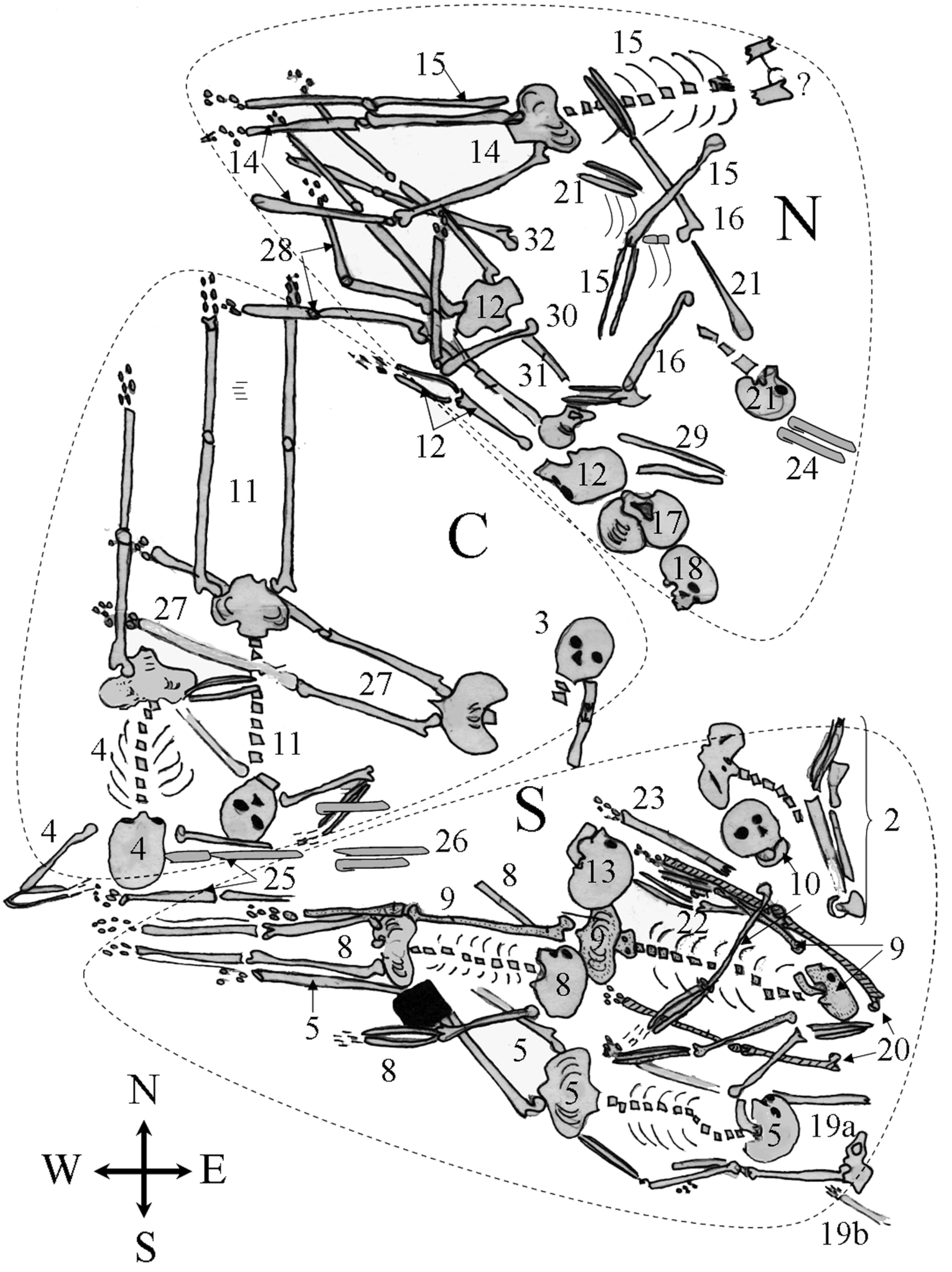

Figure 1. Schematic burial map illustrating the location and position of the skeletons from 41CF3. The area indicated by N is the northern portion, C is the central portion, and S is the southern cluster. Numbers indicate burial numbers (Reproduced from field drawings by Tom Hester).

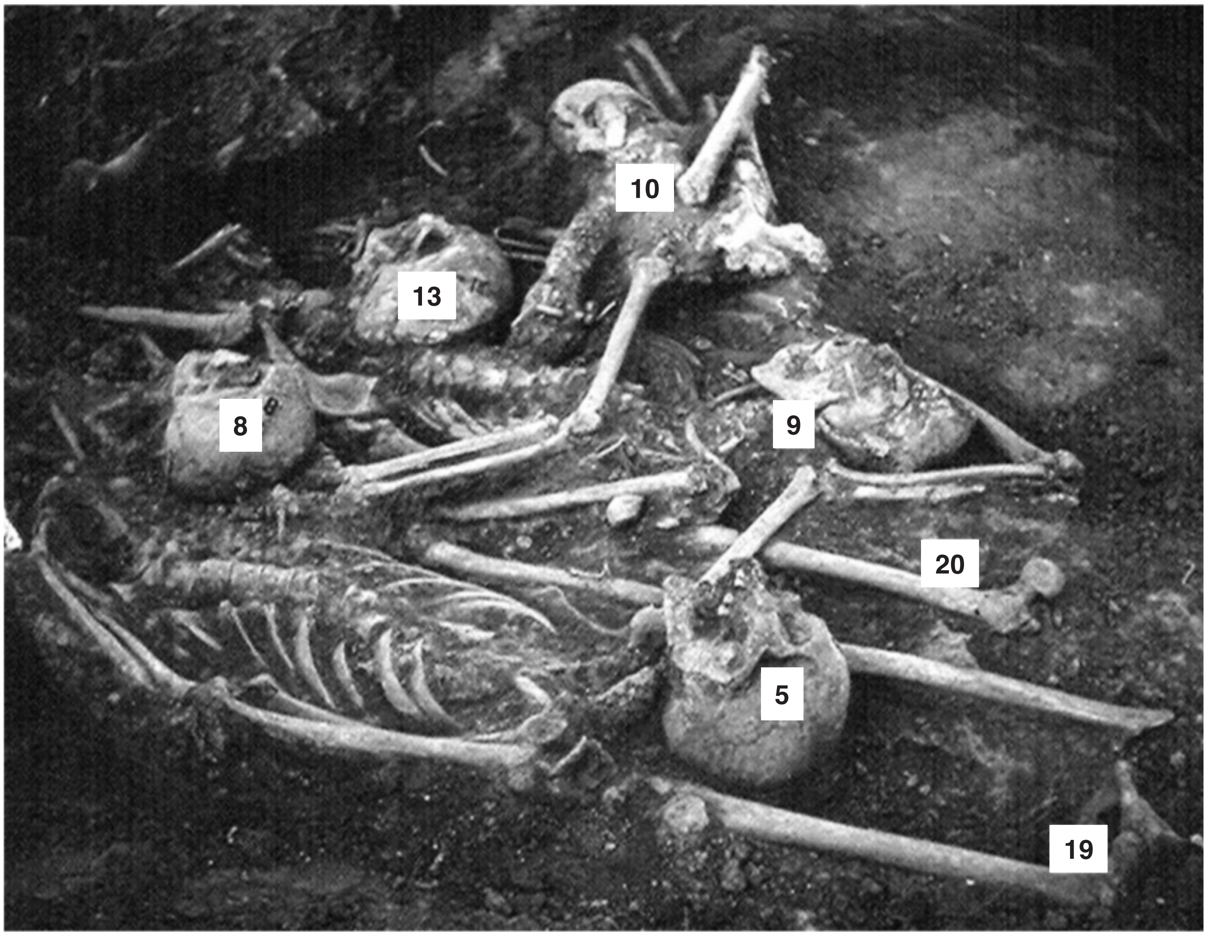

Figure 2. Excavation photograph illustrating commingling of the individuals recovered from the mass grave at Resaca de la Palma in the southern portion of the grave (Photo courtesy of the Texas Archeological Research Laboratory).

1994) argued that these extra bones may represent body parts dismembered during battle that were placed in the grave by U.S. soldiers. This assertion is impossible to verify due to the disturbance of the remains during earthmoving activities and possible mixing of individuals during the preliminary laboratory analysis (Wesolowsky 1969a). Furthermore, there was considerable overlapping of limb bones in the northern portion of the grave pit, making it difficult for archaologists to distinguish individuals. No clear osteological evidence of dismemberment was found on any of the bones.

Discovered with the skeletal remains were some military artifacts including bone and metal uniform buttons, buckles, insignia, canteens, and three musket balls (Fox 1983). Very few weapons or items of value were found with the remains as such objects were most likely collected by U.S. soldiers before the Mexican soldiers were buried. A shako badge from the Seventh Infantry was in association with one of the primary skeletons (Burial No. 8) and a crossbelt insignia for the Tenth Infantry was found in the grave backdirt removed by the construction equipment.

Previous Processing and Analysis of Burials

After completion of the excavation, the exhumed skeletons and artifacts were sent to the University of Texas at Austin for cleaning, reconstruction, inventory, and preliminary analysis. Bones that were not clearly associated with the primary burials were assigned letter designations by provenience in the sequence they were unpacked (Wesolowsky 1969b). Each of the primary burials was also assigned a University of Texas Physical Anthropology Catalog Number (see Table 1).

Wesolowsky (1969a) noted that during the initial cleaning some of the bones from the primary burials may have become mixed, but he believed that most of the discrepancies were later corrected. Based on the initial analysis of the remains at the University of Texas, Wesolowsky (1969a) concluded that there were 31 primary burials and six or seven additional individuals are represented by bones from the surface or those with no provenience for a total of 37 to 38 individuals. However, Wesolowsky (1969a) provided no clear reason for his conclusion regarding the number of individuals represented at the site. He did note that Burial No. 1 was combined with Burial No. 14, and that both Burial No. 9 and Burial No. 19 contained more than one individual. Consequently, Wesolowsky split them into Burial Nos. 9a, 9b, 19a, and 19b.

In the early 1990s, Ratliff (1993) undertook a second analysis of the remains from 41CF3 for his thesis research. During his investigation, he matched some of the unassociated bones with the primary burials using the proximity of the bone to the burial and bilateral asymmetry. Ratliff (1993), like Wesolowsky (1969a), concluded that there were 31 individuals represented by the skeletal remains from Resaca de la Palma, but he combined the remains slightly different than Wesolowsky (1969a). He argued that the skeletal remains labeled Burials No. 22 and 24 were from the same individual and combined them. He also combined the postcrania of Burial No. 3 (2280) with Burial No. 27 (2261). Ratliff (1993:29) also created a Burial No. 0 consisting of bones "recovered aside from the archaeological investigation," and assigned Burial No. 1 to a skeleton that he stated was not on the original field drawing or originally assigned a burial number. Furthermore, he assigned a skeleton that was excavated by earthmoving machinery during the construction project as Burial No. 3. Finally, he combined Burial Nos. 9b and 19b to form Burial No. 33.

To date, no archeological report has been completed for 41CF3. The skeletal remains were repatriated in 2010 after the Mexican Senate passed a resolution calling for the Foreign Ministry to pursue repatriation. Associated artifacts, archeological notes, and preliminary skeletal report are currently housed at the Texas Archeological Research Laboratory (TARL) in Austin. Summaries of the excavation and skeletal analysis were published by Hester (1978) and Fox (1983), respectively. A relatively complete skeletal inventory and bone dimensions can be found in Ratliff (1993).

Purpose of Current Study

This paper summarizes the demographic profile of 41CF3 and the osteological evidence of battle-related projectile, sharp force, and blunt force trauma inflicted on Mexican soldiers (*soldados*) and a possible accompanying female (*soldaderas*) who died during the Battle of Resaca de la Palma. Prevalence rates are presented by anatomical region, and, when possible, injuries of specific individuals are discussed. The wounds and wound patterns observed on the bones of the soldiers from 41CF3 are then compared to historical accounts of this battle and to published analyses of other North American skeletal assemblages resulting from military action.

MATERIALS AND METHODS

Inventory, Number of Individuals, and Taphonomy

A cursory inventory was conducted to confirm previous work and tally the presence of major elements. An inventory of the major bones for each of the previously identified individuals was also conducted. The minimum number of individuals (MNI) was estimated by the highest bone count (i.e., most frequently occurring bone), and represents an estimate of the number of individuals recovered. To estimate the original or actual number of individuals that contributed to the recovered skeletal assemblage, the most likely number of individuals (MLNI) was also calculated with Equation 9 in Adams and Konigsberg (2004) using paired and unpaired femora. Calculations of MLNI were done using the Excel™ spreadsheet made available by Konigsberg (http://konig.la.utk.edu/MLNI.html). Taphonomic aspects of the assemblage were assessed using burial locations and examining each element for evidence of animal scavenging marks (punctures, pits, scoring and furrows), staining, and post-depositional damage.

Biological Profile Estimation

Primary skeletons and isolated elements were assigned as undetermined sex, probable female, female, probable male, or male following Buikstra and Ubelaker (1994) using standard morphological and metric characteristic of the pelvis, skull, and long bones (Bass 1995; Buikstra and Ubelaker

1994; Ubelaker 1989). When possible, the pelvis was used to estimate sex, but in many cases overall size, femoral and humeral head diameters, and robusticity were used in the determination of sex. None of the skeletal elements exhibit evidence of incomplete growth (e.g., unfused epiphyses, unerupted teeth), so age-at-death was determined using pubic symphysis, auricular surface, cranial suture closure, and other standard adult aging methods (Bass 1995; Buikstra and Ubelaker 1994). Due to the fragmentary condition of the remains and the lack of population-specific standards, each individual was assigned to one of the following adult age categories: young adult (YA: 20-34 years), middle adult (MA: 35-49 years), old adult (OA: 50+ years), or adult of undetermined age (UA). The morphology of the skeletal remains is consistent with Mexican ancestry but no attempts were made to metrically estimate ancestry due to the lack of comparative population standards. Stature was reconstructed from femoral length using regression equations for Mesoamericans (Genovés 1967).

Trauma Analysis

Each of the skeletal elements was examined macroscopically by two physical anthropologists (D.J. Wescott and L.E. Baker) for the presence of trauma, but reconstruction of the fragmentary remains or removal of the bones for radiographic analysis was not permitted. The specific anatomical location of all traumatic lesions was documented, and the timing of the wound was determined. The timing of the wound was categorized as antemortem, perimortem, or postmortem (Sauer 1998; Galloway et al. 1999). Antemortem lesions were identified by evidence of osteogenic reaction at the injury site, while perimortem and postmortem injuries showed no signs of healing. Perimortem injuries were distinguished from postmortem injuries by examining the lesion/fracture pattern and fracture surface morphology, and comparing the lesion/fracture surface color to the bone surface color (Johnson 1985; Maples 1986; Sauer 1998; Galloway et al. 1999; Wieberg and Wescott 2008). Maples (1986) notes that depressed fractures of the skull, fractures where the fragments fail to separate, and fractures with concentric or radiating fracture lines are indicative of a perimortem or "fresh" bone break. Furthermore, perimortem fractures tend to have a smooth fracture surface and homogeneous color between the fracture surface and bone surface. Postmortem fractures usually have jagged fracture surfaces and breaks at right angles (Johnson 1985; Sauer 1998; Wieberg and Wescott 2008). Unhealed projectile wounds were classified as perimortem, as were sharp force cuts with curling and uplifting of the bone and radiating fractures.

Antemortem and perimortem lesions were then scrutinized to determine type (blunt, sharp, or projectile) of wound, direction of the force, and evidence of surgical intervention. The type of wound was identified as projectile, sharp force, or blunt force using criteria discussed in Berryman and Symes (1998), Boylston (2000), Galloway (1999a-e), Merbs (1989) and Reichs (1998). Projectile wounds were distinguished by the presence of an entrance (inward beveling) or exit (outward beveling) wound or using concentric fracture angles (Berryman and Symes 1998). The direction of projectile wounds was established using wound shape and alignment characteristics (Berryman and Symes 1998). Sharp force trauma was diagnosed by 1) a linear lesion with defined edges that are V-shape or U-shape in cross-section, 2) punctures or chop marks with vertical striations with or without fracture lines, or 3) smooth, flat cut surfaces (Boylston 2000; Reichs 1998). It should be noted that sharp force trauma may exhibit blunt force characteristics caused by a narrowly focused force. The angle of the wound and the cut surface morphology was used to determine direction in sharp force lesions. Blunt force wounds caused by relatively low-velocity forces over a large area were identified by examining fracture pattern and impact site characteristics following Berryman and Haun (1996), Berryman and Symes (1998) and Galloway (1999a-e).

RESULTS

Demographic Profile: Inventory and Number of Individuals

Curation, demographic, and inventory information is summarized for each of the primary burials in Table 1, and an inventory of the major skeletal elements from 41CF3 is presented in Table 2. Primary burial numbers were assigned to 30 individuals by archeologists in the field (Wesolowsky 1969a). Physical anthropologists later combined Burial Nos. 1 and 14 and determined that Burial Nos. 9 and Burial 19 each contained the remains of

Table 2. Major Skeletal Elements Recovered from 41CF3, Maximum Number of Individuals and Survival Index.

Element	Left	Midline	Right	MNI[a]	Survival Index[b]
Cranium[c]		16		16	59.2
Clavicles	12		17	17	63.0
Scapula	15		12	15	55.5
Humerus	16		18	18	59.2
Radius	20		17	20	74.1
Ulna	20		16	20	74.1
Vertebra		233		11	40.7
Pelvis[d]	16		12	16	59.2
Femur	27		23	27	100.0
Tibia	26		21	26	96.3
Fibula	20		19	20	74.1

[a]MNI is the minimum number of individuals represented by each bone.
[b]Survival Index = MNI for element divided by greatest MNI X 100.
[c]MNI for crania is based on left temporal bones.
[d]MNI for the pelvis is based on left ilia.

two individuals, making a total of 31 primary burials. However, one of the individuals from Burial No. 9 is represented by only a few bones and is most likely not a distinct burial. Ratliff (1993) later had assigned University of Texas catalog number 2224 as Burial No. 1 and surface remains (Catalog No. 2247) as Burial No. 0. However, the skeleton identified as Catalog No. 2224 probably is not from the Resaca de la Palma battlefield. The catalog number was not included in the original excavation or analysis notes and some of the bones are labeled with a different site number. In addition, the skeletal and dental morphology are distinct from other burials from 41CF3. The cranium is more robust and exhibits a higher and shorter vault than the other crania from the site. This individual is also much older and exhibits a different pattern of dental attrition.

While archeologists were able to identify 30 burials, an inventory of the remains reveals that 27 to 36 individuals were buried in the mass grave at Resaca de la Palma. The MNI of 27 is based on the count of left femora (Table 2). However, the 50 femora present could be grouped into at least 17 pairs, which suggest that the most likely number of individuals represented at 41CF3 is 36. This MLNI is consistent with Wesolowsky's (1969a) original estimate of 37 to 38 individuals.

Demographic Profile: Sex, Age, and Stature

Of the 31 primary burials identified, 24 are male and seven are probable males. All of the unassociated bones that could be sexed are also probably male. The skeleton (2224) designated by Ratliff (1993) as Burial No. 1 has clear morphological features of the pelvis found almost exclusively in females, including a wide greater sciatic notch, ventral arc, deep and rugged preauricular sulcus, and dorsal pubic pitting (Figure 3). However, for reasons stated previously, this individual most likely was not recovered from 41CF3. Most of the males were young to middle-aged adults in their second or third decade of life but a few were older (see Table 1). Estimations of stature range from 155 to 170 cm with an average of 162 cm.

Taphonomy

The deceased Mexican soldiers in the pit at 41CF3 appear to have been heaved into the burial pit, causing overlap and commingling of the skeletons (see Figure 2). Three primary clusters (north, central, and south) of skeletons were discovered during the excavation (see Table 1, and Figure 1). Most of the primary skeletons are only partially

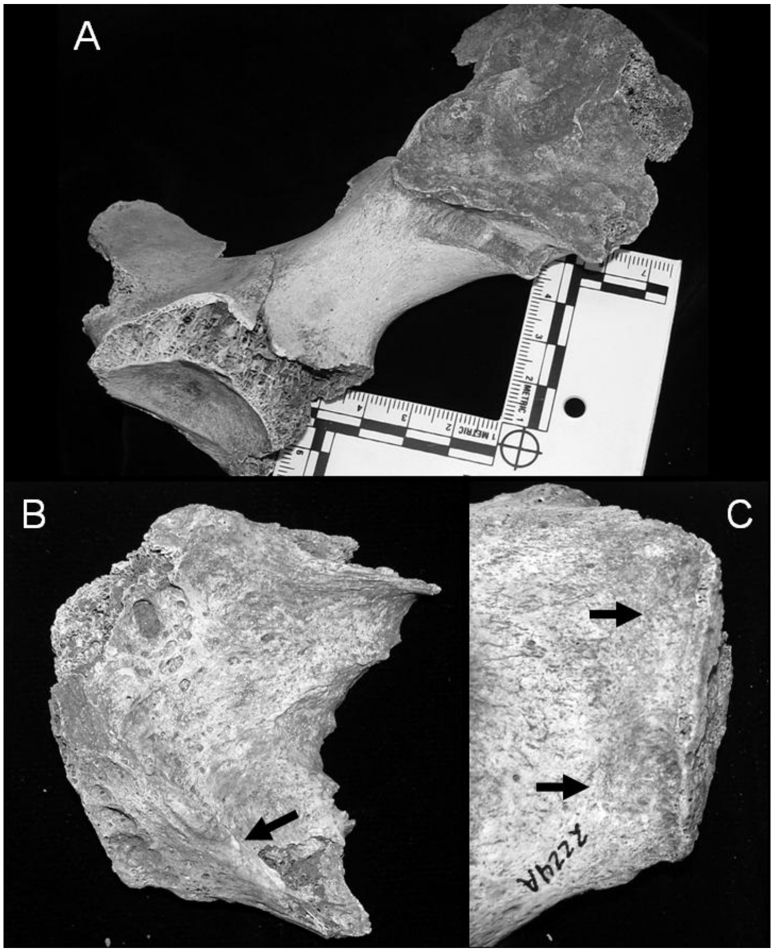

Figure 3. Sexually dimorphic characteristics of the pelvis of Burial 1. Note the wide greater sciatic notch and deep, rugged pre-auricular surface on the ilium (A) and the elevated ridge or ventral arc (arrow) on the ventral aspect of the pubic bone (B) and the cortical resorption or pubic pitting (arrow) on the dorsal aspect of the pubis (C). These morphological characteristics are found most frequently in females.

represented and many of the bones, especially the crania and bones of the thoracic cage, are fragmented. Only seven relatively complete and nine partial crania are present. Several of the individuals are represented by only lower limb bones (see Table 1). This loss may be attributed to damage caused by earthmoving excavations associated with construction activity at the site and normal taphonomic loss. Some of the fragmentation is most likely due to construction activity, ground pressure, and other taphonomic variables. There is little evidence of animal scavenging marks on the bones. One individual (Burial No. 2) exhibited a small area of green discoloration on the left tibia probably due to metallic leaching.

One of the crania from 41CF3 exhibits a unique pattern of postmortem damage. Burial No. 3 (Cat. No. 2273) exhibits numerous short but deep scratches on the left side of the frontal and the left parietal. The scratches often form an X-shape pattern and continue along the parietal in an arch following along the sagittal and coronal sutures (Figure 4). The cranium was covered with a shellac-like substance before completely cleaned; therefore, it is difficult to observe the floor of the scratches. The scratches all appear to be postmortem but do not appear to be due to movement of the skull or excavation damage.

Antemortem Trauma

The distribution and examples of antemortem trauma are illustrated in Figure 5. Antemortem trauma on the skeletal remains from 41CF3 include fractures of the left mandibular condyle (Burial No. 4), nasal bones (Burial Nos. 10, 11, and 13), first and second left ribs (Burial No. 16), right third metacarpal and phalanges (Burial No. 20), tibia midshaft (Bone R), and the medial malleolus and talus (Burial No. 24). In addition, a compression fracture of the first lumbar vertebra (Burial No. 5), a fracture of the distal end of the left radius (Burial No. 5), and a possible healed frontal bone depressed fracture (Burial No. 4) were observed. Few observed antemortem lesions can be attributed to previous battle injuries, and none of the skeletons exhibited evidence of medical intervention (e.g., amputation). The one possible exception is a well aligned, healed tibia midshaft transverse fracture (Bone R). Burial No. 3 exhibits a circular area (72 mm diameter) with an irregular surface and numerous small (2-3 mm diameter) circular pits or lytic lesions with rounded margins (Figure 6). The pitting is probably due to postmortem taphonomic events but may represent healed lesions of unknown etiology.

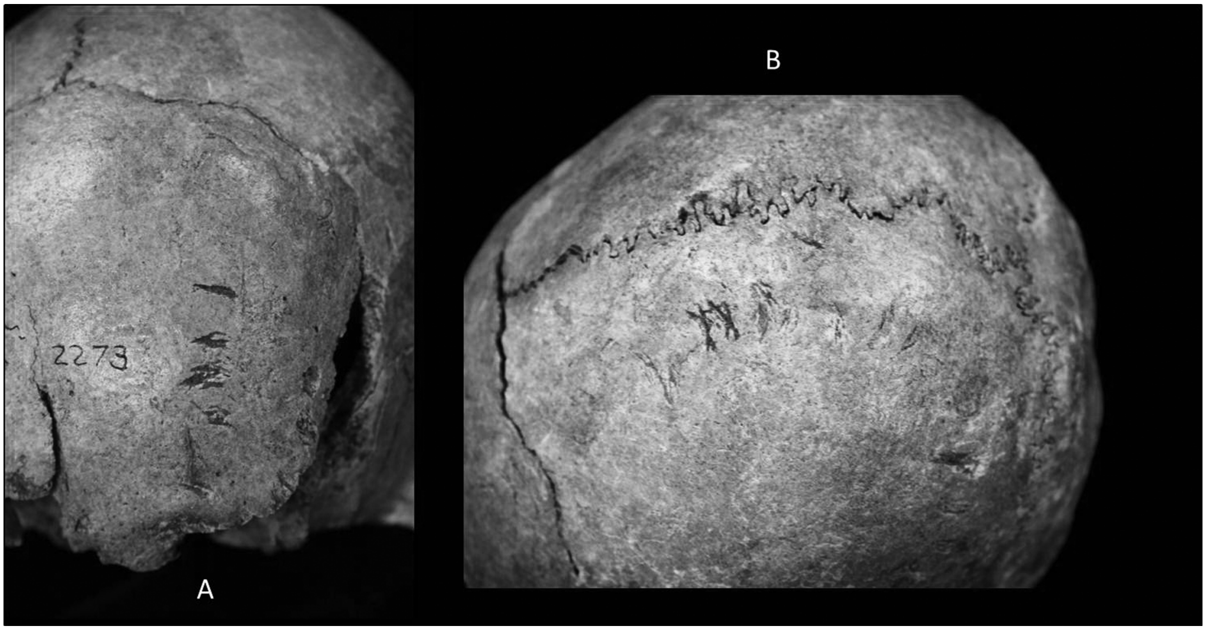

Figure 4. Postmortem scratches on the frontal (A) and left parietal (B) of Burial No. 3 (Cat. No. 2273).

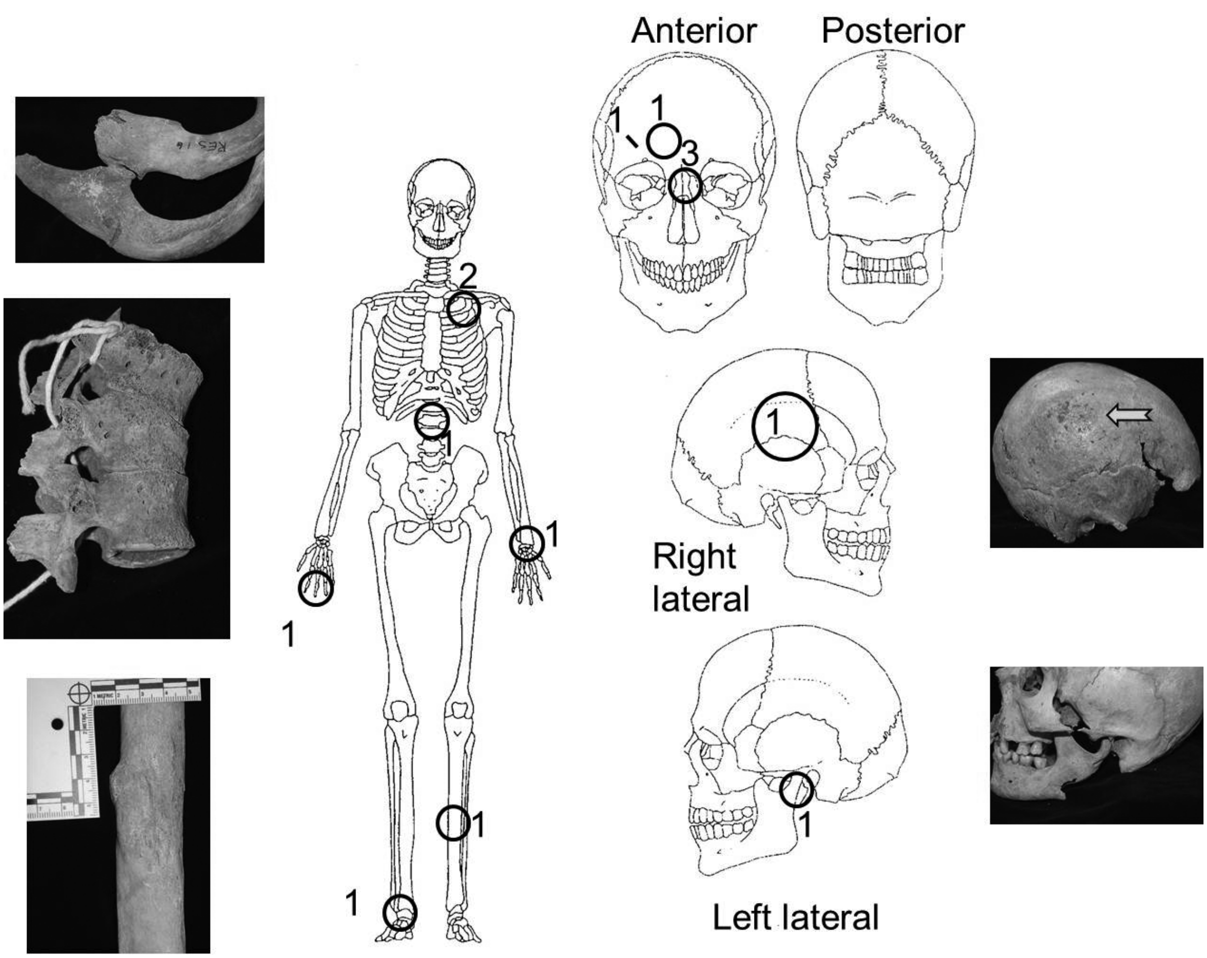

Figure 5. Distribution and types of antemortem trauma.

Figure 6. Cranium from Burial 3 showing pitting on right parietal.

Battle-Related Trauma: Projectile, Sharp Force, and Blunt Force Injuries

Projectile injuries were the most prevalent type of battle-related trauma followed by sharp force lesions (Table 3). The distribution and types of perimortem battle-related lesions are shown in Figure 7. Eighteen of the 29 individuals display perimortem battle-related trauma, with several skeletons exhibiting multiple wounds. Projectile trauma was observed on 12 skeletons, sharp-edge trauma on seven skeletons, and blunt trauma on two skeletons. Most of the projectile wounds are manifest as large oval or circular depressed fractures (Figure 8) or elongated grooves in the bone, both of which were examined closely to determine if they could be related to postmortem burial damage. The size of the depressed fractures varies greatly, ranging from 2 mm to greater than 40 mm in diameter. Bones with projectile wounds include the cranium, vertebrae, ribs, ilium, humerus, femur, and tibia (Figure 7, and Table 3). There were several more evident projectile defects observed. Burial No. 15, for example, is a middle-aged adult, probable male that has a large depressed fracture (27 x 31 mm) on the right proximal tibia with the projectile still embedded in the wound (Figure 9), a projectile induced depression (21 x 19) on the left medial condyle of the femur, and a 9 to 10 mm diameter circular depressed fracture

Table 3. Truama Observed on Primary Burials from 41CF3.

Burial	Trauma
1	Puncture wounds-elbow and ankle
3	Sharp force cut-forehead; wound-parietal
4	Antemortem depressed fracture-forehead, antemortem fracture left mandible, perimortem puncture wounds-right pelvis, lumbar vertebra, right femur, depressed fracture-left humerus
5	Antemortem compression fracture-lumbar, antemortem fracture—radius, perimortem projectile wound-frontal
8	Possible depressed fracture-right lateral vault
9	Fractures-right pelvis, left radius
10	Antemortem fracture—right nasal
11	Antemortem fracture—right nasal, left clavicle
12	Projectile wound—ribs, vertebrae
13	Antemortem fracture—left nasals; Projectile wound—frontal;
14	Sharp force trauma—vertebra, depressed fracture—left ilium/sacrum
15	Sharp force trauma—left clavicle, left femur, left tibia; projectile trauma—right ilium, right femur, left tibia; fractures - ribs
16	Antemortem rib fractures; perimortem projectile wound—right humerus, left humerus
17	Projectile wound - cranium
18	Possible perimortem fractures—frontal
19	Sharp force trauma—right femur
20	Antemortem fracture—right hand
24	Fracture?—right ankle
27	Sharp force trauma—right femur
28	Sharp force trauma—left humerus
31	Possible perimortem depression fracture—right femur

at the right iliopubic junction. Burial No. 17 has an inward beveling oval hole with three radiating fractures on the left side of the cranium near asterion and an outward beveling oval hole on the right squamosal suture. These wounds are consistent with a projectile entrance and exit wound, respectively, with the projectile entering the left side of the skull at a slightly upward trajectory (Figure 10). Burial No. 4 exhibits numerous small puncture wounds on the lumbar vertebrae, right ilium, and right femoral neck. While the cause of these wounds cannot be determined, they are consistent with shotgun or buck and ball trauma. Radiographs of the bones are needed to determine if metal fragments are present in any of the wounds. If the punctures are due to shotgun pellets, the angle of the punctures suggest an upward trajectory consistent with the individual being shot by a soldier positioned in front of him at a lower elevation or with the victim shot while lying on his back. Finally, an inward beveling (projectile entrance) wound was observed on the frontal bone superior to the right orbit of Burial No. 13. Fractures radiate from the defect into the coronal suture and right orbit. No exit wound was observed, however, the posterior portion of the cranium was not recovered.

Bones with sharp force cuts and punctures include the frontal, parietal, cervical vertebra, clavicle, humerus, ulna, femur, and tibia (see Table 3; Figure 7). Sharp force trauma to the femur occurs most frequently followed by lesions to the cranium. Some of the more evident examples of sharp force trauma include Burial Nos. 15, 27, 28, and possibly 3. Burial No. 3 (Cat. No. 2273) has a 2.3 mm wide and 43 mm long incision through the right orbit and frontal bone (Figure 11). A small, postmortem fracture radiates superiorly from the cut. The superior margin of the wound exhibits a distinct tapering and a V-shaped cross-section. This lesion is possibly perimortem but could have been caused postmortem. However, the color

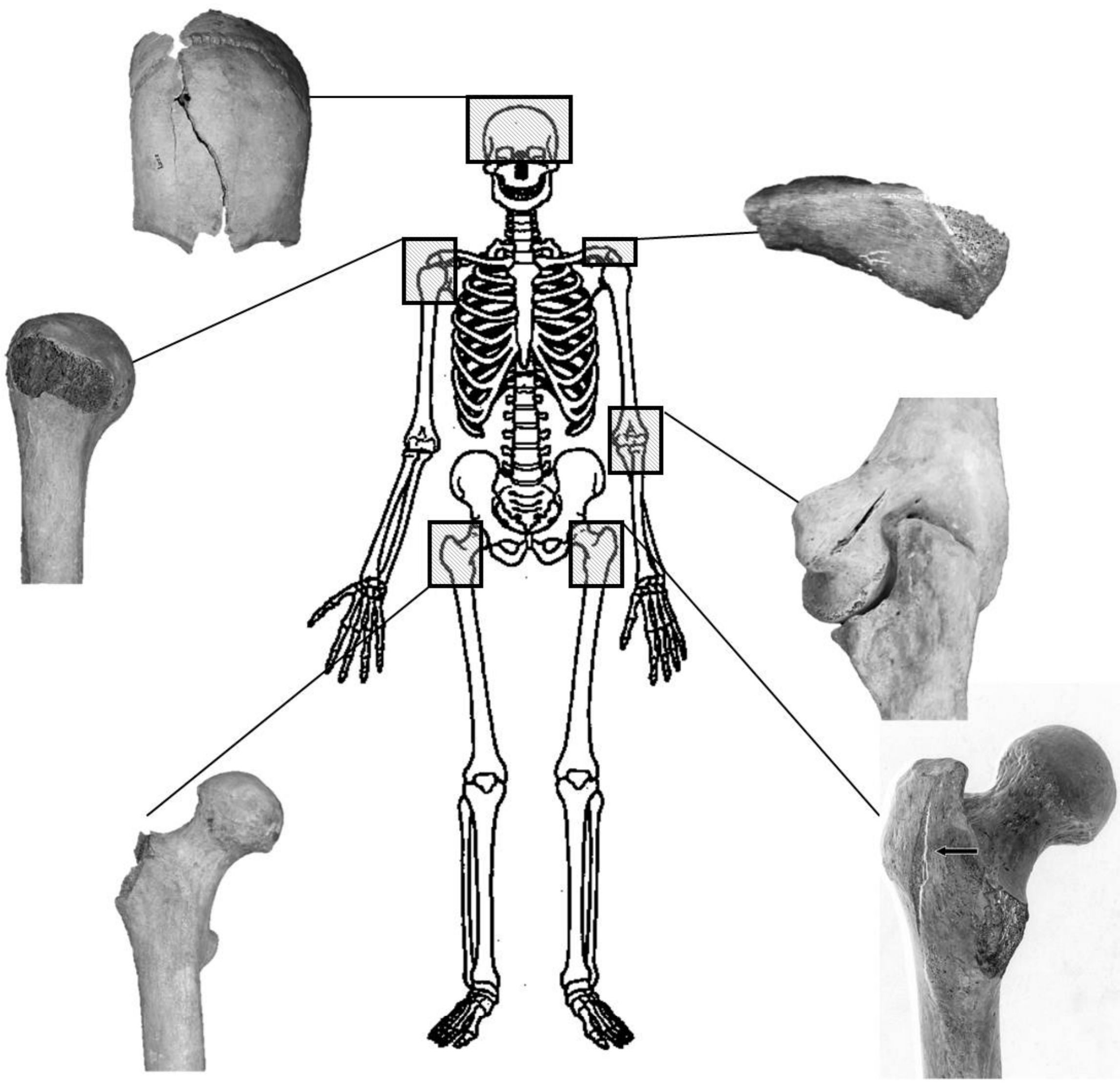

Figure 7. Distribution and types of perimortem trauma.

differentiation and shape of the cut is not consistent with damage caused during excavation. The morphology of the lesion indicates that if it was perimortem, it was directed from a right-handed soldier facing the victim. The cranium from Burial No. 27 has a large (5 mm wide and 39 mm long) puncture wound with associated radiating fractures to the posterolateral surface of the left parietal (Figure 12). While this type of wound was probably caused by a sharp weapon, it also exhibits narrowly focused blunt force characteristics. The caudal margin of the puncture is squared-off while the cranial end is tapered. Burial No. 15 exhibits three cut marks. There is a cut across the acromial end of the left clavicle (Figure 13), a 4.2 mm wide and 46 mm long chop mark on the posterior surface of the greater trochanter (Figure 14), and a short (24 mm long) cut on the medial surface of the right tibia. While it is possible that these cuts were caused by postmortem activities, the wound characteristics are consistent with perimortem trauma. Finally, Burial No. 28 has a puncture/cut on the posterior surface of the medial epicondyle of the right humerus.

DISCUSSION

The historical record of wars generally focuses on military leaders and battlefield tactics while the

Figure 8. Typical projectile induced depressed fractures observed on the skeletal remains.

Figure 9. Right proximal tibia of Burial 15 showing depressed fracture with imbedded projectile.

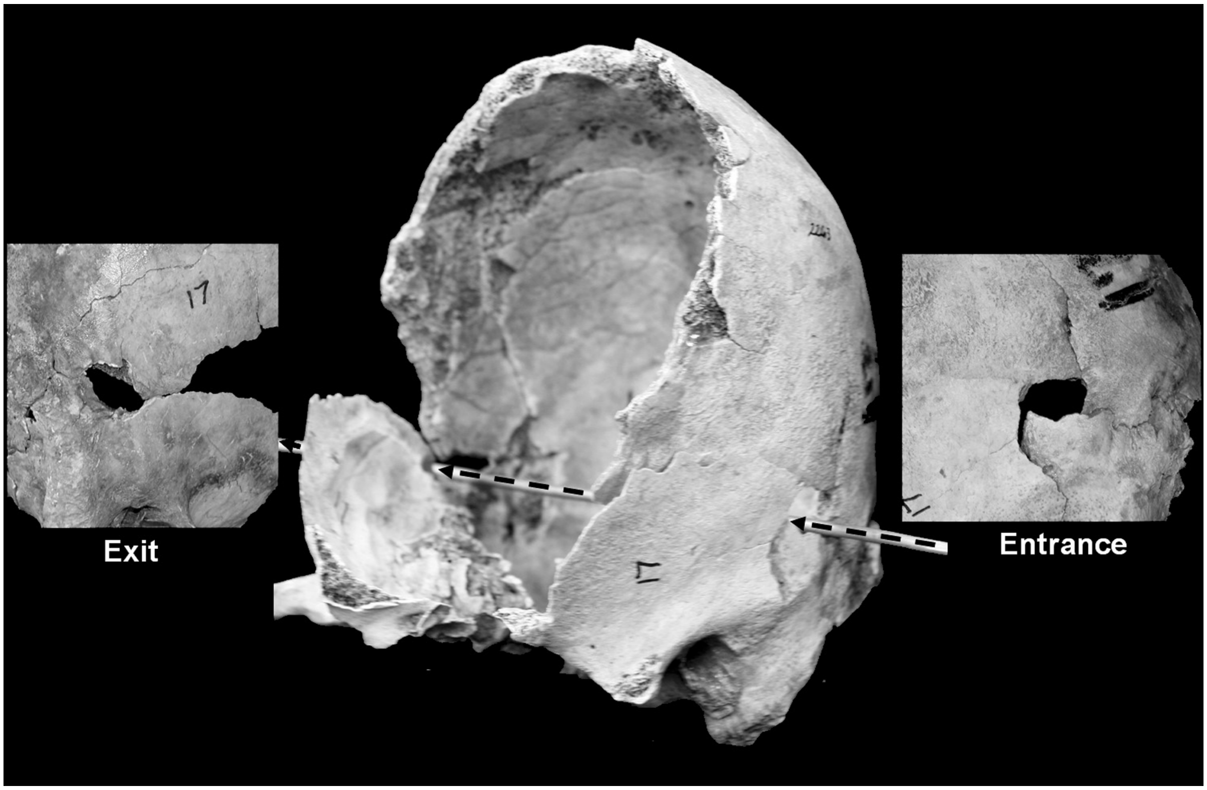

Figure 10. Projectile injury in the cranium of Burial No. 17 showing trajectory and entrance and exit wound morphology.

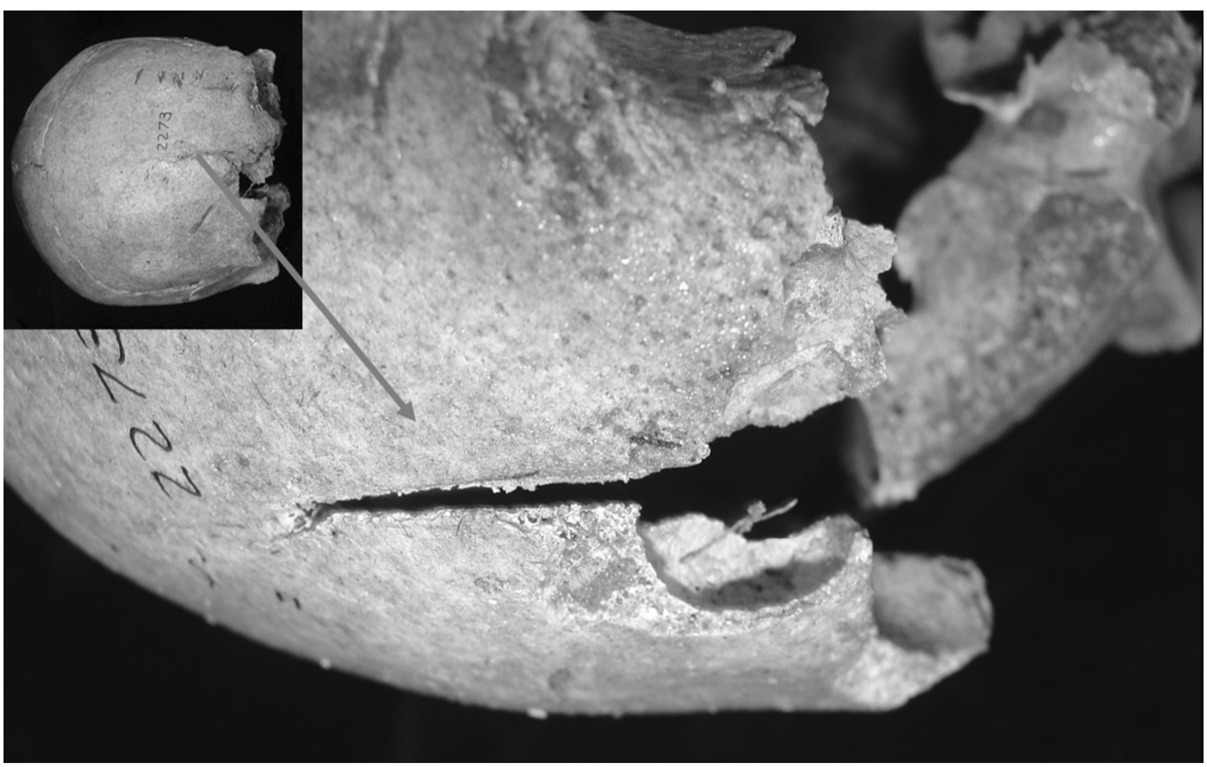

Figure 11. Possible sharp force laceration to the forehead of Burial No. 3.

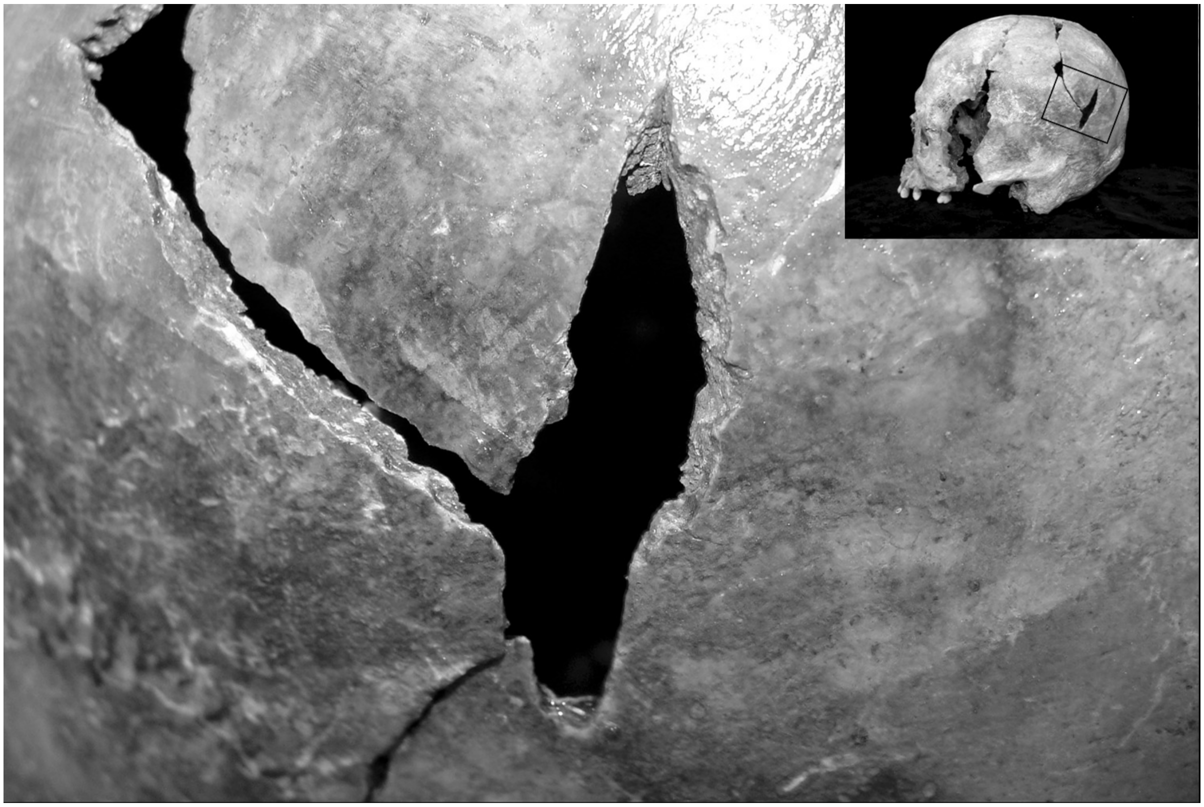

Figure 12. Sharp force puncture wound in parietal of Burial No. 27.

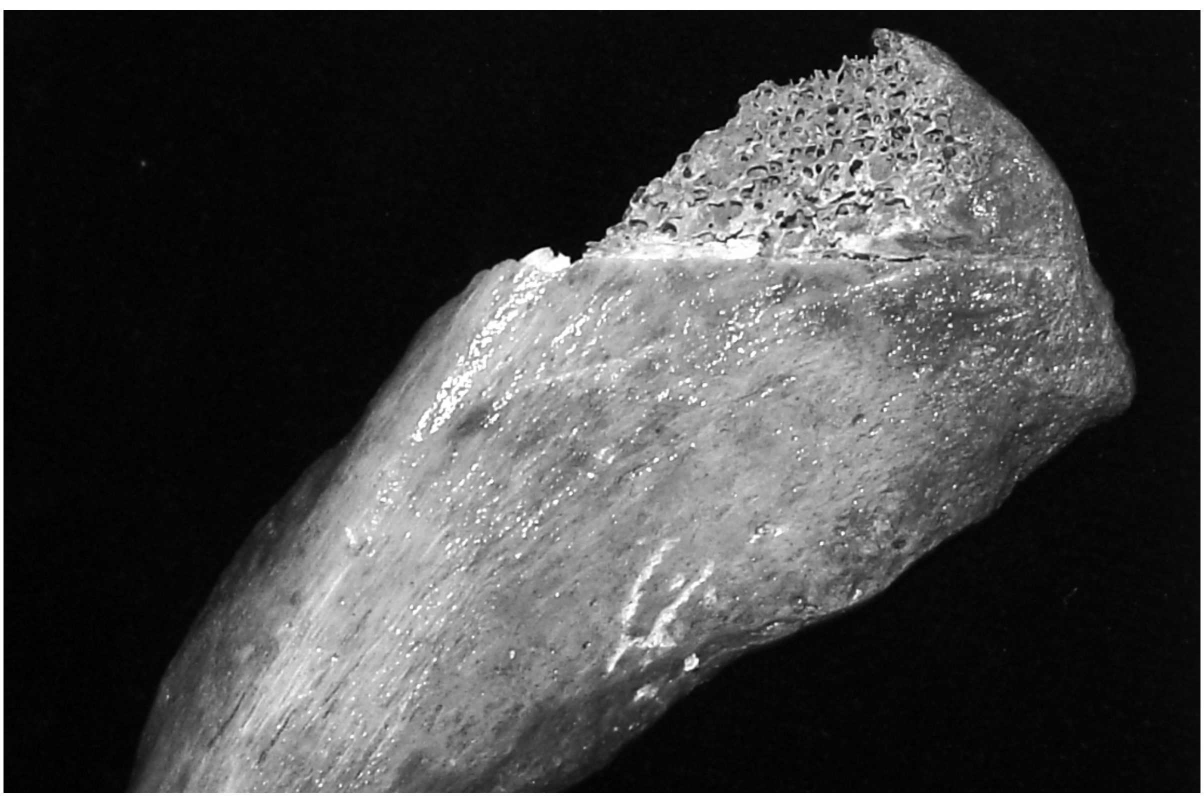

Figure 13. Sharp force chop mark trauma on the clavicle of Burial No. 15.

Figure 14. Sharp force chop mark trauma on femur of Burial No. 15.

common soldiers remain undescribed. Over the past several decades, bioarcheological analyses of skeletal remains from military forts and battlefields (e.g., Liston and Baker 1996; Pfeiffer and Williamson 1991; Willey and Scott 1996) have provided unique information on the common soldiers participating in North American military campaigns. The skeletal remains of Mexican soldiers from the Battle of Resaca de la Palma add to this database of information by providing valuable data regarding this historic battle.

Demography and Burial Position

The skeletal remains from Resaca de la Palma represent at least 27 individuals and most likely 36 individuals from the Mexican Army. The bodies appear to have been placed in a shallow grave pit in a supine position and laid out in pseudo-rows with the bodies lying side by side in each row and the heads of soldiers in subsequent rows placed between the legs of the soldiers in the preceding row. The taphonomic evidence is consistent with historical documents regarding the burial of the Mexican soldiers at Resaca de la Palma. There is very little evidence of animal scavenging activity, as would be expected for bodies buried within 24 hours. However, there is significant loss of skeletal elements and postmortem damage due to construction work and possible looting. The placement of the bodies (see Figure 2) in the grave is consistent with the bodies being buried by adversarial (U.S.) troops, as indicated by historical accounts. Thomas Holland (personal communication 2006) has observed that soldiers buried by comrades are generally laid out face up with the hands carefully positioned and bodies lined up side by side in rows. On the other hand, enemy troops do not usually take the time to carefully position the bodies during burial. As a result, there is frequent commingling and the bodies are found in a variety of positions. While the bodies at Resaca de la Palma were partially arranged in rows with the bodies in a supine position, the arms were not placed in any standard position, and several bodies were placed on top of others facing the opposite direction (see Figure 2).

Ratcliff (1993) argued that at least one female was present among the skeletal remains from Resaca de la Palma. Female camp followers, known as *soldaderas*, traveled with the Mexican Army serving as domestic servants and sometimes combatants (Salas 1990; Young 1994; Haecker and Mauck 1997). Many of these women were wives or mistresses of the soldiers, and provided vital tasks, such as collecting food to supplement rations, preparing meals, and mending and cleaning uniforms and equipment. There is osteological evidence for the presence of at least one female among the remains cataloged at TARL as being part of Resaca de la Palma, but this skeleton was not included in the original inventory or part of the original burial map. In addition, cranial morphology and the dental attrition of this individual are distinct from that of individuals from Resaca. The female remains are most likely associated with another site and were accidently mixed with the remains of 41CF3. Therefore, we believe that all the remains represent male soldiers that died during the battle.

The common Mexican soldier or *soldado* was a conscript from the lower socioeconomic tiers (e.g., laborers and farmers) of Mexican society. Soldiers were generally Indian or *mestizo* and were forced to serve an 8 to 10 year enlistment with poor pay, and meager and unsanitary living conditions (Young 1994). Mexican military recruits were generally in their second or third decade of life and usually ranged between 162 and 173 cm in height (Young 1994). The age distribution of individuals recovered from 41CF3 is consistent with this description. Furthermore, of the individuals from Resaca de la Palma where stature could be estimated, height ranged from 155 to 170 cm with a mean of 162.3 cm.

Trauma

The Mexican soldiers who fought at the Battle of Resaca de la Palma are thought to have been battle experienced, but there are few, if any, antemortem injuries that can be attributed to battle experience. It is likely that many of these soldiers obtained injuries related to the farming and labor jobs they performed prior to being drafted into the military. As a result, it is difficult to determine with any degree of certainty if the antemortem lesions seen on the skeletal remains were from previous combat. Furthermore, it is also possible that because the Battle of Resaca de la Palma occurred early in the war only healthy men were on the front lines, which would also explain the lack of definitive antemortem battle-related trauma.

Contrary to previous reports on the skeletal remains from Resaca de la Palma (Wesolowsky 1969c; Ratliff 1994), we observed that over half (58 percent) of the Mexican soldiers have unhealed battle-related injuries observable on the skeletons. There is considerable postmortem damage to the skeletons from 41CF3, but many of the individuals exhibit injuries with perimortem characteristics. The number of soldiers with observable injuries at Resaca de la Palma is consistent with prevalence rates reported for other military samples (Snow and Fitzpatrick 1989; Owsley et al. 1991). Unlike some military cemeteries (Owsley et al. 1991), however, it can be assumed that all of the soldiers in the burial pit at Resaca de la Palma received fatal combat injuries. Many of these injuries may not have left an osteological signatures (i.e., resulted in soft tissue injuries only) or were obscured by postmortem processes. Burial No. 27, for example, was found with a projectile in the torso but there is no evidence of the entrance wound on the bones of the thoracic cage. The fragmentary nature of the crania, ribs, vertebrae, and sterna of the Mexican soldiers probably also prevented recognition of some of the bone lesions. Perimortem blunt force trauma was especially difficult to determine because the skeletal remains were highly fragmented. It is likely that the number of blunt force injuries was underestimated in this study.

At the Battle of Resaca de la Palma, the Mexican *soldados* were confronted by a well-trained and well-equipped U.S. Army accompanied by a few Texas volunteers (Haecker and Mauck 1997). Each soldier was armed with either a musket with attached bayonet or a flintlock rife, while Texas volunteers carried shotguns or muskets. The U.S. artillery units were especially well-trained and discharged round shot, canister, and explosive shell from their cannons (Haecker and Mauck 1997; Mischke 2002). As a result, it is not surprising that projectiles inflicted the greatest number of observable battle-related injuries.

The relatively high prevalence of sharp force trauma is consistent with the historical record that indicates the Battle of Resaca de la Palma was one of hand-to-hand combat (Deas 1870; Grant 1885; Longstreet 1912; Smith 1917). Surprisingly, there is no direct evidence of bayonet injuries on any of the skeletons since bayonets were considered the best line of defense by both armies. The bayonet used by U.S. troops had a triangular blade (Haecker 1994; Haecker and Mauck 1997). Most of the cut marks on the skeletal remains are nonspecific, but the more evident ones are consistent with sword or saber cuts rather than bayonet wounds. The lack of sharp force wounds on the forearms, which often indicate defense injuries (Novak 2000), is also surprising.

A number of individuals appear to have blade and ballistic wounds on the lower limb bones, and Burial No. 4, for example, has multiple piercing wounds to the abdomen consistent with a shotgun injury. The direction of the wounds suggests the soldier was at a higher elevation than the shooter. The presence of blade wounds on the lower limbs and the direction of blade and projectile wounds on several of the individuals might be interpreted as wounds that were inflicted on horse-mounted soldiers (Kjellström 2005). The injuries to Burial No. 4, for example, are consistent with im being shot while mounted on a horse. However, while a cavalry unit was in the vicinity of Resaca de la Palma, there is no compelling archeological or historical evidence that the soldiers buried in 41CF3 were cavalrymen or that the cavalry played a significant role in the battle.

A few of the Mexican soldiers have multiple injuries caused by a variety of weapons. Burial No. 15, for example, has projectile-induced depressed fractures on the proximal right tibia and on the distal left femur. This individual also has several small puncture wounds on the right ilium and ribs as well as sharp force trauma to the left clavicle and left proximal femur. Likewise, Burial No. 4 has large projectile wounds on both shoulders and numerous small puncture wounds on the pelvis and lumbar vertebrae consistent with a shotgun or cannon wound. The multiple wounds on these individuals may indicate that they were wounded by cannon or musket fire during the battle but survived long enough to fight U.S. soldiers face-to-face.

SUMMARY AND CONCLUSIONS

The skeletal remains of at least 27, and most likely 36, Mexican *soldados* that died during the Battle of Resaca de la Palma were examined for traumatic battle-related lesions. As expected for a battlefield cemetery, the majority (58 percent) of the skeletons have perimortem projectile or sharp force trauma. The high prevalence of sharp force trauma is consistent with historical records that indicate close contact between U.S. and Mexican soldiers during the Battle of Resaca de la Palma. This study provides important insight into the Battle of Resaca de la Palma, and adds to our understanding of battle injuries among soldiers in North American military campaigns. This study also provides physical evidence that the Battle of Resaca de la Palma involved not only traditional battle tactics (i.e., firearm and cannon fire) but also numerous hand-to-hand battles.

ACKNOWLEDGMENTS

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The Pine Tree Mound Site and the Archeology of the Nadaco Caddo

Ross C. Fields and Eloise Frances Gadus

ABSTRACT

In 2004 and 2006–2007, personnel from Prewitt and Associates, Inc., conducted testing and data recovery excavations at the Pine Tree Mound site (41HS15), a mostly Late Caddo ceremonial and civic center, in Harrison County, Texas. The 2004 testing involved work across the entirety of the site and resulted in the identification of a core ceremonial area with earthen mounds, off-mound structures, and a cemetery situated around a plaza, as well as eight possible village areas around the core area. The 2006–2007 data recovery excavations in three of the possible village areas revealed that two contained the remains of multi-generational household compounds, while the third probably was used as an activity area and likely did not contain domiciles. The two phases of work together identified more than 3,300 potential cultural features, including 38 burials, and recovered 150 ceramic vessels from mortuary contexts, 46,378 ceramic sherds from non-burial contexts, 6,095 lithic artifacts, more than 10,000 animal bones, and about 1.5 kg of botanical remains.

The work at the Pine Tree Mound site documents the archeology and history of a community of Caddo Indians whose homeland was centered in the Potters Creek valley of the middle Sabine River basin, starting in the A.D. 1300s and continuing till at least the mid- 1600s, and perhaps through most of the 1700s. This community was first documented, as the Nondacao province, by the remnants of the Hernando de Soto expedition in 1542. This group was known as the Nadaco Caddo by the eighteenth century, and we equate the Pine Tree Mound community with the home territory of that group, the descendants of which live in Oklahoma today.

INTRODUCTION

This article presents an overview of testing and data recovery excavations at the Pine Tree Mound site, a ceremonial and civic complex that the Caddo occupied from sometime in the A.D. 1300s to the 1700s in what is today south-central Harrison County, Texas. This project has done much to further an understanding of the prehistory of a part of northeast Texas, while at the same time resulting in the long-term preservation of a rich body of archeological evidence relating to the Caddo Indians, who lived in this region of northeast Texas, southeast Oklahoma, southwest Arkansas, and northwest Louisiana for 1,000 years, from about A.D. 800 to the early 1800s. Their descendants make up the Caddo Nation of Oklahoma today.

This project is notable in two respects. First, archeologists had the rare opportunity to conduct well-funded excavations across the entirety of the complex, including both the ceremonial core and the surrounding residential areas. Second, in 2006 the heart of the site was donated to the Archaeological Conservancy and thus is protected from future disturbance. The work was done by Prewitt and Associates, Inc., under two contracts with the Sabine Mining Company (SMC), which is a subsidiary of the North American Coal Corporation, and was prompted by the planned expansion of the Sabine Mine. The mine is a lignite operation that produces fuel for the H. W. Pirkey Power Plant nearby. The plant is operated by American Electric Power (AEP), which was the ultimate funding source for the project. AEP's commitment to the project extended well beyond funding the archeological work, however; they also volunteered to purchase part of the site and donate it to the Conservancy for preservation.

The project was completed in two phases. The entirety of the site was tested through the excavation of 143 backhoe trenches in June through August 2004. That project resulted in a recommendation that the site is eligible for listing in the National Register of Historic Places. When it was determined that the cost of data recovery would exceed the value of the lignite under the site, SMC altered its mining plans to avoid the core area and five of the residential loci and activity areas bordering the core on the west and south. The three residential loci and activity areas at the west edge of the site could not be avoided, however, and Prewitt and Associates completed data recovery excavations there in April 2006 through January 2007; these excavations covered about 14,560 m^2 (Figure 1).

The work at Pine Tree Mound is important because it documents the rich archeology and history of a little-known community of Caddo Indians whose homeland was in the Potters Creek valley of the middle Sabine River basin, starting in the A.D. 1300s and continuing till at least the mid-1600s, and perhaps through most of the 1700s. This community was first documented, as the Nondacao province, by the remnants of the Hernando de Soto expedition as it traveled south on the Hasinai Trace through Caddo country in 1542. We believe this is the group known as the Nadaco Caddo by the eighteenth century, and after that the Anadarko Caddo, and thus we equate the Pine Tree Mound community with the home territory of that group, the descendants of which live in Oklahoma today. The excavations reported here concern just one site, but it was a most important site. This is where the community leaders and elite members lived and conducted the ceremonies and rituals that bound the community together. By drawing in information from other nearby Caddo sites, we are able to look beyond this one ceremonial center and address not only topics dealing with mundane aspects of their daily lives—for example, how they built their houses, how they organized their household compounds, what kinds of crops they grew, and what animals they hunted—but also questions relating to the configuration of the community as a whole. As a result, the archeology of Pine Tree Mound provides new perspectives on the nature of the Nadaco community's religious and cosmological beliefs and how those beliefs may have connected them, socially and politically, to their neighbors. All of this new information provides insights into who the Nadaco Caddo were.

This article consists mostly of the final synthetic chapter taken from the technical report on the excavations (Fields and Gadus 2012), with enough introductory material added to provide a context for that synthesis. As such, it does not contain much specific information about the excavations or what was found. For such information, the interested reader should refer to the technical report.

SITE SETTING

The Pine Tree Mound site (with trinomial designation 41HS15) occupies a broad upland surface east of Potters Creek and west of Starkey Creek, ca. 1.3 km north-northeast of where these streams join and 7.3 km north of where Potters Creek flows onto the floodplain of the Sabine River (Figure 2). The site is large, covering an area of 800 m east-west by 720 m north-south. Its most conspicuous features are three earthen mounds that stand 0.4 to 2.4 m above the surface of a large interfluve that makes up the northeast part of the site and that overlooks the floodplain of Starkey Creek to the east. The landform is bounded on the north and south by spring-fed drainages that have been dammed to form a stock pond (north drainage) and a small lake (south drainage) and that flow southeast toward Starkey Creek. At the time of the excavations, most of the interfluve was in improved-grass pastures, although from the 1960s until 2006 its southern portion was used for residential and ranching purposes. The three mounds are within an area measuring 210 m east-west by 150 m north-south, and testing in 2004 revealed that they are associated with a possible plowed-down mound, at least five areas with off-mound structures, a plaza, and at least one cemetery. Together, these constitute the core of the site, measuring about 360 m both east-west and north-south and covering 27 acres. It is this area, along with the small lake to the south and land just south of the lake, that are now owned by the Archaeological Conservancy.

SUMMARY OF THE 2004 TESTING RESULTS

Test excavations consisted of two 1 x 1 m units and 143 backhoe trenches totaling 1,267 m in length. Three of the trenches were in the three mounds evident on the surface of the site, and the other 140 trenches were situated to look for off-mound features such as houses, non-residential structures, and cemeteries. The test excavations resulted in the documentation of 202 features, exclusive of the three mounds, including postholes, pits, hearths, burials, a buried midden, and a buried structure, and recovered 1,816 artifacts, mostly sherds from ceramic vessels. The distributions of the trenches with features, the trenches lacking features but containing artifacts, and the

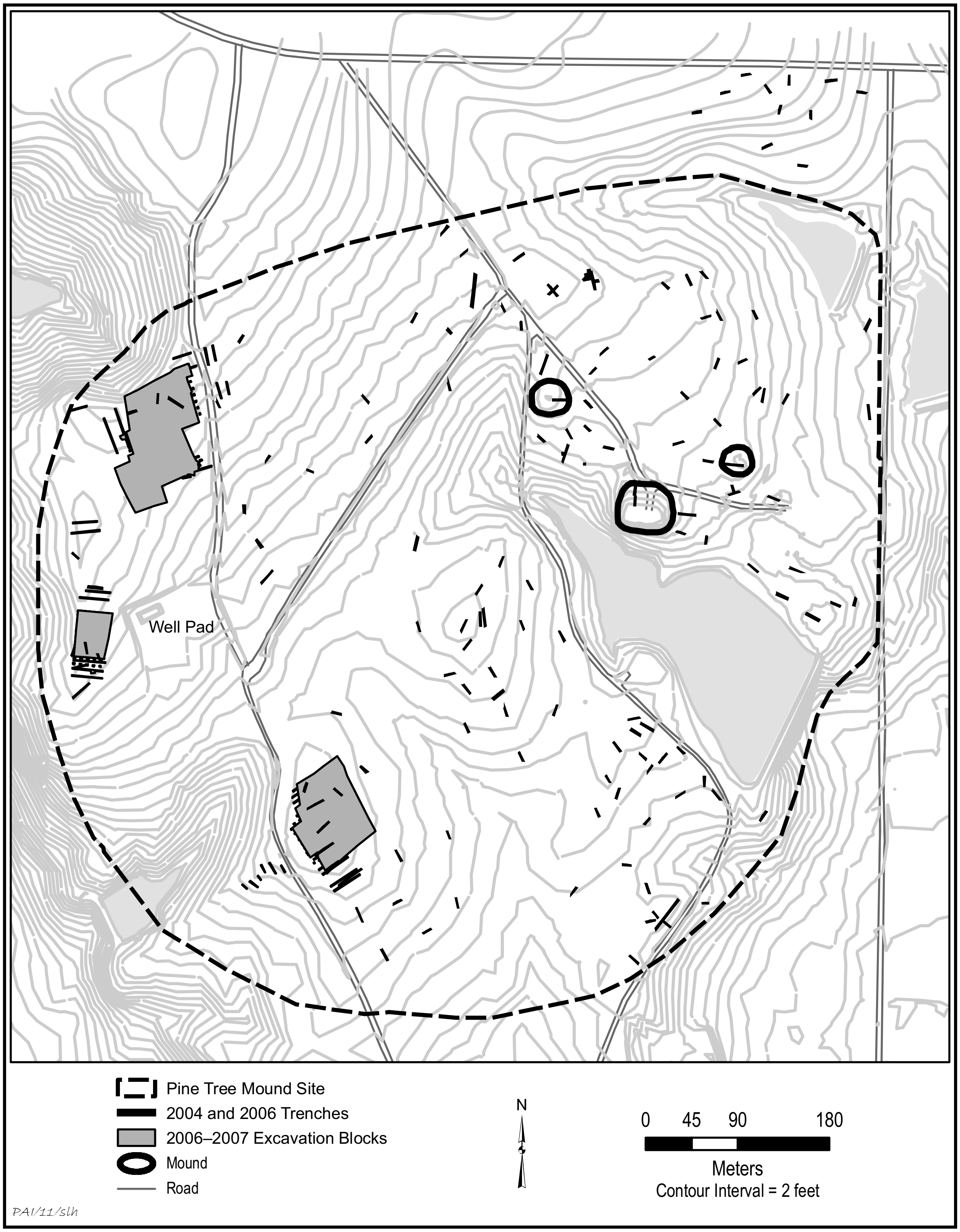

Figure 1. Map showing the excavations at the Pine Tree Mound site.

three mounds visible on the surface allowed the site to be subdivided into a core area containing the ceremonial precinct (and probably an adjacent residential area to the east) and eight possible village areas (Figure 3).

The central part of the ceremonial precinct is a

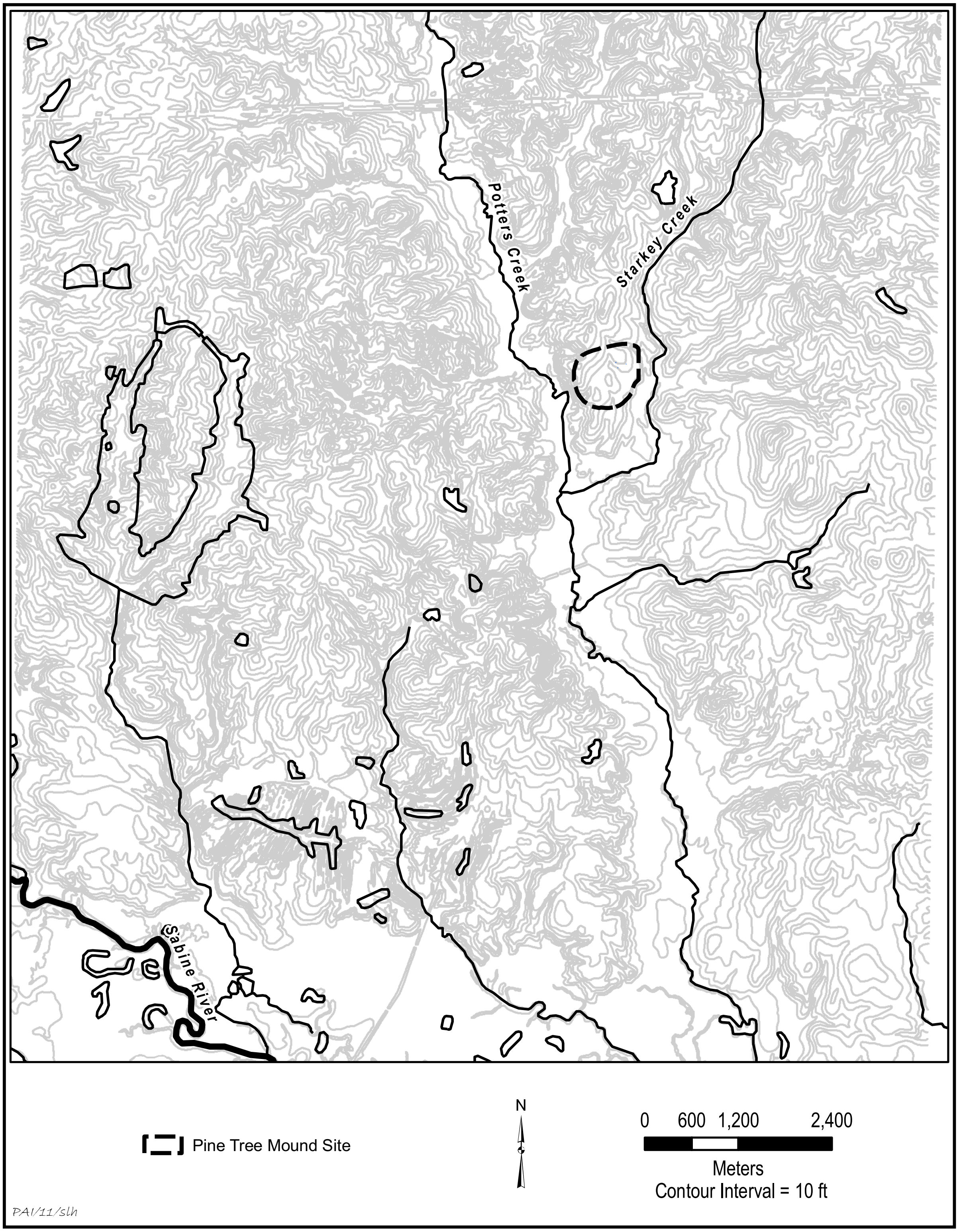

Figure 2. Topographic map showing the location of the Pine Tree Mound site relative to the Potters and Starkey Creek valleys.

vacant plaza, with the largest mound, Mound A, at its south end. This mound, measuring 55 x 45 m and about 2.4 m high, was a platform mound that was built rapidly, probably to support one or more important buildings on its summit, although other such buildings likely stood here before the mound was

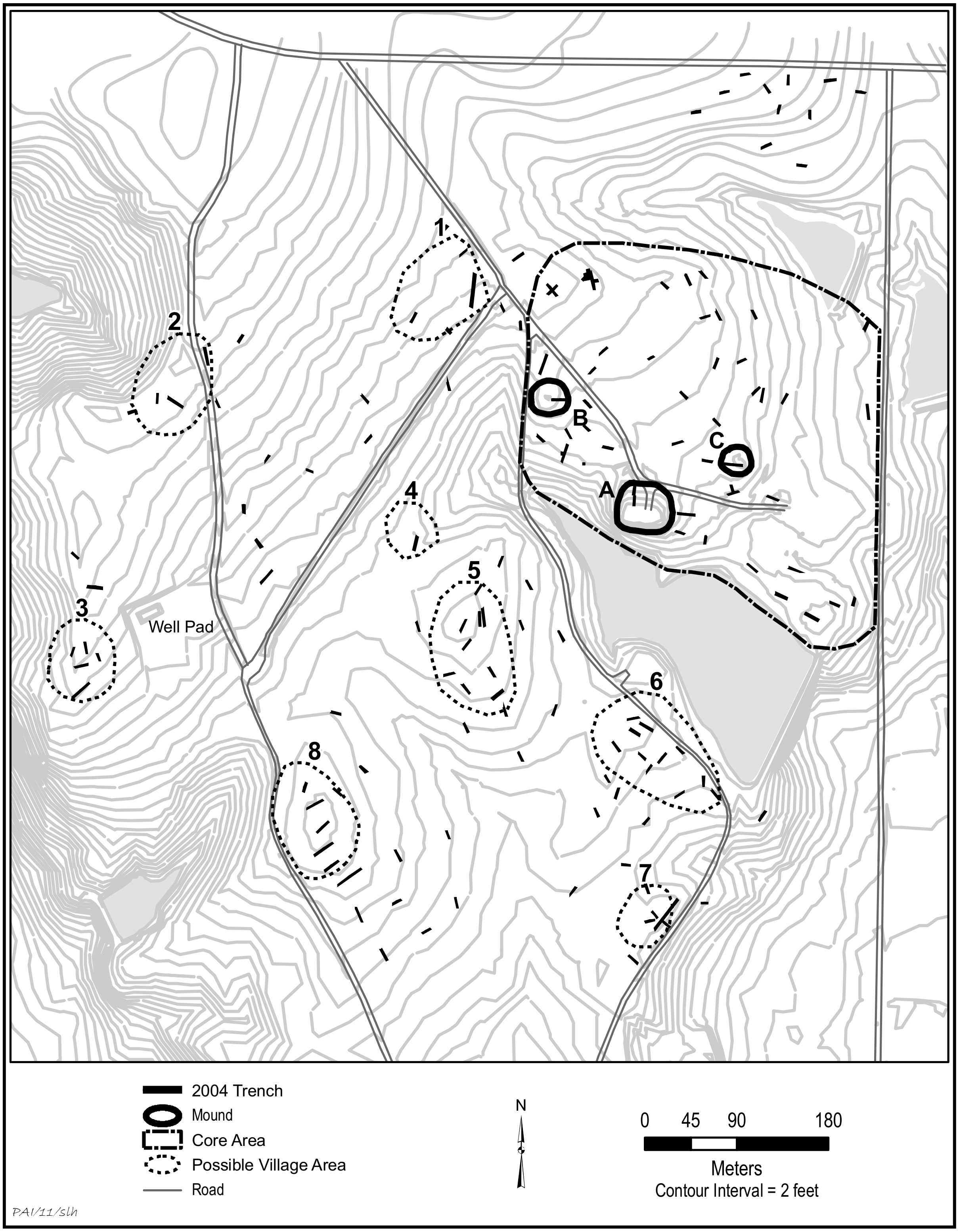

Figure 3. Map showing the spatial organization of the Pine Tree Mound site based on the 2004 test excavations.

erected. Mound C is a similar but much smaller (27 x 33 x 0.4 m) platform mound about 60 m northeast of Mound A. About 90 m northwest of Mound A, on the western side of the plaza, is Mound B. Measuring 33 x 37 x 1.2 m, it accumulated through the construction, destruction, and capping of a sequence of important buildings. Postholes and other features indicate that various structures bordered the plaza between Mounds A and B, north of Mound B, east of Mound A, and south and north of Mound C. The plaza may have been defined topographically on its north side by the slope down to a spring-fed drainage, but its northwest corner also appears to have been marked by a large cemetery.

SUMMARY OF THE 2006–2007 DATA RECOVERY RESULTS

The data recovery excavations were in three of the possible villages areas—Areas 2, 3, and 8—at the west edge of the site. In total, 60 backhoe trenches were dug, 13,500 m^2 of plow zone were removed mechanically, and 282 sample units of various sizes were excavated manually or by machine and screened. More than 3,100 features were identified relating to at least 38 Caddo houses and their associated ancillary structures and activity areas, but also including 27 Caddo burials.

Area 2 contained two house compounds, a northern one (Area 2N) with 18 structures and a southern one (Area 2S) with 11 structures (Figure 4). Also found here was a small cemetery with 13 graves set off from the house compounds, as well as three isolated graves in and among the houses, one small grave was very close to the wall of a southern compound house and thus is hard to see in Figure 4). One of these graves was a multiple interment containing two individuals. These graves were rich in funerary objects, containing 98 ceramic vessels, five ceramic pipes, 21 arrow points, three celts, two pairs of ear spools, and a grinding slab. Area 8 was very similar to Area 2, except that it contained only one compound with nine house patterns (Figure 5). It also contained a small cemetery with eight graves situated closer to the houses than in Area 2, and it contained three isolated graves around the houses as well. Funerary objects from this part of the site included 47 ceramic vessels, two ceramic pipes, 29 arrow points, one pair of ear spools, and a stone knapper's tool kit. One grave in the cemetery also contained two individuals. Area 3 contained far fewer features than Areas 2 and 8, and thus it appears to represent a large outdoor activity area rather than a domiciliary locale.

Analysis of the artifacts recovered in the 2004 and 2006–2007 excavations, including the grave goods listed above and a large collection of materials donated by avocational archeologist Macky McIntosh, resulted in documentation of 150 ceramic vessels, more than 46,000 sherds, 27 ceramic pipes and fragments, one ceramic bead, one ceramic earplug, and two ceramic spindle whorls. Just over half the sherds are brushed, while 6 percent are engraved and 7 percent are incised; one-third are undecorated. Ripley Engraved, Wilder Engraved, and Pease Brushed-Incised are the predominant ceramic types; minor types include Belcher Ridged, Cass Appliqued, Cowhide Stamped, Harleton Appliqued, Hodges Engraved, Karnack Brushed-Incised, La Rue Neck Banded, Maydelle Incised, Poyner Engraved, and Taylor Engraved. Chipped stone artifacts consist of 182 arrow points and preforms, 25 dart points and preforms, 121 bifaces, 14 gunflints, one strike-a-light, three unifaces, 16 modified flakes, one cobble tool, 128 cores and tested cobbles, and 5,421 peces of unmodified debitage. The predominant arrow point styles are Perdiz, Perdiz-Bassett, and Bassett, with Alba, Alba-Bonham, Bonham, Fresno, and Friley occurring in smaller numbers. A variety of dart points are represented: Carrollton, Edgewood, Ellis, Ellis-Edgewood, Gary, Morrill, Palmer, Palmillas, Trinity, Wells, and Yarbrough. The collection of ground, pecked, and battered stone artifacts consists of 14 grinding slabs, 67 anvils, eight grinding slabs/anvils, six manos, eight hammerstones, five manos/hammerstones, three hammerstones/anvils, six abraders, 16 celts and fragments, one celt preform, six axes and preforms, four polishing stones, 20 pigment stones, 11 earspools and fragments, two beads, one boat-shaped stone, and five other items. Also recovered were sizeable samples of macrobotanical and faunal remains.

CHRONOLOGY OF THE PINE TREE MOUND SITE

The Radiocarbon Evidence

There are a number of limitations to the radiocarbon evidence from Pine Tree Mound, including too few samples from primary contexts, the long spans of some of the intervals, and the multiple intercepts of many of the dates. Figure 6, which shows the two-sigma calibrated ranges for all 105 dates obtained, illustrates the latter two of these problems. More importantly, though, it highlights

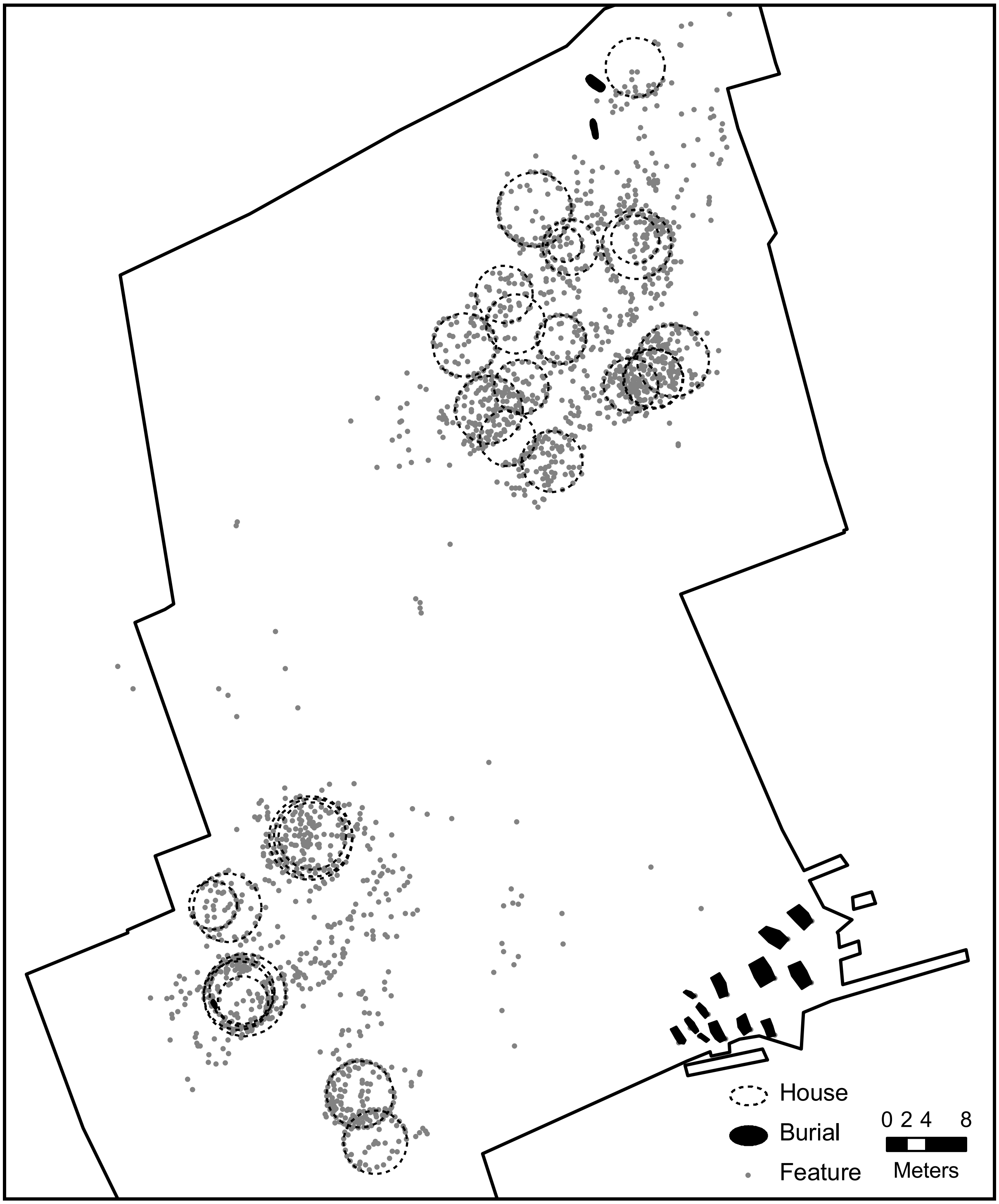

Figure 4. Plan of Area 2 showing feature locations and identified houses.

the robust nature of the data set. Just two dates are wholly outside the range of the others, both on the early end. One of these, on organic residue from a vessel in burial Feature 2.2073, is about 800 years too old. The other, on organic residue from a vessel in burial Feature 8.1088, is probably at least 200 years too old. A third date overlaps the early end of the predominant range slightly, but based on its context it is clearly too old as well, probably by at least 125 years.

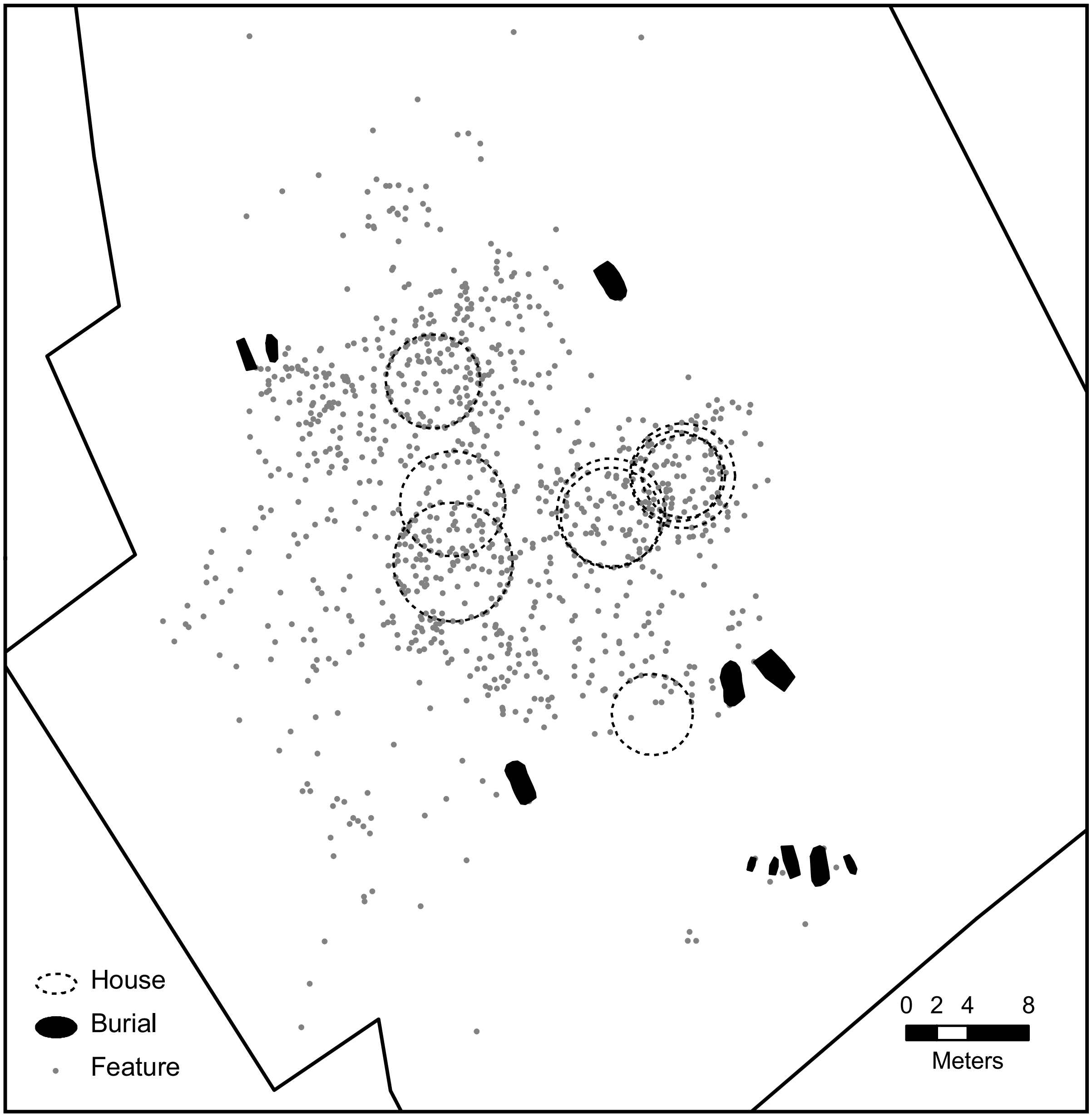

Figure 5. Plan of Area 8 showing feature locations and identified houses.

On the late end, there are 12 dates with intervals in the nineteenth and twentieth centuries that, at first blush, might look too young. However, all but one are from contexts (smudge pits) or are on materials (corn and cane) that leave little doubt about their Native American origins, and all also have intervals in the sixteenth, seventeenth, or eighteenth centuries and hence relate to late use of the site. The last period of use, perhaps in the mid-A.D. 1700s, represents the terminus of a ca. 400-year span, beginning in the 1300s, when the Caddo settled on the ridge between Potters and Starkey Creeks, established a plaza with adjoining ceremonial buildings, and ringed this central ceremonial precinct with residential areas.

Some additional details about this chronology, albeit with a reduction in confidence, have been obtained by focusing on the one-sigma ranges of the 102 dates that are not erroneously early rather than the two-sigma ones; paying attention to relative probabilities for dates with multiple intervals, and disregarding intervals with very low probabilities; carefully evaluating contexts to determine if particular intervals or parts of intervals make more sense

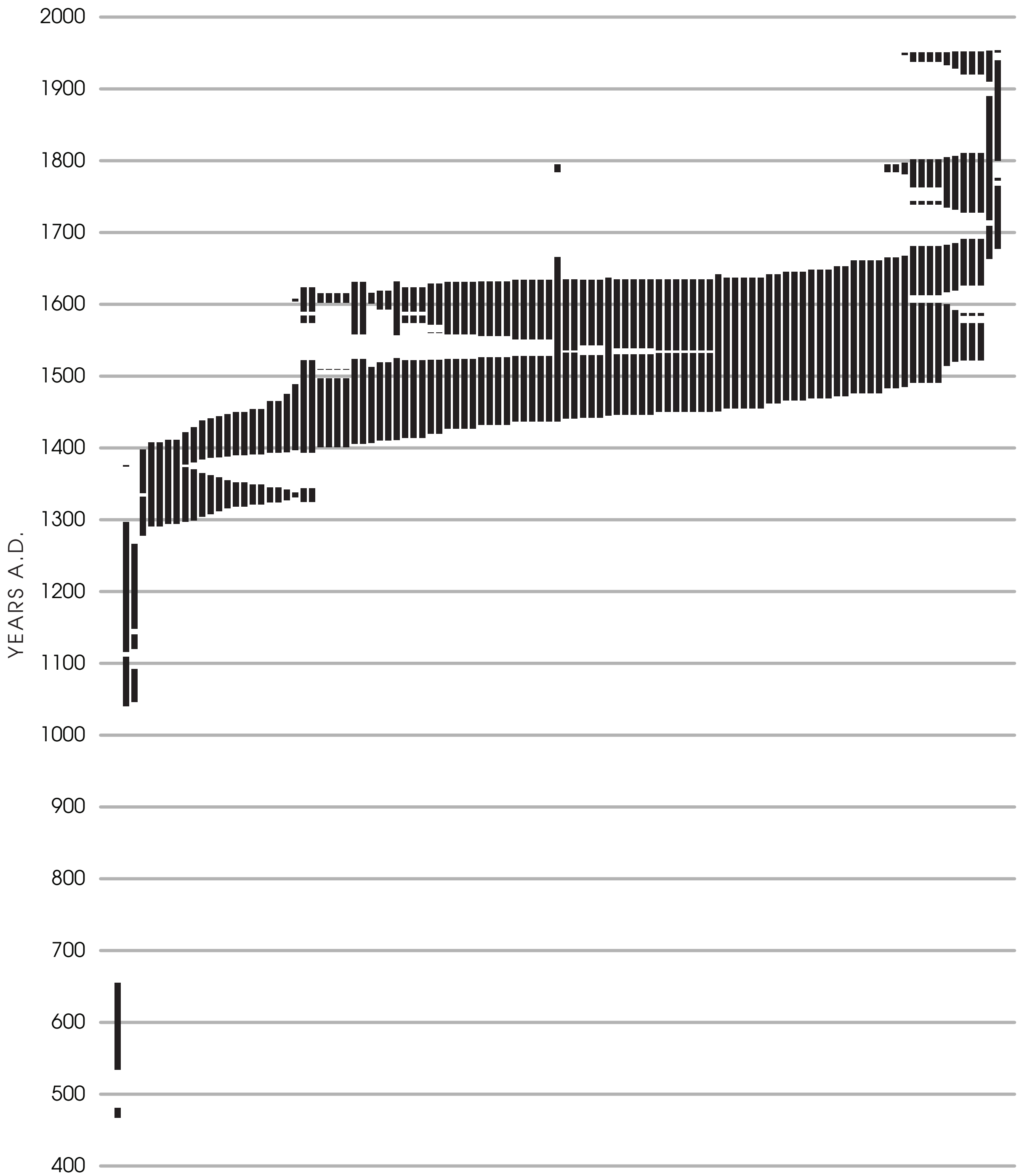

Figure 6. Graph of two-sigma calibrated ranges of all 105 radiocarbon dates.

than others; and calculating mean dates, in some cases resulting in shorter intervals, where we have multiple dates representing single events or multiple events closely spaced in time, judging from context. This allowed us to boil the radiocarbon evidence down to 76 dated contexts, 15 in the core part of the site and 61 in village areas (Figure 7).

The graphs in Figure 7 are similar in two important ways: (1) both start in the A.D. 1300s; and (2) both have the largest number of samples in the 1400s and into the early 1500s. They are dissimilar in that the one for the village areas has samples clearly postdating 1600 while the one for the core area does not. These patterns indicate the following: (1) initial

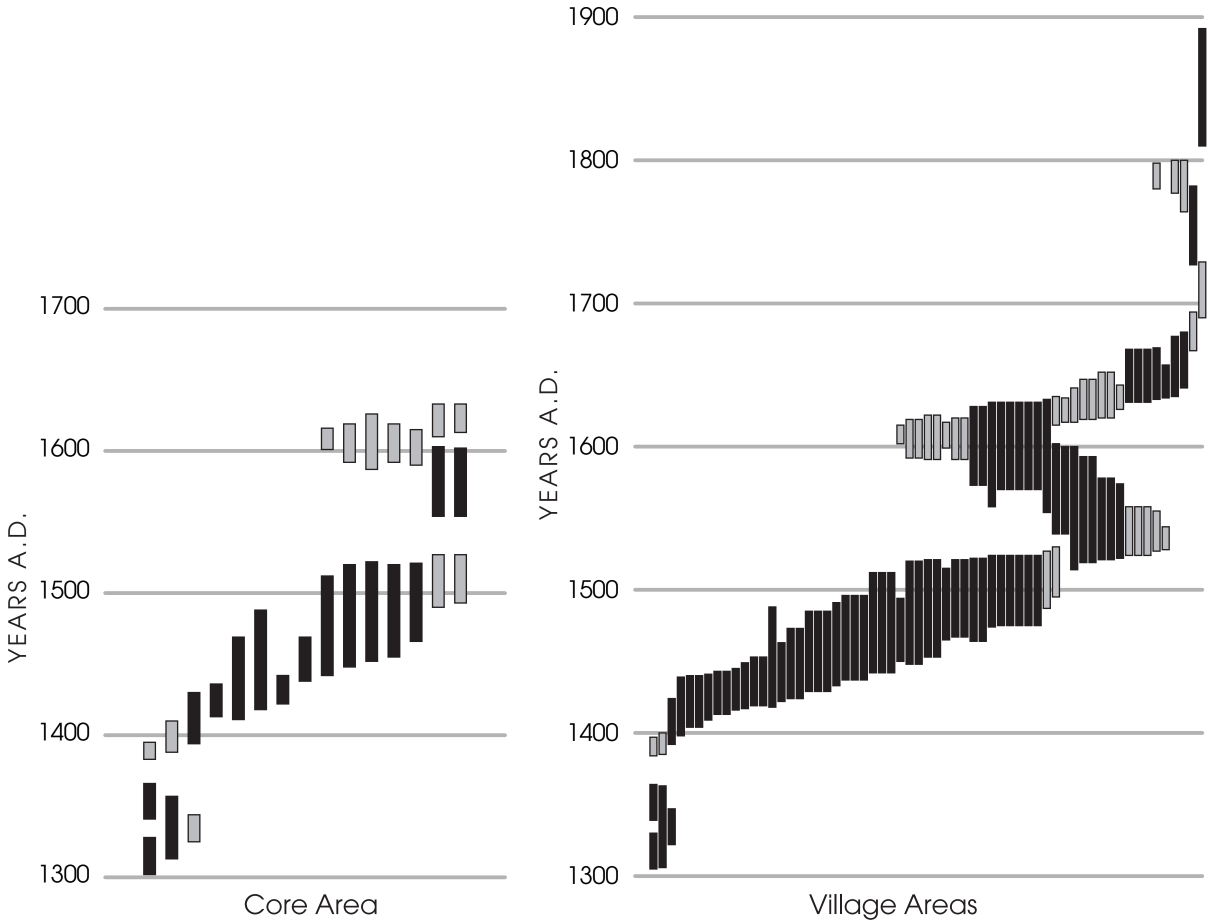

Figure 7. Graphs of one-sigma calibrated ranges of radiocarbon dates from 76 contexts in the core and village areas; only intervals with high (black; p > .38 at the one-sigma level) and moderate (gray; p = .17–.35 at the one-sigma level) probabilities are shown (i.e., low probability intervals are omitted).

use of the site for ceremonial and residential activities was contemporaneous, commencing sometime in the 1300s; (2) the most intensive use for both ceremonial and residential purposes was in the 1400s and early 1500s; and (3) use of residential areas continued later than use of the ceremonial area. The last of these is the least-supported conclusion, since far fewer dates were obtained from the ceremonial part of the site, and it is possible that use of that area continued but without substantial construction that resulted in radiocarbon evidence. The difference in the late ends of the two graphs is striking nonetheless.

To get a more-refined picture of how the site developed, the dated contexts are assigned to eight temporal intervals: A.D. 1300s, early 1400s, mid-1400s, late 1400s, late 1400s–early 1500s, mid–late 1500s, 1600s, and 1700s (Table 1). The earliest and three latest ones are mutually exclusive, while the four in the middle (early 1400s through late 1400s–early 1500s) overlap to varying degrees. This effort is complicated by ambiguities in some of the radiocarbon dates, but based on probabilities and contexts, it is possible to assign all but five of the 76 contexts to one interval or another, albeit with varying certainty. All five of these (four from Area 2 and one from Area 5) could relate to occupations in the late 1400s–early 1500s or the late 1500s–early 1600s, but there is no contextual evidence allowing them to be pushed one way or the other. For the one date from Area 5, this is the case partly because it is the only dated feature from that part of the site, although probabilities alone suggest it could be assigned to the earlier interval.

The four dated contexts restricted to the A.D. 1300s are from Area 8 and the core area; the latter come from the bottom of Mound C and what is probably a burned structure south of Mound C. This initial period of use is not dated very tightly,

Table 1. Contexts assigned to temporal intervals based on radiocarbon dates and other evidence

Interval	Area 2	Area 2N	Area 2S	Area 3	Area 5	Area 8	Core Area
1300s						8.216 (smudge pit) 8.387 (smudge pit)	Mound C, Zone 2 Trench 123
Early 1400s	2.2079 (burial)	2.011 (smudge pit, secondary context)				8.047 (posthole)	Mound C, F-169 & 172
						8.129 (posthole) 8.501b (smudge pit, secondary context) 8.648 (pit) 8.1088 (burial) 8.1094 (burial) F-30 (pit)	Trench 88, F-96 Trench 90, F-136 Trench 126, F-153
Mid 1400s		2.384 (smudge pit)	2.1327 (pit) 2.1559 (posthole) 2.1560 (posthole) 2.1689b (pit) 2.1689c (pit)			8.1064 (pit) F-31 (pit)	
Late 1400s	2.2075 (burial)	2.011 (smudge pit) 2.164 (smudge pit) 2.621 (posthole) 2.828 (smudge pit)				8.442 (smudge pit) 8.1091 (burial)	
Late 1400s–early 1500s	2.2071 (burial)	2.219, 2.220, 2.230, & 2.231 (postholes)				8.107 (smudge pit)	Mound B., Zone 12
	2.2072 (burial) 2.2074 (burial) 2.2078 (burial) 2.2080 (burial)	2.726 (pit)				8.112 (smudge pit) 8.162 (smudge pit) 8.169 (smudge pit) 8.293 (smudge pit) 8.501b (smudge pit) 8.1085 (burial)	Mound B, Zones 13 & 14 Mound B, Zones 27 & 34 Trench 69, F-70 Trench 69, F-71 Trench 73, F-72 & 84 Trench 73, F-137 Trench 100, F-125
Mid–late 1500s		2.751 (posthole) 2.1004 (smudge pit) 2.1118 (smudge pit)	2.1689 (pit) 2.2068 (smudge pit)	3.010 (pit)		8.380 (posthole) 8.387 (smudge pit)	Mound B, Zone 7

Table 1. *(Continued)*

Interval	Area 2	Area 2N	Area 2S	Area 3	Area 5	Area 8	Core Area
1600s			2.1443 (posthole) 2.1623 (smudge pit) 2.1681 (smudge pit) 2.1723 (pit)	3.025 (pit)			
1700s		2.068 (pit) 2.124 (smudge pit)	2.002 (smudge pit)				
unassigned		2.303 (smudge pit)	2.1296 (posthole) 2.1909 (posthole) 2.2020 (pit)		Trench 62, F-59		
Total No.	7	14	15	2	1	22	15

but all four are more likely to date to the first half of the century than the latter half, with the highest-probability intervals overlapping at 1313–1357. If this is correct, the limited number of dates suggests a gradual start for residential and ceremonial activities, given that all other dated contexts are later than 1400. Of course, it is possible that this picture would be different if we had more samples from the core area and other unexcavated village areas.

The A.D. 1400s history of the site is hard to unravel because of the overlapping ranges of the intervals within it and the difficulty of assigning some contexts. However, of the 13 contexts that appear to date to the first half of the century, seven are in Area 8 and four are in the core area. The latter are from features intrusive into the top of Mound C, a pit and burial in the cemetery at the north end of the plaza, and a feature representing structures east of Mound A. Two of the Area 8 contexts are burials, while the others represent domiciliary activities. Feature 2.011 in Area 2N and burial Feature 2.2079 indicate use of Area 2 for domiciliary and mortuary purposes during this interval as well. There are some dates from Area 2S that could reflect residential use in the early 1400s, but overlap in most of the early dates from this part of the site suggests initial village occupation began there around the middle of the 15th century.

Twenty-nine contexts appear to date to the late A.D. 1400s into the early 1500s. They are well represented in the Area 2 cemetery, the Area 2N village, the Area 8 village and cemetery, and the core area. Table 1 lists no contexts for this interval in the Area 2S village, but it is possible that several of those shown there as earlier (Features 2.1327, 2.1689b, and 2.1689c) actually belong with this later interval. Most of the core area contexts in this group are associated with Mound B and the various structures in trenches just north and south of Mound B, as well as a likely structure across the plaza north of Mound C. Taken together, the contexts that relate to use from the early 1400s through the early 1500s account for almost two-thirds of all dated contexts; this was when the Pine Tree Mound site was occupied most intensively.

Nine contexts appear to represent occupation in the mid A.D. 1500s and latter half of that century. These are in the Area 2N, 2S, and 8 villages, Area 3, and the core area. The fact that this is the earliest date from Area 3 suggests any earlier use was of a kind that did not result in any datable contexts, such as an agricultural field. The single core area date comes from the Zone 7 upper fill of Mound B. This almost certainly does not relate to the last use of the mound, however, and the chronology of this component of the ceremonial part of the site remains poorly known. That said, the radiocarbon evidence could be interpreted as indicating that the Zone 7 fill does not postdate the first quarter of the 1500s, and in this scenario it would seem likely that any mound surfaces above Zone 7, while later, still probably date no later than the sixteenth century.

The final two intervals are represented by comparatively few samples. Five contexts appear to date to the A.D. 1600s, four in Area 2S and one in Area 3. Those in Area 2S suggest village occupation there in the middle decades of the century. The Area 3 date indicates contemporaneous use of that part of the site. Finally, three dates imply limited use of Areas 2N and 2S in the 1700s. These three do not form a very coherent group, but two overlap in the 1720s and the third may relate to use in the last few decades of the century.

Figure 8 shows graphically how the site developed over time, plotting the dated contexts in each area by interval as a percentage of those that can be assigned. Because of the overlap in the four middle intervals (early A.D. 1400s–early 1500s), they are lumped together. The Area 2 cemetery is graphed separately from the Area 2 villages since associations are uncertain; this is not the case for the Area 8 village and burial contexts, which are lumped. These graphs depict the founding of the Pine Tree Mound community in the 1300s with simultaneous creation of the ceremonial precinct and establishment of a village in Area 8. There is no indication of residential occupation in Area 2 at that time. All three villages (Areas 2N, 2S, and 8) saw intensive use in the 1400s and early 1500s with 62, 42, and 82 percent of their dates in this interval, as did the core area with 80 percent; the Area 2 cemetery appears to go with these occupations as well. As noted above, it is likely that the Area 5 village dates at least partly to this interval. Modest numbers of contexts in the three village areas and the core area indicate continued use of all four areas through the 1500s, although apparently at a quieter pace than before. One of the two dates from Area 3 suggests this is when that part of the site was used first. Use after 1600 was much more restricted areally. Evidence for occupation in the seventeenth century comes only from Areas 2S and 3, while dates indicating use

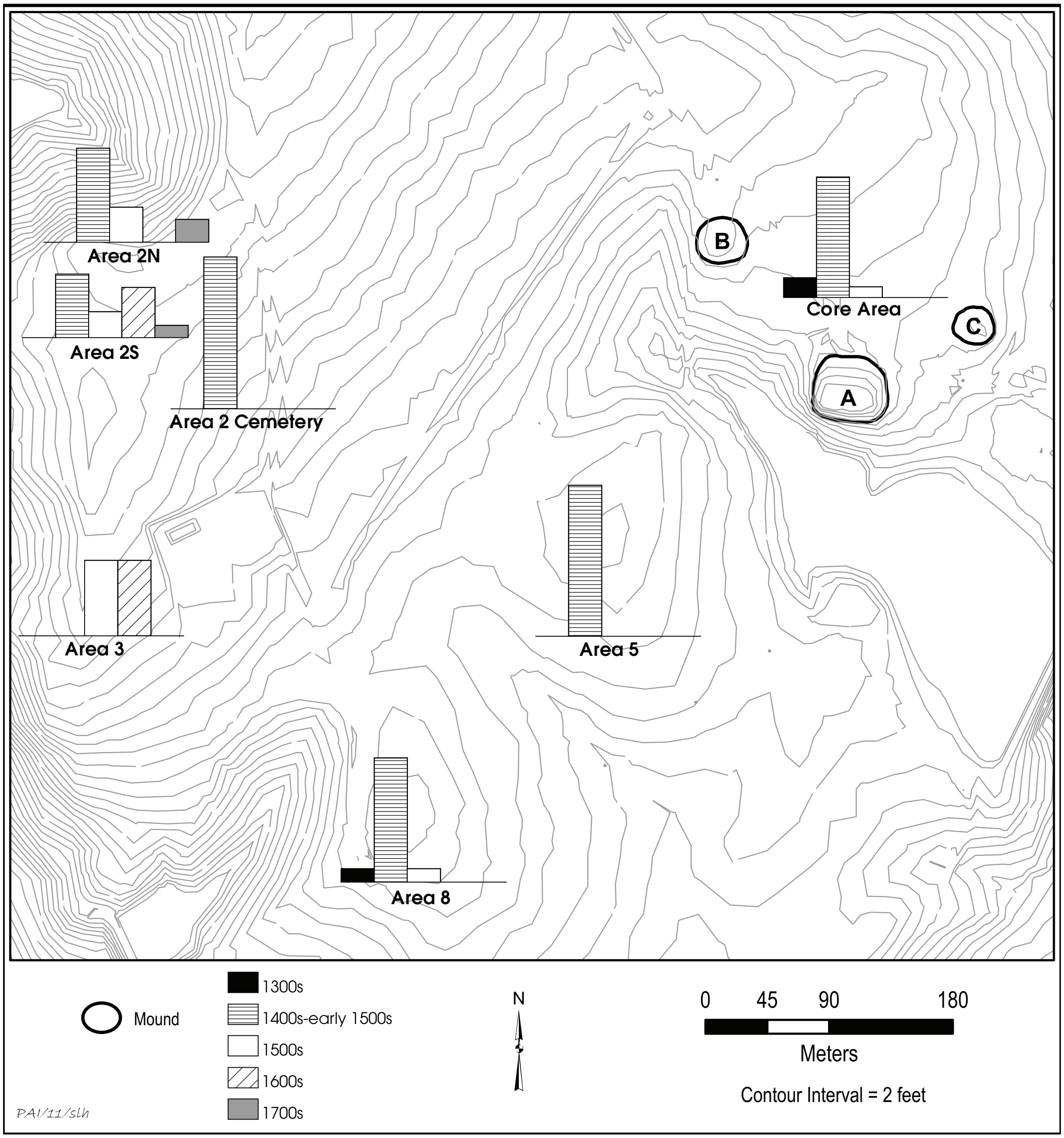

Figure 8. Graphs of percentages of dated contexts by temporal interval and site area.

during the eighteenth century were obtained from Areas 2N and 2S.

The Artifact Evidence

The temporally sensitive artifacts do not add a great deal to this discussion, since they generally support the picture given by the radiocarbon dates. The small collection of dart points, consisting of specimens typed as Edgewood, Ellis, Gary, Palmer, Palmillas, Trinity, Wells, and Yarbrough, as well as some untyped forms, probably relates to intermittent, low-intensity use of the landform before the Caddo settled there and thus is not associated with the Pine Tree Mound community. This also may be true for the few minor arrow point styles—Alba, Bonham, Alba-Bonham, and Friley—which could go with some ephemeral use during Early Caddo or Woodland times. The absence of ceramics such as Williams Plain, Coles Creek Incised, Marksville Stamped, or Tchefuncte Stamped, and the very rare occurrence of Early Caddo pottery (just five sherds typed as Pennington Punctated-Incised, all from the core area), indicate that any such use was insubstantial, though.

The diagnostic artifacts that do go with occupation of the village and ceremonial areas consist of arrow points typed as Perdiz, Perdiz-Bassett, and Bassett and ceramics typed as Ripley Engraved, Pease Brushed-Incised, Wilder Engraved, Harleton Appliqued, Maydelle Incised, Poyner Engraved, Cass Appliqued, Belcher Ridged, La Rue Neck Banded, Cowhide Stamped, Hodges Engraved, Karnack Brushed-Incised, and Taylor Engraved, as well as a variety of untyped utility and fineware pottery. All of these fit well with the main period of occupation, and there is nothing in their spatial distributions that allows any refinements to the occupational sequence outlined above.

However, there are some puzzling absences from the list of ceramic types given the evidence for very late use of Areas 2N and 2S. Most notable among these are Simms Engraved and Natchitoches Engraved, which are common on Kinsloe phase sites in this area. Their apparent absence here may be due to the fact that most of the sherds are highly fragmented and thus hard to identify to type, or perhaps because almost all that is known about Kinsloe phase ceramic assemblages comes from burials rather than village contexts. Regardless, the 12 gunflints, one strike-a-light, and maybe the single Fresno arrow point from Area 2 clearly point to occupation of that part of the site during the 1700s, and a strong case can be made for some sort of continuity with the earlier occupations there. One interpretation is that Area 2 was used in a very limited way in the A.D. 1700s by Caddo people who mostly lived elsewhere but who had some knowledge of the former village and chose to do things there in some of the same places where houses once sat. These people may be the ones who left the single gunflints found in Area 8 and the core area, or perhaps these are just items lost or discarded by passersby.

Summary

The history of Native American occupation at the Pine Tree Mound site can be seen as evolving through five stages. The first, in the A.D. 1300s, involved a slow start to residential and ceremonial activities. By the early 1400s and continuing through the early 1500s, residential activities were widespread and intensive, as was use of one part of the site for ceremonial activities. These patterns continued through the 1500s, but in a less-intensive fashion than before. One area continued to be used for residential activities into the mid-1600s, but it appears that ritual-associated construction was no longer taking place in the core area. The focus of such activities had shifted elsewhere by then. The final stage, in the 1700s, may have little to do with what came before. Area 2 saw residential use, but it was not intensive and may have been by people whose main villages were elsewhere. Any connections to the Pine Tree Mound community that thrived there in the 1400s and 1500s may have been based only on oral traditions and distant memories. It is even possible that there were no connections at all, with the latest occupations having been short-term stays by Caddo or non-Caddo people traveling through the area.

There is little doubt that many visitors passed Pine Tree Mound during the eighteenth century, for it is close to the route of Trammel's Trace, a historic trail laid out by 1813 to connect Nacogdoches with the Red River and the main route from the north into east Texas at that time (Pirtle 2011). Trammel's Trace followed an existing Indian trail known as the Hasinai Trace. Recent research by Bob Vernon of the Texas Archeological Stewards Network and Gary Pinkerton (http://www.trammels trace.org) indicates that these trails passed close by Pine Tree. Using Texas General Land Office county headright maps and original surveyors' field notes, they have been able to plot the primary route of Trammel's Trace with some precision across most of Harrison County. According to that plotting, the trace ran 1.4 km east of Pine Tree Mound on its southwestward course to the Ramsdale Ferry crossing of the Sabine, about 9.3 km southwest of the site (see Figure 10 below).

Of particular relevance to the history of the Pine Tree Mound community is the fact that the remnants of the Hernando de Soto expedition, led by Luis de Moscoso after de Soto's death, likely followed the Hasinai Trace when they entered Texas in July A.D. 1542. Numerous researchers have examined possible routes for the Moscoso expedition in Texas (e.g., Bruseth and Kenmotsu 1993; Hudson 1993; Kenmotsu et al. 1993; Perttula 1992:19–27; Schambach 1993; Strickland 1942; Swanton 1985:274–278; Williams 1942; Woldert

1942), a task complicated by two things. First, this part of the journey is documented in only the Elvas (Robertson 1933) and Biedma (Bourne 1904) accounts without any corroborating information from the Ranjel narrative, which is missing for the period after November 1541 and was the "best and most detailed of all the de Soto documents on the day-to-day movements of the army" (Schambach 1993:79). Second, what was documented was sketchy, perhaps because the much-diminished expedition was focused on finding an end to the journey rather than recording their movements and observations.

Some have argued that the expedition entered Texas after moving west across northern Louisiana, but the most-critical studies conclude convincingly that the army traveled across southwestern Arkansas before crossing the Red River. While Schambach (1993:86–90) places Naguatex, the first Caddo province along the Red encountered by the expedition, in southwestern Arkansas east of Texarkana, Bruseth and Kenmotsu (1993:210–212) conclude it more likely was above the Great Bend northwest of Texarkana. Either way, it is clear that upon leaving Naguatex Moscoso and his men followed an existing trail southward into Caddo country. Bruseth and Kenmotsu (1993:213) suggest that the first two Caddo provinces the expedition encountered after leaving Naguatex—Nissohone and Lacane—were on the trace near where it crossed the Sulphur River and Big Cypress Creek, and that the third province—Nondacao—was on the Sabine River, in the vicinity of the Pine Tree Mound site. According to Chafe (1993:223), Nondacao comes from the Caddo word "Nadaakuh," meaning "the place of the bumblebee" or the people of that place.

There is nothing in the entrada accounts that conclusively places Nondacao in the vicinity of Pine Tree Mound. The Biedma account is particularly uninformative about this, and all that is said in the Elvas account (Robertson 1933) is the following: "Two days later, he reached another wretched land called Lacane. There he captured an Indian who said that the land of Nondacao was a very populous region and the houses scattered about one from another as is customary in mountains, and that there was an abundance of maize. The cacique [of Nondacao] and his Indians came weeping like those of Naguatex, that being their custom in token of obedience. He made him [the governor] a gift of a great quantity of fish and offered to do as he should order. He took his leave of him and gave him a guide to the province of Soacatino." The limited picture of Nondacao that these comments present certainly would be consistent with the archeology of the Pine Tree Mound vicinity, but probably no more so than many other parts of the Caddo area. In fact, there is no specific mention that Moscoso actually saw the Nondacao settlement, since it sounds like the cacique came to meet Moscoso (on the Hasinai Trace?), and there is no indication that the expedition members stayed at Nondacao for any time at all. Nontheless, Bruseth and Kenmotsu's (1993) reconstruction seems sound, relying as it does on multiple lines of evidence. Assuming that Moscoso and his party traveled down the Hasinai Trace, it is inconceivable that the Spaniards and Portuguese and the Pine Tree Mound Caddo remained unaware of one another.

We do not know if this encounter, brief as it was, relates in any way to the changes evident at the Pine Tree Mound site starting in the latter half of the A.D. 1500s. It is easy to imagine that it did, though, with that contact resulting in population loss from introduced infectious diseases.

WHAT CAME BEFORE?

The history presented above begs two questions. Where did the Pine Tree Mound Caddo come from, and what happened to them? Part of the first question has an easy answer, in that there is no archeological evidence for substantial Caddo occupation of the Potters and Starkey Creek valleys predating Pine Tree Mound. Hence, the people who settled there in the A.D. 1300s were not local to the immediate area. This is indicated by the fact that just a handful of possible Early to Middle Caddo sherds (Pennington Punctated-Incised) and arrow points (Alba, Bonham, Alba-Bonham, and maybe Friley) were found at Pine Tree, suggesting ephemeral use at most. Similar sparse Early to Middle Caddo artifacts have been found at three tested sites nearby. Site 41HS846 not far to the south yielded a few possible Kiam and Dunkin Incised sherds and Bonham, Steiner, and Friley arrow points (Gadus et al. 2006:130), but most of the Caddo remains there are later and contemporaneous with Pine Tree. Site 41HS718, also to the south, yielded a few early arrow points (Bonham and Scallorn), but the pottery clearly ties this site with the main occupation at Pine Tree (Gadus et al. 2006:81–91, 130). Finally, 41HS574 just to the east had a single radiocarbon date that could slightly predate Pine Tree, with an early two-sigma range of 1270–1320, but it also has a later range of 1340–1390 that is contemporaneous with the initial occupation of the ceremonial precinct and Area 8; further, the ceramics tie this site to Pine Tree (Gadus et al. 2006:130, 172). In short, Caddo groups used the ridge between Potters and Starkey Creeks during the centuries preceding the founding of the Pine Tree Mound site, but that use was limited in kind and intensity, too limited to see it as directly ancestral to the Pine Tree Mound community.

Moving slightly farther afield, the Resch site (41HS16) on Potters Creek 1.6 km south of Pine Tree supports the conclusion of sparse Caddo occupation here before settlement of Pine Tree Mound (Figure 9). Resch yielded a fair number of early arrow points (Alba, Bonham, Catahoula, Colbert, and Friley; Webb et al. 1969:55–56), but most are Frileys and go with the strong Woodland component there. Much of the pottery also probably goes with this early occupation, including examples of Williams Plain, Tchefuncte Plain and Stamped, Alexander Pinched, Troyville Stamped, and Marksville Stamped, although there are some sherds of Coles Creek Incised, Hickory Engraved, and Davis Incised that fit better with occupation during the Early Caddo period (Webb et al. 1969:32–40). Resch probably has the most substantial Caddo component predating Pine Tree among the tested and excavated sites in the vicinity, but it seems too early to be related directly to it and not substantial enough to represent an occupation by settled Caddo villagers.

The Caddo component at Resch may well be a campsite or non-residential outlier associated with the Early Caddo ceremonial and civic center at the Hudnall-Pirtle site on the south side of the Sabine River, ca. 14 km southwest of Pine Tree Mound (see Figure 9). Hudnall-Pirtle yielded four radiocarbon dates, three of which suggest it was occupied between A.D. 980 and 1265 (Bruseth and Perttula 2006:74, 78, 81, 82, 147–148), although some of the ceramic assemblage looks earlier, and a longer span than this years would be expected given its size (1,100 x 400 m) and complexity (eight constructed mounds, a plaza, three borrow pits, and multiple residential areas). Alba, Catahoula, Colbert, and Steiner are the main arrow point styles, with Friley and Scallorn points being minor types and just single examples of Perdiz and Bassett (Bruseth and Perttula 2006:100–107). The ceramics are firmly Early Caddo, consisting of the types Coles Creek Incised, Crockett Curvilinear Incised, Davis Incised, Hickory Fine Engraved, Holly Fine Engraved, Kiam Incised, Pennington Punctated-Incised, Spiro Engraved, and Weches Fingernail Impressed (Bruseth and Perttula 2006:82–95). Based on the radiocarbon evidence, Hudnall-Pirtle might be seen as a good candidate for a community that was ancestral to the one at Pine Tree Mound. There are two arguments against this, however. First, the dates suggest a lapse of perhaps a century between abandonment of Hudnall-Pirtle and occupation of Pine Tree, especially the main period of use of the latter. Second, the ceramics from the two sites are dramatically dissimilar, suggesting they are the products of different traditions.

What is missing at Hudnall-Pirtle that would make it a better candidate for an ancestral community are remains bridging the Early and Late Caddo intervals. Just such remains are present at two other nearby excavated sites, though, and this is where we may need to look to understand how Pine Tree Mound came to be. The better-understood of these two is the Oak Hill Village site in Rusk County, 35 km southwest of Pine Tree and 21 km southwest of Hudnall-Pirtle (see Figure 9). Oak Hill Village is a large site with evidence of about 40 structures and one mound (Rogers and Perttula 2004). Radiocarbon dates indicate a main Caddo occupation between A.D. 1150 and 1450, with the most intensive village occupation, including construction of the mound and arrangement of houses around a plaza, after 1250 (Rogers and Perttula 2004:345–347). Arrow points consist of both early forms (Alba and Bonham) and later ones (Perdiz, Bassett, and Perdiz/Bassett) (Rogers and Perttula 2004:167–175). The ceramics are quite varied, with most of the many types identified or suggested—Crockett Curvilinear Incised, Davis Incised, Dunkin Incised, Hickory Fine Engraved, Holly Fine Engraved, Kiam Incised, Killough Pinched, Nacogdoches Engraved, Pease or Reavely Brushed-Incised, Pennington Punctated-Incised, Tyson Engraved, Washington Square Paneled, and Weches Fingernail Impressed—being Early to Middle Caddo (Rogers and Perttula 2004:211–258).

The second site, 41HS74, is on Hatley Creek, a northern tributary of the Sabine River, 8 km west of Pine Tree Mound and 8 km north-northeast of Hudnall-Pirtle (Heartfield, Price and Greene, Inc. 1988; see Figure 9). No houses were detected, probably because of the thick sandy sediments, but

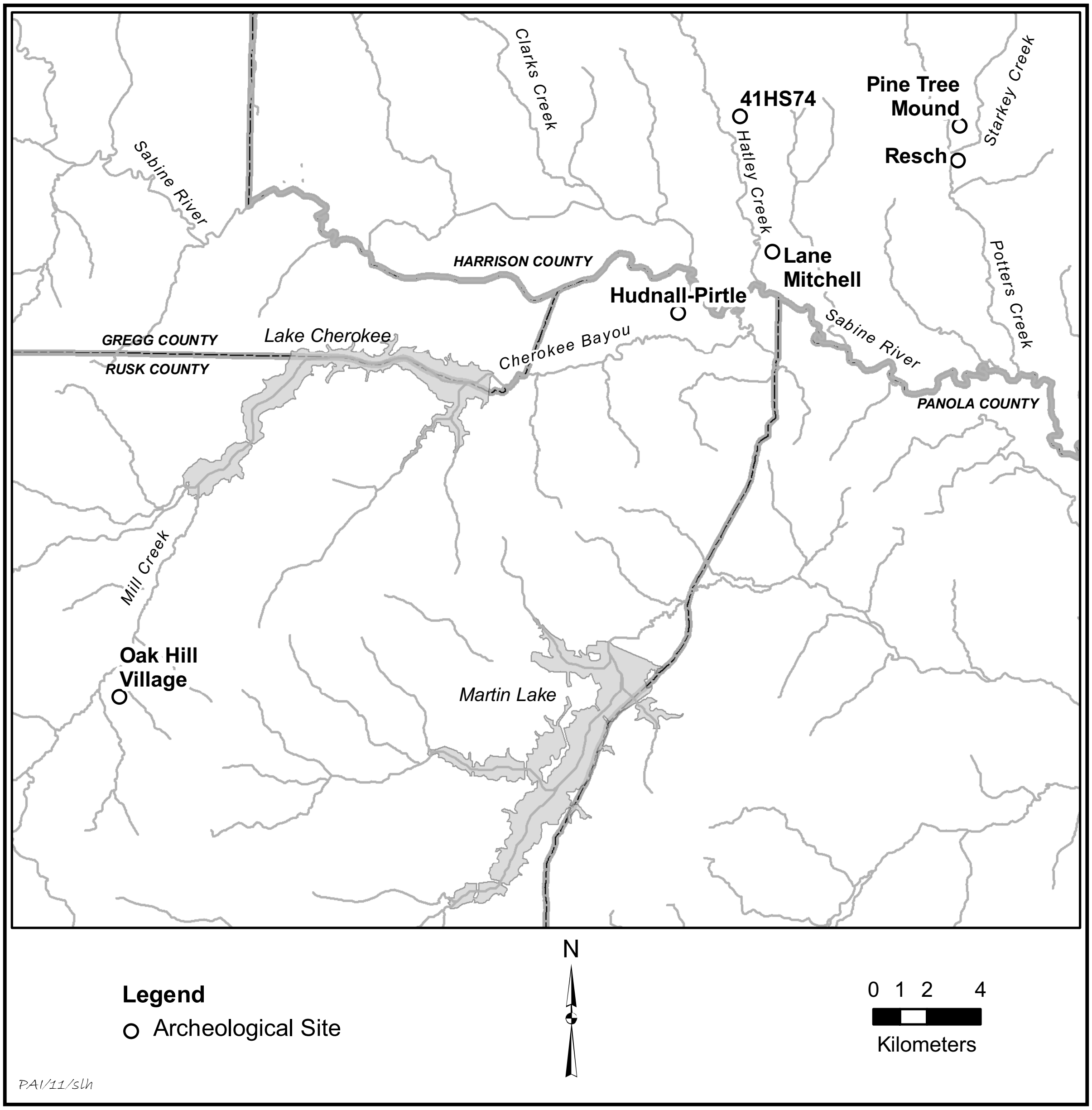

Figure 9. Map showing the locations of the Pine Tree Mound site relative to the Resch, Hudnall-Pirtle, Oak Hill Village, and Lane Mitchell sites and 41HS74.

a small cemetery with nine burials, probably Middle Caddo in age, was found (Heartfield, Price and Greene, Inc. 1988:4-25 through 4-31). The burials were oriented with their heads to the southeast or south, very similar to the pattern at Pine Tree. The single pre-modern radiocarbon date is not at all useful for assessing the chronology of the site, as it spans almost 500 years of the Early, Middle, and Late Caddo periods (Heartfield, Price and Greene, Inc.:1988:13-1). Like Oak Hill Village, 41HS74 yielded both early arrow points, mostly Alba and Bonham, and later ones typed as Perdiz (Heartfield, Price and Greene, Inc. 1988:7-1 through 7-8). This is consistent with the identified ceramics, which consist of a mix of earlier and later types, including Carmel Engraved, Crockett Curvilinear Incised, Hickory Fine Engraved, Holly Fine Engraved, Pennington Punctated-Incised, Maydelle Incised, Pease Brushed-Incised, and Glassell or Ripley Engraved (Heartfield, Price and Greene, Inc. 1988:6-1 through 6-46). There is room to question some of these typological identifications, but nonetheless it does appear that 41HS74 contains one or more substantial components that predate Pine Tree Mound, though perhaps not by much. Some of the artifacts point to some temporal overlap with Pine Tree as well.

What Oak Hill Village and 41HS74 suggest is that abandonment of the Hudnall-Pirtle complex in the A.D. 1200s was associated with decentralization of political and religious authority in the middle Sabine basin, with residential sites that were scattered throughout the countryside, and that were occupied initially during the height of Hudnall-Pirtle's power and probably were connected to it, perhaps gaining greater autonomy. This would explain not only the artifact assemblages at these two sites, but also the mound built at Oak Hill Village after 1250. Perttula (2004b:40) sees the events of the Middle Caddo period in the middle Sabine basin as being typical of what was happening across the Caddo area at that time, representing the establishment of "many independent social communities," which he ties to intensification of maize agriculture and "loosening [of] the longstanding ties between the public and ritual, and the secular and residential, at least at the regional scale."

The evidence that these region-wide changes in Caddo society in the A.D. 1200–1400 interval were associated with changes in agricultural economies is strong, but they also appear to have been connected to political changes. In the Early Caddo period, the elites who lived and ultimately were buried at sites such as George C. Davis and Gahagan, and almost certainly Hudnall-Pirtle, may have derived their authority from an ability to operate within a far-reaching exchange network. Clearly, they had the capacity to acquire and control symbols of power that were exotic to the Caddo area, as represented by things such as marine shell cups, gorgets, and beads; Gahagan bifaces and arrow points fashioned from non-local chert; large spatula-shaped celts; copper artifacts; masses of galena; and stone effigy pipes (Girard 2010:201–202; Story 1997; Webb and Dodd 1939). These were part of a corpus of themes and motifs that helped foster local political elites across the Mississippian world (Brown et al. 1990:255–272; Knight 1986; Mann 1986:22–23). However, Muller (1995:320) posits that after 1300 the use of these symbols, especially as fashioned from exotic materials, became attenuated. This seems to have engendered regionalization in long-used cultural themes and motifs (Reilly and Garber 2007:3). For the Caddo, this involved changes in political regionalism, which were given expression on the canvas of locally made ceramic vessels.

The slow start to the development of the Pine Tree Mound site can be seen as the infancy of one local political elite, starting in the A.D. 1300s and accelerating after 1400. However, we suggest that the Pine Tree Mound community was settled by Caddo people who already lived in the vicinity, just not much in the Potters Creek valley itself. Because excavated sites are few, it is hard to say much about how large an area they occupied before creating Pine Tree, but the two sites noted above (Oak Hill Village and 41HS74) suggest it could have been sizeable, encompassing tributary valleys both north and south of the Sabine River. Hudnall-Pirtle may not have been directly ancestral to Pine Tree Mound, but it is possible that what came out of Hudnall-Pirtle eventually recrystallized, in a different political form, into the Pine Tree Mound community. One intriguing piece of evidence that could tie these two sites together is the poorly known Lane Mitchell site, which lies 9.3 km southwest of Pine Tree and 3.8 km northeast of Hudnall-Pirtle (see Figure 9).

Lane Mitchell contains four or five small mounds and a borrow pit, with the mounds arrayed roughly linearly for a distance of about 130 m atop the bluff overlooking the Hatley Creek valley just north of where it meets the Sabine River floodplain. There is no obvious plaza, although too little work has been done there to say much about the overall site layout, and the mounds seem not to be associated with numerous surrounding village areas like Pine Tree, judging from the survey data. Limited excavations in 1919–1920 (Pearce 1919, 1920) and again in 1998 (Keller 2000) indicate that most or all of the mounds contain burned structures, presumably ceremonial in nature. Based on examination of the ceramics from the early excavations, Thurmond (1981:48–49) suggests that the site dates to the Late Caddo period, making it contemporaneous with the Pine Tree Mound site. Recent examination of 189 sherds collected from the surface in the 1998 work supports this conclusion, based on the low plain to decorated sherd ratio of 0.6 to 1 and the high percentage of brushing among the decorated sherds (62 percent). Just how Pine Tree Mound and Lane Mitchell are related is unknown, but the fact that the latter sits astride a straight northeast-southwest line drawn between Pine Tree and Hudnall-Pirtle, on a high spot with the Sabine floodplain beyond, suggests that it may have served as a geographic marker connecting the old center of power and authority (Hudnall-Pirtle) with the new (Pine Tree Mound).

WHAT HAPPENED TO THE PINE TREE MOUND PEOPLE?

We have already alluded to what may have happened to the people who lived at the Pine Tree Mound site after its heyday in the A.D. 1400s and 1500s, with at least part of the answer potentially lying in an archeological construct proposed in the 1960s by Buddy Calvin Jones: the Kinsloe phase (Jones 1968). He defined this construct to account for a series of sites in Gregg, Rusk, and Harrison counties where graves containing Caddo pottery and historic trade materials had been found. Jones (1968:211–212) concluded that these sites, dating perhaps as early as the late seventeenth century and as late as the early nineteenth century, could be related to several named Caddo groups, with the most likely one being the Nadaco, or the descendants of the Nondacao Caddo who Moscoso met in 1542 (Perttula 2007). One branch of the Nadaco apparently had moved south into the Angelina River basin to be near the Hasinai Caddo by 1717, but the account of Pedro Vial's journey indicates that a northern branch was still living in this part of the Sabine basin in 1788, occupying a village with 13–15 houses scattered over a distance of 3 leagues, or about 13 km (Perttula 1992:175–177).

The Kinsloe phase included the following sites: Ware Acres (41GG31) near Longview in southern Gregg County; Kinsloe (41GG3) near Kilgore in southern Gregg County; Cherokee Lake (41RK132) in northern Rusk County southeast of Kilgore; Millsey Williamson (41RK3) in Rusk County southwest of Tatum; C. D. Marsh (41HS269) on Eightmile Creek about 1.6 km north of where it flows into the Sabine River in southern Harrison County; and Susie Slade (41HS13) and Henry Brown No. 1 (41HS261) in southern Harrison County. The latter two are quite close to Pine Tree Mound, just 2.1 and 4.3 km south of it on Potters Creek (Figure 10). Along with two other similar sites nearby, they may mark the locales where the people of the Pine Tree Mound community lived after they abandoned the village at 41HS15. One of the other sites is Henry Brown No. 2 (41HS262), which is just across Potters Creek from Henry Brown No. 1. The other is 41HS770, which is on Potters Creek between the Susie Slade and Henry Brown sites (see Figure 10). These four sites span a 2.2-km-long north-south segment of the Potters Creek valley.

The problem with determining if and how these sites are connected to Pine Tree Mound is that none are well documented. Most of what we know about the Susie Slade site is based on information Jones gathered from individuals who looted it in 1962, although Jones did excavate three burials there, and personnel with the Texas Archeological Salvage Project (of The University of Texas at Austin) removed two others (Jones 1968:98–125; Scurlock 1962). Looters reportedly excavated some 50 graves at Susie Slade, most in an area ca. 50 m in diameter. The burials were 6–13 ft apart in a checkerboard pattern, suggesting a planned cemetery. Most had single individuals, though one or two had two people. The interments were extended with heads to the east or southeast. Bone preservation was good in several but poor in most. Almost every grave had five or more ceramic vessels, and one without historic materials had 25 vessels. Green and gray pigments were common as offerings. Small quantities of historic materials were found in about 15 graves, typically one or two strings of beads or one or two metal items per grave.

The three burials that Jones excavated consisted of the following: (1) a male with head to the east accompanied by seven vessels, glass beads, an iron knife, a polishing stone, and red and green pigments; (1) a female with head to the east accompanied by eight vessels, conch shell beads, gray pigment, and a deer jaw; and (3) a male with head to the southeast accompanied by seven vessels. Jones classified the 22 vessels recovered as six Natchitoches Engraved, four Emory Punctated, three Simms Engraved, three La Rue Neck Banded, one Darco Engraved, one Taylor Engraved, two other engraved, one effigy vessel, and one plain. Other kinds of pottery he observed in a looter's collection included Patton Engraved, Cass Appliqued, Bullard Brushed, Maydelle Incised, red-filmed bottles, and rattle bowls. The collection also contained two or three elbow pipes, a Bassett arrow point, a Gary dart point, a large flint knife, one or two celts, shell beads, glass beads, iron arrowheads/knives/awls, and a brass disk.

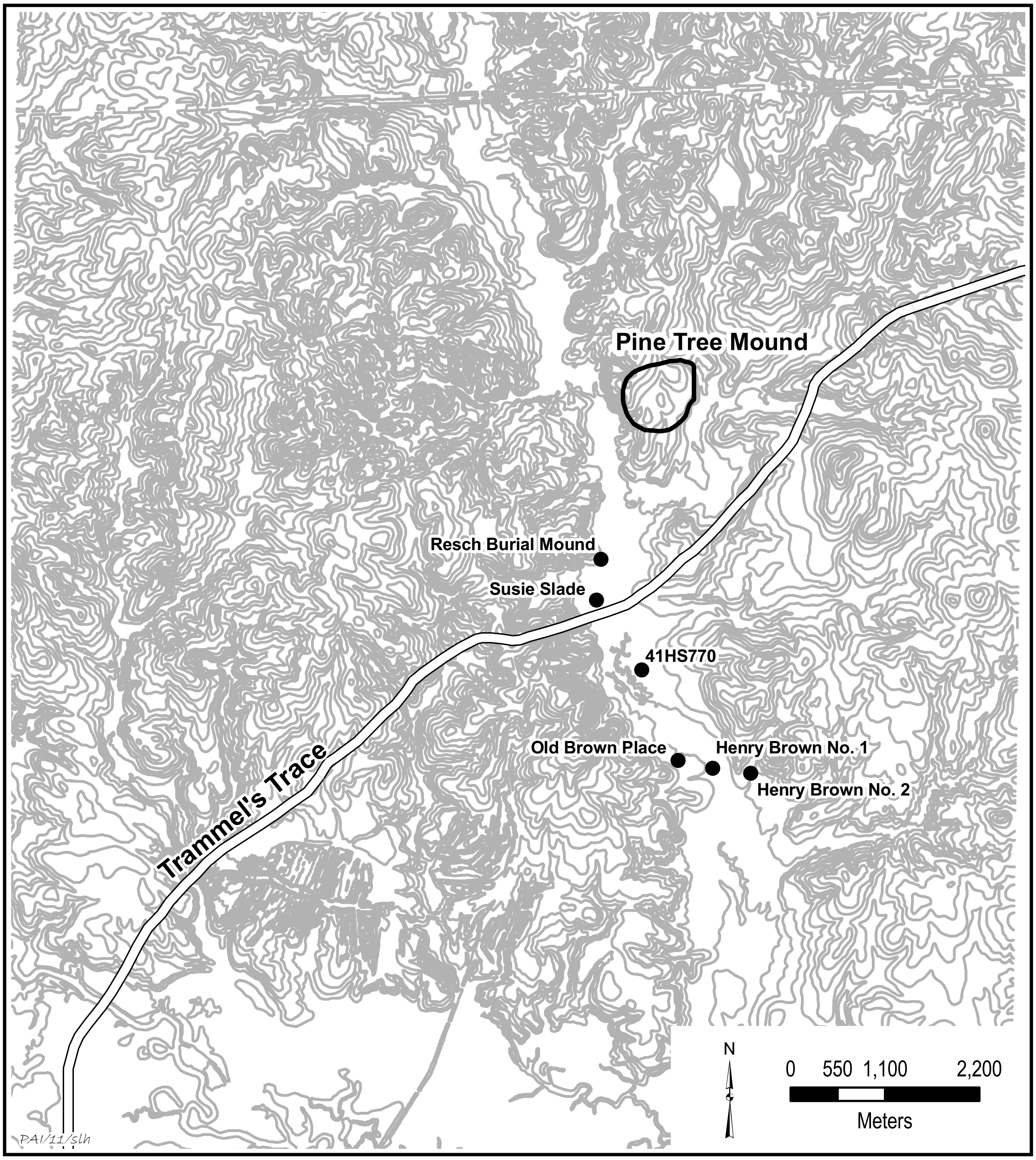

Figure 10. Map showing the location of the Pine Tree Mound site relative to the Susie Slade, Henry Brown, Resch Burial Mound, and Old Brown Place sites, 41HS770, and the route of Trammel's Trace.

J. Dan Scurlock and other personnel with the Texas Archeological Salvage Project excavated two burials at Susie Slade, also in 1962. One was a previously dug grave that Scurlock reopened to recover bones; it was oriented with head to the east and contained glass beads, conch shell beads, and a Fresno point that the looters had left behind. The other also had an eastward orientation and contained five vessels (one Simms Engraved, one Ripley Engraved, one Taylor Engraved containing green pigment, a small punctated jar, and a small engraved bottle), as well as glass and shell beads. Another grave was documented during this effort as it was exposed by road grading and removed by looters. It also was oriented to the east, and it contained at least six vessels (three are described as Simms Engraved, Hodges Engraved, and a plain miniature bottle). Scurlock examined the collections held by two of the looters, which consisted of more than 110 ceramic vessels. He identified Simms Engraved bowls as being most common, followed by Natchitoches Engraved, Ripley Engraved, Clements Brushed, vessels with appliqué, plain vessels, miscellaneous engraved vessels, spool-necked bottles, Hodges Engraved, rattle bowls, effigy vessels, and Patton Engraved. Scurlock also collected 129 sherds from the surface: 51 plain, 41 engraved, 19 incised, 10 brushed, 4 punctated, 3 neck banded, and 1 appliquéd, with some typed as Taylor Engraved, Patton Engraved, Natchitoches Engraved, and Hodges Engraved.

The Henry Brown No. 1 site consists of a small cemetery and possible village areas nearby (Jones 1968:126–155). Nine burials were found there, two excavated by looters in 1962 and seven dug by Jones in 1963 and 1965. The graves were 3–15 ft apart and, as at Susie Slade, in a checkerboard pattern. The only one containing bones had the head oriented to the east. The other grave pits were oriented similarly, though (three to the east, four to the southeast, and one unknown). Virtually nothing is known about one of the two looted graves, except that it contained several ceramic vessels and no historic materials. The other eight graves were reported to contain 3–14 ceramic vessels each, with two graves having three elbow pipes, one grave having a large chert knife and 28 bipointed knives, one grave having seven Fresno arrow points and one Scallorn point, one grave having red pigment, two graves containing three iron knife blades or arrow points, and two graves containing glass beads. Historic materials, consisting of single strings of glass beads or small iron objects, were found in a total of three graves. Jones classified the 38 vessels he recovered as follows: 10 Simms Engraved, 6 Darco Engraved, 4 Taylor Engraved, 4 Emory Punctated, 3 Natchitoches Engraved, 2 Patton Engraved, 2 other engraved, 2 Maydelle Incised, 2 Bullard Brushed, 1 trailed, and 2 plain.

Jones (1968:127) knew about the Henry Brown No. 2 site, saying that it was similar to Henry Brown No. 1 with burials containing historic materials and village areas, but he did not include it in the Kinsloe phase because he did not have detailed information on it; this probably means that he had not dug any graves there, and that the looters had not shown him what they had found. Virtually all we know about this site is what Webb et al. (1969:8–9) report: "a number of burials contained glass trade beads, a brass or copper disc, and pottery vessels of types Keno Trailed, Patton Engraved, Taylor Engraved, Natchitoches Engraved, Wilkinson Incised, Cass Appliquéd, Maydelle Incised, Clements Brushed, and Bullard Brushed. Arrow points were predominantly leaf-shaped, of Nodena type, with a few of Maud type."

Finally, even less is known about 41HS770. Keller (2000:112–113) recorded it in 1997, excavating seven shovel tests and not finding much. He observed many potholes, mostly oriented east-west, and noted that an informant said that "the assemblage was characterized by historic contact materials including gunflints, glass beads, hawkbells, and Natchitoches Engraved vessels."

The argument that these four sites could mark the descendant Pine Tree Mound community hinges first on their ages. The historic materials in the graves indicate clearly that they are at least partly, and maybe wholly, more recent than most of the archeological remains at Pine Tree Mound. The large blue glass beads from Susie Slade and Henry Brown No. 1 suggest occupation during the first quarter of the A.D. 1700s (Perttula 2007:118), shortly after the last main village occupations at Pine Tree. This is supported by the overall scarceness of historic materials at these sites and the fact that such artifacts are not ubiquitous, occurring in fewer than a third of the graves where this information is known.

A second part of the argument centers on the fact that, within the vicinities of these downstream sites, it appears there were continuities with earlier occupations that surely were contemporaneous with Pine Tree. Thus, this part of the Potters Creek valley was part of the Pine Tree Mound community before sustained contact with Europeans. Evidence for this comes from two sites, Resch Burial Mound (across the creek from, and not the same as, the Resch site) and the Old Brown Place (see Figure 10). The former (41HS14) is about 350 m north of the Susie Slade site. It apparently contained a looted cemetery where bone preservation was negligible and where grave goods included vessels of the types Ripley Engraved, Wilder Engraved, Hodges Engraved, Glassell Engraved, Cass Appliqued, Pease Brushed-Incised, Karnack Brushed-Incised, Belcher Ridged, and Taylor Engraved, as well as Bassett and Perdiz arrow points and celts, but no historic materials (Jones 1968:124; Webb et al. 1969:7–8). Jones (1968:124) notes both similarities and differences in the vessel assemblages from the Resch Burial Mound and Susie Slade, and he says "as a whole, burial ware from [Resch Burial Mound] is smaller, lacks bulbous shapes, spool necked bottles, and modified or rounded bases in comparison to ware from the Slade site." Focusing on the shared ceramic types, he suggests that Resch Burial Mound was ancestral to Susie Slade.

The Old Brown Place (41HS260) is about 400 m west of Henry Brown No. 1. Little is known about it, but Webb et al. (1969:8) report that three vessels from a single burial and sherds from the surface represent an early Titus phase occupation predating the occupations at Henry Brown Nos. 1 and 2 (or at least the ones that produced the burials). Two of the vessels resembled Ripley and Avery Engraved.

Finally, there are similarities between the burials at Pine Tree Mound and Susie Slade and Henry Brown No. 1 that hint at continuities in mortuary traditions, though some of these certainly are common to Late Caddo burials in general. These include the following: some burials with southeastern orientations, elbow pipes and celts as offerings, comparable numbers of vessels, pigments as offerings, clustered arrow points and other chipped stone tools, and graves containing multiple individuals.

These similarities notwithstanding, there are some notable differences. Most of the documented graves at Susie Slade and Henry Brown No. 1 were oriented east-west, though some were northwest-southeast like some of the graves at Pine Tree. Another difference involved the placement of ceramic vessels in the graves. At Susie Slade and Henry Brown No. 1, graves often had a large bottle and a medium-sized to small bowl or jar in the fill above the head and a small bottle on the floor at the head (assuming the heads were to the east or southeast). At Pine Tree, large bottles were on the grave floor generally near the head, and small bottles, bowls, or jars were situated at various places.

The most glaring differences, though, are in the vessel assemblages. While there are six ceramic types that occur in the burial assemblages from both Pine Tree Mound and Susie Slade/Henry Brown No. 1—Taylor Engraved, La Rue Neck Banded, Maydelle Incised, Cass Appliqued, Hodges Engraved, and Ripley Engraved—all but Ripley Engraved, which is ubiquitous at Pine Tree, are minor types. The Ripley Engraved bowls and bottles and Pease Brushed-Incised jars most common at Pine Tree are rare or totally missing from the Susie Slade and Henry Brown No. 1 graves (acknowledging that only a fraction of the vessels recovered at Susie Slade were documented). Replacing Ripley and Pease are Natchitoches/Hodges Engraved bowls and bottles, Simms/Darco Engraved bowls, and Emory Punctated jars.

The short-necked (spool-necked), bulbous-bodied Natchitoches/Hodges bottles are very different than the long-necked, bell-shaped Ripley bottles. Bowl forms too are dissimilar, with the recurved body of Natchitoches Engraved bowls contrasting with the angular carinations seen on the Ripley bowls. Lacking on the Natchitoches/Hodges bowls is the common use at Pine Tree of scalloped and peaked rims, suggesting that the potters had different ideas about how the bowl itself served as a canvas for motif construction. The scroll and swirl motifs on the Natchitoches Engraved bowls clearly revolve around the bowl base instead of being restricted to the space above the first carination as on Ripley bowls from Pine Tree. The distinctive short, sharply inverted rim on a deep body characteristic of Simms Engraved "hub cap" bowls also is missing at Pine Tree, as is the small bowl form with globular body and short everted rim decorated with ticked panels that Jones (1968:161–163) calls Darco Engraved. Perttula (2007:116–119) suggests these are a local variant of Simms Engraved and calls them variety Darco, since they were not found at any of the other Kinsloe sites. If he is right, they may indicate a local response to ceramic influences from beyond the Potters Creek valley, though the form bears little resemblance to any of the bowl forms at Pine Tree Mound.

In sum, the differences in vessel forms and motifs between these two groups of ceramic types suggest that most of the Susie Slade/Henry Brown No. 1 assemblage did not develop out of the ceramics made at Pine Tree Mound. Their antecedents appear to lie elsewhere. Based strictly on the types involved, the obvious directions to look are east (Natchitoches/Hodges and Emory) and north (Simms and Emory) (Perttula 1992:127–128, 131, 153–154, 166). Though these types occur widely across the Caddo area in early historic contexts, they are most common in the Red River valley below and above the Great Bend. Of course, the fact that these styles of pots do occur over such a wide area is one of the things that makes it hard to know what to make of their prominence at Susie Slade and Henry Brown No. 1. Caddo-made pottery was involved in extensive trade in the A.D. 1700s (Perttula 1992:168), but there also was much movement of people.

One way of interpreting the evidence from the Potters Creek valley is that it does contain the remnant resident population of the Pine Tree Mound community, but one that was being affected in profound ways by interactions they and other Caddo groups were having with Europeans, starting in the late A.D. 1600s and accelerating through the 1700s and into the 1800s. That this was happening throughout the Caddo area is axiomatic, but this explanation is especially apt for this part of Harrison County because the Hasinai Trace, and after that Trammel's Trace, traversed it, crossing Potters Creek near the Susie Slade site (see Figure 10). With so many changes afoot, and so much movement of people and interaction between groups, both Native and not, it is little wonder we see differences in burial practices compared to the prehistoric practices at Pine Tree Mound. Hence, it seems likely that what is visible archeologically in this area, in this subset of the Kinsloe phase, is what remained of a Pine Tree Mound community that had been severely altered by decrease in population through disease and rapid shifts of the centers of political power as Europeans entered the region. Other Caddo groups likely consolidated with or subsumed what was left of this community in the face of these changes, creating an archeological signature different than the one that preceded it.

HOUSE COMPOUNDS AT THE PINE TREE MOUND SITE

The features and artifacts found in Areas 2N, 2S, and 8 at Pine Tree Mound leave little room to doubt whether the structures there were residences. There is nothing in the artifacts or the architecture, such as extended entranceways or prepared floors atop introduced fill, to indicate that these were special buildings. Rather, the structures show a consistency of form, even with the complication of overprinting, that suggests functional consistency as domiciles ranging from 4.8 to 8.3 m in diameter, averaging 6.3 m (excluding the smallest one, discussed below as a possible auxiliary structure). Groups probably ranging in size from four to 11 individuals, with an average of seven, and probably representing single nuclear or extended families lived in these houses. Some houses were built, occupied for a time, and then abandoned, while others were substantially rebuilt up to three times before abandonment. It is likely that rebuilding was dictated mostly by deterioration of construction materials, especially wall posts, and this could explain some of the variation in house size, for example, reuse of shorter recycled posts necessitating smaller houses. Other factors such as changes in family size or status could have been at play as well, but archeological evidence allowing us to address this question is scant to nonexistent.

Architectural consistency is indicated by the fact that central postholes that held construction posts were found in 18 of the 38 structures. Plowing likely destroyed those in the other structures and also is the reason no intact hearths were found above central postholes in any of the houses. However, in one house in Area 2N and another in Area 2S, the center postholes were capped with burned sediment interpreted as remnants of hearths, indicating that this practice probably was common. Otherwise, a small pit, smudge pit, or series of small pits was near many center postholes. Aside from the occasional smudge pits, these pits showed no evidence of burning within them, and thus they appear not to be pit hearths. However, their positions suggest they were integral to activities commonly performed near house centers.

Other than the central pit and post features, overprinting makes it difficult to distinguish structural features within the houses. However, in one Area 2S house complex where overprinting was comparatively limited, an internal posthole pattern was discernible some 50 to 70 cm from the house walls. This pattern extended along the western two-thirds of the house, flanking and opposite the eastern entryway. These interior postholes may represent benches or alcoves along the walls of the house. In addition, a large shallow pit with an intrusive small pit and a smudge pit were along the western wall, opposite the entryway. These pit features suggest that this part of the house was the focus of particular kinds of activities, storage, or even ritual, as an infant burial was found in this position in another Area 2S house. All of these features are consistent with historic descriptions of Caddo houses that mention raised beds or sleeping alcoves, a central communal hearth, and either a special-purpose or storage area across from the entryway (Griffith 1954:99–102).

Features exterior to the houses include postholes, smudge pits, other small pits, and various large pits. It was impossible to determine associations in most cases, but one small circular structure in Area 2N, at 3.5 m in diameter, is a good candidate for an auxiliary building such as a ramada or large granary. Two concentrations of features in Area 8 contain linear alignments of postholes that could be rectangular structures such as ramadas or raised platforms measuring 5.0 x 3.0 and 7.0 x 2.5 m. Most of the exterior features, though, appear to relate to outdoor activity areas positioned around the houses. Feature Cluster B in Area 2S may be one of the less overprinted ones. Covering an area of about 7.5 x 2.5 m, it contains nine possible postholes, two possible postholes/pits, one smudge pit, two small pits, and one large pit. The smudge pit and both small pits are close to one another on one side of the cluster, while the large pit is about 3.4 m away on the other side. Six of the possible postholes, perhaps representing drying racks or similar structures, are in the area between.

Artifact distributions make it clear that the trash that accumulated in and around the houses included things discarded where they were used as well as trash transported a short distance away. There is no indication of consistent trash disposal away from the houses creating large middens. It appears that most activities associated with daily life occurred within the house compounds. The debris includes faunal remains, macrobotanical remains, chipped stone debitage, chipped stone tools, ground stone tools, and ceramic sherds, all representing domestic activities. The many ground stone anvils and grinding slabs used in processing vegetal materials support this conclusion, as do the often-broken arrow points and other chipped stone tools made mostly from local materials, which contrasts with the high proportion of arrow points of imported materials in the burials. The ceramic sherds represent numerous vessels broken and discarded in and around the houses, with the domestic assemblage having a greater proportion of jars used in daily tasks such as cooking and storage than the assemblage included in the graves.

The many overprinted structures and coinciding artifact distributions in Areas 2N and 8 (the plow zone in Area 2S was not sampled well enough to include it in the artifact distributional analysis), each covering about 0.14 hectares, suggest that the house compounds may have been circumscribed to some degree. Whether this was by hedgerows as appear on the A.D. 1691 Terán map of the Nasoni town on the Red River or simply by surrounding cultivated fields is unknown. Whatever it was may have had long-lasting effects, though, since it appears the Caddo (or somebody) returned to Area 2 in the eighteenth century to live or camp right on top of the remains of the earlier village.

Considerable attention was given in analyzing the excavation data to trying to determine whether the house compounds in Areas 2 and 8 represent use by particular families or lineages by looking at identity, role, and status information gleaned from the burials. Acknowledging that there is ambiguity about which set of houses the Area 2 cemetery actually goes with and that the burials in both areas contain only a sample of the people who resided there, that analysis indicates that the two have similar percentages of high-status graves with similar kinds of offerings and similar average numbers of vessels per grave—10.8 in Area 2 and 10.0 in Area 8—which suggests that the families associated with them were equivalent socially. From this perspective, the house compounds look like functionally and socially equivalent parts of an integrated community.

Differences were noted, however, between the vessel motifs from the Areas 2 and 8 burials. These differences are structural, i.e., in the ways elements were combined, rather than in the use of particular elements. The differences suggest that individual potters controlled how meaning was expressed in ways that conveyed family identity. For instance, bowls decorated with scroll motifs (including all variations of the central element) are more common in the Area 2 graves than in Area 8. Conversely, bowls decorated with bands of motifs are more common in Area 8. Differences in bowl rim treatment also distinguish the two areas. While bowls from both areas have high percentages of straight rims, peaked rims only appear in the Area 2 graves, and scalloped rims are relatively common in Area 8. Differences also can be seen in bottle motifs. In the Area 2 graves, Ripley Engraved bottles have scroll or circular motif elements that are decorated with pendant triangles. In the Area 8 graves, bottles with pendant triangles are present, but they decorate concentric bands around the body. Thus, bottles decorated with concentric circle or scroll motifs and peaked bowls decorated with scroll motifs may mark the family associated with the Area 2 cemetery, while bottles with bands of pendant triangles and bowls decorated with a band of elements and a scalloped rim would more likely represent the Area 8 family. Of course, burials in both Areas 2 and 8 also have vessel offerings with motifs common to the other, implying a level of integration that is not surprising given the fact they were neighboring members of the same community.

SUBSISTENCE PRACTICES AT THE PINE TREE MOUND SITE

The excavations yielded evidence that fits well with the results of other studies of Caddo subsistence but falls short of contributing as much as it could have if isotopic analyses of human bones from the graves had been done. For example, Wilson (2010) shows that carbon and nitrogen isotope data are much better indicators of certain aspects of human diets, including the importance of maize, than are other commonly used measures, such as dental attrition and caries rates. That said, maize was moderately ubiquitous at Pine Tree, occurring in 55 percent of the flotation samples, and must have been an important food. Other cultivated plant remains recovered are beans, squash, and gourd, although none of these was at all common, presumably because of how they were processed and the poor preservation environment. These are the crops the Caddo grew in their gardens and fields and relied on to support what probably was year-round occupation of the village, at least by part of the community. Maygrass, *Chenopodium,* little barley, and erect knotweed seeds were recovered as well, indicating use of these starchy-seeded annuals.

Most of the other plant remains representing foods (or in some cases perhaps medicines) are hardwood nuts, especially hickory but also acorn, black walnut, and pecan. Sumac fruits, waterlily or pondlily buds, American lotus seeds, Virginia creeper or grape fruits, persimmon seeds, blackberry seeds, verbena nutlets, and bulbs that could be from plants such as wild garlic or camas apparently also were consumed or used, though these remains are few. The sumac remains are important because this plant may have been a colonizer of old agricultural fields. The overall picture is one of a diet based on agricultural products supplemented by wild foods obtained from the site and its environs.

The faunal remains indicate that white-tailed deer supplied the bulk of the animal protein, with primarily terrestrial turtles, rabbits, and squirrels contributing most of the balance. Fish, mussels, and birds apparently were not large parts of the diet. Deer is especially predominant compared to many other Caddo sites. This probably is due to differences in site setting more than any other factor.

LAYOUT AND EXTENT OF THE PINE TREE MOUND COMMUNITY

When talking about the layout of the Pine Tree Mound community, it is necessary to address the question at multiple spatial scales. The first is the immediate environs of 41HS15, including two sites that are recorded separately (41HS573 and 41HS574) but that are adjacent to the arbitrarily defined eastern edge of 41HS15 and surely were part of it. Sites 41HS573 and 41HS574 are known chiefly from testing-level data collected in 2005 (Gadus et al. 2006:41–76). These two sites, which are interpreted as residential in nature, complete a crescent of house compounds around the core ceremonial part of the site, extending from the edge of the Potters Creek valley on the west to the Starkey Creek valley on the east.

Site 41HS573 is on an eastward-projecting interfluve at the northeast edge of Pine Tree Mound, immediately west of Starkey Creek. The landform is bounded on the south by the unnamed spring-fed tributary that bounds the north end of the ceremonial part of Pine Tree. The excavations identified five possible postholes and two pits, most on the southwestern and southern edges of the site overlooking the tributary. These features likely indicate that one or more houses stood here. Though three dart points indicate some Archaic occupation, most of the diagnostic items reflect a predominant Caddo component. These include a Bassett arrow point and 380 vessel ceramics. Just over 50 percent of the pottery is brushed, and the types identified consist of Pease Brushed-Incised, Ripley Engraved, and Taylor Engraved. All five radiocarbon dates have multiple calibrated intervals, with four having intervals too late to relate to the Caddo occupation (at one sigma). All four of these also have earlier intervals, however, that could go with the late dates from Pine Tree (A.D. 1695–1726; 1523–1572, 1630–1690, and 1729–1810; 1695–1726; and 1688–1730). The fifth date has intervals of 1499–1504, 1511–1601, and 1616–1642, with the middle one having the highest probability (0.74). Hence, this component clearly is contemporaneous with Pine Tree Mound, probably representing a village occupied during the latter part of the history of the community.

The eastern part of what remains of 41HS574, also known as the Coleman Farm site, is on a southward extension of the same interfluve that contains 41HS573. This landform is defined by Starkey Creek on the east and the now-dry tributary creek to the west, with the western part of 41HS574 and the southeastern edge of 41HS15 beyond that drainage to the west. At the time the site was first recorded in the 1990s, a looter had used a bulldozer to find and remove several Indian burials, at least one of which was accompanied by ceramic vessels. Perttula and Nelson (1997) report that one of the looted pots had been identified as Natchitoches Engraved, indicating that at least one of the graves could be Historic Caddo. Testing identified a single cultural feature, a pit, and determined that the looter had removed all the graves once present. The 15 dart points among the artifacts analyzed (including a sizeable collection of materials obtained from the surface after the site was looted) indicate a long history of occasional use during the Archaic period, but, as at 41HS573, most of the artifacts relate to Caddo occupations. These include five arrow points (four probably Perdiz and one possibly Bonham) and over 1,000 sherds. Almost two-fifths (38 percent) of the 200 analyzed sherds are brushed; types identified are Pease Brushed-Incised, Ripley Engraved, Taylor Engraved, Cass Appliqued, and Harleton Appliqued. Hence, the site is contemporaneous with Pine Tree Mound. The single radiocarbon date has calibrated one-sigma intervals of A.D. 1276–1306 and 1363–1385 (and two-sigma intervals of 1263–1325 and 1344–1394) and could relate to the early end of the Pine Tree sequence, although this is at odds with the reported recovery of a Natchitoches Engraved vessel. Of course, it is possible the site was occupied at various times, with a comparatively strong earlier Caddo occupation supported by the moderate percentage of brushing.

The Ceremonial Precinct

The place to start talking about the layout of the Pine Tree Mound community is what we have called the core area, and more specifically a subset of that area that was the focus of ceremonial activities. This ceremonial precinct, which was the center of the higher-level religious and political activities for the entire community, extends about 300 m north-south and 230 m east-west, encompassing some 5.7 hectares (Figure 11). At its heart, and covering most of its area, was the plaza. Though this feature may not be as empty as the lack of features, and near-absence of artifacts, in the 15 trenches dug there imply, it does not appear to have contained any substantial buildings. Pauketat (2007:90–95) and others have noted that "central plazas, not the surrounding earthen pyramids, were the anchoring features of these central built landscapes," with "plazas…often designed, engineered, and built at the very inception of a Mississippian town." We think this likely was the case at Pine Tree. Certainly, the construction of Mound C and an off-mound structure just south of it, both defining the southeast edge of the plaza, happened early in the history of the site, and an argument can be made that construction of Mound A on its south edge did too.

The north side of the plaza is defined topographically by the slope down to the spring-fed drainage that separates 41HS15 from 41HS573 and part of 41HS574, and at its northwest corner is one or more burial plots, or perhaps more likely a large cemetery. A few postholes and possible postholes suggest that some of these graves were marked by aboveground poles. This cemetery could contain hundreds of graves, some for high-status members of the community. The radiocarbon evidence indicates that use of this cemetery began early in the history of the ceremonial precinct, if not at the beginning.

Over time, in the A.D. 1400s and 1500s, other ceremonial buildings and probably houses for important people were constructed around the edges of the plaza. Minimally, this happened just east of Mound A, about 50 m north of Mound C, and most dramatically on the southwest side of the plaza. Here, Mound B was created in several stages through the construction and destruction of a sequence of important buildings; a special building with multiple superimposed burned floors was erected off the mound just to its north; and at least two structures, one being a circular one about the size of the houses in Areas 2 and 8 and the other possibly a low small mound, a maze-like building, or even a built-up surface with posts jutting from it, were built between Mounds A and B. The end result was a ceremonial precinct with space for gathered crowds in the middle bounded by tumuli supporting special buildings around its southern sides and a cemetery for important people on its north side. Other buildings with ritual functions and probably houses for people critical to these functions were present at various times and in various places between and around the mounds.

Of course, it is likely that the layout of some components of this part of the site was guided by things associated with the cosmology of the people who worshipped here. Analysis of the burials at the site concluded that the positions of the sunrise and the stars Antares and Sirius were important to the

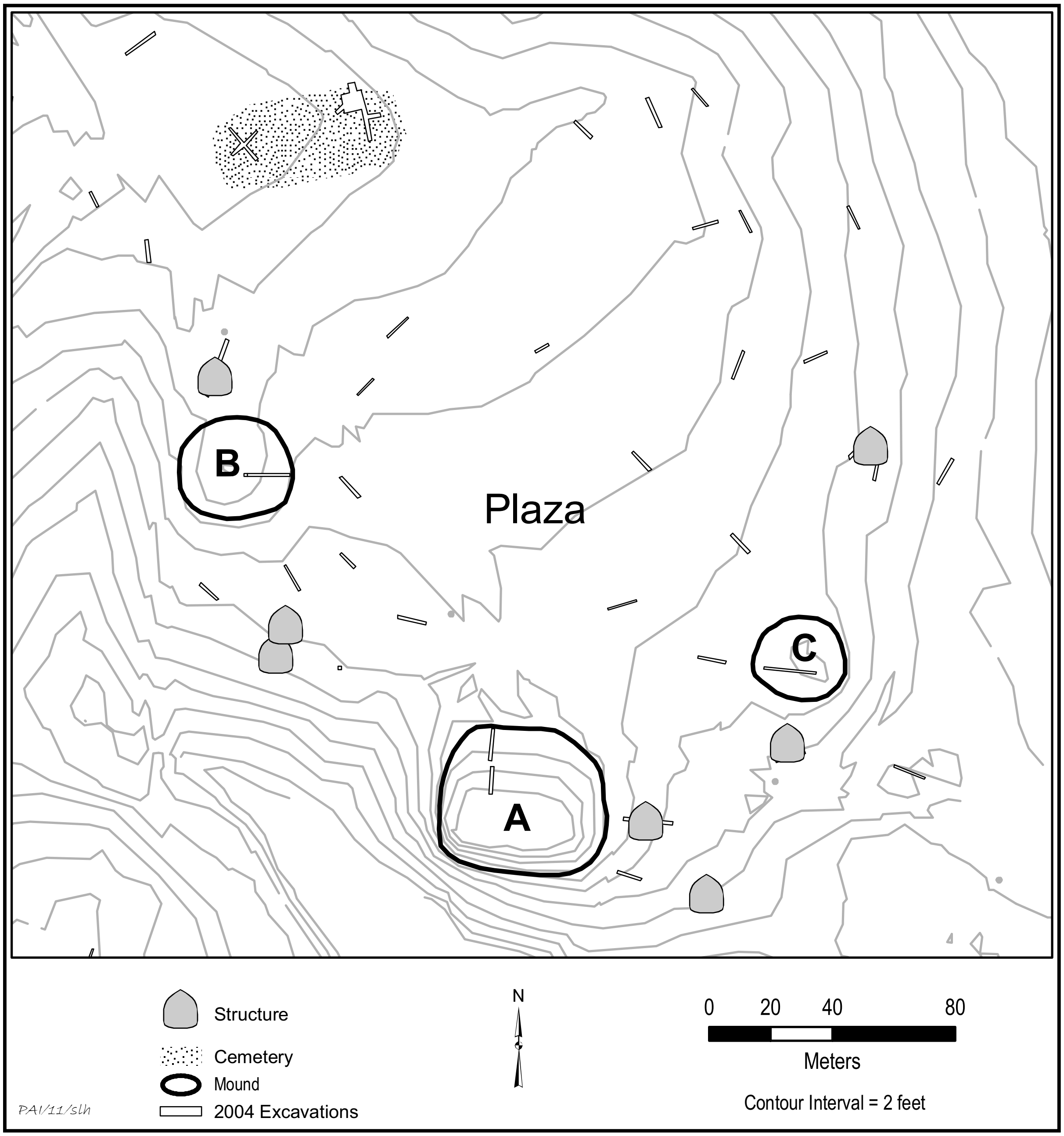

Figure 11. Layout of the ceremonial precinct at the Pine Tree Mound site.

people who lived here. The fact that, when viewed from Mound A, the sun rises over Mound C at the summer solstice supports the first part of this conclusion. The positions of Mound B and the cemetery relative to Mound A (northwest) appear unrelated to sunrise position per se, but they are consistent with the northwest-southeast orientation of the graves, which is perpendicular to the summer solstice sunrise.

Residential Areas Around the Ceremonial Precinct

Including 41HS573 and 41HS574, 10 possible residential areas had been identified immediately around the ceremonial precinct prior to the data recovery excavations in Areas 2, 3, and 8. The subsequent excavations showed that the 2004 testing provided an imperfect picture of these possible villages,

Figure 12

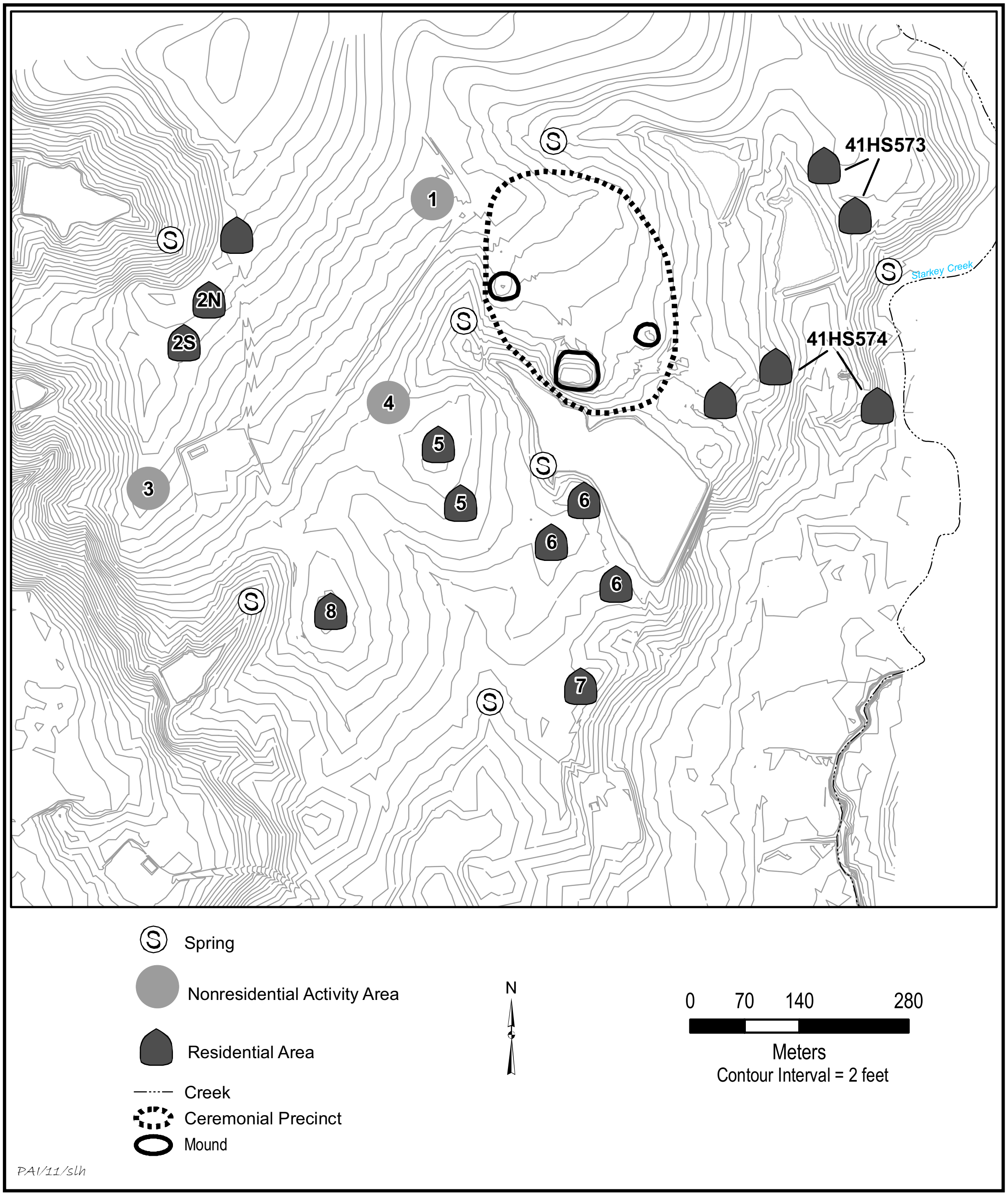

Figure 12. Map showing components of the Pine Tree Mound community around the ceremonial precinct.

however, since one (Area 3) turned out to more likely be a non-domiciliary activity area, and another (Area 2) actually contains two residential areas.

So, with the advantage of hindsight, how many residential areas might there actually be? Our guess is at least 15 (Figure 12). This includes the following: the three in Areas 2N, 2S, and 8; one just northeast of Area 2N, as suggested by artifact distributions there; two in Area 5, judging from the size of the landform and extent of the trenches with archeological materials; three in Area 6, judging from the size of the landform, extent of the trenches with archeological materials, and the fact that this area likely extended farther north than suggested by testing before a modern house was built there; one in Area 7, based on its small size; two at 41HS573, based on the extent of trenches with possible cultural features; two at 41HS574, with one on the east side of the tributary cutting through the site based on the pit there and looted graves nearby and one west of the tributary adjacent to 41HS15; and one at the untested southeast edge of the core area, just west of 41HS574, where many artifacts were found in disturbed areas around a barn and livestock pens. This excludes three areas considered possible villages in 2004: (1) Area 1, because no cultural features were found there, and its proximity to the ceremonial precinct suggests the midden deposits there more likely relate to things that happened in that precinct; (2) Area 3, probably a locus of non-domiciliary activities; and (3) Area 4, because no cultural features were found there, and it consists of a small (25 m in diameter) natural rise surrounded by low marshy terrain that seems better suited to non-domiciliary activities.

These 15 residential areas are as close to the ceremonial precinct as 100 m and as far away as 370 m. The closest ones, at 100–150 m, are in Areas 5 and 6 to the southwest and south, along with the ones at the southeast edge of the core area and in the west part of 41HS574. Somewhat farther away, at about 250 m, are 41HS573 and the east part of 41HS574. The ones in Areas 2, 7, and 8 and just northeast of Area 2 are most distant at 300–370 m. This variability in distance appears to be a function of where places on the landscape best suited for residential occupation were (e.g., elevated spots), as opposed to some sort of planned layout consisting of concentric bands of villages arrayed around the ceremonial area. This is not to say, however, that there might not be differences between the village areas that correlate with distance (status, for example). Because all of the excavated ones are in the group farthest from the mounds, we do not have the capacity to look at this question, though.

While there is some chance that the true number of residential areas is fewer than 15 (e.g., maybe Areas 5 and 6 and 41HS573 and 41HS574 have only single ones), there is a greater likelihood that the actual number is higher. There are two main reasons to think this. First, the 2004 trenching was neither systematic nor very intensive. Thus, there are parts of the site where no trenching at all was done. The Area 2S village, which was not discovered until the 2006 excavations, illustrates the consequences of this.

Second, the ca. 1-m-wide trenches used in testing and the initial stage of data recovery probably are better at finding features when there are lots of them than when there are few. Hence, they are more effective at locating villages that were used for a long time and thus heavily overprinted than ones with short use histories, such as single houses that were not rebuilt. The fact that two of the areas excavated in 2006–2007 are of the former sort supports this conclusion. This opens up the possibility that there could be any number of less-intensively used residential areas that escaped detection in 2004.

So, what did these minimum 15 residential areas look like? Based on what we found in Areas 2N, 2S, and 8, it seems that, more often than not, each consisted of a single circular pole-and-thatch house averaging 6.3 m in diameter. Two houses may have stood simultaneously in some areas at certain times, but this appears to have been the exception rather than the rule. Auxiliary structures such as ramadas and granaries probably were present as well, though these are not well-defined in the Pine Tree Mound site data set. Outside activity areas relating to various mundane activities also are indicated, and these likely were associated with less-substantial structures such as drying racks and wind screens. The evidence from the excavated ones suggests that most residential areas were not occupied continuously. A house was built and then rebuilt once, twice, or three times, spanning perhaps no more than 40 years, and then that area was abandoned for a period of time before being reoccupied again and a new house built. These can be seen as multi-generational house compounds, just not ones that had a simple use history of genesis followed by continuous use and then abandonment. What spurred the ebb and flow of occupation is unknown, although it could relate to events such as the death of a lineage head, for example. As noted above, there may well be other kinds of residential areas that were occupied for single generations or less, though we have no concrete evidence of this.

From this characterization, it is fair to say that calling these village areas, as we did commonly during the project, is misleading. Single houses do not make villages. Multiple houses do, and it is the aggregate of the residential areas in use at any one time that made up the Pine Tree Mound village. Trading the likelihood that not all residential areas were occupied at the same time off against the possibility of some undiscovered and unimagined ones, maybe mostly single-house ones but perhaps one or two with more-complicated histories, it probably is reasonable to suggest that, at its height, the nucleus of this village consisted of about 15 houses and their auxiliary structures situated strategically around the ceremonial precinct, which had its complement of ceremonial buildings and houses for elite group members. Assuming three houses in the ceremonial precinct, and using the average family size of seven individuals proposed for Areas 2 and 8, it appears likely that about 125 people lived in this village. In general, this village looks much like what Terán mapped at the Nasoni Caddo village on the Red River in A.D. 1691.

Other Landscape Components Associated with the Pine Tree Mound Village

Aside from the house compounds and ceremonial precinct, other landscape components that contributed to the character of the site included non-residential activity areas, cultivated fields, cemeteries at some distance from residential areas, freshwater springs and drainages, borrow areas where the more than 5,000 m^3 of fill used for mound construction was obtained, and pathways or lines of sight.

There are three known concentrations of cultural materials outside the ceremonial precinct that are interpreted as something other than residential areas (see Figure 12). Area 3 is the only one we know much about. With just 11 cultural features (two probable postholes, one possible posthole, one possible posthole/pit, three small pits, three large pits, and one burned rock concentration) found there in testing and data recovery, it appears not to contain any houses. While it likely represents a large activity area, there is little indication in the artifacts that those activities were much different than those performed in the residential areas. The only notable exception is the relatively frequent occurrence of ground stone anvils and grinding slabs, suggesting an emphasis on plant food processing (30 percent of those found during data recovery are from Area 3). One possibility raised by the two late radiocarbon dates is that the Caddo used this part of the ridge top, immediately overlooking the Potters Creek valley to the west, first for growing crops and only later for artifact-producing activities.

The other two possible nonresidential locales—Areas 1 and 4—are known only from testing data. Their interpretations are based on the fact that no features were found there (other than a midden in one), the location of Area 1 adjacent to the ceremonial precinct, and the small size of Area 4. There is nothing in the artifacts collected that makes these areas look different, though, and interpreting them as non-residential is speculative.

Cultivated fields, noted as possibly having been in the vicinity of Area 3, likely occupied much of the ridge where houses and other things the Caddo built were not present, with fields shifting around as house compounds were created, expanded, and abandoned. There is no direct archeological evidence for fields near the house compounds, but the presence of sumac wood and seeds in village area features may be indicative of this, as sumac grows best on disturbed land such as abandoned agricultural fields. Most of the ridge between Potters and Starkey creeks contains well-drained Bernaldo fine sandy loam soils, which the U.S. Department of Agriculture today classes as prime farmland[1] and probably would have been better suited to prehistoric agriculture than the Iuka fine sandy loam and Bibb silt loam soils that occur on the adjoining Potters and Starkey Creek floodplains. Of course, this does not mean the people of the Pine Tree Mound community did not sometimes plant crops on sandier, more-elevated parts of the floodplain or in uplands with non-Bernaldo soils, just that their larger fields may have been concentrated in areas with this soil. Bernaldo soils, along with three other minor ones also considered prime farmland (Scottsville very fine sandy loam, Bowie very fine sandy loam, and Metcalf-Cart complex), are extensive both north and south of the site and also occupy upland areas to the east across Starkey Creek and west across Potters Creek. About 41 percent of the 706 hectares within 1.5 km of the center of the site, or 289 hectares, is considered prime farmland by modern standards. Clearly, the Pine Tree Mound Caddo had ample room to raise crops.

The presence of family cemeteries removed from residential areas is suggested by the one found in Area 2. We are not certain which village area those graves go with, but there is an argument that they are associated with some of the houses in Area 2N about 60 m away. This contrasts with the situation in Area 8 where all of the graves were close to the houses and thus within or very near the compound. Such cemeteries could have been marked by poles or other visible elements, as was suggested for the cemetery in the ceremonial precinct (no postholes were recorded in the Area 2 cemetery, but only obvious ones would have been found in the rapid stripping done in this area).

Seven freshwater springs were on and adjacent to the site as of 2004, and, though direct archeological evidence is lacking, these probably were the main sources of water when the site was occupied (see Figure 12). The spring at the head of the dammed drainage on the west edge of the ceremonial precinct was still productive enough to water cattle in 2004. If these sources, and perhaps others undiscovered in the drainages on the site, did not fill the residents' water needs, Potters and Starkey Creeks were short walks away. Presently, at their nearest points Starkey Creek is 460 m east of Mound A and Potters Creek is 300 m west of Area 3.

The springs also likely had cosmological significance as portals to the underworld. The underworld, or lower realm, of the multi-level cosmos represented by Mississippian iconography was considered a watery world below the earth-disk that was ruled by the Great Serpent or Horned Serpent (Lankford 2007:108–109). It probably is no coincidence that Mounds A and B are close to springs, with the springs linking the mounds to that watery realm. The Great Serpent also had a celestial manifestation that has been linked to the asterism Antares/Scorpio (Lankford 2007:128–129). The southeastern orientation of Mound A relative to Mound B and the high-status cemetery and the similar head placement of the deceased in the Pine Tree Mound site graves may have been an acknowledgment of that manifestation, as Antares/Scorpio first appears in the spring/summer sky in the southeast.

Some of the sandy fill composing the mounds could be A and E horizon sediments scraped from the surface almost anywhere on the site. If fill was obtained in this way, borrow pits still recognizable today may not have been created. The clayey mound fill units likely came from elsewhere, though, in areas where deeper parts of the solum were exposed naturally. A potential source area for these is along the now-dammed drainage that borders the south side of the ceremonial precinct. The current configuration of the lake there was created in the mid-1960s by the addition of an extensive earthen dam at the southeast end. However, a 1935 aerial photograph shows what appears to be a steep northern bank of the drainage east of Mound A, where the present bank of the lake flares to the northeast. It is possible that this was a borrow area for fill for the mounds. One other possibility for an on-site fill procurement area is at the head of this drainage and southwestward toward and around Area 4. No pits are evident here, but Macky McIntosh reports that the often marshy expanse around Area 4 contains sediments similar to some of the white and light gray mound fills, and it is possible that the Caddo obtained fill here by scraping it from the surface; this may even by why this area is marshy today. Fill for mound building also could have been brought in from off site, for example, the steep slopes leading down to Potters Creek.

The final landscape element mentioned above, pathways, left no archeological signatures that we detected. They surely were present, though. Further, it is likely that clear lines of sight were maintained between the family compounds and the ceremonial precinct, preserving visual communication with the village center. Given the number of residential areas, as well as the likelihood of cultivated fields surrounding them, the site probably was mostly open with stands of trees only along the drainages east of Area 8, the south and southwest sides of the ceremonial precinct, and the north side of the ceremonial precinct.

One landscape feature that appears not to have been characteristic of this village were consistently used trash dumps outside of residential areas. It appears that trash disposal occurred most often near houses, with that debris becoming mixed with materials discarded where they were used and broken. It is possible, of course, that a somewhat different conclusion might be reached if the drainage through the middle of the site was not inundated, but even if trash disposal did occur there, it seems unlikely that it would have been for the whole village.

The Larger Pine Tree Mound Community

Moving beyond the immediate vicinity of Pine Tree Mound, it is possible to identify other places where Caddo people who probably were members of the community lived. With few other sites excavated, the quantity and quality of the data do not match that from Pine Tree, but we do have one distinct advantage in that surveys for the Sabine Mine have covered some 15,800 hectares in the vicinity, including substantial parts of the Potters and Starkey Creek valleys and those of six other Sabine River tributaries—Spring Creek, Brandy Branch, Hatley Creek, Hardin Creek, Rodgers Creek, and Clarks Creek—to the west. Coverage to the east is less, although much of the uplands between the valleys of Potters and Starkey Creeks east to Colliers Creek, a tributary of Eightmile Creek, has been examined.

Of the 613 archeological sites documented at the Sabine Mine and adjacent Darco Mine, most in systematic surveys done since 1976, 397 have Native American components (not counting 41HS15, 41HS573, and 41HS574, which make up the nucleus of the Pine Tree Mound community). Most of these are lithic scatters about which we know very little. Some lithic scatters could be associated with Pine Tree as limited-use campsites or procurement or processing locations, but almost always there is no way to know since they typically do not have diagnostic artifacts or datable materials. It is easier to say something about most of the 95 sites that contain pottery and one site with a Caddo-age arrow point but no pottery, since they give us at least some chance of assessing their ages and thus potential associations. Even these are not without problems, though. Just one has seen data recovery excavations by professional archeologists (41HS74), and 34 others have seen varying amounts of test excavations. One site (Resch, 41HS16) was excavated by avocational archeologists and is well reported. Eight others—Susie Slade (41HS13); Resch Burial Mound (41HS14); 41HS144; 41HS191; Old Brown Place (41HS260); Henry Brown Nos. 1 and 2 (41HS261 and 41HS262); and 41HS770—are known mostly from accounts by looters and are not reported well. That leaves 52 sites for which we have only survey-level information, and for many that information is limited to a handful of sherds and flakes.

However, the data that do exist can be used to take a stab at identifying sites that were associated with Pine Tree Mound, providing insights into the extent of the community. For a small number of sites, this can be done using radiocarbon dates or sizeable and well-reported samples of diagnostic artifacts, especially sherds. For most, though, it hinges on one simple factor, whether a site contains brushed pottery. We recognize this does not constitute proof, since multiple Caddo groups over a wide area used pots with brushed surfaces over a long time period. But given the prominence of brushing in the Pine Tree Mound assemblage, the fact that the site spans all of the Late Caddo period and parts of the Middle Caddo and Historic Caddo ones as well, and the fact that brushed pottery does not occur much in contexts clearly predating the A.D. 1300s in this area (e.g., at the Hudnall-Pirtle site), the presence of brushing at sites in the immediate vicinity seems like a reasonable indicator that they were occupied at the same time Pine Tree Mound was.

Forty of the 95 sites with pottery (once again, excluding 41HS15, 41HS573, and 41HS574) have brushed sherds and thus probably are associated in some way with Pine Tree (Table 2). The single site with an arrow point but no pottery is not associated, since that artifact is an Early Caddo Catahoula point. For 81 sites, determinations could be made based on data in reports or on site forms. This assumes that brushed sherds were identified correctly in those analyses, which probably is safe given that brushing is usually obvious. For the remaining 14 sites, we tried to find collections at the Texas Archeological Research Laboratory we could examine but were successful in only four cases. This leaves 10 sites (41HS57, 41HS61, 41HS62, 41HS117, 41HS118, 41HS129, 41HS138, 41HS184, 41HS230, and 41HS282) that are supposed to contain ceramics but for which we are unable to determine possible associations with Pine Tree. If the proportions among the 85 sites for which we have data apply, five of these 10 could be Late Caddo.

What is most striking about the 40 sites that could be associated with Pine Tree Mound is their distribution relative to the 347 sites that are unlikely to be associated (excluding the 10 sites that cannot be evaluated; Figure 13). They are heavily concentrated in the Potters Creek valley (63 percent), with much smaller numbers on Spring Creek (5 percent), Hatley Creek (10 percent), Hardin Creek (3 percent), and Clarks Creek (10 percent) to the west; the remaining four sites (10 percent) overlook the Sabine River floodplain. The sites that are not associated have a much more equitable distribution across the drainages. This suggests that the principal Pine Tree Mound community village extended for a distance of about 5.5 km along Potters Creek, with the ceremonial precinct at its northern upstream end, mirroring what Terán mapped at the Hatchel site on the Red River in

Table 2. Sites at the Sabine Mine that may be associated with the Pine Tree Mound community.

Site	Nature of Investigation	Basis for Association with 41HS15	Drainage	Distance and Direction from center of 41HS15
41HS4/233 (Lane Mitchell)	Survey, testing	Late Caddo ceramics identified by Thurmond (1981); 55 brushed sherds out of 158 in 1998 surface collection (62% of decorated sherds); PDR = 0.6)	Hatley Creek	9.3 km SW
41HS13 (Susie Slade)	Mostly looters' information, some graves excavated and reported	brushed sherds in graves and on the surface; Ripley Engraved as minor type in graves; Bassett arrow point	Potters Creek	2.7 km SSW
41HS14 (Resch Burial Mound)	Looters' information	Ripley Engraved, Wilder Engraved, Pease Brushed-Incised, and Perdiz and Bassett points reported from graves	Potters Creek	2.2 km SSW
41HS16 (Resch)	Excavations by avocationals	8 brushed sherds out of 1,541 collected (6% of decorated sherds); PDR = 11.1	Potters Creek	2.1 km SSW
41HS40	Survey	5 brushed sherds out of 39 collected (17% of decorated sherds); PDR = 0.3	Sabine River	7.7 km SSW
41HS42	Survey	3 brushed sherds out of 21 collected (43% of decorated sherds); PDR = 2.0	Spring Creek	7.2 km SSW
41HS44	Survey	4 brushed sherds out of 17 collected (57% of decorated sherds); PDR = 1.4	Spring Creek	7.7 km SSW
41HS74	Survey, testing, data recovery	Pease Brushed-Incised and Ripley (?) Engraved present, along with Perdiz points; 846 brushed sherds out of 13,557 collected (29% of decorated sherds); PDR = 3.7	Hatley Creek	9.1 km W
41HS144	Survey, looters' information	Pease Brushed-Incised present; 217 brushed sherds out of 407 collected (77% of decorated sherds); PDR = 0.4; site contained 17 looted graves and multiple structures	Sabine River/Clarks Creek	15.6 km WSW
41HS146	Survey	single sherd collected is brushed	Potters Creek	2.5 km W
41HS147	Survey	6 brushed sherds out of 32 collected (86% of decorated sherds); PDR = 3.6	Potters Creek	3.5 km NW
41HS189	Survey	brushed sherds reported	Hatley Creek	8.7 km WSW
41HS191	Survey, informant	informant reported ceramics and a Bassett point	Hardin Creek	11.3 km WSW
41HS231	Survey, testing	radiocarbon dates; 7 brushed sherds out of 161 collected (28% of decorated sherds); PDR = 5.4	Sabine River/Hatley Creek	10.0 km SW
41HS254	Survey, testing	brushed sherds reported	Hatley Creek	9.6 km WNW

Table 2. *(Continued)*

Site	Nature of Investigation	Basis for Association with 41HS15	Drainage	Distance and Direction from center of 41HS15
41HS260 (Old Brown Place)	Survey, informant	Ripley Engraved reported from a grave	Potters Creek	4.5 km S
41HS261 (Henry Brown No. 1)	Some graves excavated and reported, looters' information	brushed vessels as minor constituent of burial assemblage	Potters Creek	4.5 km S
41HS262 (Henry Brown No. 2)	Survey, looters' information	brushed vessels as minor constituent of burial assemblage	Potters Creek	4.6 km S
41HS488	Survey, testing, informant	1 brushed sherd out of 152 collected (5% of decorated sherds); PDR = 7.0	Clarks Creek	15.7 km WSW
41HS489	Survey, testing	328 brushed sherds out of 1,446 collected (75% of decorated sherds); PDR = 2.3	Clarks Creek	15.7 km WSW
41HS515	Survey	brushed sherds reported	Clarks Creek	15.8 km WSW
41HS524	Survey, testing	22 brushed sherds out of 2,352 collected (4% of decorated sherds); PDR = 3.3	Clarks Creek	16.6 km W
41HS537	Survey, testing on part	3 brushed sherds out of 11 collected (100% of decorated sherds); PDR = 2.7	Potters Creek	1.5 km SE
41HS588	Survey, testing	radiocarbon dates; Ripley Engraved and Pease Brushed-Incised present, along with Perdiz and Perdiz-Bassett points; 526 brushed sherds out of 1,562 collected (67% of decorated sherds); PDR = 1.0	Sabine River	9.7 km SW
41HS613	Survey	only 2 sherds collected are brushed	Potters Creek	4.8 km S
41HS619	Survey	5 brushed sherds out of 8 collected (83% of decorated sherds); PDR = 0.3	Potters Creek	6.8 km S
41HS653	Survey	only 2 sherds collected are brushed	Potters Creek	4.3 km S
41HS664	Survey	1 brushed sherd out of 12 collected (50% of decorated sherds); PDR = 5.0	Potters Creek	5.4 km SSE
41HS667	Survey	5 brushed sherds out of 34 collected (33% of decorated sherds); PDR = 1.3	Potters Creek	3.8 km S
41HS676	Survey	2 brushed sherds out of 7 collected (40% of decorated sherds); PDR = 0.4	Potters Creek	5.7 km SE
41HS679	Survey	2 brushed sherds out of 3 collected (100% of decorated sherds); PDR = 0.5	Potters Creek	5.7 km SE

Table 2. *(Continued)*

Site	Nature of Investigation	Basis for Association with 41HS15	Drainage	Distance and Direction from center of 41HS15
41HS718	Survey, testing	Ripley Engraved in a grave; 14 brushed sherds out of 22 collected (78% of decorated sherds); PDR = 0.2	Potters Creek	1.2 km SW
41HS725	Survey	1 brushed sherd out of 2 collected (100% of decorated sherds); PDR = 1.0	Potters Creek	0.8 km WSW
41HS770	Survey, informant	reportedly similar to 41HS261 and 41HS262	Potters Creek	3.3 km S
41HS843	Survey, testing	radiocarbon date; Ripley Engraved and Pease Brushed-Incised present; 18 brushed sherds out of 76 collected (47% of decorated sherds); PDR = 1.0	Potters Creek	1.3 km SE
41HS844	Survey, testing	Ripley Engraved and Pease Brushed-Incised present, along with Bassett point; 45 brushed sherds (38% of decorated sherds) out of 343 collected; PDR = 1.9	Potters Creek	1.2 km SE
41HS846	Survey, testing	radiocarbon dates; Ripley Engraved and Pease Brushed-Incised present, along with Perdiz point; 43 brushed sherds out of 360 collected (27% of decorated sherds); PDR = 1.3	Potters Creek	1.0 km S
41HS850	Survey	2 brushed sherds out of 45 collected (12% of decorated sherds); PDR = 1.6	Potters Creek	0.7 km E
41HS875	Survey	11 brushed sherds out of 20 collected (92% of decorated sherds); PDR = 0.7	Potters Creek	0.9 km E
41HS886	Survey	1 brushed sherd out of 6 collected (33% of decorated sherds); PDR = 1.0	Potters Creek	1.8 km ENE

Notes: This table excludes the three sites forming the nucleus of the community: 41HS15, 41HS573, and 41HS574. For reference, 41HS15 yielded 5,015 brushed sherds out of 9,874 collected (76% of decorated sherds) and has a PDR of 0.5; 41HS573 yielded 182 brushed sherds out of 380 collected (76% of decorated sherds) and has a PDR of 0.6; and 41HS574 yielded 76 brushed sherds out of 200 collected (46% of decorated sherds) and has a PDR of 0.2.

PDR = Ratio of plain to decorated sherds.

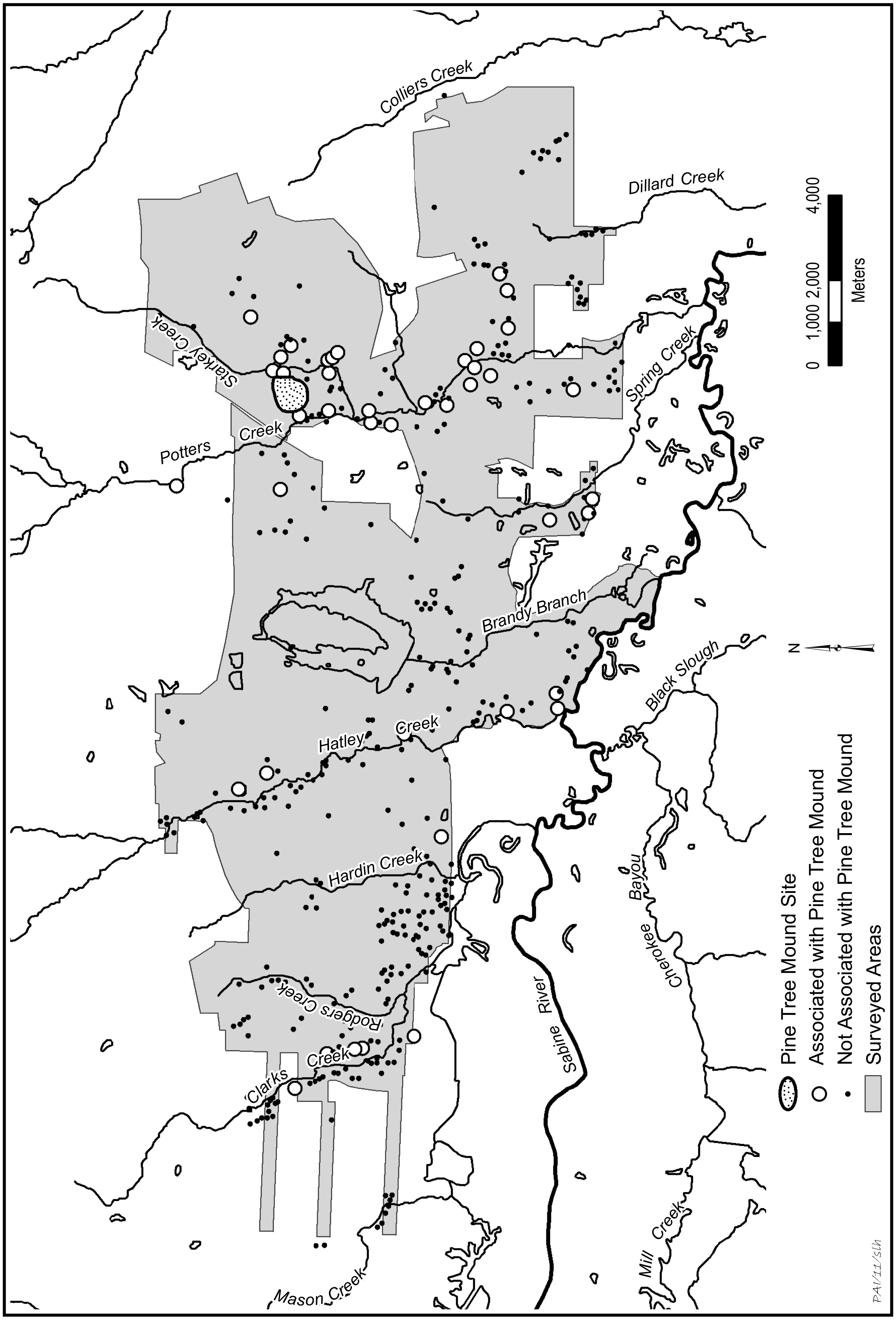

Figure 13. Map showing the distribution of Native American sites at the Sabine Mine and extent of area surveyed.

A.D. 1691 (as Perttula [personal communication 2011] notes, however, that map was a snapshot in time; if you look at the Hatchel site in its totality, the large mound there was in the middle of the village, not on the edge). Though part of the Potters Creek valley above Pine Tree Mound has not been surveyed systematically, sufficient acreage has been examined to indicate that associated sites there are scattered rather than clustered as they are downstream. The associated sites outside the Potters Creek valley probably can be viewed best as outlying members of the community.

For many of these sites, we do not have enough information to know just how they are associated with the community, for example, as residential hamlets or procurement/processing locations, or even if the Late Caddo occupation was the major one at that location. From the better known ones, though, it is clear that there is variability among them. At one end of the spectrum is the Lane Mitchell site (41HS4/233), discussed earlier, which overlooks lower Hatley Creek just north of the Sabine River floodplain. The ceramics (high percentage of brushing [62 percent] and low ratio of plain to decorated sherds [PDR = 0.6]) clearly tie it temporally to Pine Tree, and with four or five mounds it must represent another nexus of ceremonial activities for the community, but too little is known about the site to say much more.

At the other end of the spectrum are sites where brushed sherds are infrequent (4–29 percent) and plain sherds outnumber decorated ones by far (PDR = 3.3–11.1). Among these are the Resch site (41HS16) on Potters Creek, which has significant Archaic and Woodland components (Webb et al. 1969:96–99); 41HS231 overlooking Hatley Creek and the Sabine River floodplain, where Archaic, Woodland, and Early to Middle Caddo materials are relatively abundant (Dockall et al. 2008:57–96); and 41HS488 and the Gray's Pasture site (41HS524) on Clarks Creek and 41HS74 on Hatley Creek, where most of the remains are from Archaic and Early to Middle Caddo occupations (Heartfield, Price and Greene, Inc., 1988:6-1 through 7-20; Keller 1993:43–45, 70–72; Keller and Speir n.d.; Perttula 2000). The small numbers of brushed sherds, and in some cases Late Caddo arrow points, at these sites probably indicate they were used in a non-intensive fashion, perhaps as short-term campsites during procurement or processing forays, by members of the Pine Tree Mound community.

Other sites likely to be associated with Pine Tree, and for which more than minimal information is available, break down into three groups. The first consists of the four sites downstream on Potters Creek with Historic Caddo graves discussed earlier: Susie Slade (41HS13), Henry Brown Nos. 1 and 2 (41HS261 and 41HS262), and 41HS770. Though some of the graves at these sites clearly postdate the main period of occupation at Pine Tree, others may not, given that two-thirds or more of those at Susie Slade and Henry Brown No. 1 lacked historic materials (information is not available for the other two sites). Coupled with some overlap in the pottery types represented at these sites and Pine Tree Mound, this suggests that some parts of these cemeteries could be earlier than others and perhaps contemporaneous with Pine Tree. It is just as likely that parts of the essentially unknown residential areas that go with these cemeteries were occupied at the same time as Pine Tree.

The second group consists of four sites with strong evidence that their primary components were associated with villages or smaller residential areas contemporaneous with Pine Tree. Two of these are the Resch Burial Mound (41HS14) and Old Brown Place (41HS260) downstream on Potters Creek discussed earlier. Information on them is limited, but there is little doubt of their function and associations. The other two are 41HS588 and 41HS718, both of which have high percentages of brushing (67–78 percent) and low ratios of plain to decorated sherds (0.2–1.0). The former was tested extensively and found to be a Late Caddo residential site with one or more houses and other features, including at least one burial, and artifacts and radiocarbon dates demonstrating contemporaneity with Pine Tree Mound; it is on the north wall of the Sabine River valley just downstream from Hatley Creek, near the Lane Mitchell site (Dockall et al. 2008:96–143). Site 41HS718 is known chiefly from limited testing done there and analysis of six vessels from a single grave destroyed by construction of a well pad (Gadus et al. 2006:76–91). Given the similarities between those vessels and some from graves at Pine Tree, as well as its location on the ridge between Potters and Starkey Creeks 600 m south of Pine Tree, 41HS718 probably is equivalent to Areas 2 and 8, i.e., a component of the Pine Tree Mound village, but a more-distant one. A fifth site, 41HS144 overlooking the Sabine River floodplain just west of Clarks Creek, may belong with this group as well. The archeologists who recorded it noted that looters were uncovering the last of an unknown number of structures and had excavated 17 graves oriented generally southeast-northwest. The grave orientation, the fact that Pease Brushed-Incised is well represented in the numerous sherds collected from the surface (77 percent of the decorated sherds are brushed), and the low ratio of plain to decorated sherds (0.4) suggest that this site is a small village connected to Pine Tree Mound; the presence of a few sherds typed as Handy Engraved, Haley Engraved, and Haley Complicated Incised indicates that a minor earlier component is present as well.

The third group consists of four sites where brushed pottery is common enough to suggest that Late Caddo components representing something more than ephemeral use are present, but the evidence that they are villages or residential areas may not be as strong as at 41HS14, 41HS260, 41HS588, and 41HS718, since few or no features were found there. One of these (41HS846) is on the west side of Starkey Creek just 500 m south of Pine Tree Mound, and two others (41HS843 and 41HS844) are immediately across Starkey Creek to the east. Site 41HS846 has a substantial Archaic component and an Early Caddo one, but other artifacts and two radiocarbon dates from a midden indicate occupation contemporaneous with at least the early end of the Pine Tree occupation as well (Gadus et al. 2006:109–128). Site 41HS843 is limited to a small floodplain rise, which, coupled with the low density of ceramics, supports the conclusion it is not residential (Gadus et al. 2006:91–99). Site 41HS844 nearby is slightly higher than 41HS843, which along with the ceramics, a Bassett arrow point, and three possible middens makes it more likely that it supported residences (Gadus et al. 2006:99–109). The recovery of a few Simms Engraved sherds suggests it could even have a Historic Caddo component, though most of the pottery looks Late Caddo. The fourth site in this group is 41HS489 on Clarks Creek at the west end of the study area (Keller 1993:72–75); not much is known about it, other than it contains prominent Archaic and Late Caddo components.

The better-known of the 40 sites at the Sabine Mine that appear to be associated with Pine Tree Mound indicate that this part of the community consisted of two centers of ceremonial activities, one major and one minor; a large village nucleus composed of at least 15 household compounds immediately around the main ceremonial center; at least 25 other residential areas and probably short-term campsites on Starkey and Potters creeks nearby, mostly in a 5.5-km stretch downstream; and at least 15 other sites, probably a mix of short-term campsites and more-intensively occupied residential locales, scattered along other Sabine River tributaries to the west and the adjacent upland margins overlooking the Sabine floodplain. We can only speculate about how many people lived in this community. Based on the estimate of 125 people for the nucleus and dividing the number of associated sites by the hypothesized number of residential areas at 41HS15, 41HS573, and 41HS574, though, suggests a population at any one time of perhaps 400 people in the surveyed areas at the mine. Of course, we will never know how good this estimate really is given the vagaries of survey coverage, the certainty of unidentified sites, and the uncertainties about site function. Regardless, we think this is the core part of the Nondacao province that Moscoso traveled through in A.D. 1542. It would be naïve to think that this captures all who were affiliated with the community, however. There is no reason to assume that Caddo people living farther to the east, south, west, and maybe north were not connected to Pine Tree as well.

Lacking large numbers of excavated sites, it is hard to know how far the territory associated with the Pine Tree Mound community extended, but it is possible to make some educated guesses (Figure 14). To the north, it likely went no farther than the divide between the Sabine River and Cypress Creek basins. The latter, and particularly Big Cypress Creek, is the heartland of the contemporaneous Titus phase. As discussed below, there are enough differences between Pine Tree Mound and the Titus sites to indicate they represent distinct, though related, groups.

To the south, between the Sabine River and the upper parts of the Neches basin, sites with Late Caddo components are present but not frequent. There are no confirmed mound sites, and Perttula (2004b:40) suggests that the Caddo abandoned much of the middle and upper Sabine River basin in the A.D. 1400s and did not reoccupy it in a substantial way till the mid-1700s. The results of recent survey and testing efforts in the Sabine Mine's Rusk Permit immediately south of the Sabine River suggest that abandonment may be too strong a word, though. For example, there is a cluster of five sites on the Pleistocene terrace where the Hasinai Trace came up out of the Sabine River bottoms that have Caddo materials, and test excavations at two

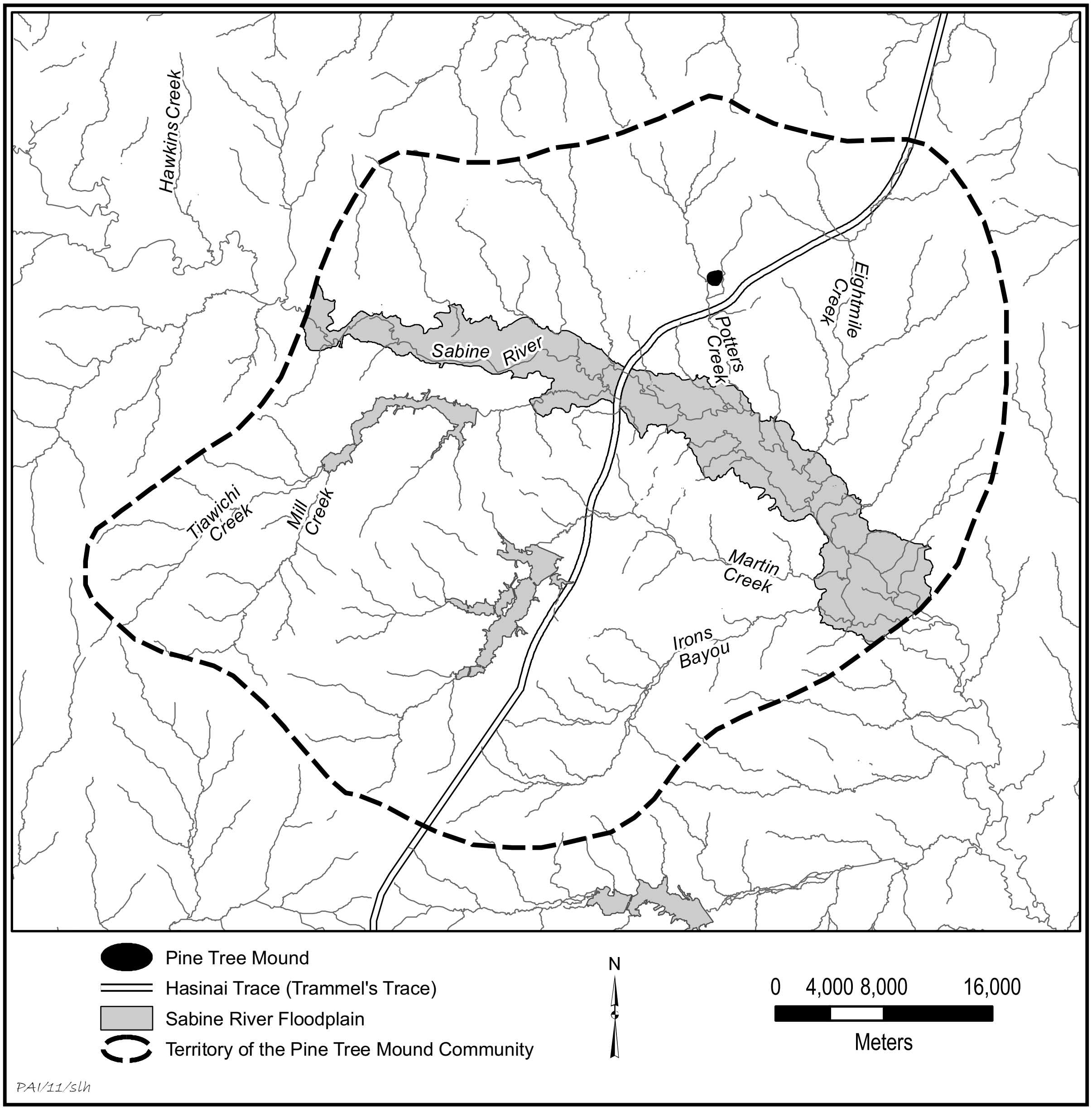

Figure 14. Map showing the hypothesized extent of the territory of the Pine Tree Mound community.

of them yielded radiocarbon dates and ceramics attributable to the types Killough Pinched, Pease Brushed-Incised, Maydelle Incised, and perhaps Ripley Engraved and Simms Engraved that point to occupation during the late part of the Caddo period. These sites also contain earlier Caddo artifacts, though, and they may represent a series of small residential sites and short-term trailside campsites dating to various parts of the Caddo tradition rather than a single large Caddo village (Dockall and Fields 2011:82; Dockall et al. 2010:229). The late materials there do indicate some use that was contemporaneous with, and almost certainly connected to, the main occupation at Pine Tree Mound.

Investigations nearby at the Oak Hill and Martin Lake Mines in Rusk and Panola counties have identified other sites that also have Late Caddo materials. One of these is the Oak Hill Village site on Mill Creek discussed earlier; though the predominant component there is Middle Caddo, the ceramics, arrow points, and radiocarbon dates all indicate some use after A.D. 1400, contemporaneous with the early occupations at Pine Tree Mound (Rogers and Perttula 2004:96). Other sites in this group include 41RK19 and 41RK21 on Martin Creek; the materials recovered were not thoroughly analyzed or reported, but both sites yielded numerous brushed sherds implying that later Caddo components are present (Clark and Ivey 1974). In short, this part of the Sabine basin, extending probably to the drainage divide, appears to have been sparsely settled by people affiliated with the Pine Tree Mound Caddo.

Deciding where to draw the boundary line moving east and west on the south side of the Sabine is tricky, but placing it beyond Mill and Tiawichi creeks on the west and Irons Bayou, the next drainage beyond Martin Creek, on the south, makes it line up well with the boundaries suggested below for the north side of the river. Doing this places two more Kinsloe phase sites, Cherokee Lake (41RK132) and Millsey Williamson (41RK3), within the extent of the Pine Tree Mound community. Cherokee Lake, in the Mill/Tiawichi Creek valley downstream from Oak Hill Village, contained a moderate amount of village debris in addition to the single historic grave, which was oriented east-west and contained vessels typed as Simms Engraved and Maydelle Incised along with an elbow pipe, a Fresno arrow point, and glass beads (Jones 1968:51–56). Among the village debris were sherds that Jones felt were Early Caddo but also brushed pottery, including one sherd typeable as Pease Brushed-Incised. Hence, it also had a Middle or Late Caddo component. At Millsey Williamson on Martin Creek, it is hard to tell if a component contemporaneous with the main period of occupation at Pine Tree was represented, as the site had been almost completely looted by the time Jones saw it. However, most of what he documented, including historic materials in almost every grave, thousands of trade beads, gun parts, gunflints, iron knives and arrow points, several brass objects, and Native-made ceramics, is solidly historic (Jones 1968:67–84). The results of recent analysis of a small collection of ceramics and glass beads from the site is consistent with this, suggesting a date range of A.D. 1740–1790 (Perttula and Nelson 2007).

Moving west from Pine Tree Mound on the north side of the river, clues about a boundary come from a series of looted cemeteries on Hawkins Creek in Gregg County, northwest of Longview (41GG50, 41GG51, and 41GG53–41GG56). Though little is known of them, the site records indicate they contained about 100 graves oriented east-west, with offerings including Ripley Engraved bowls with the pendant triangles motif, Wilder and Taylor Engraved bottles, brushed jars, Bassett and Maud arrow points, and a pair of ear spools, among other things. Perttula (2005b:358, 371–376) considers these to be associated with the Titus phase, and the apparent prominence of the pendant triangles motif, Taylor Engraved bottles, and Maud points does stand in contrast to what was found at Pine Tree. Based on this, it appears the western boundary of the Pine Tree Mound community north of the Sabine may have been somewhere east of Hawkins Creek and west of Clarks Creek.

East of Pine Tree Mound, there is so little archeological information that it is hard to use it as a basis for addressing this issue. The only area that has seen much attention is along the lower portion of Eightmile Creek just above its confluence with the Sabine River. A recent survey examined about 2,100 acres here and documented a handful of Native American sites, including C. D. Marsh (41HS269), another of the Kinsloe phase sites. The single historic grave at the Marsh site is quite similar to those at Susie Slade and Henry Brown No. 1 much closer to Pine Tree, with an east-west orientation and containing vessels typed as Natchitoches Engraved, Emory Punctated, Simms Engraved, and La Rue Neck Banded, along with a plain vessel, a large biface, and two silver disks (Jones 1968:88–93). More important, though, is the fact that the site contains abundant earlier Caddo remains. Jones excavated seven other burials, all prehistoric and apparently oriented north-south, in another part of the site, and he collected or observed much village debris, the bulk of which he felt went with the prehistoric occupations. Though he concluded that much of the prehistoric material related to Haley and Bossier phase occupations, the sherds he identified as Pease Brushed-Incised and the two arrow points he typed as Bassett suggest some similarities to the materials from Pine Tree Mound (Jones 1968:85, 96). Contemporaneity also is implied by the high percentage of brushing (64 percent) and low ratio of plain to decorated sherds (0.5) among the small collection (n = 64) made in shovel testing at C. D. Marsh in 2010 (Griffith et al. 2011). Given this and the fact that Eightmile Creek is the next drainage east of Potters Creek, it is likely that 41HS269 is at least partly associated with the Pine Tree Mound community.

East beyond Eightmile Creek and its upper tributary Quapaw Creek is the divide between the Sabine and Red River basins, and this is a logical place for the boundary of the Pine Tree Mound community. There is no way to know if this boundary should follow the Eightmile Creek valley closely as it moves south toward the Sabine or encompass the next two drainages to the east, Caddo and Jackson Creeks. Figure 14 depicts the latter, though, based on the fact that it is a long distance down river to the next large north-side tributary, Socagee Creek. Drawing the line this way pulls 41PN1 on the river between Caddo and Jackson creeks within the boundary. This is significant because 41PN1 may contain a mound. All that is known about it, though, is that A. M. Woolsey observed a tumulus of dirt about 20 m in diameter and 2.4 m high on the floodplain here in 1939. Its setting is more similar to that of Hudnall-Pirtle upstream than Pine Tree or Lane Mitchell, and thus if it is a mound it may be Early Caddo rather than Late Caddo.

This exercise suggests that the larger Pine Tree Mound community, equating to the Nondacao province and the home territory of the Nadaco Caddo, extended across an area roughly 50 km north-south by 60 km east-west, encompassing some 2,400 km^2 with the Sabine River running through the middle. People were not distributed evenly throughout this area, though. The main village was north of the river, stretching for 5.5 km along the Potters Creek valley and anchored by the Pine Tree Mound site at its north end. The rest of the community appears to have been more rural, though at two different scales. Other north-side tributary valleys, extending from maybe Mason Creek on the west to Eightmile, Caddo, or Jackson Creek on the east, may have supported moderately scattered settlements. The entire territory south of the river, accounting for well over half of it, appears to have been sparsely settled.

This largely hypothetical reconstruction is similar to Story and Creel's (1982) model of sociopolitical organization and settlement patterning for the Frankston and Allen phases of the Neches-Angelina River basin, which grew out of study of the Deshazo site and built on earlier work by Wyckoff and Baugh (1980) and others. Their model posits a single major ceremonial center for what they call the "affiliated group." This would have been "the temple-residence complex… associated with a paramount leader, the *grand xinesi* in the historic accounts," and they suggest that the A. C. Saunders site in Anderson County, containing a mound with much ash fill and a large structure nearby, could be such a center (Story and Creel 1982:32). Positioned around this center would be multiple scattered supporting "constituent groups," each containing a lesser ceremonial center and potentially an array of residential sites ranging from single-house farmsteads to small villages, as well as short-term use sites. The lesser centers likely would be the residence-ritual complexes of local leaders, i.e., *caddis*, consisting of several buildings and an associated plaza but no mounds, and they hypothesize that Deshazo could be one of these (Story and Creel 1982:32). They suggest that the archeological evidence of the affiliated group that was the subject of their study should be called the "Anderson Cluster."

The evidence from the Pine Tree Mound community that is most consistent with this model is the Pine Tree Mound site itself, which certainly is the paramount ceremonial center, and the distribution and variety of associated sites; together, they make this community look like an affiliated group. What is not readily apparent are constituent groups. While it would be possible to look at Figure 13 and suggest that some clusters of sites represent constituent groups, we know too little about most of these sites to begin to address that question, and the problem becomes even more acute moving away from Potters Creek and adjacent valleys into areas where much less archeological work has been done. There is some logic to interpreting the Lane Mitchell site, with four mounds, as a lesser center for a constituent group in the Hatley Creek valley, but our feeling is that this is not the case, based largely on the facts that it is so close to Pine Tree Mound and it appears not to have many residential areas nearby. Instead, as discussed earlier, we suspect that the rituals performed there had a different role, for example, to link the mounds at Pine Tree with those at Hudnall-Pirtle. This issue can be cast in a more-positive light, however, by seeing this topic—identifying constituent groups archeologically—as one that could guide future research in the area for years to come.

On one level (and perhaps largely because of too little data), the Pine Tree Mound community model differs from the Frankston-Allen phase one in that it consists of a single main village tethered to the sole major ceremonial center, all ringed by a zone with moderately scattered settlements and a sparsely settled zone beyond. The two models share the same basic building blocks, however, consisting of places considered sacred where ceremonial activities were concentrated and places where people lived and grew their crops, and they describe the same phenomenon, i.e., development of regional communities with their own sociopolitical identities, happening among related peoples at the same time in neighboring parts of the Caddo area.

PINE TREE MOUND AND THE SOUTHERN CADDO WORLD

The Pine Tree Mound community did not exist in isolation from the wider Caddo world. The deepest connections were with Caddo groups living in the Cypress Creek drainage just to the north and northwest. These groups belonged to what archeologists have labeled the Titus phase (Figure 15). There also was interaction with Belcher phase groups who lived along the Red River to the east and northeast, Frankston phase peoples in the upper Neches/Angelina basin, perhaps the Texarkana and McCurtain phase Caddo who lived on the Red River at and above the Great Bend, and maybe even Mid-Ouachita phase groups in south-central Arkansas. The following paragraphs address the latter of these first because the data are limited and straightforward. The remainder of the section then looks at the more-complicated Titus phase connections.

Connections Beyond the Nearest Neighbors

Clues about interactions with other groups come from the kinds of stones that some of the tools and ornaments from the Pine Tree Mound site are made of. The vast majority of the lithic artifacts are of materials that could have been obtained locally, but small numbers came from the Ouachita Mountains of Oklahoma and Arkansas or gravels redeposited in the Red River from the Ouachitas (cherts of gray, white, black, and some other colors; novaculite; Stanley/Jackfork sandstone; basalt or basalt porphyry; and an unidentified igneous rock). Given the source areas, these nonlocal rocks may indicate interaction with McCurtain, Texarkana, and even Mid-Ouachita phase peoples, though it also is possible these artifacts reached the site via its closer Titus and Belcher phase neighbors. Particularly notable are the three sets of stone ear spools recovered from three of the graves. These are similar in form and size to two sets of ear spools from the Belcher phase Foster site in southwestern Arkansas (Weinstein et al. 2003:522–523), and we speculate that the craftsmen who made these items were residents of that region and obtained the argillite they are made of there. Least prominent in the collection are artifacts of materials that appear to be from central Texas (light to medium brown and gray, often mottled, chert) and the southern part of east Texas (Manning Formation tuff), these probably were introduced through contact with Frankston phase peoples. The overall infrequency of these tools and ornaments, and the fact that many were included as grave offerings, indicate they were not mundane items. Instead, most were prized symbols of power, authority, status, or role, as well as symbols of the connections that tied elite members of the Pine Tree Mound community to their peers in neighboring and more far-flung Caddo communities, cementing relationships between them.

The ceramics at Pine Tree Mound that most clearly are imports from non-Titus phase groups are a small Cass Appliqued jar, a small Cowhide Stamped jar, a large Hodges Engraved bottle, a medium-sized Poyner Engraved bowl, a small Poyner-like bottle, and 10 Belcher Ridged sherds. Some of the vessels are small and could have been transported easily, with the Pine Tree Mound people perhaps more interested in their contents than the vessels themselves. The Cass Appliqued jar suggests interaction with Texarkana phase groups, though perhaps via Titus peoples, while the two Poyner Engraved and Poyner-like vessels indicate connections to Frankston phase groups.

The Belcher Ridged sherds certainly point eastward, as do the Hodges Engraved bottle and the Cowhide Stamped jar. Other connections to the Belcher phase can be seen in the ritual utilization of four-quartered pedestal bowls and smoking pipe forms. Four-quartered pedestal bowls similar to Vessel 1 in burial Feature 8.1085 were found in one Belcher site grave and in graves at the Foster site (Webb 1959:Figure 83m; Weinstein et al. 2003:524–525). We have linked this vessel form to belief in a four-quartered, multilevel cosmic order, and hence its occurrence in burial contexts in multiple places probably indicates shared beliefs and rituals. A Pine Tree Mound ceramic smoking pipe form with the distal end wrapping up around the bowl also is seen at the Foster site (Weinstein et al. 2003:516, 565–566).

An emphasis on Belcher connections is not surprising, of course, given its location relative to Pine Tree Mound. It may even be that the Red

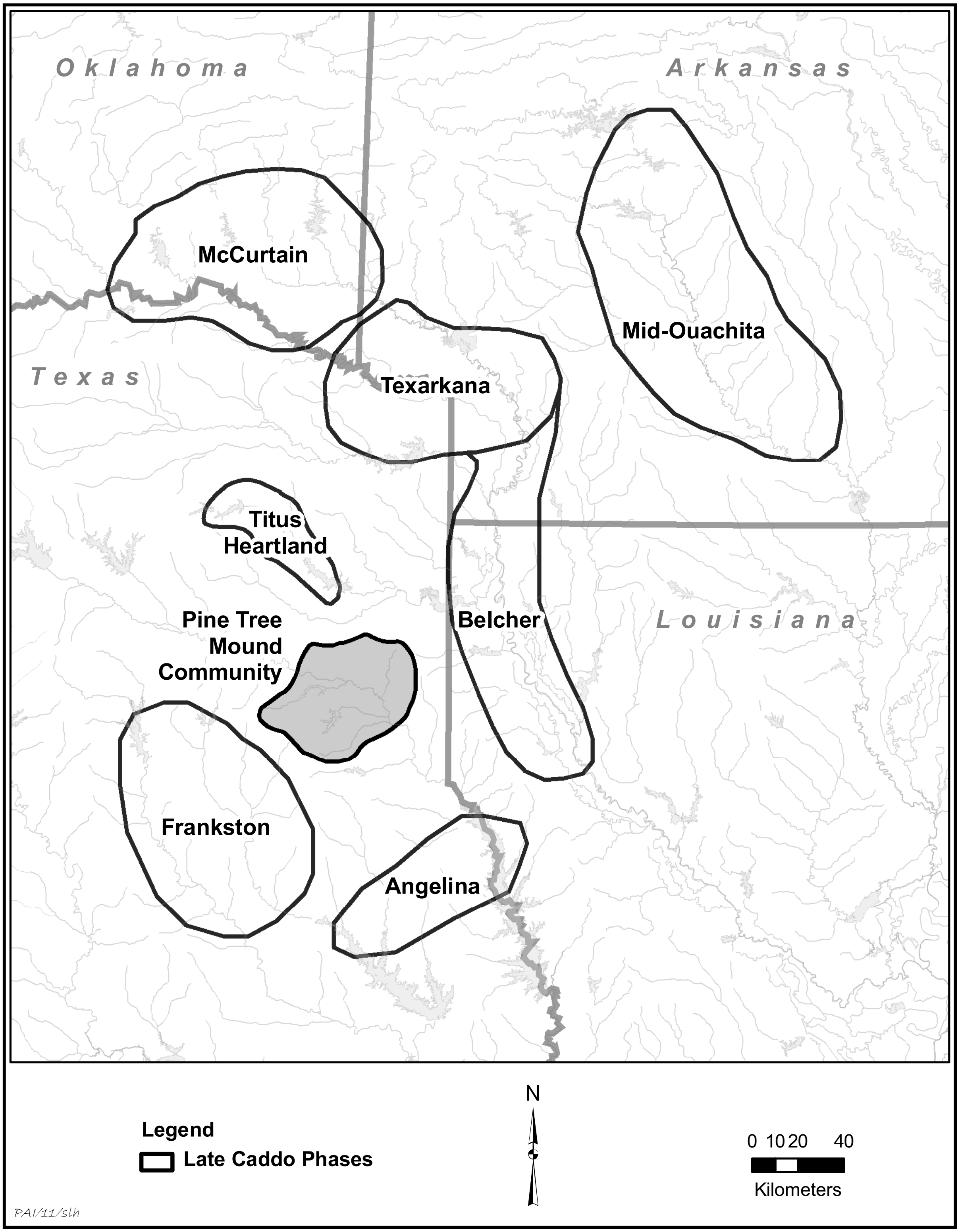

Figure 15. Map showing the location of the Pine Tree Mound community relative to the Late Caddo Belcher, Texarkana, McCurtain, Mid-Ouachita, Frankston, Angelina, and Titus (heartland only) phases.

River valley to the east is where we need to look to see the origins of the kind of pottery that plays such a prominent role not only at Pine Tree but also in the Titus phase, Ripley Engraved. Specifically, we are talking about the types Haley Engraved (for bottles) and Handy Engraved (for bowls), which are characteristic of the earlier Haley phase of the Red River just below the Great Bend (Suhm and Jelks 1962:60–63).

For instance, the Haley Engraved bottles recovered by C. B. Moore from nine burials below the northwestern mound at the Haley site show the use of the scroll and half scroll motifs with pendant triangles and the concentric circles motif with central cross or open circle, which are also decorated with pendant triangles (Weinstein et al. 2003:465–475). These motifs are common on Ripley Engraved bottles from the burials at Pine Tree. Other elements used on both Haley and Ripley bottles are the SZ and curl elements. However, Haley and Ripley bottles differ in form, with Haley bottles having a barrel-shaped body and a neck that tapers only slightly toward the lip, contrasting with the Ripley bell-shaped body and neck that flares at both ends. Handy Engraved bowls are more similar to forms common in Ripley, including carinated and compound bowls with peaked, scalloped, and punctated lips (Suhm and Jelks 1962:64). These similarities of motif and form suggest that the type Ripley Engraved, made so commonly by both the Pine Tree Mound and Titus phase Caddo during Late Caddo times, may have developed out of a ceramic tradition with its roots in the Red River valley to the east. Supporting this contention is the fact that one of the utility wares that occurs both at Pine Tree Mound and Titus sites, Pease Brushed-Incised, also occurs in Haley phase contexts (Hoffman 1970:171). This implies that connections between these regions were deep and long lasting.

Connections with the Titus Phase

To understand the things that unite the Pine Tree Mound community with and separate it from its nearest neighbor, the Titus phase, it is necessary first to lay out some specifics about the current state of knowledge of what the Titus phase represents. Fortunately, it is one of the most thoroughly studied Caddo spatio-temporal units (e.g., Perttula 1992, 2004a, 2005b; Perttula and Sherman 2009; Thurmond 1981, 1985, 1990; Turner 1978).

Summary of the Titus Phase

The Titus phase is a Caddo archeological manifestation that existed in the Cypress Creek basin from the fifteenth to seventeenth centuries (ca. A.D. 1430 to 1680) (Perttula and Sherman 2009:382–386). Its main part extended for about 75 km along Big Cypress Creek, encompassing some 1,350 km^2 (Figure 16). Beyond this heartland is a much larger area, bringing in another 6,240 km^2 and extending south to the Sabine River, west to the Lake Fork Creek basin, north to the Sulphur River, and east to Black Cypress Bayou and Potters Creek (Perttula 2004a:Figure 13.27), that traditionally has been viewed as having been the homelands of groups affiliated with the Titus heartland groups. The Pine Tree Mound site is at the southeast corner of this greater Titus phase area.

Sites in the Titus heartland are thought to reflect a sociopolitical system similar to the historic tribal confederacies of the Hasinai to the south and Kadohadacho to the north (Perttula 2004a:396–398). As such, Titus phase communities were organized hierarchically with elite members more or less controlling the economic output of their affiliated groups, extended families, or clans.

In his comprehensive study of the archeology of this area, Thurmond (1981, 1990) recognized a variety of site types, including small settlements, large settlements, limited-use areas, mounds, and large community cemeteries, and suggested that there were four contemporaneous and spatially distinct subclusters of sites that could represent different groups. Those subcluster definitions were based on shared arrow point and ceramic types and distinctive Ripley Engraved ceramic bowl motifs, with different motifs considered likely signals of group affiliation. Though the interpretive value of those particular subclusters has not held up well over the ensuing years, the idea behind them was important nonetheless. The Titus phase, even just its heartland, covers a large area containing very similar archeological remains representing a large number of Caddo people. Surely there is something in the spatial arrangement of these sites that relates to how those people were organized socially and politically.

More-recent investigations have gone beyond Thurmond's work by developing a model of Titus phase settlement patterning consisting of contemporaneous dispersed farmsteads or villages forming a community through affiliation with a key site or sites

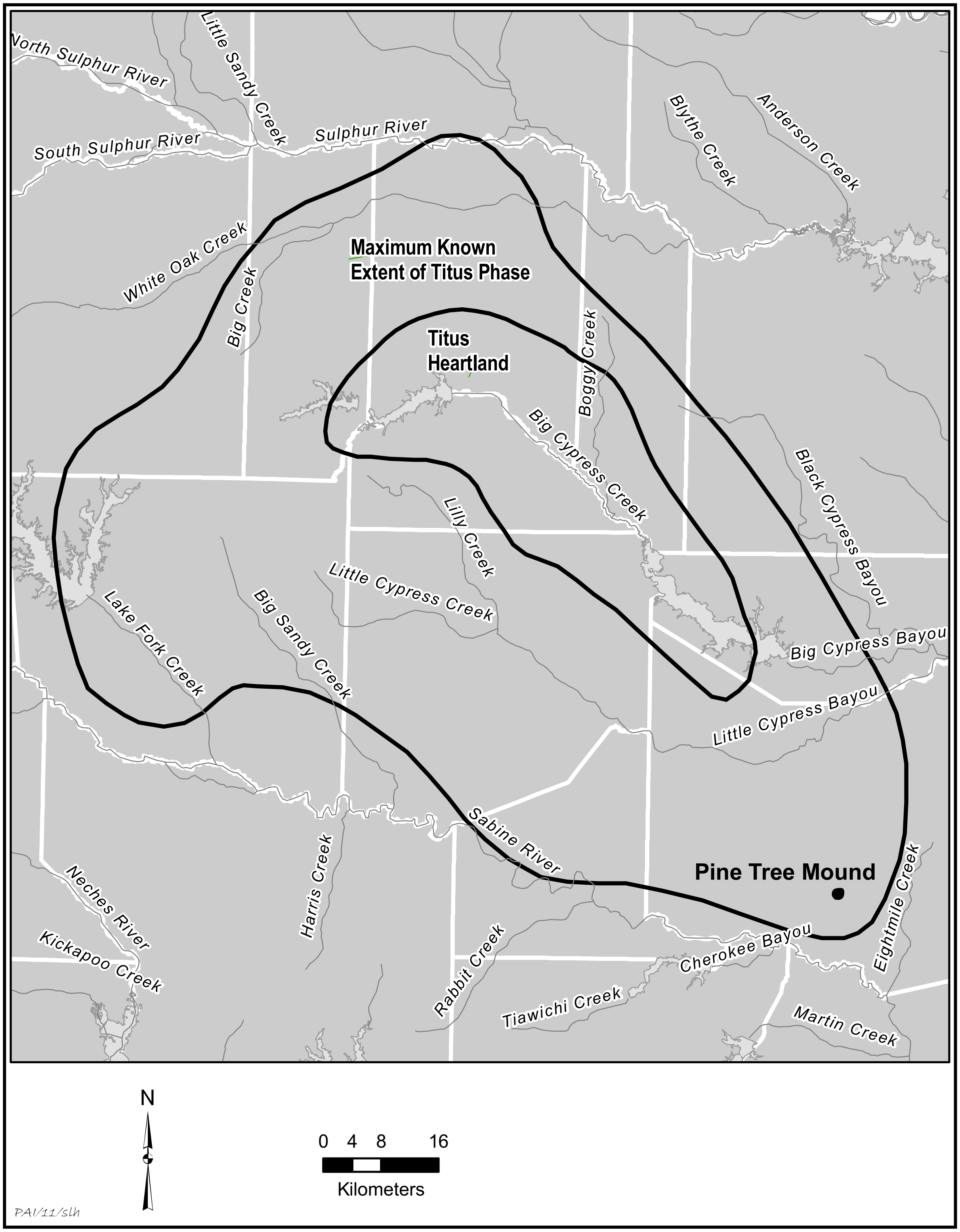

Figure 16. Map showing the extent of the Titus phase in northeast Texas.

marked by public architecture such as mounds, ritual buildings, or community cemeteries (Perttula and Sherman 2009:375–377). A minimum of five such communities have been proposed for the part of the heartland downstream from Tankersley Creek (Perttula and Sherman 2009:376–377). One community sits at the southeast end of the heartland. Whelan (41MR2), a site with four mounds at the confluence of Arms Creek and Big Cypress Creek, is the community's key site (Figure 17). The H. R. Taylor (41HS3) and Pea Patch (41HS825) sites nearby, with more than 150 graves, may have been that community's main cemeteries. Moving northwestward, the other four communities were anchored by the following: (1) in the vicinity of Meddlin Creek, the four mounds at the Harroun (41UR10) site and three mounds at the Chastain/Dalton/Camp Joy (41UR11, 41UR18, and 41UR144) complex, along with community cemeteries at Pleasure Point (41MR63), Henderson-Southall (41UR3), Big Oaks (41MR4), and Sandy Creek (41MR122), which probably contained more than 500 graves; (2) the single-mound Shelby (41CP71), P. S. Cash (41CP2), and Sam Roberts (41CP8) sites on Greasy and Prairie Creeks, with community cemeteries at Shelby and the Gold Star Ballroom site (41UR107) containing more than 250 graves; (3) the community cemeteries at Tuck Carpenter (41CP5) and Harold Williams (41CP10), with more than 166 graves, on Dry and Swauano creeks and maybe the community cemetery at the W-S site with 118 graves not far away, perhaps accompanied by the single-mound Tom Hanks site (41CP239); and (4) the single-mound Pilgrim's Pride site (41CP304) on Walker Creek and perhaps Tiddle Lake (41CP246) with another mound nearby. Though not defined, at least one and probably more communities were present on Big Cypress Creek upstream from Tankersley Creek as well, as this area contains at least one large community cemetery with more than 150 graves, Sandlin Dam (41TT726), and another cemetery, Lower Peach Orchard (41CP17), with 35–45 graves including five or six large shaft tombs (Perttula 2005b:371, 374, 380, 385).

Residential sites consist of small settlements (0.2 to 1.8 hectares) marked by midden and daub concentrations; these make up 73 percent of the known Titus phase sites, while larger settlements comprise only 4 percent (Perttula 2004a:398). One large settlement that has been investigated recently is the Pilgrim's Pride site (41CP304) at the confluence of Big Cypress and Walker creeks (Perttula 2005a). The site consists of four to six circular structures with adjacent middens, many pit features, burials associated with structures, a planned cemetery, and a 6.5-m-diameter mound built over a possible ritual structure. Structures that were likely domiciliary were about 6 to 8 m in diameter with the most complete one having a southern entryway. All of the major features appear to have a north-south organization, with the mound and ritual structure on the north, planned cemetery on the south, and houses in between.

There are 11 known mound sites (or nine if Chastain, Dalton, and Camp Joy are counted as a single complex) within the Titus phase heartland; all are considered key sites, serving as ritual centers that drew together the dispersed residential units. Six sites have single mounds, one has three mounds, and two have four mounds. Most of the 17 small rounded mounds apparently were erected to cap burned ceremonial structures, some of which had extended entryways (one mound at the Harroun site was put atop a grave). Perttula and Sherman (2009:389–391) suggest that the timing of mound-building events may have coincided with the deaths of important people who were laid to rest elsewhere. Radiocarbon dates indicate that mound use continued throughout the phase (Perttula and Sherman 2009:387).

All three of the known multiple-mound sites (Whelan, Harroun, and the Chastain/Dalton/Camp Joy complex) are in the southeastern part of the heartland (Perttula and Sherman (2009:389). This suggests that not all communities along Big Cypress Creek participated in political and social life in the same way and gives support to the idea that a hierarchical cultural system prevailed here. Perttula and Sherman (2009:392) also point to the limited residential features at the Whelan and Harroun sites as an indication that the religious and political leaders at these sites maintained separation from the greater population and, in doing so, solidified their authority through regulation of ritual and resources. This does not appear to have been the case at mound sites farther up the Big Cypress, however, where Perttula and Sherman (2009:392) see no separation of the mound sites from the greater communities. Again, this indicates differences between Titus phase communities within an overarching stratified social and political system.

Status differences also may be recognizable within Titus communities based on how they treated their dead. Two kinds of cemeteries have been defined (Perttula 2005b:377). They are small

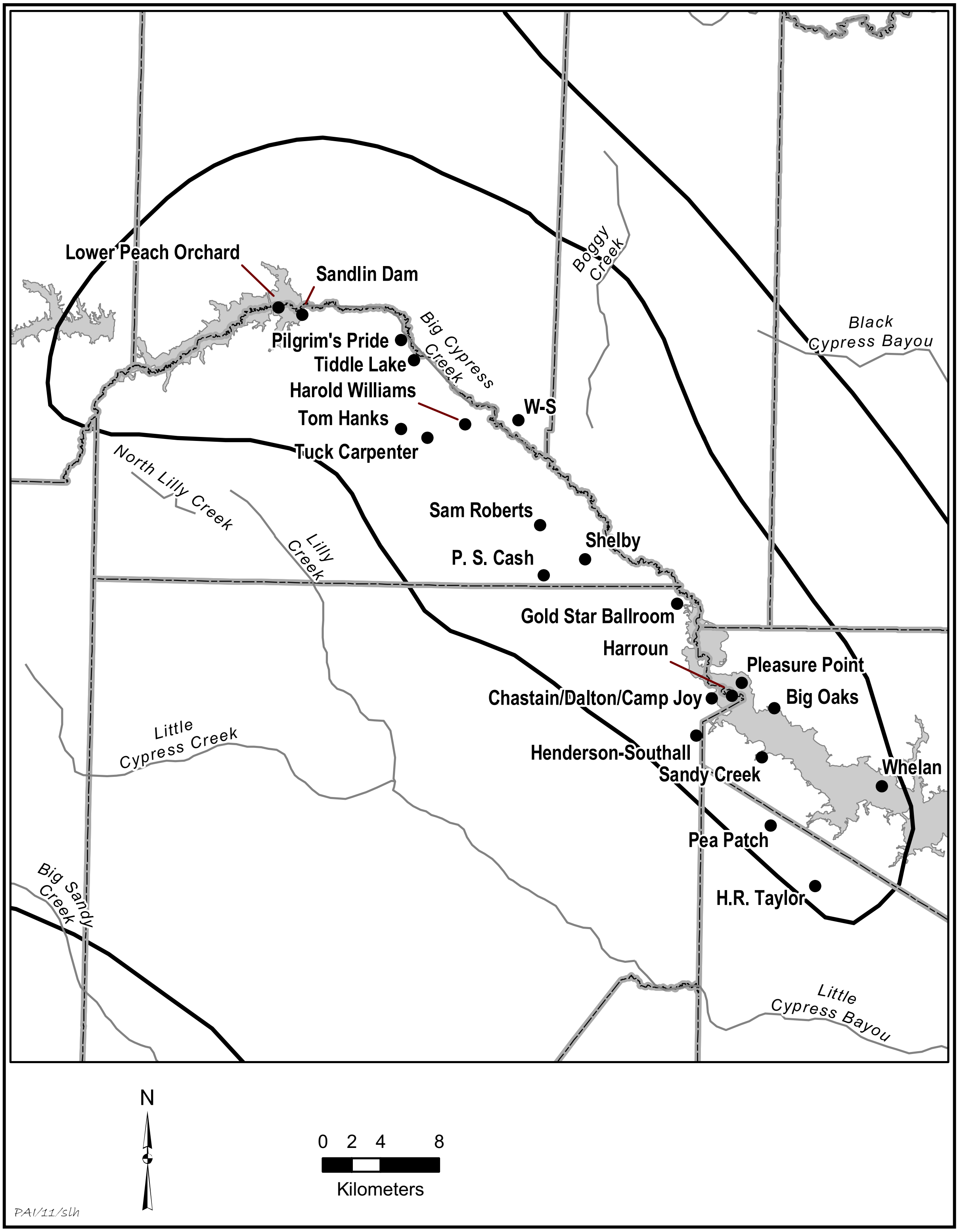

Figure 17. Map of the Titus heartland showing locations of key sites.

family cemeteries with few interments (ca. 10 to 40 individuals) that are directly associated with habitation sites and large community cemeteries (70–200+ individuals) that are divorced from habitations. Individuals buried in family cemeteries usually show little distinction in burial offerings that may indicate differences in status (Perttula 2005b:383). Thurmond (1990:235–236) notes that, in family cemeteries, offering associations appear to be determined by age and sex instead. Some burials in community cemeteries provide the best evidence for an elite segment of the society, as they appear to be planned space with an elite individual placed at the center and regular rows of interments. These elite individuals are identified by the presence of rare offerings in their graves, large numbers of offerings, and unique modes of burial such as shaft graves, litter burials, or multiple interments (Perttula 2004a:401).

Thirteen community cemeteries are known. Twelve are in the heartland (the other is in the Little Cypress Creek basin), with six being in the southeastern part where the multiple mound sites are (Perttula 2004a:Figure 13.31). Because of their size, the presence of elite members of the society, and their positions away from residential areas, Perttula (2004a:401–403) considers them to be equivalent to mound centers as places that served integrative functions.

One commonality in the graves, elite and commoner alike, relates to grave orientation and body placement. The deceased generally were placed on their backs with legs extended and arms at their sides. Grave orientation was generally east to west or northeast to southwest with head placement to the east or northeast (Perttula 2005b:380–385; Turner 1978:52). To account for this general consistency and explain slight variations, Turner (1978:49–60) shows that burial orientation could have been based on the setting sun as its direction varied through the year. This may mark an important commonality of belief that Titus phase groups held that differentiated them from some other Caddo groups.

Titus phase peoples produced or acquired a rich and varied ceramic assemblage consisting of grog- and grog/bone-tempered wares that included carinated bowls, compound bowls, square bowls, pedestal bowls, rattle bowls, zoomorphic effigy bowls, bottles, ollas, everted-rim jars, and globular jars. Fine ware types include Ripley Engraved, Taylor Engraved, Wilder Engraved, Bailey Engraved, Avery Engraved, Simms Engraved, and Belcher Engraved, with Ripley constituting on average 49 percent of the vessels placed as burial offerings (Perttula and Sherman 209:397). Wilder and Taylor Engraved typically make up 3 and 5 percent of the burial collections. Utility wares consist of a variety of small to large jar forms and include La Rue Neck Banded, Karnack Brushed-Incised, Harleton Appliqued, and Bullard Brushed (Perttula 2004a:404–406).

Perttula and Sherman (2009:397–401) see an east-west split in the ceramic tradition somewhere between Greasy Creek and Dry Creek in the heartland. In the western sites, trade wares such as Avery Engraved from McCurtain phase sites on the Red River to the north are more common in burial assemblages. For utility wares, La Rue Neck Banded jars are more frequent, as are plain vessels and untyped jars. In the eastern sites, Taylor, Bailey, and Simms Engraved appear as important secondary types along with trade wares from the Belcher phase on the Red River to the east. Utility wares for the eastern sites include more Harleton Appliqued, Bullard Brushed, and Karnack Brushed-Incised jars. Though Ripley Engraved dominates both subtraditions, the bowl motifs differ. Pendant triangle and interlocking horizontal scroll motifs are more prevalent in the eastern sites, while the western sites have bowls that display scroll, continuous scroll, scroll and semicircle, horizontal diamond, and bisected diamond motifs (Perttula and Sherman 2009:400).

The east-west ceramic dichotomy is evident even in the harder-to-interpret sherd collections from residential contexts (Perttula and Sherman 2009:400). Eastern heartland sites have more brushed sherds reflecting a prevalence of body brushing on utility jars, which may have been influenced by similar vessel decoration used by Belcher phase potters. In the west, undecorated and neck banded sherds are more prevalent (Perttula and Sherman 2009:403). In addition, red-slipped sherds are more common in the west.

Differences in burial vessels and sherd assemblages, mound-building activity, and community cemeteries suggest that the Titus heartland contains the archeological expressions of multiple communities with differing degrees of interrelatedness. In terms of hierarchical organization, a case can be made for two core communities, each covering about 675 km^2 and encompassing a number of smaller communities marked by the key sites as proposed by Perttula and Sherman (2009:335–337). The dichotomy of "belief and cultural practices"

(Perttula and Sherman: 2009:400) between the eastern and western core communities may have occurred on the ground somewhere between Greasy Creek and Dry Creek along Big Cypress Creek, i.e., between the third and fourth of the five heartland communities listed above. What this model does not address is how best to interpret Titus phase sites outside the heartland. Were they aligned in some way with the two core communities noted above, or were they equivalent core communities within an overarching confederation? The Pine Tree Mound community is one place to look for part of an answer to that question.

Pine Tree Mound: Another Titus Core Community?

We think that Pine Tree Mound can be interpreted as the key site in a third major Titus core community, one that has both important similarities to and differences from the two defined for the heartland (Figure 18). We make the case for this below focusing on five main lines of evidence: radiocarbon dates, ceramic tradition, mound construction and organization of ritual space, burial ritual, and geography.

Radiocarbon Dates

Radiocarbon dates leave no doubt that the Pine Tree Mound community and Titus phase were contemporaneous. The 102 good radiocarbon dates from Pine Tree indicate that the primary occupation there started by A.D. 1350 and lasted till perhaps the mid-1600s; it also was used in the 1700s, though this occupation may have had little to do with the earlier one. There are another 29 dates in this span from eight other sites nearby (Dockall and Fields 2011; Dockall et al. 2008; Gadus et al. 2006), bringing the total number of radiocarbon dates for the Pine Tree Mound community to 131. We consider it well dated.

The Titus phase also is well dated, with Perttula and Sherman (2009:383–384) listing 91 radiocarbon assays from 27 sites and Hatfield et al. (2008) adding 16 more from three sites for a total of 107 dates. The span indicated is A.D. 1430 to 1680. While this makes it look like the Titus phase started almost a century later than Pine Tree, that impression evaporates if the poorly understood Whelan phase is added in. Typically thought to have started around 1350 and to have been ancestral to the Titus phase, Whelan is a construct that probably should be discarded (Davis et al. 2010:45–46, 99–102; Perttula 1992:106–107). It is just the beginning of the Titus phase, paralleling the early end of the record at Pine Tree.

Ceramic Tradition

There is a strong connection through a shared ceramic tradition between the Pine Tree Mound site and Titus phase communities to the north and northwest. The ceramic assemblage that is local to Pine Tree, consisting of a wide variety of Ripley Engraved bowls and bottles, Wilder Engraved bottles, many untyped engraved bowls and bottles as well as undecorated ones, Pease Brushed-Incised jars, maybe Harleton Appliqued and Maydelle Incised jars, a variety of untyped jars decorated mostly with brushing, and mostly undecorated ollas, has much in common with assemblages found at Titus sites, and it is certain that some of the vessels recovered from the Pine Tree Mound graves—most obviously a small Taylor Engraved jar and a medium-sized Karnack Brushed-Incised jar—are imports from the north.

Other pots likely originated there too, and the fact that there are six analyzed ceramics from Pine Tree that appear to be local on subjective grounds but non-local based on instrumental neutron activation analysis or petrographic evidence supports this. These six consist of a Ripley Engraved bowl, two Ripley bottles, a Pease Brushed-Incised jar, and two untyped brushed jars. We are equally certain that there are vessels found at Titus sites that were made at Pine Tree, reflecting connections that extend beyond sharing a tradition to interacting frequently and exchanging goods and ideas.

Similarities are evident even at the sherd level. For example, the high incidence of brushing (48 to 56 percent) in the sherd samples associated with the Pine Tree Mound village areas is very similar to the preponderance of this surface treatment in the eastern Titus heartland. More dramatic, though, is the predominance of Ripley Engraved at Pine Tree. Ripley vessels make up 40 percent of the Pine Tree Mound mortuary assemblage, comparable to the numbers from such Titus phase cemeteries as Mockingbird (42 percent) and Tuck Carpenter (54 percent). In fact, some of the Ripley Engraved vessels from Pine Tree could get lost within the assemblage from Tuck Carpenter, and vice versa. Certain Ripley vessel forms, such as bowls with

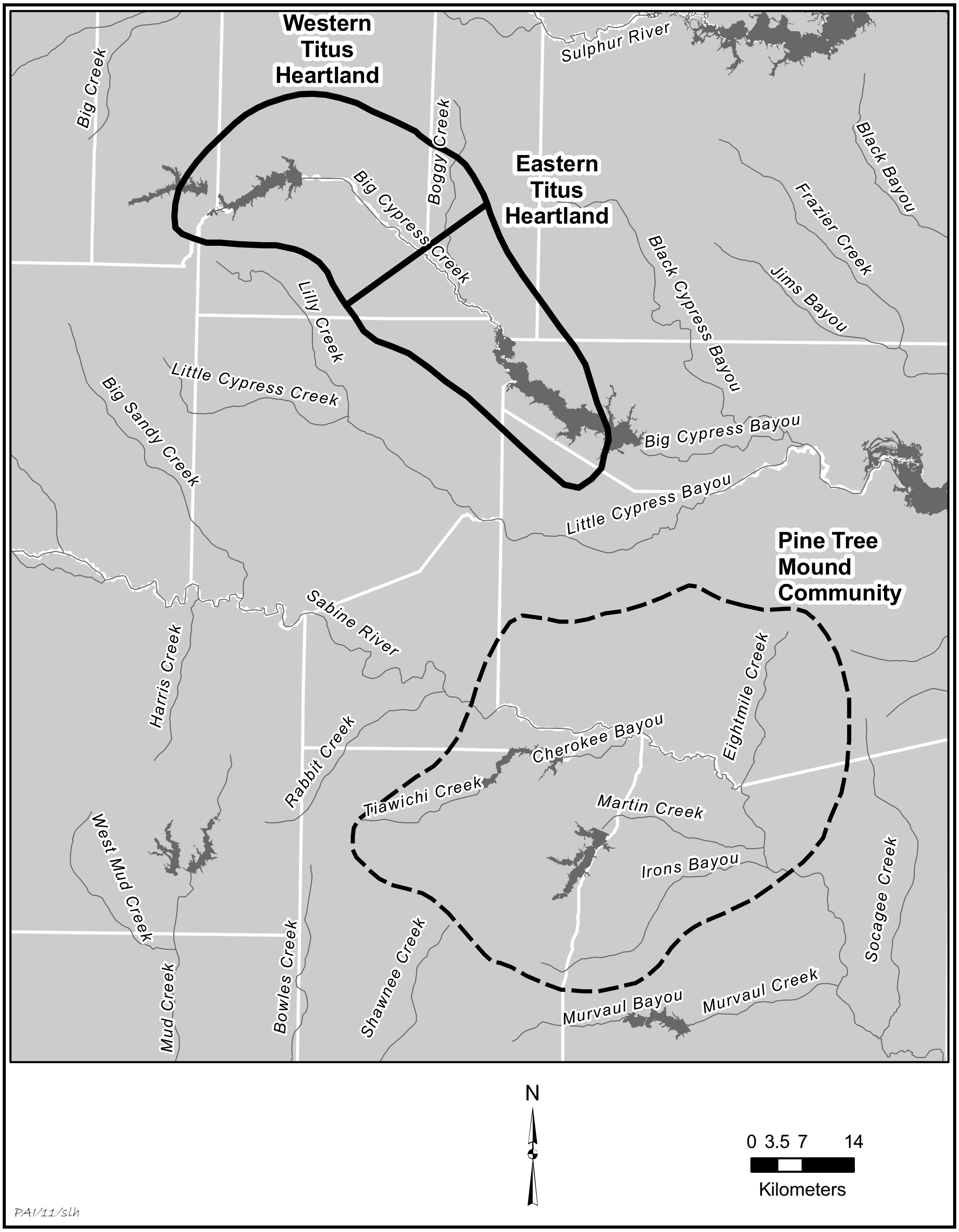

Figure 18. Map showing the location of the Pine Tree Mound community relative to the eastern and western Titus heartland core communities.

peaked or scalloped rims and square bottles, occur in the graves at both sites, and there is a single example of a pedestal bowl at each (Turner 1978:81–99). Many of the motifs and elements on the Ripley bottles and bowls from Pine Tree—for instance, concentric circles, concentric circles/diamonds, medallions, slanted and straight scrolls, and half scrolls—also occur at Tuck Carpenter.

These shared motifs occur in different percentages in the two assemblages, however. Scrolls and half scrolls on bottles are common in the Pine Tree Mound graves (n=5, 30 percent of Ripley bottles) but infrequent at Tuck Carpenter (n=1, 6 percent). The concentric circles motif is the most common one on Ripley bottles from the latter (n=9, 50 percent), most often associated with square vessels (n=7, 39 percent). At Pine Tree, only three (18 percent) of the Ripley bottles are square. Also at Tuck Carpenter, Wilder Engraved bottles with their characteristic interlocking spirals occur almost as frequently (n=15, 35 percent of bottles) as Ripley bottles (n=18, 42 percent). At Pine Tree Mound, however, only 15 percent (n=5) of the bottles are Wilder Engraved.

Ripley carinated bowls with scroll motifs are common in both assemblages, with 126 (75 percent of all bowls) of those from Tuck Carpenter and 27 (54 percent) from Pine Tree displaying some variation of the motif. The slanted scroll with no central element variation is more prominent at the former (n=44, 35 percent) than the latter (n=5, 10 percent), though, and the Tuck Carpenter graves produced 13 examples (10 percent) of a straight scroll with diamonds and circles as central elements and pendant triangles as secondary elements (the traditional pendant triangle motif defined by Turner [1978] and Thurmond [1990]), while Pine Tree had no bowls with this particular design. The Pine Tree Mound graves did contain two bowls that are variations on this theme, however, one with a straight scroll with a diamond central element but no pendant triangles and another with a half scroll, central circle, and pendant triangles. So, the same elements are present, but they were combined or executed in different ways at the two sites. Other differences include more bowls with peaked or scalloped rims at Pine Tree (n=26, 36 percent of bowls) than at Tuck Carpenter (n=18, 11 percent). Also, the latter produced small numbers of rattle and animal effigy bowls while the Pine Tree Mound graves had none.

We believe the similarities in the pottery represent a single shared ceramic tradition among multiple closely related groups of people. The differences relate to variable preferences for how to construct motifs that reflected widely held beliefs, with some apparently intended to convey information about identity at the community, lineage, or family level. Thus, variation in motif construction can be seen as varied ways of projecting a single message that bound Titus phase communities together.

Mound Construction and the Organization of Ritual Space

One of the main things that appears to set the Pine Tree Mound site apart from Titus phase sites relates to the nature of the mounds constructed at both. As noted, there are 17 recorded mounds in the Titus heartland, none of which are known to be platform mounds (Perttula and Sherman 2009:387–389). All are small, and all of the excavated ones except one at the Harroun site are the result of dirt being piled up to cap burned ceremonial structures. Hence, they are similar to Mound B at Pine Tree and unlike Mounds A and C, which were built rapidly, likely to support important buildings on their summits (with Mound C and probably Mound A also having such structures beneath them). Titus phase peoples apparently did not build mounds to serve as platforms for such structures, implying sociopolitical or religious differences between them and the Pine Tree Mound Caddo.

It is difficult to know just how much to make of this, though, partly because we do not know much about some of the Titus mounds. In fact, it is possible to see similarities in the use of ritual space and site layout that unite the Pine Tree Mound site and the Titus phase. While it is true that there are no Titus sites that have such clearly defined ritual spaces as the ceremonial precinct at Pine Tree, with its large platform mound at one end of the plaza and community cemetery at the other, smaller platform mound on the east side of the plaza, and non-platform mound on the west side of the plaza, it is not hard to see the arrangement of the mounds at what may be the premier mound site in the Titus phase, Whelan, as reflecting a structured ceremonial place. The four mounds there form a rough crescent around the south side of what could be a plaza measuring some 220 m across (Davis et al. 2010:16). It is even possible that one or both of the unexcavated mounds there could be a small platform mound like Mound C at Pine Tree.

Further, Perttula and Sherman (2009:392) suggest that the dense midden deposits there indicate it was the scene of communal feasting associated with repeated ritual use. And finally, the position of Mound D relative to Mound A at Whelan (328º east of north) is close to the orientation of Mound B relative to Mound A at Pine Tree (320º). We argue that this northwest-southeast axis, also common to the grave orientations, is related to a particular astronomical alignment, that of the bright red star Antares. Mounds B and C at Whelan are oriented more easterly relative to Mound A (79 and 74º) than the relationship between Mounds C and A at Pine Tree (63º), but still within the range of what we have proposed as the orienting principle, i.e., sunrise position. These patterns suggest that the Pine Tree Mound Caddo and at least the eastern Titus phase Caddo shared some important ideas about the nature of the cosmos, implying a strong degree of connectedness.

Of course, it is possible to see this same phenomenon occurring over a much larger area as well. One example of this can be seen at the Belcher site, where an axis projected though the centers of Mounds A and B and extending through the center of Houses 5 and 6 on and beneath the lower mound nearby measures 330º east of north, i.e., northwest-southeast (Webb 1959:13). The houses associated with the Belcher mounds had extended entryways further reflecting their ritual importance, and those entryways were oriented perpendicular to the 330º axis of the mounds, pointing in the direction of the summer solstice sunrise (ca. 60º east of north). The fact that similar orientations can be found for mounds and burials at the Haley site upstream from Belcher indicates that these orientations had been used for a long time in this area (Weinstein et al. 2003:441–443), and the arrangement of the mounds at the Hudnall-Pirtle site on the Sabine River may indicate the same for the vicinity of Pine Tree Mound (Bruseth and Perttula 2006:Figure 2).

Similarities between the Pine Tree Mound and Titus phase communities also extend beyond the primary sacred places. If hierarchical social orders did exist, then other kinds of mound site configurations would be expected, and this appears to be represented in both. One of the other two multiple-mound Titus sites, Harroun (41UR10), has four mounds arranged in a roughly linear fashion following the edge of the landform over a distance of about 250 m (Jelks and Tunnell 1959:2). This is very reminiscent of the Lane Mitchell site near Pine Tree Mound, which, as discussed, has four or five small mounds arrayed roughly linearly for a distance of about 130 m and no obvious plaza. Both sites have little evidence for much residential occupation nearby. These may be places that were used solely for ceremonial purposes and may represent a different level of activity within the community system.

Burial Ritual

A second important characteristic that appears to separate the Pine Tree Mound community from the Titus phase relates to burial ritual practices. People at Pine Tree were buried with their heads to the south or southeast, in contrast to the generally eastward and northeastward orientation in Titus phase graves (Perttula 2005b:381–384; Turner 1978:50–53, 75; Webb 1959:66). Probably more than the apparent lack of platform mounds in Titus sites, this speaks to what likely were significant differences in group identity. This characteristic more than any other (at least among those we can see archeologically) is what says that the Pine Tree Mound Caddo considered themselves different than the Caddo who lived in the Titus heartland.

It would be a mistake, though, to see these distinct identities as reflecting separate peoples. The evidence to the contrary, i.e., of groups who were closely aligned and whose lives were intertwined, is just too strong. There is even some evidence in the burial data going beyond just head orientation that points in this direction. Specifically, it appears that the path of souls mythology may have had a role in the burial practices for both. This interpretation hinges on the fact that the Milky Way (the path of souls) changes its orientation in the night sky, moving from generally west-east to northwest-southeast to almost north-south over the course of the year (Lankford 2007:205–206). Thus, the Titus phase Caddo generally buried their dead with their feet on the path of souls and their heads to the rising sun. Those buried at Pine Tree Mound also had their feet on the path of souls, but their heads would have been aligned with the Great Serpent as represented by Antares. The rising sun was on their right hand. Thus, the Pine Tree Mound and Titus phase Caddo may have adhered to the same iconic system. Like the Skidi Pawnee (Aveni 2001:304) for whom the location of each village was associated with a particular asterism, different burial alignments may be one way that groups within associated communities differentiated themselves while still participating within the wider Caddo society.

Geography

Geography offers the easiest part of the argument that Pine Tree Mound and associated sites represent a third major Titus core community. The main point here is that, unlike the two proposed core communities in the Titus heartland that butt up against each other, Pine Tree is well removed, across the Cypress Creek-Sabine River divide, about 20 km south of the east end of the heartland. There are sites in between on Little Cypress Creek that likely go with communities on Big Cypress to the north, or maybe constitute another core community in its own right (the community cemetery at the Spider Lilly site [41UR143] with 60+ graves is in this area), but the Pine Tree Mound community still seems distinct spatially. With its own well-defined main ritual space near the north edge of the community, subsidiary ritual space at Lane Mitchell nearer the Sabine River, and residential sites concentrated along Potters Creek but also on other Sabine tributaries, it is a coherent unit that stands apart from the Titus phase ones in the Cypress Creek basin. Also relevant is the fact that the main part of the Pine Tree Mound community as we have reconstructed it, i.e., the part north of the Sabine River floodplain, covers an area that is comparable in size (800–900 km^2) to each of the two core communities proposed for the heartland (675 km^2 each), suggesting similar settlement patterns and political organizations.

One other thing about the geography of Pine Tree Mound that merits mention here, and that applies equally well to the mound center at the Whelan site, is that they are near the boundaries between the Titus phase and neighboring areas, with Pine Tree at the southeast corner and Whelan near the east edge. As such, they were in good places to serve as portals to Belcher and Frankston phase territories to the east and south and to symbolize the power of the Titus peoples to these other groups.

Conclusion

Identifying Pine Tree Mound as a third Titus phase core community, comparable in size to the two that make up the Titus heartland and rivaling or exceeding them in terms of sociopolitical complexity, raises the question of how useful the heartland concept is. Because the Cypress Creek valley appears to have been comparatively densely settled, contained multiple smaller adjacent communities within the two core ones, has at least nine sites containing 17 mounds, and has at least 11 community cemeteries with the graves of close to 1,200 people or maybe more, it does seem logical to think of it as the place many Titus peoples called home. What Pine Tree Mound makes clear, though, is that some communities outside the heartland, and maybe many of them, were more than just distant relations. The problems with the heartland concept, which archeologists who have worked there have long recognized, are that it says more about differing intensities of archeological work than it does about variability in archeological remains across the landscape, and it automatically sets up a heartland-periphery dichotomy that unfairly affects how people think about the greater Titus phase. Without doubt, the archeological evidence from all parts of the Titus area could benefit from a new look, informed by what the Pine Tree Mound site has taught us, to get a better picture of the Titus whole.

Clearly, Pine Tree was a powerful community in its own right, with its own history. We propose that this history grew out of what started at the Hudnall-Pirtle site several centuries before the Pine Tree Mound site was founded and was influenced strongly by what was happening on the Red River to the east and northeast. The Pine Tree community may have been a fourteenth-century development among essentially local Caddo groups, but it was the combination of this with ideas, practices, and maybe even peoples from influential groups living on the Red River that created the Potters Creek version of the Titus phase Caddo. By the middle of the sixteenth century, these people were identified as the Nadaco Caddo, or the people "of the place of the bumblebee," and it appears that they may have stayed there, albeit much modified by the effects of European intrusions and movement of Caddo and other native groups, through much of the eighteenth century. Whether the Nadaco appellation could be applied to all of the Titus territory we do not know, and probably never will, since parts of the area apparently were abandoned by the late seventeenth century and hence are missing from the early Spanish and French accounts.

The evidence presented here indicates that the boundary of the greater Titus area needs to be pushed southward beyond the Sabine River, at least in the area of Rusk and Panola counties. We will leave it to other researchers to look to see if that needs to be done moving west on the south side of the Sabine River. There certainly could be grounds for doing it based on drainage patterns, but the real test lies in what the archeology there looks like. It would be interesting to see if the south side of the Sabine River throughout this area was as sparsely settled as the south part of the Pine Tree Mound community was. If so, there was a large area that both the Titus and Frankston phase peoples may have viewed as open country. Also left to other researchers is the question of whether the Titus phase should be expanded down the Sabine River to include the area of Toledo Bend Reservoir. Though the ceramics from sites there are similar in some ways to Titus pottery (Turner 1978:95–96) and some sites have been considered to be associated with the Titus phase (Perttula 1995:340), there is a countering school of thought that those sites were created by local groups who were distinct from their Titus and Belcher neighbors (Kelley 2006:64).

Finally, it is worth returning here to ask how what was going on in the Pine Tree Mound and other Titus communities relates to what we imagine the sociopolitical system was based on historical records. We have alluded to some aspects of this, including discussion of Story and Creel's (1982) Anderson Cluster model, and we think a case can be made that at least some parts of this model apply to the greater Titus phase. The fundamental question is whether there was a single main seat of power and authority for the whole of the Titus phase, i.e., the temple-residential complex of the *grand xinesi*, and if so where it was. Pine Tree Mound certainly would seem to be a candidate for such a site, but we hesitate to proclaim it so for two related reasons. First, we think it is important not to bank too much on this one site, simply because we know so much about it relative to others. Second, there are at least two other Titus localities, i.e., the Whelan site and the Harroun, Chastain/Dalton/Camp Joy, and Pleasure Point vicinity, that could be candidates for the premier site, and we fear that what we know about them, or what we think we know, is too skimpy to push them one way or the other with great confidence. If afforded the same level of investigation as Pine Tree, they might look much different than they do to us now. In short, we think the issue of Titus phase sociopolitical organization remains an open question that deserves continued debate, with the evidence presented here on the Pine Tree Mound site playing a key role in that discussion.

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Risky Business: Caddo Farmers Living at the Edge of the Eastern Woodlands

Timothy K. Perttula

ABSTRACT

I consider the successes and failures of Caddo farmers during times of rapidly fluctuating climatic conditions between ca. A.D. 1430-1680. These farming societies lived at the western edge of the eastern Woodlands in Texas, Arkansas, Louisiana, and Oklahoma during repeated periods of droughty conditions, especially a major cool and dry period from ca. A.D. 1430-1470.

INTRODUCTION

The prehistoric occupation of the Big Cypress Creek, Sabine River, and Sulphur river basins in northeastern Texas by Titus phase Caddo peoples began during the Late Caddo period, around A.D. 1430. These Caddo peoples were contemporaneous with various Plaquemine, Middle Mississippian, and South Appalachian aboriginal groups living across eastern North America, as well as with Plains Village communities in the southern Plains to the west and northwest, and they were a strong and powerful group of peoples (e.g., Early 2000, 2004; Perttula 2002, 2004; Calloway 2003:105-110; see Pauketat [2005] for a summation of the history of the Mississippian peoples). They were farmers, as were other Mississippian groups, living in dispersed communities, and they were active traders, as we know from the wide distribution outside the Caddo archeological area (Rogers and Sabo 2004:Figure 1) of decorated Titus phase pottery. The Titus phase Caddo groups in the Big Cypress Creek basin were perhaps the most populous and socially complex of the many Caddo societies living in northeastern Texas at that time. They were the westernmost aboriginal group that was socio-politically akin to middle and late Mississippian polities in the broader southeastern U.S. region (Figure 1).

The Titus phase Caddo communities in the heartland of the Big Cypress Creek basin were experiencing rapid and sustained population growth during times of fluctuating climatic conditions in the 15th, 16th, and 17th centuries. These dynamic farming communities dealt with climatic and subsistence stresses by effecting new means of holding their societies together, boldly coming together into several stronger political communities centered around the establishment of larger mound centers, community cemeteries, and villages at key nexuses in the Big Cypress Creek basin (Figure 2). In the words of George Sabo (2003:444-445), "Caddo history as enacted… history is neither mute nor static; it is a dynamic component of Caddo culture that people use today—just as their ancestors did in times past—to shape identities and transfer those identities from generation to generation, even in the face of disruption and loss." It appears that these Caddo communities made considerable investment in the development of ceremonialism—in their construction of mound centers and large community centers—and the end result was long-term stability (cf. Marston 2011; Hunt and Lip 2011:135, 144).

THE ENVIRONMENTAL SETTING OF TITUS PHASE COMMUNITIES

The Pilgrim's Pride site (41CP304) on Big Cypress Creek is one of these newly created larger and community-centered Caddo mound and village settlements (see Figure 2). These are places where the most important and life-giving ceremonies, rituals, and decisions were made by the social and political elite that guided and organized the changing Titus phase societies living along Big Cypress Creek. The community at the Pilgrim's site and vicinity

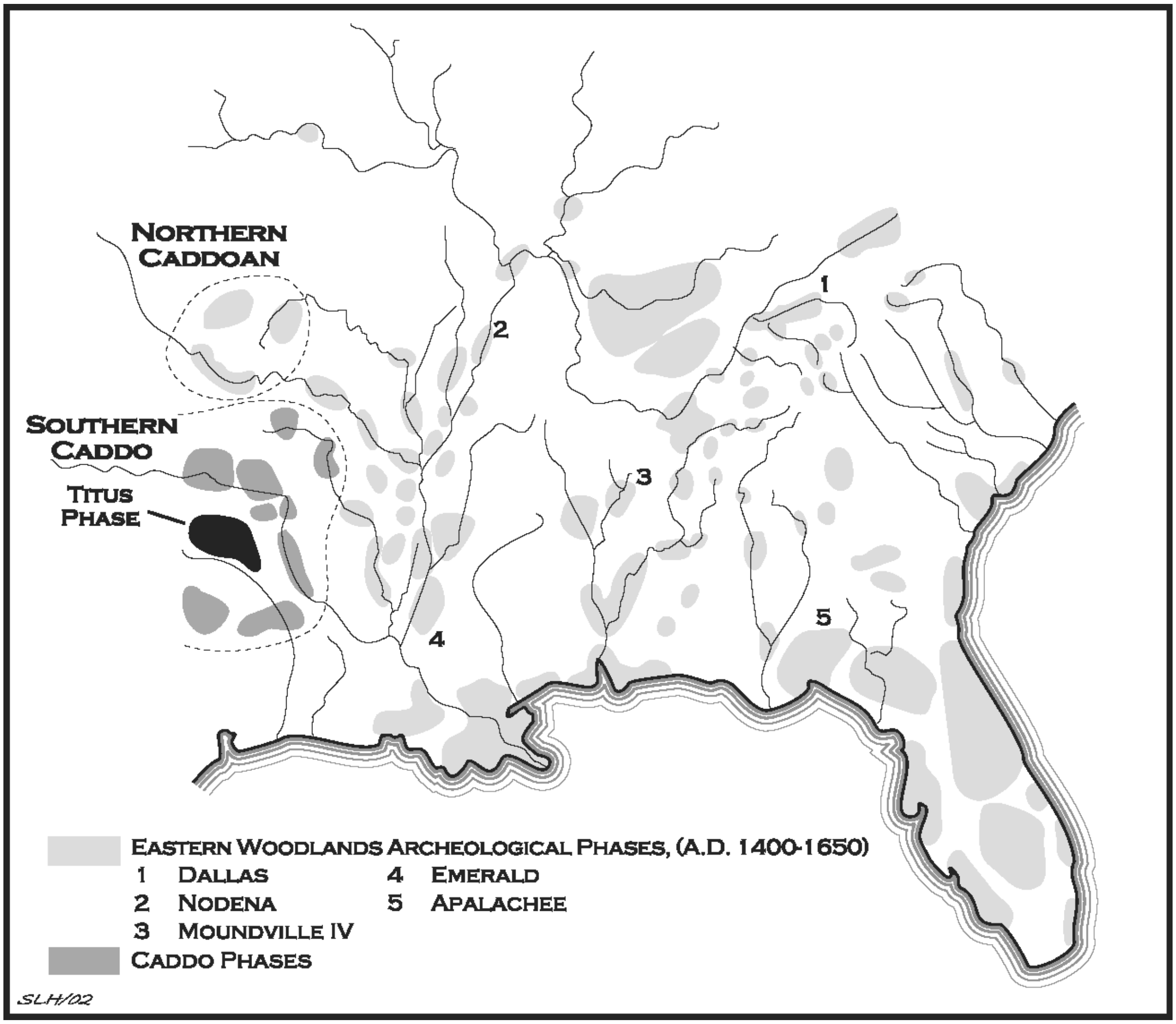

Figure 1. Eastern Woodlands archeological phases contemporaneous with the Titus phase, including other phases in the Southern Caddo area, based on Milner et al. (2001:Figure 2.2).

appears to have been established around ca. A.D. 1430. Smaller farming households were dispersed for several miles around the Pilgrim's Pride site. Life here was organized around the rhythm of planting and harvesting the cultivated plant foods (especially maize), men hunting large game, the rituals and ceremonies of the seasons, and daily life in the household and village settlements.

These Titus phase political communities generally, and the Pilgrim's Pride in particular, are located along and near the modern ecotone between the Pineywoods and the Post Oak Savannah (Diggs et al. 2006:Figures 1-5), with the latter lying on sandy loam soils on the north side of Big Cypress Creek (Figure 3). The Post Oak Savannah is a narrow strip of woodlands between the Pineywoods to the east and south, with the Blackland Prairie vegetational region to the west, north (Talco Prairie; see Figure 3) and northwest, no closer than 20 km away. According to Schmidly (2002:371), the "topography is level to gently rolling and slopes gently from the northwest to the southeast… the post oak region can best be described as an ecotone between the eastern deciduous forest and the tall-grass prairie. The area supports a stunted, open forest dotted with small tall-grass prairies. The dominant plants of the overstory are post oak and blackjack oak, and to a lesser extent winged elm and black hickory." The Pineywoods have medium-sized to tall broadleaf deciduous forests in more mesic habitats, and shortleaf and loblolly pines are common on upland fine sandy loam soils

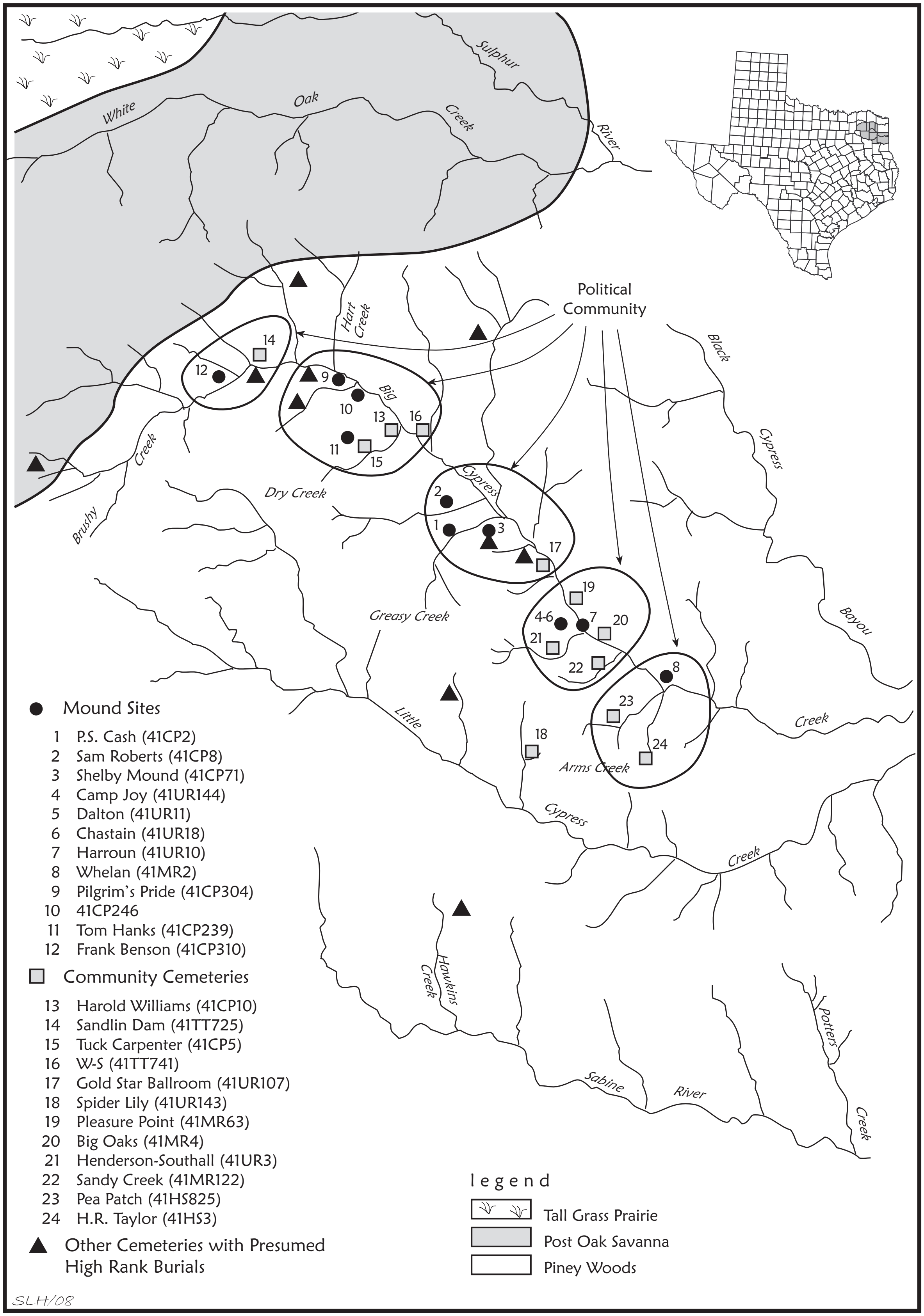

Figure 2. Titus phase political communities.

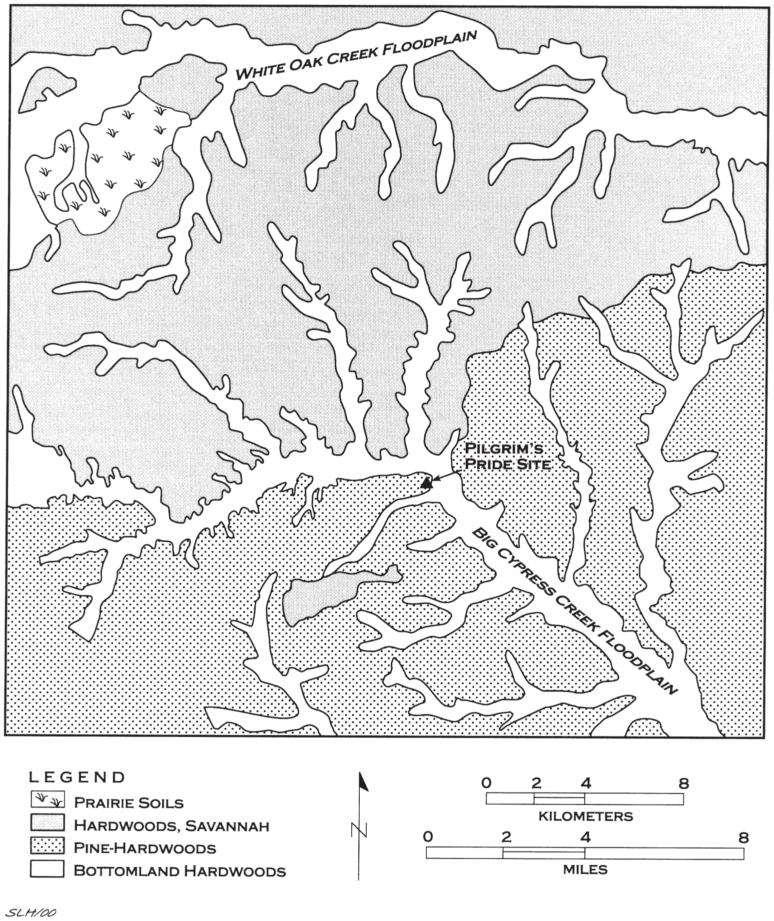

Figure 3. Vegetation zones in the vicinity of the Pilgrim's Pride site in northeastern Texas.

with adequate moisture. Smaller areas of tall grass prairie may be present in both communities throughout the region (e.g., Jordan 1981:Figure 4.1), particularly in more xeric sandy lands.

MID-19TH CENTURY VEGETATION CONDITIONS

Texas General Land Office (GLO) survey notes from a number of the patented land grant surveys in and around the middle reaches of the Big Cypress Creek valley in Camp and Titus counties, Texas, provide initial environmental data on the vegetation conditions in this part of the Big Cypress Creek basin in the mid-19th century. This is before the area was likely to have been extensively cleared and lumbered (Perttula and Nelson 2002:15-16), and may not have been much different then when Caddo groups lived there. The 30+ land survey field notes date from 1837-1854.

The predominant overstory trees in this general locale in the mid-19th century were red oak (*Quercus falcata*), post oak (*Q. stellata*), blackjack oak (*Q. marilandica*), and various species of hickory (*Carya* sp.), along with sweetgum (*Liquidambar styraciflua*). Pine trees must have only occurred in patches, particularly in Camp County, as they represent only 0.8 percent (Titus County) to 3.2 percent of the marker trees (Table 1). The general composition of the forested landscape on both sides of the Big Cypress Creek was an upland woodland of oaks and hickories—with more mesic patches of white oak and red oak—with hardwood forests in the floodplain that comprised willow oak, water oak, overcup oak, maple, sweetgum, ash, elm, and sassafras. There must have been some swampy or marshy, and frequently inundated floodplain areas along Big Cypress Creek because of the occurrence of black gum or black tupelo (see Table 1). Pine was not a primary constituent in the forest in the mid-19th century, and the pine that did occur (probably shortleaf pine, *Pinus echninata*) probably grew on the drier soils in the forest, likely in patches mixed with blackjack oak and post oak (Bonnicksen 2000:229). The pine that did occur was also likely affected by the frequency and intensity of natural or human-created fires. One 1838 land survey on a large tract of land on the north side of Big Cypress Creek, and west of the Pilgrim's Pride site, had a "little prairie." This was probably an area with poorly drained soils that would have had a ground cover of big and little bluestem, switchgrass, and Indiangrass (Marietta and Nixon 1984).

The forest composition in the 1830s-1850s appears to have been greatly influenced by the frequency and timing of Indian-set and lightning-ignited fires (see Bonnicksen 2000:331, 339). These fires created a mosaic of patches of trees with different tolerances to fire, shade, and moisture, with

Table 1. Tree species mentioned in General Land Office records for the middle part of the Big Cypress Creek valley.

Common Name	Species name	Camp County	Titus County
Post oak	*Quercus stellata*	15.9%	19.0%
Blackjack oak	*Q. marilandica*	19.1%	9.1%
Red oak	*Q. falcata*	25.5%	33.1%
White oak	*Q. alba*	1.9%	4.1%
Willow oak	*Q. phellos*	1.9%	1.6%
Water oak	*Q. nigra*	2.5%	2.4%
Overcup oak	*Q. lyrata*	—	0.8%
Hickory	*Carya* sp.	17.9%	17.4%
Black walnut	*Juglans nigra*	—	1.6%
Sassafras	*Sassafras albidum*	0.6%	0.8%
Sweetgum	*Liquidambar styraciflua*	7.6%	4.9%
Ash	*Fraxinus* sp.	0.6%	1.6%
Elm	*Ulmus* sp.	0.6%	1.6%
Maple	*Acer* sp.	1.9%	--
Black gum	*Nyssa sylvatica*	0.6%	0.8%
Pine	*Pinus* sp.	3.2%	0.8%
Number of observations		157	121

the more-fire-tolerant shortleaf pine in the area being found on drier upland soils, along with the more fire resistant post oak and blackjack oak also dominant on the drier soils in the forest.

Post oak and blackjack oaks comprised between 28-35 percent of the tree species mentioned in the area (see Table 1), and these two species were actually more common on the Camp County side of Big Cypress Creek (within the modern boundaries of the Pineywoods, see Figure 3) than they were on the Titus County side (within the modern boundaries of the Post Oak Savannah). The post oak and blackjack oaks would have been found on leached soils on poorly drained upland landforms with low clay content, and there would have been a sparse floor understory cover.

Moister slopes and other upland landforms, along with elevated alluvial landforms, apparently tended to have trees that were moderately tolerant of fire, including loblolly pine, red oak, white oak, and hickory, along with maple, walnut, and other hardwoods. The white and red oaks were nut-bearing trees, as were hickory and walnut. This forest mosaic tended to have a greater diversity of species in canopy than the post oak-blackjack oak or pine forests (Marietta and Nixon 1983). About 21-22 percent of the tree species in Camp and Titus counties tabulated in Table 1 included these more mesic upland forests. The distribution of mesic forests appears to have been comparable on both sides of Big Cypress Creek. Hickory, in particular, preferred moist slopes as well as river bottoms because they are more vulnerable to fires than the oaks and shortleaf pine.

The distribution of sweetgum in mid-19th century Camp and Titus County land records indicates that there were floodplain habitats in the immediate area that were only occasionally inundated (Nixon et al. 1983). Slighter larger floodplain areas were present in Camp County at the time (see Figure 3). Other trees common in such habitats would have included maple, holly, and American hornbeam.

It is interesting how few pine trees were noted in the middle reaches of the Big Cypress Creek valley during the 1837-1854 General Land Office surveys, particularly since much of Camp County falls within the modern Pineywoods. This is probably a product of two different, but unrelated factors. First, the land surveys that were specifically examined were relatively close to Big Cypress Creek, and thus would have excluded much of the higher and drier upland areas of shortleaf pine that oftentimes occurred in parts of the region in pure stands with little undergrowth. The second factor is the possibility that the dominance of pine in modern times in what is termed the Pineywoods may well be the product of the cessation of Indian-set fires after the Caddo Indians were removed from the region by the mid- to late 1830s, as well as more strenuous attempts by farmers after the mid-1850s in fighting lightning-ignited fires. As the frequency and intensity of fires diminished in modern times, and fires had not burned for a number of years, the extent of upland sandy loam habitats suitable for pines also increased.

General Land Office field notes indicate that Big Cypress Creek had only a 20-28 foot wide channel in this area, not much different than in modern times. The stream flowed all year-round. The channels of the smaller tributaries ranged from 6-10 feet in width, and many of these (particularly in Titus County) were probably spring-fed, and others only flowed part of the year (Thurmond 1990:16 and Figure 4).

LATE HOLOCENE ENVIRONMENTAL CHANGE

The Late Holocene period after ca. 5000 years ago appears to have been characterized by fluctuating climates—between moist or dry cycles--that were generally wetter than during the preceding Middle Holocene period. Modeled precipitation histories (Perttula 2005:Figures 2.3a-c) suggest that the peaks and valleys in these cycles differed by ca.100-200 mm through time.

With these climatic and rainfall conditions, Oak-hickory-pine woodlands were probably the principal vegetation in upland habitats in the Big Cypress Creek basin, with a well-developed riverine hardwood forest in the floodplain settings. Supporting the hypothesized drier and warmer cycles in the middle portion of the Late Holocene, the Ferndale Bog pollen record indicates that the peak in pine pollen was between ca. A.D. 200 to 1100 (Holloway 1994: Table I.2), while Bousman (1998:207) notes one grass spike or peak in the Weakly Bog in Central Texas that dates to about 1500-1600 years ago (ca. A.D. 400-500), with another between A.D. 1450 to 1550. These periods were also slightly colder and drier.

For the last 1000 years or more, dendrochronological or tree-ring records that are relevant to tracking paleoenvironmental change are the most accurate and temporally sensitive data available on Late Holocene environmental change (e.g., Stahle 1996). Tree-ring research in Texas, Arkansas, and Louisiana, as well as the Southeast U.S., by Stahle and Cleaveland (1988, 1992, 1993, 1994, 1995) has compiled significant information on subtle but changing climatic and rainfall conditions and trends for the general Trans-Mississippi South region (of which the Caddo area is a part).

Most notably, droughts are not uncommon in the region in modern times (as can be attested by 2011 drought conditions in northeastern Texas), and there were numerous wet and dry spells and periods of climatic instability between ca. A.D. 1000-1700 and after, just as there were between 5000-1000 years ago (see Stahle and Cleaveland 1988, 1994). Some of the worse droughts may have occurred around A.D. 1555, 1570, 1595, and 1670, and the period between A.D. 1549 and 1577 has been suggested to have had the worse droughts in the past 450 years (Stahle et al. 1985).

More detailed analyses are available from bald cypress tree-ring chronologies on spring rainfall between A.D. 997 and 1988 from Big Cypress State Park in northwestern Louisiana (Stahle and Cleaveland 1995; see also Tree-Ring Data Bank, IGBP Pages/World Data Center for Paleoclimatology Program, Boulder, Colorado). Year by year changes in prehistoric times indicate that the seven sets of wettest years were between A.D. 1053 and 1057, 1168 and 1176, 1178 and 1180, 1265 and 1268, 1323 and 1328, 1553 and 1555, and between 1584 and 1586. The wettest years in prehistoric times were about a decade from 1168 to 1176 and 1178 to 1180 (Figure 4). These years would likely have been optimal growing years for Caddo horticultural groups, assuming a correlation between crop production and spring precipitation values (cf. Anderson et al. 1995:265). The wetter conditions would also likely have led to an increase in the extent of swamp and wetland habitats in much of the Big Cypress Creek basin, and a concomitant expansion in the carrying capacity of woodland plants and animals in valley and floodplain areas.

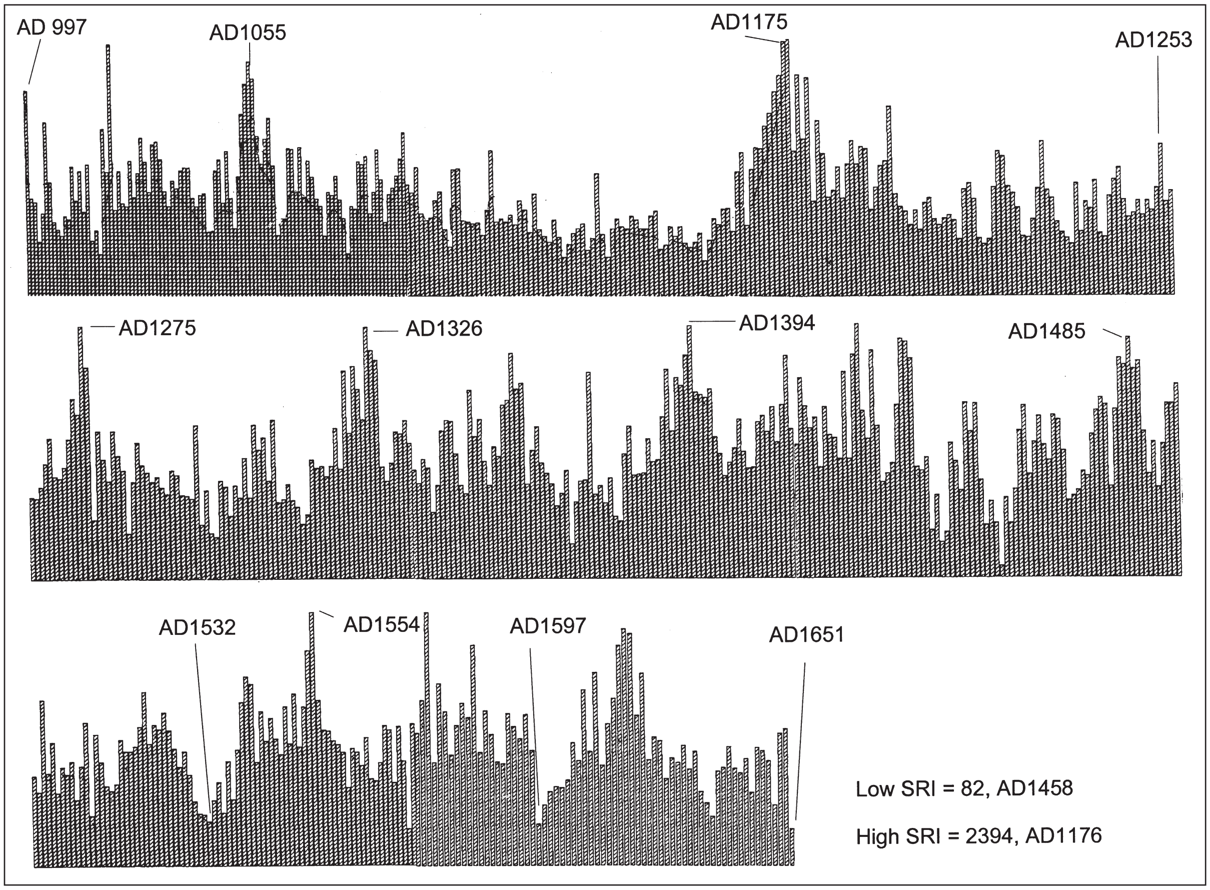

Figure 4. Tree-ring sequence, Big Cypress State Park, Louisiana, A.D. 997-1651.

Conversely, the driest years in prehistoric and early historic times—between A.D. 1014 and 1016, 1215 and 1217, 1444 and 1447, 1455 and 1460, 1529 and 1533, 1653 and 1655, and between 1697 and 1699—may well have been periods when food supplies were stressed. The climatic conditions during these times would have put at risk the ability of Caddo groups to produce sufficient food reserves from the cultivation of tropical cultigens, as well as their chances of success in obtained good maize harvests during these extended droughty periods (see below). The very dry years between A.D. 1444 and 1460 detected by the tree-ring record (see Figure 4) correlate well with the grass spike/drier episode noted by Bousman (1998) from the Weakly Bog pollen record. These droughts probably also affected the constancy of flow in the numerous upland springs in the area, as well as the volume of flow in the Big Cypress Creek basin, which would have influenced the relative quantity of animal and plant foods in floodplain and upland forested habitats.

Looking at the period of wet and dry spells from ca. A.D. 1000 to 1650, the wetter years (>1400 standard ring width indices [sri]) were more than two times as frequent as the driest and droughty (<560 sri) years (see Figure 4). After ca. A.D. 1430, the wetter years occurred less often, some 55 percent less between A.D. 1600 and 1700 than in the ca. A.D. 1200 and 1400 period.

The frequency of very dry years remained rather constant after ca. A.D. 1430 (and remained so until the 1790s), but were conversely quite rare between A.D. 1000 and 1400 (see Figure 4). Clearly then, if the tree-ring data from Big Cypress State Park are relevant to understanding local climatic conditions in the Big Cypress Creek basin, Caddo settlement of the region before A.D. 1400 took place during an equitable climatic episode when floodplain and upland forests were expanding at the expense of more xeric habitats. There were comparable spring rainfall amounts during most of a 400-year period. It is only after the early to mid-15th century that more xeric and cooler conditions probably existed in the Big

Cypress Creek basin. There were major periods of drought between A.D. 1444 and 1447, and between 1455 and 1460, in the early 16th century, the mid-17th century, and then with regularity until the latter part of the 18th century. During these times, the Big Cypress Creek region was occupied by Titus phase Caddo groups (see Figures 1 and 2).

Changes in solar radiation inferred from atmospheric delta C14 variation (Bradley et al. 2003: Figure 6.13) also provide a useful climatic proxy for paleoenvironmental change. Climatic minima (i.e., cooler and drier times) peaked around A.D. 1450 and A.D. 1650, and were probable periods of cultural hardships for the Titus phase Caddo peoples.

CLIMATIC EPISODES, CA. A.D. 1430-1680

More detailed paleoenvironmental reconstructions of past climatic episodes during the Titus phase Caddo settlement of the Big Cypress Creek basin are based on the previously discussed Big Cypress State Park tree-ring data base and various reconstructions of changes in temperature over the last 1000 years (Figure 5) offered by Mann et al. (1998) and Crowley 2000). These reconstructions use a wide range of proxies, such as tree rings, ice cores, and corals (see Jones et al. 2001:662; Mann 2002).

The mean temperature reconstructions indicate that there has been a general decline in temperature from about A.D. 1000 (if not earlier) to about 1900, with a rapid warming after that time. Crowley's (2000) studies suggest that prior to 1850, decadal-scale changes in temperature variation are due to low frequency changes in solar irradiance and pulses in volcanism that served as climatic forcing mechanisms. The 11th and 12th centuries were warm, and the 13th century was a time of temperature fluctuations, as was the 14th century and much of the 15th century. Some of the coldest reconstructed temperatures occurred around the mid-14th century, as well as in the mid-15th century, and much of the 17th century was cool. Otherwise, much of the period between ca. A.D. 1300 and 1580 was relatively warm. After A.D. 1700, about the time that the Titus phase Caddo peoples abandoned the northeastern Texas region, temperatures warmed again, until a period of abrupt cooling in the early part of the 19th century. Other reconstructions of past temperature variability over the last 1000 years suggests that the 17th century was even colder than previously thought, and much of the 12th, 13th, and 14th centuries were cool (Esper et al. 2002; Mann 2002), as "reconstructed temperatures are consistently well below those indicated by all other records" (Briffa and Osborn 2002:2228).

The second part of the climatic data base is the A.D. 997 to 1988 tree ring width data from Big Cypress State Park. The tree ring data is the proxy for moisture over the last 1000 years in the general northeastern Texas region. The range in tree ring values over the 250 year period of the Titus phase, namely the standard ring indices, are from a low of 82 (in A.D. 1458) to a high of 2386 (in A.D. 1578) (see Figure 4), with trends from wet to dry apparent over the course of a millennium.

From these trends in tree ring width and reconstructed mean temperature variation, I have defined six alternating droughty and mesic periods between A.D. 1430 and 1680 (Table 2). The droughty periods date from A.D. 1430 to 1476, 1525 to 1538, and from 1573 to 1602, and the generally warmer

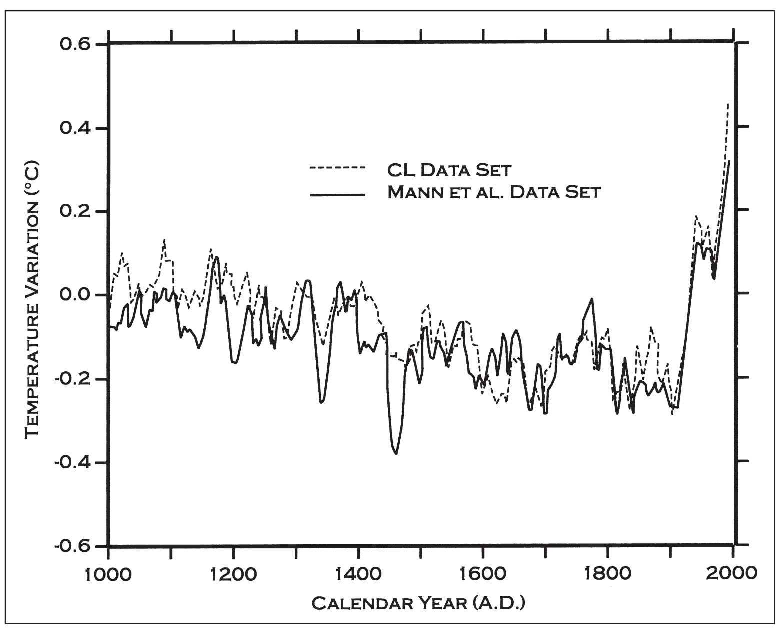

Figure 5. Reconstructed temperature variation, A.D. 1000-2000, after Mann et al. (1998) and Crowley (2000).

and wetter periods date from A.D. 1477 through 1524, 1539 through 1572, and from 1603 through 1670+. After 1670, the period from 1671 to 1676 was relatively dry and cool.

Based on mean tree-ring widths in the three principal droughty climatic episodes, the most sustained and persistent period of drought was at the beginning of the Titus phase, in the A.D. 1430 to 1476 climatic episode (see Table 2). The three peaks of drought conditions in A.D. 1444 to 1447, 1455 to 1460, and in 1472 to 1473 had mean tree ring widths of only 370.5-556.0, between 40-60 percent lower than in times of an equitable climate and average growing and moisture conditions. The A.D. 1455 through 1460 drought was also a notably colder era during the Titus phase.

The other two droughty climatic episodes were also very dry (with mean tree-ring widths ranging between 304 and 487.5), some 50 to 70 percent lower than in average climatic conditions. These drier and colder drought periods, and the four year drought (A.D. 1651 to 1655) during the last mesic period, did not generally last as long as the cold and dry pulses during the A.D. 1430 to 1476 period. While the A.D. 1525 through 1538 droughty period was quite dry, it was nowhere as severe a drought as the drought in the mid-16th century that Stahle et al. (2000:121) consider the "most severe prolonged drought over much of North America for at least the last 500 years." This period of persistent drought occurred between about 1560 to 1590 in parts of Texas and between 1540 and 1580 in northern Mexico, with the worst years in the mid-1570s in Texas—apparently indicated by the two very dry years in 1573 and 1574—with very low summer precipitation. Reconstruction of the spatial extent of this mid-16th mega-drought by Cook et al. (1999) suggests its effects were more severe from southern Texas to the panhandle of Texas, and then north and west into the southwestern U.S., and were less intensely felt in the Caddo area.

LATE CADDO TITUS PHASE ARCHEOLOGICAL AND ENVIRONMENTAL INTERRELATIONSHIPS

The climatic episodes that can be defined over the 250 year period of the Titus phase (ca. A.D. 1430 to 1680) provide the opportunity to examine responses made by these Caddo peoples to

Table 2. Reconstructed Climatic Episodes, A.D. 1430-1680.

Climatic Episode	Droughty periods	Mean Tree-Ring Width in droughty Periods	Mesic periods
A.D. 1430-1476	X	370.5 (1444-1447) 380.5 (1455-1460) 556.0 (1472-1473)	
A.D. 1477-1524			X
A.D. 1525-1538	X	466.0 (1525-1538)	
A.D. 1539-1572			X
A.D. 1573-1602	X	304.0 (1573-1574) 487.5 (1597-1598)	
A.D. 1603-1660+		425.7 (1651-1655)	X

Note: the lower the mean tree-ring width, the drier the climate. A mean standard ring width of 1000 represents an equitable climate and average growing and moisture conditions.

climatic changes over inter-annual to decadal and multi-decadal intervals. I am interested not only in knowing if climatic changes disrupted ordinary or traditional cultural responses of Caddo communities as well as whether Caddo peoples had the means to respond to changes in climatic conditions that may have exceeded normal annual and inter-annual variations.

Since by ca. A.D. 1300 the Caddo had become a society that was increasingly dependent upon cultivated plant foods (see Perttula 2008), it is reasonable to argue that "as agricultural food production increased in importance, fluctuations in climate and hence potential crop yields had varying impacts on societies at both local and regional scales" (Anderson 2001:143). At the same time, in no way do I mean to suggest that the impacts of climate changes, no matter how deleterious, were the root and deterministic cause of cultural changes among the Titus phase Caddo peoples, or that there is necessarily any connection between the two. Rather, climatic changes at different scales can be reasonably expected to "elicit adaptive responses or, at the very least, destabilize well-established adaptive systems" (Binford 2001:447). In other words, climate changes "influence but do not cause particular responses on the part of human populations" (Miller 2004:137). No adaptive strategy of any peoples is divorced from the range of habitats it exploits to survive and prosper. In essence, therefore, what I want to do here is lay the temporal and climatic framework to consider how changes in habitat variability and climate may have affected the adaptive success and influenced the cultural responses of Titus phase agricultural Caddo peoples living in the middle reaches of the Big Cypress Creek basin, at the edge of the eastern Woodlands of North America.

There may be some relevant comparisons to be made between the climatic and native history of the Titus phase Caddo peoples and what recent archeological, bioarcheological, and paleoenvironmental research in the lower Mississippi valley has to say about the mid-16th century societies living there at the time of a mega-drought that lasted from the 1540s to the 1580s (Stahle et al. 2000; Fisher-Carroll 2001; Burnett and Murray 1993). This lengthy period of drought is thought to have had major effects on these native peoples, leading to a major reduction in reproductive potential, agricultural destabilization, social stresses, and "the abandonment of an entire region within a relatively short period" (Fisher-Carroll 2001:242). How might the droughty periods in Northeast Texas between A.D. 1430 and 1680 have affected the Titus phase Caddo groups living in a number of Big Cypress Creek political communities?

The droughty climatic episodes occurred about every 35 to 48 years, or about once every generation, given that the average life span of Caddo males and females in Late Caddo times was about 40 years of age (Derrick and Wilson 2001:Table 2). Thus, the memories of these droughts, and the cultural ability to learn how to recognize and respond to the signs and changes signaling the onset of droughty conditions (i.e., social memory, see McIntosh et al. 2000:24-25), were likely part and parcel of the adaptive strategies and knowledge possessed by the Titus phase Caddo farming peoples in managing subsistence risks. Even so, it is unlikely that they were culturally prepared for the onset of the most intensive droughty period over the last millennium that occurred between A.D. 1444 and 1460, or had the crop reserves on hand to successfully withstand such lengthy very cold and very dry conditions without other social or cultural options at hand.

The more mesic periods between severe droughty conditions also lasted between 35 and 49 years at a time (see Table 2). These periods were warmer and wetter than times that came before and after, and were periods of more equitable rainfall and increased net productivity and carrying capacity of plants and animals in the Post Oak Savannah and Pineywoods habitats that were settled by the Titus phase populations. How are these environmental changes linked to subsistence and demographic changes, and what are the effects of subsistence changes on reproductive potential during equitable climatic episodes? We will turn to these questions in the remainder of this article.

In Late Caddo Titus phase times, when the Caddo peoples had a diet that primarily consisted of cultivated plants like maize, beans, and squash, insuring the continued success of agricultural pursuits must have been of primary importance in determining the location of individual farmsteads and hamlets, as well as the community centers. This is likely to have been even more the case than it was in the Early or Middle Caddo periods when Caddo peoples were not apparently quite so dependent upon cultivated plants for their diet, or at least that was the case until ca. A.D. 1300 to 1350 (see Perttula 1996, 2008; Dering 2004, 2005).

How are these constraints reflected in the spatial distribution of Late Caddo Titus phase sites during times of climatic instability? What can be documented in this part of the Big Cypress Creek basin (see Figure 2) is that the overall settlement pattern was dispersed, in conjunction with a heightened emphasis on situating sites along the secondary streams and the spring-fed branches. These areas may have had more dependable water, or more accessible water, and it is also likely that fields would have been easier to clear along the more open upland forests than if fields had to be located in the more mesic valleys. The spatial dispersion of settlements within the community would have contributed to a reduction in food production risk by growing crops across the widest range of suitable habitats as possible. Marston (2011:193) also notes that "food sharing is a socially embedded form of spatial diversification" and risk mitigation.

There are more Late Caddo Titus phase sites in this part of the Big Cypress Creek basin than sites found during earlier periods (Perttula 2004: Table 13.2), suggesting that the regional population was quite a bit higher during the Late Caddo period (all things being equal, especially the length of time each settlement was occupied and the general shifting of populations across the landscape), and there are several clusters of settlements that may represent parts of contemporaneous small communities or villages. Titus phase cemeteries are particularly common in sites located along Big Cypress Creek itself, followed by other cemeteries on a series of tributaries to Big Cypress Creek. The principal tributary creek settings for Titus phase cemeteries are Swauano Creek, Boggy Creek, Dry Creek, Arms Creek, Meddlin Creek, and Greasy Creek (see Figure 2). The Late Caddo communities living in the Pineywoods on the tributaries appear to represent recognizable concentrations of settlements, mounds, and community cemeteries that constitute distinct political and socially-linked communities. A political community as used here is marked by a cluster of interrelated settlements and associated cemeteries that are centered on a key site or group of sites distinguished by public architecture (i.e., earthen mounds) and large domestic village areas.

Perttula and Nelson (2003:34) have noted that Late Caddo Titus phase sites are more common south of Big Cypress Creek in the Pineywoods than they are on the north side of the basin in the Post Oak Savanna, or in other stream valleys (such as Little Cypress Creek, White Oak Creek, or streams in the Lake Fork Creek basin) in the Big Cypress, Sulphur River, and Sabine River basins. Much of the upper Sulphur and Sabine River basins were abandoned after ca. A.D. 1430 (cf. Bruseth 1987; Fields et al. 1997:91). Poorly drained and steeper, rockier landforms on the east side of Big Cypress Creek were also apparently not heavily settled by Caddo peoples.

Regional settlement data for the Titus phase does also suggest that this pattern in the spatial distribution of sites may be part of a much broader trend in the density of Late Caddo sites between the Titus phase "heartland" and outlying areas also occupied by Titus phase Caddo peoples (Perttula 1998, 2004; Perttula and Nelson 2003). This trend indicates that Titus phase sites—as well as Titus phase sites with mounds and large community cemeteries—are more common across the landscape from the Brushy Creek area downstream along Big Cypress Creek than they are in the Post Oak Savannah immediately north and northeast of Big Cypress Creek. This distribution strongly suggests that the density of Caddo peoples during the Titus phase was more concentrated in the Big Cypress Creek heartland in the Pineywoods, including its many southward-flowing and eastward-flowing tributaries, than it was elsewhere across the landscape then, or in earlier times.

It is not until the onset of the Titus phase about A.D. 1430 that the Pineywoods were the scene of large village settlements of Caddo farmers along the western margins of the Post Oak Savannah and Pineywoods ecotone. These villages were established during a major droughty period (ca. A.D. 1430 through 1476, see Table 2). At the same time, there is evidence of a dramatic residential movement of Titus phase Caddo peoples (as marked by the absence of sites) from much of the Post Oak Savanna (e.g., Bruseth 1987:276-277, 280). The movement, redistribution, or emigration of Caddo peoples from more marginal settings may have been the product of a response to periods of stress and subsistence instability during this time of climatic perturbations. Allen (2004:200-201) has noted that populations living in temporally variable environments—environments where the carrying capacity varies widely because of significant climatic turbations of some duration and relative frequency, as is the case at the western edge of the Eastern Woodlands—will frequently emigrate during bad years rather than risk extinction or catastrophic population losses.

These villages and political communities apparently flourished for at least 5 to 6 generations, during both dry and more mesic periods. Several of these large village settlements were apparently abandoned in the early to mid-17th century, however. The important villages are situated in similar topographic settings in the Pineywoods, namely along tributary streams near their confluence with Big Cypress Creek, but they are not found in the Post Oak Savanna. They are marked by a higher density of settlements around one premier community center (see Figure 2). These components represent permanent, year-round, settlements of horticultural peoples. The locations that they chose to permanently settle and build structures and other facilities at had to be situated in habitats where suitable sandy soils were nearby that could be worked with simple wood and bone digging tools, and that the land they built their homesteads and communities on had to be well-drained and elevated above the annual floods along Big Cypress Creek and its tributaries. They also had to be in areas where wood and grass was plentiful for house construction and refurbishing, as well as near relatively plentiful or predictable fresh drinking water. The fact that the Titus phase settlements are not found in any notable spatial clusters around the larger and more important villages suggests that the many resources that were needed by sedentary Caddo populations to successfully live in the Big Cypress Creek valley could best be exploited by dispersing the groups in a variety of settings. In turn, the religious and political elite at the community centers probably helped develop strategies that controlled the redistribution and exchange of resources in times of need, especially the redistribution of agricultural surpluses.

This dispersed settlement arrangement would have also helped lessen the competition for plant and animal resources, and would not have led to the environmental degradation of suitable habitats by a single large community. This would have been of critical concern as a means of alleviating or minimizing stress during droughty periods for Caddo peoples living along the margins of the Pineywoods, in environmentally risky areas. It would also have permitted the Caddo peoples to take advantage of the diversity in habitats to exploit a number of them, thus insuring through resource redistribution and agricultural diversification that the overall community could survive if there were economic difficulties or failures (i.e., local droughts, flooding, fires) in some habitats but not in most of the others within the broader community homelands.

Early (2004:568) has noted that "episodes of drought and climatic instability that have been identified [in the Caddoan area] may have made an agrarian economy untenable in some locations." This seems to have been the case in parts of the upper Sabine and Sulphur River basins after ca. A.D. 1430. Furthermore, Early (2004:563) has commented that "stresses on arboreal canopy cover and habitat, as well as on plants and animal species sensitive to water availability, are likely to have been significant. Expansion of grass and other open canopy species eastward, and other drought responses can occur rapidly in this ecotone, and human adjustments might have required dietary and subsistence changes of some magnitude."

In the Titus phase, the tropical cultigen maize (*Zea mays* L.) was a dietary staple, and domesticated beans (*Phaseolus vulgaris*) were also an important food source. Nuts and seeds were also gathered, but they appear in some areas to have been of lesser importance in the diet of Caddo peoples than they had been between ca. A.D. 900 and 1350 (Rogers and Perttula 2004:37). In fact, the subsistence evidence from Titus phase Caddo sites in the Pineywoods and Post Oak Savanna, as well as elsewhere in the Caddo archeological area after ca. A.D. 1400, suggests the rather successful development of a Caddo maize-based economy by about this time. Dering (2005) does make a strong argument, however, that the diet of Titus phase Caddo peoples was a diverse mixture of cultivated foods and gathered wild plants, especially hardwood mast (see also Dering 2004), and this diversification would have been an appropriate strategy to pursue in times of risk (e.g., Marston 2011) to insure the long-term success of Caddo agricultural strategies, even in the most productive locales.

As noted earlier in the discussion of Late Holocene environmental changes, the Late Caddo agricultural lifeway probably was flourishing in parts of northeastern Texas (likely those areas with the highest agricultural potential) at least in part due to quite adequate growing season rainfall from the late 14th century through the first quarter of the 15th century, the last quarter of the 15th century and the first quarter of the 16th century, the mid-16th century (A.D. 1539 through 1572), and then again in the early 17th century. During droughty periods (see Table 2) that sometimes lasted for several years, the effects of the droughts must have been localized in the Pineywoods, because there is a general continuity of Titus phase settlement across many parts of the Sabine and Big Cypress Creek basins that suggests crops were successfully grown and harvested even in these droughty periods.

The long-term storage of plant foods and seed stock—perhaps in above-ground granaries like the one apparently identified at the Whelan site (41MR2) community center (Thurmond 1990:168; see Figure 2)—also would have helped to offset losses from poor or failed harvests. Above-ground granaries appear to have been a technological innovation whose purpose was to maintain agricultural stability within local communities, by minimizing the impact of risk (or at least redistributing the risk) across the community. The first documented evidence for the use of above-ground granaries in the northeastern Texas region may be from the late village (ca. A.D. 1350 or 1375 through 1450) at the Oak Hill Village (41RK214) in the middle Sabine River basin. There, the granaries had no obvious entrance; instead, entrance to the structures was probably by a ladder to an elevated platform (Rogers and Perttula 2004; Perttula and Rogers 2007:Figure 4d). One granary there had a second line of post holes on the interior of the structure, probably serving as the supports for an interior compartment with good air circulation and ready access.

Two Titus phase sites in the Little Cypress Creek basin have bison skeletal remains, indicating the exploitation during droughty periods of prairie habitats to the northwest and west of Caddo settlements in the Pineywoods. The occurrence of bison in prehistoric Caddo faunal assemblages is otherwise quite rare in northeastern Texas sites. It is likely that small herds of bison roamed the tall-grass prairie in Late Holocene times, although it would have been a considerable trek to the tall-grass prairies in the upper Sulphur River basin (Figure 2) for Titus phase hunters who did not yet have any horses. The high density of arrow points and scraping tools, as well as signs of intensive arrow point manufacture, at the Ear spool site (41TT653) in the White Oak Creek basin and Post Oak Savanna (Perttula and Sherman 2009), suggest that this particular Caddo population was intensively but opportunistically exploiting large game animals.

Stable carbon isotope values have been obtained from Late Caddo and post-1650 Caddo burials along the Red River in northeastern Texas, as well as from the Titus phase, and other Caddo populations living in southwestern Arkansas, and northwestern Louisiana (Perttula 1996:321; Rose et al. 1998). Those mean values on collagen range from –14.8 ± 1.35 ‰ (n=28) from ca. A.D. 1450 to 1650 Caddo sites and –14.2 ± 1.17 ‰ (n=18) from protohistoric Caddo sites. In comparing these Caddo stable isotope values to other generally contemporaneous agricultural populations, such as Cahokia and the American Bottoms along the Mississippi River (Hedman et al. 2002); Iroquois sites in Ontario, Canada (Harrison and Katzenberg 2003); Central Mexico; the Maya region in Guatemala; or from coastal Ecuador (Smalley and Blake 2003:Table 2) in South America, the latter agricultural populations had more enriched isotope values that ranged between –7.0 ‰ to –11.7 ‰.

These populations had very high maize diets, actually about 15-50% higher than did the Titus phase Caddo and other contemporaneous Caddo groups living along the Red River. So while we may be fairly confident that maize was an essential part of the Titus phase Caddo diet, probably accounting for ca. 50% of the diet, as it was for other Late Caddo groups, it was nowhere near as intensive a reliance as it was for many other aboriginal groups in North America, central America, or even South America. There was a flexibility, diversity, or resilience in the Titus phase diet, that is highlighted by their continued use of a broad mixture of wild and domesticated plants (Dering 2005; Fritz 2000:244).

CONCLUSIONS

For Caddo communities living in certain parts of the Post Oak Savanna and Pineywoods of northeastern Texas, the regional archeological information on the density and distribution of settlements after ca. A.D. 1430 does not suggest that there was a continual movement of settlements and communities to exploit new habitats during periods of climatic instability. Further, this information does not point to the fact that the Caddo were moving to reoccupy more marginal areas that had been previously settled by Caddo farmers, or might have been physically degraded by forest clearance and hunting impacts on game animals. There simply do not appear to be Caddo sites dating after ca. A.D. 1430 in some areas (like the upper Sabine River and upper Sulphur River basins) until a period of resettlement in the late 17th to early 18th century (cf. Scurlock 1962). Instead, the archeological record suggests a considerable movement or emigration of people from west to east across the landscape, in concert with the development of a number of political communities in the Big Cypress Creek basin during Titus phase times.

The pervasive evidence of regional abandonment, along with the eastward movement of Caddo peoples in, and into, the Big Cypress Creek basin, points to a broad and regional (or larger-scale) cause. It is suggested that the root cause of the Caddo abandonment of settlements of many sites occupied around this time is paleoclimatic. Climatic proxies such as tree-ring data, reconstructed northern hemisphere mean annual temperatures, and solar radiation inferred from atmospheric delta 14C variation, all point to increasingly colder and drier conditions beginning around A.D. 1375, and lasting well into the 15th century. Peak periods of colder temperatures and drier conditions occurred between A.D. 1440 and 1470, when parts of northeastern Texas were definitely being abandoned by a number of Caddo groups, while stronger and socially-connected polities were developing in other and less marginal parts of the region.

For Caddo societies that were dependent on agricultural crops, but perhaps were living in parts of the region that were more marginal (due to soil fertility, rainfall, incidence of flooding, or incidence of droughty weather) for successful crop production, repeated crop failures brought on by cooler and droughty conditions extending over several years may have had stressful, if not disastrous, results for these Caddo. Having lived in a region subject to repeated droughts, the Caddo probably developed cropping and storage strategies to successfully sustain themselves through a 1- or 2-year drought. But the likelihood of continued poor harvests and the lack of storable food reserves over a decadal-scale drought, when linked with evidence for regional abandonment around A.D. 1450, suggests they were unsuccessful and they abandoned those more marginal areas.

In the face of climatic unpredictability, and risky agricultural practices, Titus phase Caddo societies living along Big Cypress Creek and tributaries in the East Texas Pineywoods developed social and political strategies to manage and minimize environmental and agricultural risks. Their efforts, particularly the creation of distinctive political communities marked by the development of monuments (earthen mounds and large community cemeteries) represent the actions and practices of many different Titus phase Caddo groups to strongly integrate and bond together with each other. This integration was not a form of increasing social complexity so much as it was the constructive actions of people to insure their survival in stressful times.

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Siren Site Chronology: A Reconsideration of the Late Archaic to Late Prehistoric Temporal Sequence of Eastern Central Texas

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ABSTRACT

The Siren site (41WM1126) is a stratified prehistoric camp on the terraces of the San Gabriel River near Georgetown, Texas. Sustained archeological investigations in 2005 and 2006 yielded data that contribute to a refined temporal sequence for eastern Central Texas. The site's best-defined components comprise intermittent occupations from about 2600 to 900 years ago, a time covering the long shift from Late Archaic to Late Prehistoric lifeways. The chronological data, primarily comprising 65 radiocarbon dates from feature contexts, supports some prevailing notions on the regional prehistoric chronology, but strongly contradicts others. We present the Siren site data here and consider the implications for synthesizing past and present efforts.

INTRODUCTION

Battles that are never decisively resolved tend to be refought until some resolution is attained, for better or worse. Cultural chronology has been a central, and often contentious, issue in Texas archeology from the beginning. While much ink has been spilled, there has been gradual progress in developing finer resolution in the spatial and chronological divisions of archeological units. However, the conflicting views have never been conclusively resolved, and they likely never will. The most consequential differences have centered upon the final phases of the Archaic, namely the Uvalde, Twin Sisters and Driftwood phases formulated by Kelley (1947), Weir (1976a, 1976b), and Prewitt (1981, 1985), which form the basis for many of the more general works. A long string of critiques have asserted these phases are flawed, casting confusion on one of the two most pivotal transitions in all of prehistory, the transition from Archaic to Late Prehistoric lifeways. The Siren site, which offers comparative clarity on this obscure part of the archeological record in Central Texas, strongly contradicts some well-established temporal constructs, but in the end is highly consistent with the regional data.

The long road to the current understanding of Central Texas chronology is littered with tired old debates of the proper taxonomic units and their formulation. We have no interest in resurrecting these but need to very briefly wade into the fray to establish a context for our arguments. In comparing the Siren site record to the many extant chronologies, there is a need to sort out the different classifications and underlying premises so that true contradictions can be drawn to the front. Prior to 1987, most chronologies focused on the finer divisions of chronology and used phases as the primary division. Subsequent to 1987, none of the major chronologies have used phases, preferring instead more general categories of stages, periods, or style intervals.

To presage where the undercurrents of this article are heading and to avoid adding to the discord, a key to the analysis herein is drawing careful partitions between spatial, temporal, archeological, and socio-cultural aspects of classification. The conflation of these differing aspects of cultural taxonomy has long been a source of great confusion. In drawing clear distinctions, some clarity might be projected onto the multiple layers of evidence, allowing development of a perspective on the cultural processes happening at the end of the Archaic. Salient among these processes is the nature of the transition between two major stages of prehistory, the Archaic and the Late Prehistoric.

This article begins with a brief introduction to the Siren site, follows with a discussion of important terms and concepts, and then reviews the literature on Central Texas chronology, with a focus on the various schemes for the end of the Archaic period. The Siren site chronology is then compared to the existing models, and similarities and differences are addressed to propose a revised chronology for the latter part of the Archaic and the beginning of the Late Prehistoric. Finally, some thoughts on future research directions are offered.

AN INTRODUCTION TO THE SIREN SITE

The Siren site (41WM1126) lies on the southern terraces of the South Fork of the San Gabriel River on the eastern margin of the Edwards Plateau of Central Texas (Figure 1). In the site area, the river is confined to a fairly narrow valley cut into the underlying Cretaceous limestone bedrock. On behalf of the Texas Department of Transportation, SWCA Environmental Consultants tested the Siren site between June 27 and August 1, 2005, under Antiquities Code of Texas Permit 3834. Data recovery investigations followed between November 15, 2005, and February 3, 2006, under Permit 3938. Kevin Miller served as Principal Investigator on both permits. The work was conducted in compliance with both the Antiquities Code of Texas and Section 106 of the National Historic Preservation Act.

Archeological investigations were limited to a narrow right-of-way, precluding the exploration of trends that extended beyond the study area. It is certain, however, that the site continues well beyond the right-of-way. The northern edge of the T1 terrace drops steeply for approximately 7 m to a lower floodplain terrace, which is only 50-100 cm above the level of the river. The southern edge of the T1 terrace abuts the valley wall, where vertical limestone bluffs rise quickly above the site. In these bluffs, high quality Georgetown chert from the Edwards formation occurs naturally and abundantly in the immediate vicinity of the site.

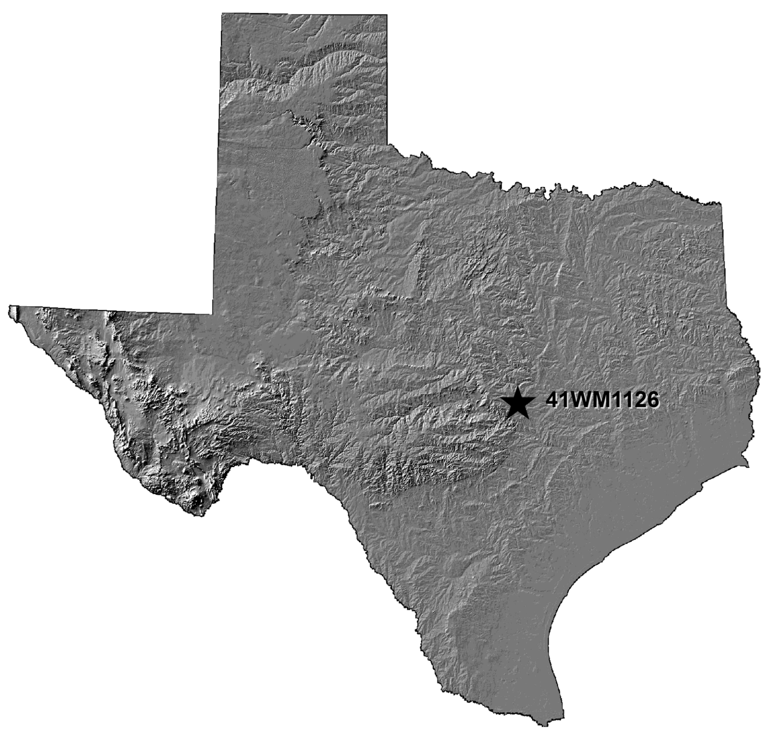


Figure 1. Site location map.

Site archeological deposits occur in 4 to 6 m deep Holocene alluvium. Charles Frederick's (2012) geoarcheological study of the site identified a fairly rapidly aggrading depositional context through the Early and Middle Holocene, but gradual aggradation during the later components that were the focus of site investigations. The slow depositional rate produced a variable preservation potential: some areas are intact, but some are mixed by multiple occupations on the same surface.

Though the site had varying degrees of stratigraphic integrity, an analytical tack focusing on the structural aspects of the site allowed the definition of cultural-temporal components. Based on the analysis of correlations in the distributions of features, 65 radiocarbon dates (Table 1), temporally diagnostic artifacts, and stratigraphic breaks, five cultural components, or analytical units, are well defined. Additionally, there is a lower sixth component, but this was not thoroughly investigated in the excavations. The basic cultural components in the Siren site include:

- Component 1: A Late Prehistoric Austin phase component; one, possibly two, substrata associated with Edwards and Scallorn points dating from roughly 1260-980 B.P.

- Component 2: A sparse Darl-associated component dating from 1730-1550 B.P.
- Component 3: Two possibly distinct components associated with Ensor, Frio, and Fairland projectile points dating to 2000 and 1900 B.P.
- Component 4: A component with bison remains, Castroville points, and possibly Montell points dating from about 2310-2190 B.P.
- Component 5: Dense occupational debris, including a burned rock midden, dating from 2600-2400 B.P., lying on a short-lived stable surface at the contact between two depositional units.
- Component 6: Deeply buried, undifferentiated Archaic components pre-dating ca. 2600 B.P.

Using only radiocarbon dates from feature contexts, the tabulated features showing the different components are plotted by northing and elevation (Table 2 and Figure 2). The stratigraphic and horizontal distribution of the features is discernible. Some of the components could conceivably be further subdivided, and future work may gather additional data to "pop the grain" (develop fine-grain analyses for higher resolution distinctions), but the divisions discussed here are reasonably conservative. Regarding a note on nomenclature, archeologists typically prefer to designate the components consecutively from earliest to latest, but in circumstances such as at the Siren site where the earliest components are unidentified, ordering from latest to earliest is warranted. So it is here: the cultural components are defined as Strata 1 through 6, from top to bottom.

CULTURE HISTORY SYSTEMATICS: A BRIEF DEFINITION OF TERMS

In 1958, Willey and Phillips, building upon the efforts of many before them, established a workable blueprint for the basic archeological unit concepts. That work has been cited as the authority in many of the Central Texas cultural chronologies addressed in this article (i.e., Black 1989; Johnson 1987; Prewitt 1981, 1985). Accordingly, a brief look at the basic concepts in that work is in order prior to moving on to the implications for the Central Texas chronology.

Underlying Willey and Phillips' (1958) effort was a clear distinction between descriptive and explanatory units––we return to that premise momentarily. There are three primary partitions of archeological units, which are descriptive: temporal, spatial, and archeological. For the *temporal* aspects, there are local and regional sequences. For *spatial* divisions, there are sites, localities, regions, subareas, and areas. *Archeological units* include components, phases, and subphases (Figure 3). To draw broader correlations among some of these categories, horizons (broad spatial distributions with shallow time depth) and traditions (fairly spatially-specific patterns with deep time depth), are called *integrative units*. For the most part these are all descriptive categories of analysis. The explanatory level is triggered when inferring social aspects of the descriptive units. Crossing that threshold is the crux of many problems. Additionally, conflating the different descriptive categories is a common source of confusion. For example, while phases are often inferred to correlate with regional spatial contexts, the Toyah phase is identified in at least five established archeological regions in Texas (Johnson 1994:243). The archeological and spatial units ought not be inextricably bound.

CHIMERAS AND GORDIAN KNOTS—MOVING BEYOND THE PLAGUE OF PHASES

The mythical chimera is a figure with a lion's head vomiting fire, a goat's body, and serpent's tail. In more common usage, a chimera is an entity composed of incongruous parts. The concept of a "phase" is at once the keystone of culture history, but also a source of unending confusion, largely because of its chimerical nature. Originally, it was defined as an archeological unit consisting of comparable components on different sites that contained unifying characteristics distinguishing them from others (Kidder et al. 1946; Willey and Phillips 1958:21-22). As noted, it was largely a descriptive unit. However, the meaning of a phase became so intertwined with social and ethnic correlations, developmental implications, and spatio-temporal parameters that it became an unwieldy construct, one comprising incongruous parts (Johnson 1987).

Johnson's (1987) critique of the "plague of phases" slashed through the intractable

Table 1. Radiocarbon Dates from the Siren Site.

Beta #	Context	Measured ^{14}C(BP)	$^{13}C/^{12}C$ Ratio	Conventional ^{14}C (BP)	2-Sigma Calibrated Age Estimate	Dated Material
215915	Feature 25	990 ± 40	-25.6	980 ± 40	AD 990 to 1160 (BP 960 to 790)	wood charcoal, *Quercus*
207247	Feature 6	990 ± 40	-25.3	990 ± 40	AD 990 to 1160 (BP 960 to 790)	wood charcoal, *Quercus*
250549	Feature 14	1040 ± 40	-25.4	1030 ± 40	AD 900 to 920 (BP 1050 to 1040) and AD 960 to 1040 (BP 990 to 910)	carbonaceous sediment
250552	Feature 12	1050 ± 40	-25.4	1040 ± 40	AD 900 to 920 (BP 1050 to 1030) and AD 950 to 1040 (BP 1000 to 920)	carbonaceous sediment
250560	Feature 25	1080 ± 40	-24.2	1090 ± 40	AD 880 to 1020 (BP 1070 to 930)	wood charcoal, *Quercus*
215912	Feature 13	1120 ± 40	-26.5	1100 ± 40	AD 880 to 1010 (BP 1070 to 940)	carbonaceous sediment
207238	Feature 1	1110 ± 40	-25.5	1110 ± 40	AD 880 to 1010 (BP 1070 to 940)	carbonaceous sediment
250550	Feature 13	1100 ± 40	-24.5	1110 ± 40	AD 870 to 1010 (BP 1080 to 940)	carbonaceous sediment
250551	Feature 14	1140 ± 40	-26.3	1120 ± 40	AD 810 to 1010 (BP 1140 to 940)	carbonaceous sediment
250554	Feature 16	1130 ± 40	-25.2	1130 ± 40	AD 780 to 1000 (BP 1160 to 950)	wood charcoal, *Quercus*
207239	Feature 1	1150 ± 40	-24.9	1150 ± 40	AD 780 to 990 (BP 1170 to 960)	unidentified charred material
215914	Feature 16	1170 ± 40	-25	1170 ± 40	AD 770 to 980 (BP 1180 to 970)	wood charcoal, *Quercus*
250555	Feature 16	1170 ± 40	-23.9	1190 ± 40	AD 710 to 750 (BP 1240 to 1200) and AD 760 to 900 (BP 1190 to 1050); AD 920 to 960 (BP 1040 to 990)	wood charcoal, *Quercus*
250557	Feature 16	1260 ± 40	-24.8	1260 ± 40	AD 660 to 880 (BP 1280 to 1070)	wood charcoal, *Quercus*
215913	Feature 17	1560 ± 40	-25.8	1550 ± 40	AD 420 to 610 (BP 1530 to 1340)	unidentified charred material
250553	Feature 15	1740 ± 40	-25.6	1730 ± 40	AD 230 to 410 (BP 1720 to 1540)	unidentified charred material
299315	No clear feature association	1750 ± 30	-25	1750 ± 30	AD 230 to 380 (BP 1720 to 1570)	unidentified charred material

Table 1. *(Continued)*

Beta #	Context	Measured ^{14}C(BP)	$^{13}C/^{12}C$ Ratio	Conventional ^{14}C (BP)	2-Sigma Calibrated Age Estimate	Dated Material
250580	No clear feature association	1810 ± 40	-25.8	1800 ± 40	AD 120 to 330 (BP 1830 to 1620)	unidentified charred material
250569	No clear feature association	1820 ± 50	-25.6	1810 ± 50	AD 80 to 340 (BP 1870 to 1610)	unidentified charred material
250566	Feature 30	1900 ± 40	-26.2	1880 ± 40	AD 50 to 230 (BP 1900 to 1720)	carbonaceous sediment
250558	Feature 18-A	1900 ± 40	-25.7	1890 ± 40	AD 30 to 230 (BP 1920 to 1720)	unidentified charred material
250559	Feature 20	1900 ± 40	-25.3	1900 ± 40	AD 20 to 220 (BP 1930 to 1730)	unidentified charred material
299317	Feature 23	1940 ± 30	-23.2	1930 ± 30	BC 40 to AD 80 (BP 1990 to 1870)	*Liliaceae* bulb
250556	Feature 17	1970 ± 40	-25.1	1970 ± 40	BC 50 to AD 120 (BP 2000 to 1830)	wood charcoal, *Quercus*
250565	Feature 30	1970 ± 40	-24.8	1970 ± 40	BC 50 to AD 120 (BP 2000 to 1830)	unidentified charred material
207246	Below Feature 4	2030 ± 40	-26.6	2000 ± 40	BC 80 to AD 80 (BP 2030 to 1870)	wood charcoal, *Quercus*
207244	Feature 4	1990 ± 40	-25.4	2000 ± 40	BC 50 to AD 100 (BP 2000 to 1860)	wood charcoal, *Quercus*
207245	Feature 4	2010 ± 40	-25.4	2000 ± 40	BC 80 to AD 80 (BP 2030 to 1870)	wood charcoal, *Quercus*
299314	No clear feature association	2050 ± 30	-25.2	2050 ± 30	BC 160 to AD 10 (BP 2110 to 1940)	unidentified charred material
215921	No clear feature association	2070 ± 40	-25.1	2070 ± 40	BC 190 to AD 20 (BP 2140 to 1930)	carbonaceous sediment
299316	No clear feature association	2080 ± 30	-25.4	2080 ± 30	BC 170 to 10 (BP 1720 to 1570)	wood charcoal, *Quercus*
215919	No clear feature association	2110 ± 40	-26.1	2090 ± 40	BC 200 to 10 (BP 2150 to 1960)	unidentified charred material
250561	Feature 23	2210 ± 40	-26.9	2180 ± 40	BC 370 to 150 (BP 2320 to 2100) and BC 140 to 110 (BP 2090 to 2060)	unidentified charred material
250575	Feature 41	2180 ± 40	-25.1	2180 ± 40	BC 370 to 150 (BP 2320 to 2100) and BC 140 to 110 (BP 2090 to 2060)	unidentified charred material

Table 1. *(Continued)*

Beta #	Context	Measured ^{14}C(BP)	$^{13}C/^{12}C$ Ratio	Conventional ^{14}C (BP)	2-Sigma Calibrated Age Estimate	Dated Material
215917	Feature 36	2200 ± 40	-25.5	2190 ± 40	BC 380 to 160 (BP 2330 to 2100)	unidentified charred material
250577	Feature 44	2250 ± 40	-26.3	2230 ± 40	BC 390 to 190 (BP 2340 to 2140)	unidentified charred material
250578	Feature 45	2250 ± 40	-26.3	2230 ± 40	BC 390 to 190 (BP 2340 to 2140)	wood charcoal, *Juglans*
250573	Feature 37	2270 ± 40	-25.4	2260 ± 40	BC 400 to 340 (BP 2350 to 2290) and BC 330 to 200 (BP 2280 to 2150)	unidentified charred material
250563	Feature 27	2300 ± 40	-26.9	2270 ± 40	BC 400 to 340 (BP 2350 to 2290) and BC 320 to 210 (BP 2270 to 2160)	unidentified charred material
250571	Feature 36	2350 ± 40	-27.7	2310 ± 40	BC 410 to 360 (BP 2360 to 2310) and BC 280 to 260 (BP 2230 to 2200)	unidentified charred material
250564	No clear feature association	2330 ± 40	-24.7	2330 ± 40	BC 410 to 370 (BP 2360 to 2320)	wood charcoal, *Quercus*
215922	Feature 35	2400 ± 40	-26.8	2370 ± 40	BC 520 to 380 (BP 2470 to 2330)	carbonaceous sediment
250576	Feature 35	2390 ± 40	-25.2	2390 ± 40	BC 730 to 690 (BP 2680 to 2640) and BC 540 to 390 (BP 2500 to 2340)	carbonaceous sediment
299318	Feature 31	2370 ± 30	-23.3	2400 ± 30	BC 720 to 700 (BP 2670 to 2650) and BC 540 to 40 (BP 2490 to 2350)	*Liliaceae* bulb
215918	Feature 37	2460 ± 50	-26.6	2430 ± 50	BC 780 to 390 (BP 2730 to 2340)	wood charcoal, *Quercus*
250581	Feature 35	2460 ± 40	-26	2440 ± 40	BC 760 to 400 (BP 2710 to 2350)	carbonaceous sediment
215916	Feature 8	2490 ± 40	-26.8	2460 ± 40	BC 780 to 410 (BP 2730 to 2360)	unidentified charred material
250567	No clear feature association	N/A	N/A	2470 ± 40	BC 780 to 410 (BP 2730 to 2360)	burned bone
207241	Below Feature 2	2480 ± 40	-25.1	2480 ± 40	BC 790 to 410 (BP 2740 to 2360)	wood charcoal, *Quercus*
250572	Feature 8	2500 ± 40	-26.4	2480 ± 40	BC 780 to 410 (BP 2730 to 2360)	wood charcoal, *Quercus*
250568	Feature 8	2490 ± 40	-25.1	2490 ± 40	BC 780 to 410 (BP 2740 to 2360)	unidentified charred material

Table 1. *(Continued)*

Beta #	Context	Measured ^{14}C(BP)	$^{13}C/^{12}C$ Ratio	Conventional ^{14}C (BP)	2-Sigma Calibrated Age Estimate	Dated Material
207243	Feature 3	2510 ± 40	-24.7	2510 ± 40	BC 790 to 500 (BP 2740 to 2450) and BC 460 to 430 (BP 2410 to 2380)	unidentified charred material
250579	No clear feature association	2510 ± 40	-23.6	2530 ± 40	BC 800 to 530 (BP 2750 to 2480)	unidentified charred material
207242	Feature 3	2570 ± 40	-26.4	2550 ± 40	BC 800 to 750 (BP 2760 to 2700) and BC 700 to 540 (BP 2650 to 2490)	Rosaceae
207240	Feature 2	2600 ± 40	-27.2	2560 ± 40	BC 810 to 760 (BP 2760 to 2710) and BC 680 to 550 (BP 2630 to 2500)	wood charcoal, *Quercus*
215920	Feature 8	2590 ± 40	-25.3	2590 ± 40	BC 820 to 770 (BP 2770 to 2720)	wood charcoal, Quercus
250562	Feature 8	2580 ± 40	-24.5	2590 ± 40	BC 810 to 760 (BP 2760 to 2710) and BC 680 to 670 (BP 2630 to 2620)	wood charcoal, *Quercus*
250570	Feature 35	2610 ± 40	-25.5	2600 ± 40	BC 820 to 760 (BP 2770 to 2710)	unidentified charred material
250574	Feature 41	2620 ± 40	-25.7	2610 ± 40	BC 820 to 760 (BP 2770 to 2720)	unidentified charred material
215923	BHT E	3370 ± 40	-10.7	3600 ± 40	BC 2040 to 1880 (BP 3990 to 3830)	n/a
215927	BHT E	4160 ± 50	-20.6	4230 ± 50	BC 2910 to 2850 (BP 4860 to 4800) and BC 2820 to 2670 (BP 4770 to 4620)	organic sediment
215926	BHT E	4170 ± 50	-20.6	4240 ± 50	BC 2920 to 2850 (BP4860 to 4800) and BC 2820 to 2680 (BP 4770 to 4630)	organic sediment
215925	BHT E	4220 ± 50	-7.6	4510 ± 50	BC 3360 to 3020 (BP 5310 to 4970)	n/a
215911	BHT D; base of slope	6760 ± 50	-9.6	7010 ± 50	BC 5990 to 5760 (BP 7940 to 7710)	n/a
207248	Base of Stratum 3	10650 ± 60	-10.9	10880 ± 60	BC 11180 to 10860 (BP 13130 to 12810) and BC 10780 to 10700 (BP 12730 to 12650)	Rabdotus shell

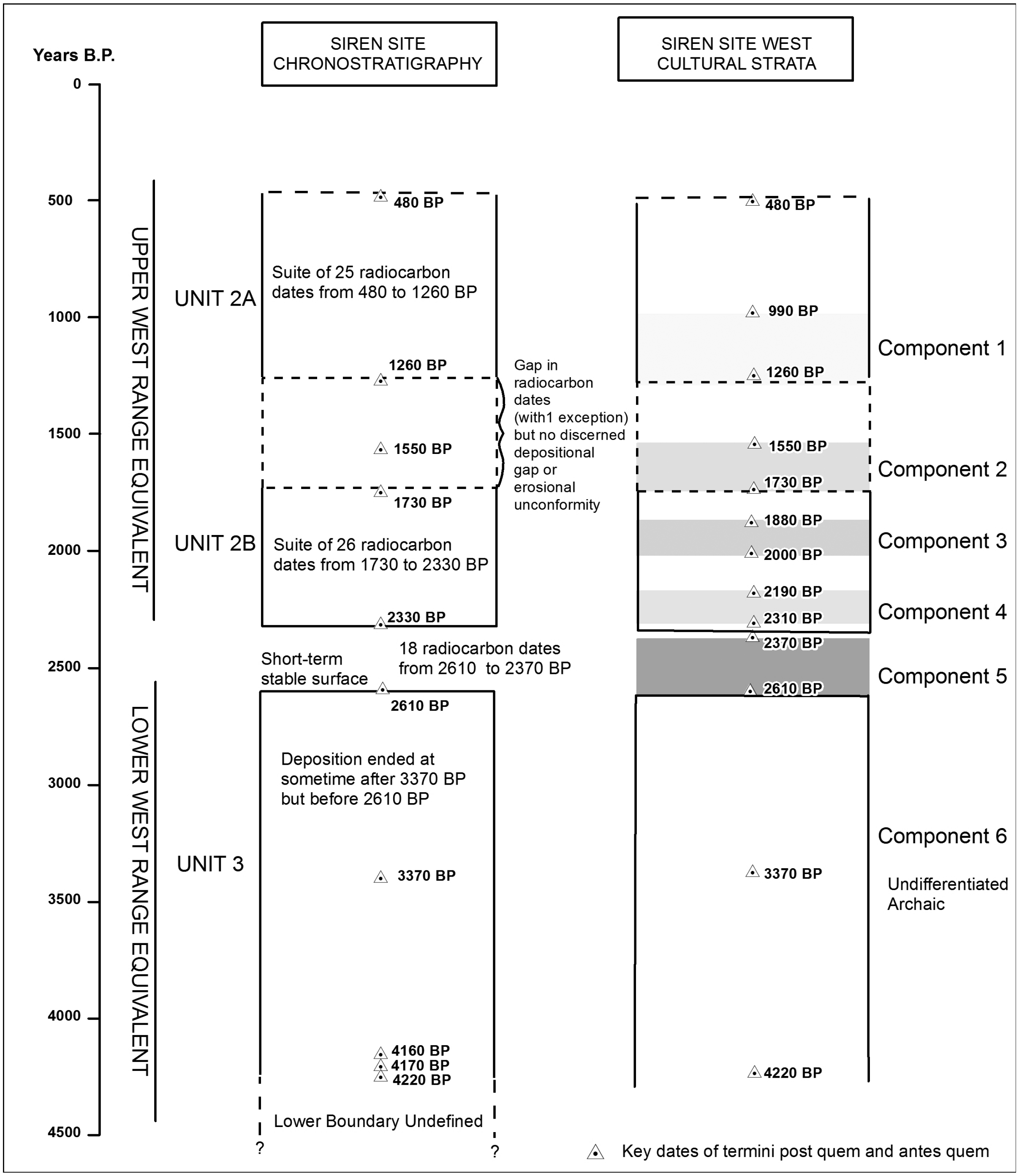


Figure 2. Siren cultural components in relation to natural strata.

complications but did so by wedding the notion of phase to ethnic and social connotations, thereby making it a theoretically untenable construct. This was clearly the case in 1987, but in his earlier discussion of the same issue, he seemed to go into a fair amount of detail on the careful delineation between archeological and socio-cultural facets (Johnson 1967:1–10). That distinction is almost entirely lost in his 1987 work, where Johnson repeatedly referred to phases as socio-cultural or ethnic units, and used that definition as the basis for critiquing previous efforts in Texas archeology. He

Table 2. All Dated Cultural Features Ordered by Component.

Cultural Component	Context	Conventional ^{14}C (BP)**
1	Feature 25	980 ± 40; 1090 ± 40
	Feature 6	990 ± 40
	Feature 12	1040 ± 40
	Feature 14	1030 ± 40; 1120 ± 40
	Feature 13	1100 ± 40; 1110 ± 40
	Feature 1	1110 ± 40; 1150 ± 40
	Feature 16	1130 ± 40; 1170 ± 40; 1190 ± 40; 1260 ± 40
2	Feature 17	1550 ± 40; 1970 ± 40
	Feature 15	1730 ± 40
3	Feature 30	1880 ± 40; 1970 ± 40
	Feature 18-A	1890 ± 40
	Feature 20	1900 ± 40
	Feature 23	1930 ± 30; 2180 ± 40
	Feature 4	2000 ± 40; 2000 ± 40; 2000 ± 40
4	Feature 36	2190 ± 40, 2310 ± 40
	Feature 44	2230 ± 40
	Feature 45	2230 ± 40
	Feature 37	2260 ± 40; 2430 ± 50
	Feature 27	2270 ± 40
	Feature 41	2180 ± 40; 2610 ± 40
5	Feature 35	2370 ± 40; 2390 ± 40; 2400 ± 40; 2600 ± 40
	Feature 31	2400 ± 40
	Feature 8	2400 ± 30; 2460 ± 40; 2480 ± 40; 2490 ± 40; 2590 ± 40; 2590 ± 40
	Feature 3	2510 ± 40; 2550 ± 40
	Feature 2	2560 ± 40

** Conventional Radiocarbon Age is the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the $\delta 13^{C}$.

furthermore noted that Willey and Phillip's (1958) "failure to illustrate in more detail the mechanics of phase recognition has brought more than one archaeologist to grief"(Johnson 1987:5).

The effect of Johnson's critique seems to have been the abandonment of the notion of phase in Central Texas chronology, although it has continued in most other portions of the state. Prior to 1987, nearly all Central Texas chronologies (e.g. Kelley 1947; Prewitt 1981, 1985; Shafer 1963; Sorrow et al., 1967; Weir 1976a, 1976b) used phases or foci as the basic unit. Since that time, the phase designation has not been used in the more recent chronologies (e.g. Black 1989; Collins 1995, 2004; Johnson 1995; Johnson and Goode 1994), and has become increasingly uncommon in the regional literature.

However, Johnson's formulation of phase oversteps the bounds of interpretive responsibility, and a barrage of social theory applied to archeology over the last 40 years has increasingly made that case. Willey and Phillips (1958:49) said the social "equivalent of 'phase' ought to be 'society,' and in a good many cases it probably is." They also warned that "finding social equivalents for archaeological units is beset by the most formidable difficulties, most of which stem from the fact that the kinds of data archaeology depends on are precisely those elements of culture that diffuse most readily across social and political boundaries" (Willey and Phillips 1958:48).

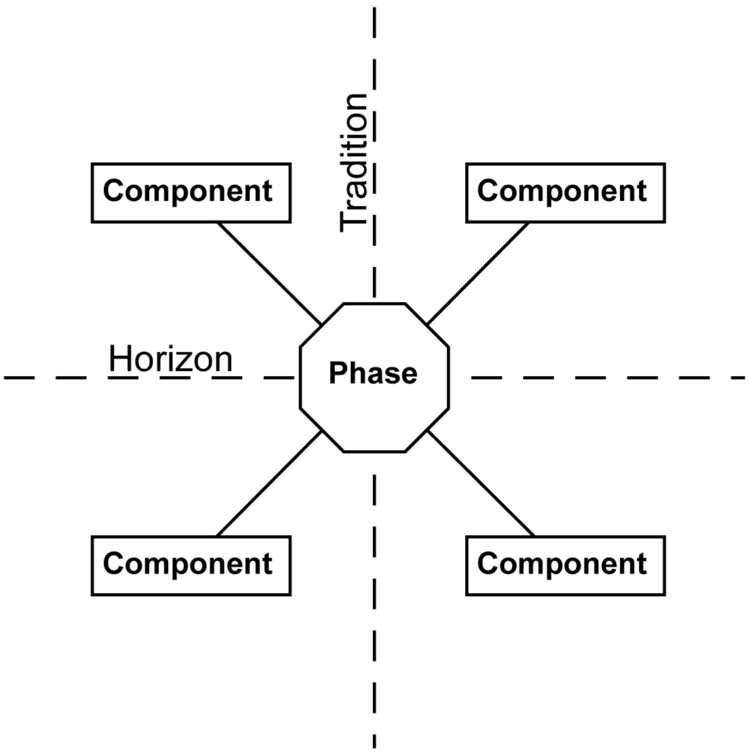


Figure 3. Willey and Phillips's (1958) archeological units. Components compose a phase. Phases of shallow time depth but broad extent are horizons, and phases of great time depth in a specific region are traditions. Adapted from Willey and Phillips (1958:41).

There is a strong need to maintain the distinction of a phase as strictly an archeological unit separate from a socio-cultural one. First, the interpretive gap between the two, which has been a primary theoretical field in archeology over the last few decades, has revealed the complexity of the interrelationship between the material remains and the society that produced them, precluding direct correlations (Hodder 1991,1999; Meskell 2008; Preucel 1991:3–14; Webster 2008:22). Secondly and relatedly, careful maintenance of the long-recognized dictum that the archeological record is not culture itself is warranted to uphold objectivity to the extent feasible. An "archaeological culture" (Ford 1954:47), the material remains of the cultures that produced it, serves as the most fundamental building blocks of prehistoric reconstruction. By maintaining a separation of the archeological evidence from the interpretation, the two aspects can be considered independently without undue prejudicial influences.

Though the Gordian Knot was slashed, the problem did not go away. The utility of the "phase" as the 'manageable' unit of archeological study still holds true for many of the reasons Willey and Phillips (1958:40) discussed, most notably at the basic comparative level within and among sites. The problem can be ignored by presenting broad syntheses, but the nature of our objectives in this article is to build up from the components at the Siren site towards the broader frameworks. How do our components compare to other archeological units? While Johnson's critique is based on what "ought" to be, and the direction that culture history needs to go, more latitude is needed to define basic archeological units currently unencumbered by incongruous aspects. The phase, as originally defined, is that construct. Ultimately, it is true that "New World archeology is anthropology, or it is nothing" (Phillips 1955:246–247), but archeology must arrive at anthropology through the material record.

THE END OF THE ARCHAIC: COMPETING SCHEMES

The long efforts at imposing chronological order on the archeological record in Central Texas have been discussed many times (e.g., Black 1989; Ellis 1994; Prewitt 1981; Suhm 1960). The literature, especially the vast collection of contract archeology reports, is rife with competing chronologies and terminologies, a condition that reflects, in part, the differing views surrounding the nature of cultural change and/or continuity at the end of the Archaic. A review of the major works underlying the main differences provides a foundation for a comparative assessment and an unraveling of the transition at the end of the Archaic in Central Texas.

Prior to 1960, most efforts used the Midwestern Taxonomic System, and consequently aspects and foci were common divisions in early Central Texas schemes (Figure 4). Johnson et al. (1962) mark an important change in classificatory designations by using time periods and stages, dropping the use of aspects, although parenthetically

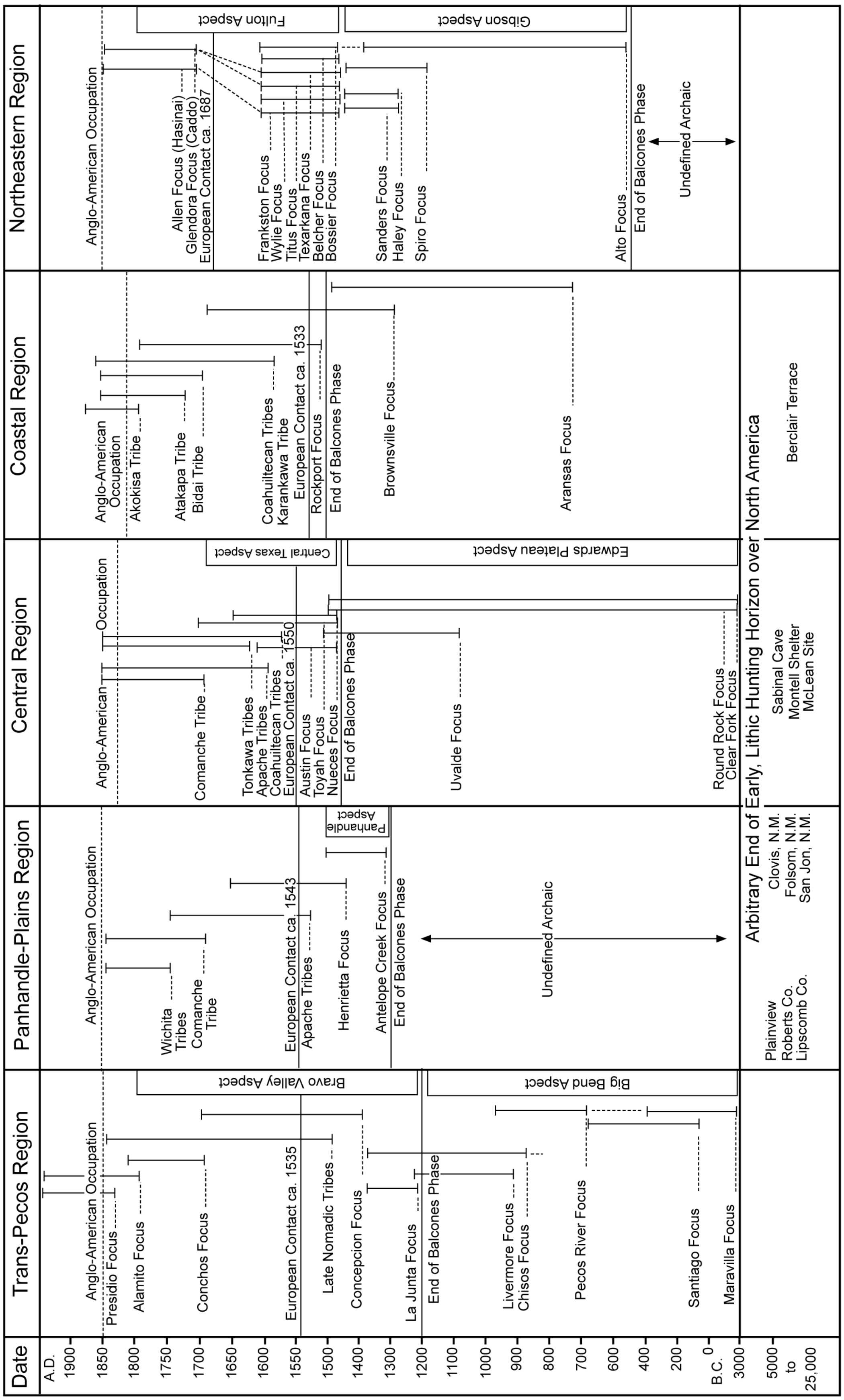


Figure 4. Stephenson's (1950) early chronology that reflects terminology used in early schemes in Texas archeology. He defines Edwards and Central Texas aspects, within which are the Austin, Toyah and other foci. Adapted from Stephenson (1950:155).

retaining the Toyah and Austin foci (Figure 5). Importantly, Johnson et al. (1962) designated the final centuries of the Archaic stage as the Transitional Archaic sub-period, in part because of the similarities between the latest dart point types, namely Darl and Figueroa points, and the earliest arrow point types. The late dart points preceded the first Late Prehistoric arrow point types and may have overlapped temporally with them. By the end of the Transitional Archaic, the bow and arrow technologies were introduced across South and Central Texas, probably around A.D. 700.

In looking back, Johnson and Goode (1994:17) later noted that the label Transitional Archaic was originally adopted in 1962 on the advice of Dee Ann Story in an effort to draw correlations with developments in the Eastern Woodlands. For some reason, perhaps because of the connotations with developments to the east, Johnson quickly dropped the term (note for example the lack of it in his 1964 work), never using it again. Since its introduction, the Transitional Archaic designation has been carried on by a few, but overall has failed to be universally accepted by researchers.

From the mid-1960s to mid-1970s, several notable developments substantially refined the regional sequence on the eastern margin of the Edwards Plateau. Numerous sites investigated in the San Gabriel River valley and thereabouts yielded a substantial amount of data, and multiple competing chronologies developed in a small area. Figure 6, drawn from Bond's (1978) Hoxie Bridge report, shows the juxtaposition of several of these efforts, revealing the variation in nomenclature, as well as the continued use of the Transitional Archaic in one of the works. On the heels of these chronologies, Weir (1976a, 1976b) introduced a five-part division of the Archaic using named phases, two of which (Clear Fork and Round Rock) derive directly from J. Charles Kelley's earlier foci. His rationale for using names rather than numbers, as Sorrow et al. (1967) had done for Stillhouse Hollow, was that divisions could be added or dropped as warranted without a need for incessant re-numbering.

Spurred by the need to synthesize the various efforts from a fairly small geographical area, Prewitt's (1981) chronology (Figure 7) is notable in one primary regard. It is one of the only systematic attempts to flesh out archeological assemblages as the foundation of a cultural sequence. His effort to do so is firmly and explicitly grounded in Willey and Phillip's cultural-historical model. Prewitt's objectives were defined as moving systematically from components to "temporal" phases to developmental stages of prehistory. A stage, he stated, is a segment in cultural-historical development characterized by a dominant economic model (Prewitt 1981:68). In this regard, he designated the final prehistoric era, rather than the Late Prehistoric as others had defined it, the Neo-Archaic because the Archaic hunter-gatherer pattern continued. In Central Texas, neither the Toyah nor Austin phase groups adopted an agricultural economic basis. Accordingly, Prewitt, in directly addressing the issue of long-term developmental change, saw continuity between the Archaic and Late Prehistoric, but otherwise did not clearly address the notion of a transition.

Black (1989) used the Terminal Archaic designation to cover Weir's (1976a, 1976b) Twin Sisters phase, which Prewitt had further subdivided into Driftwood and Twin Sisters. Black's division between the Late and Terminal Archaic followed Weir's divisions, with the former stylistically distinguished by the broad-bladed dart point forms (such as Montell, Castroville, and Lange) and the latter by the smaller sorts such as Ensor, Frio, Fairland, and Darl. One thing Black (1989:30) drew a bead on was the differing opinions regarding events from A.D. 300 to 800. On one side, some (such as Weir) saw it as a period of a return to high mobility, cessation of burned rock midden formation, and a lack of bison. Others (such as Peter et al. [1982a] and Skelton [1977]), conversely, viewed it as a time of continued midden use, intensification in the exploitation of local resources, increased occupational intensity, and diversification of tool forms. Archeological evidence from the Siren site trends strongly towards one of these interpretations, as is discussed below.

In his latest works, Johnson (1995, see also Johnson and Goode [1994]), as he had done long before, did not use the "Transitional Archaic" (Figure 8). His objectives in his recent writings were broader, however, and so addressing the finer divisions was not warranted. Rather, his intent was to uncover "gross patterns of human behavior and their changes" (Johnson and Goode 1994:16). His objectives were not of the social or ethnic sort at all, but more in line with Braudel's (1972) structural level of change, the *longue durée*. From this larger perspective, he saw a gradual low-key drama unfolding over an 8000-year period. Within this long period of time, however, his works were replete with specific references to the timing of

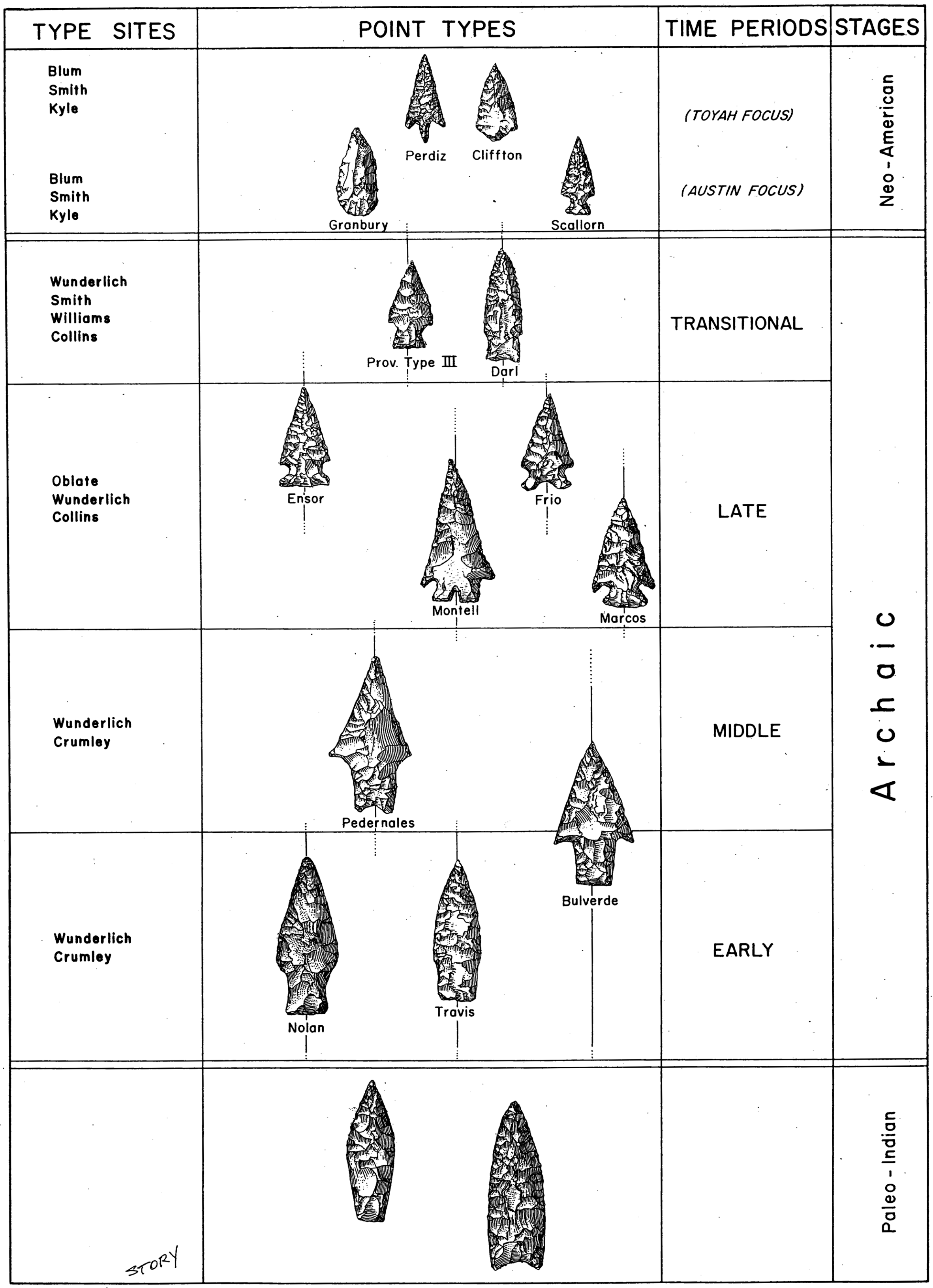


Figure 5. A distinct change from Stephenson's earlier classification, the seminal chronology by Johnson et al. (1962) drawn by Hal Story. Within the Archaic stage, the authors define the Transitional Archaic as a final time period. (Figure courtesy of the Texas Natural Science Center–UT Austin.)

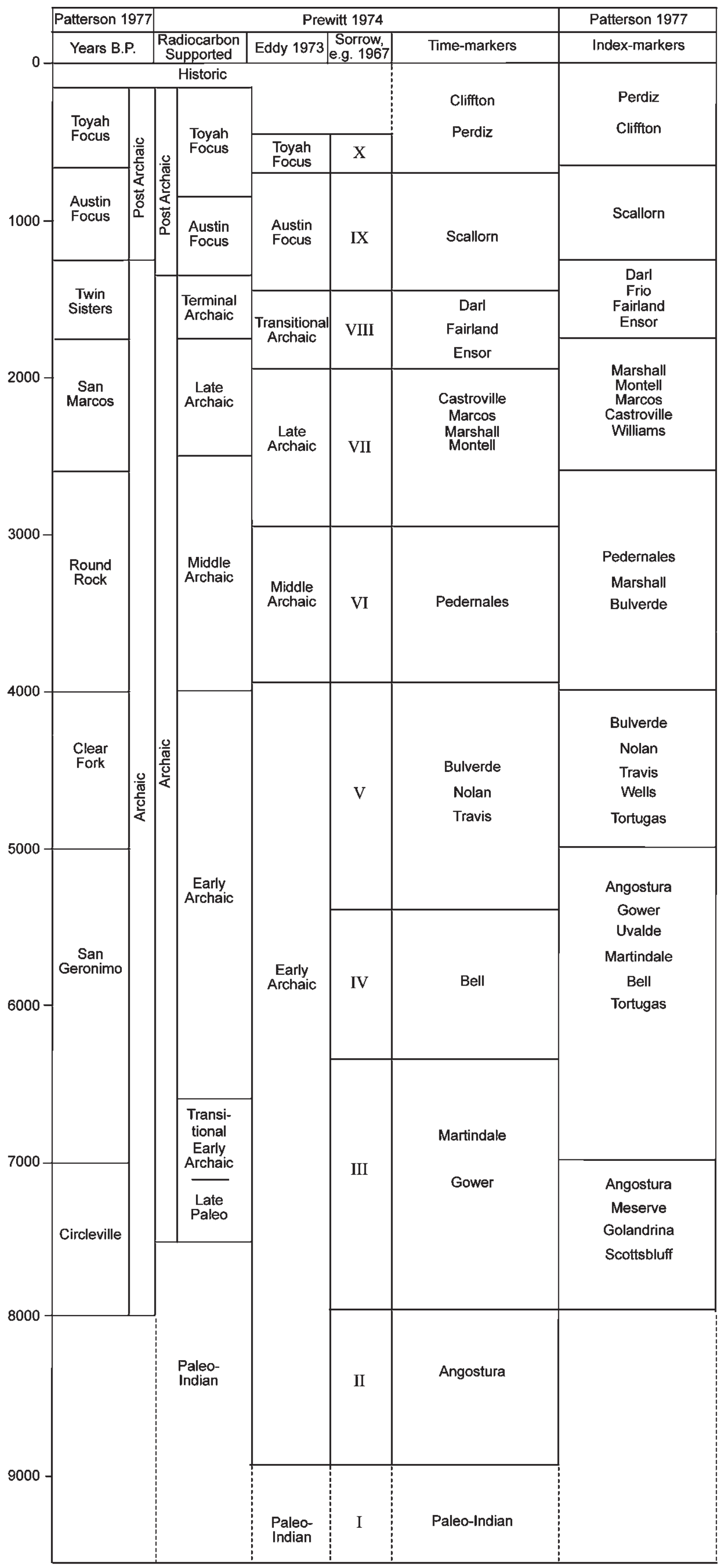


Figure 6. The comparison of several chronologies formulated in the 1970s based on the archeological record of the San Gabriel River basin and immediate vicinity. The terminology varied quite a bit. The central column under the heading of "Prewitt 1974" reflects some of the data sets that were foundations to his 1981 and 1985 syntheses. Adapted from Bond (1978:33).

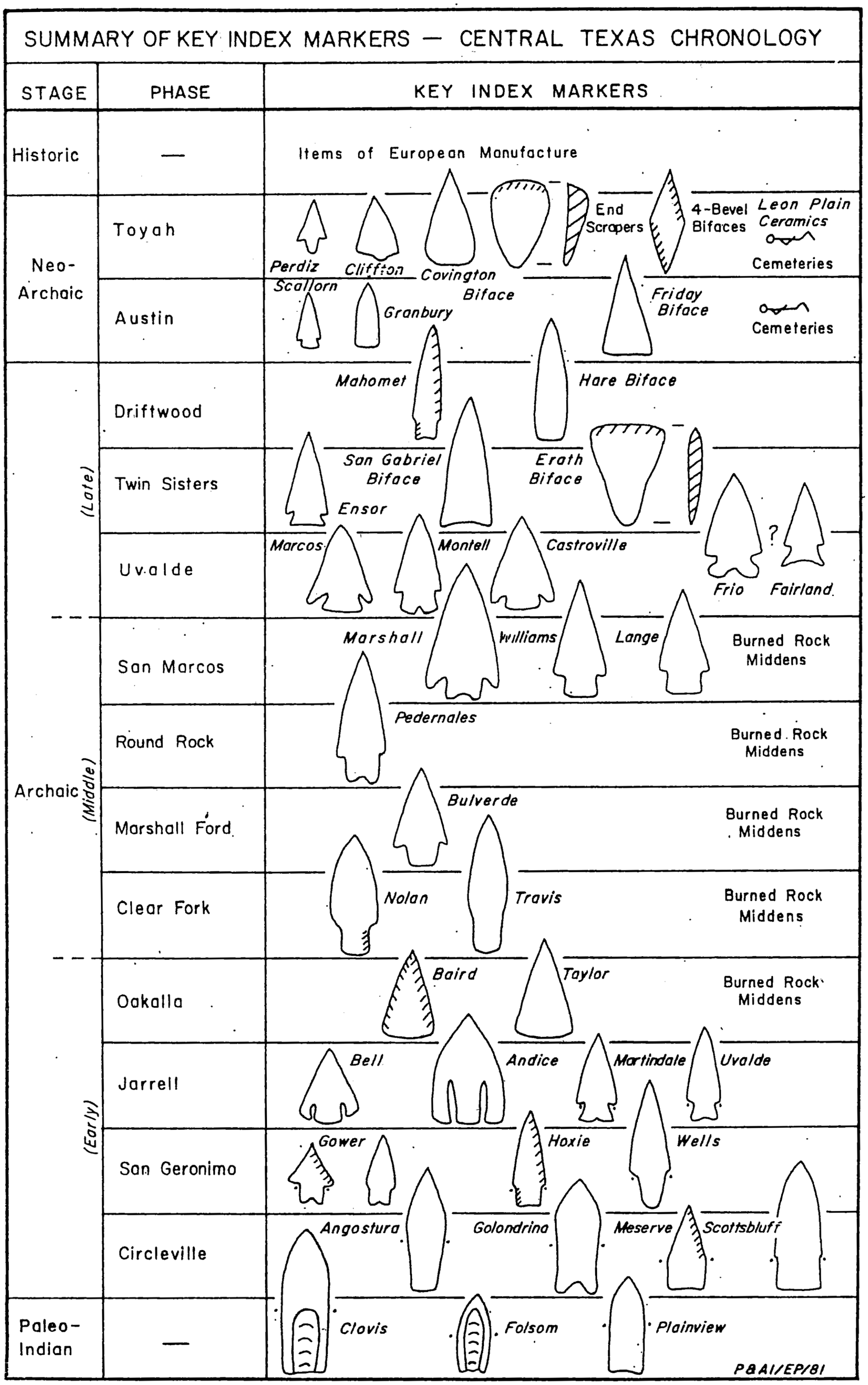


Figure 7. Among the most widely recognizable chronologies in Texas, Prewitt's (1981) depiction shows stage and phases with key index markers. Used with permission of the Texas Archeological Society.

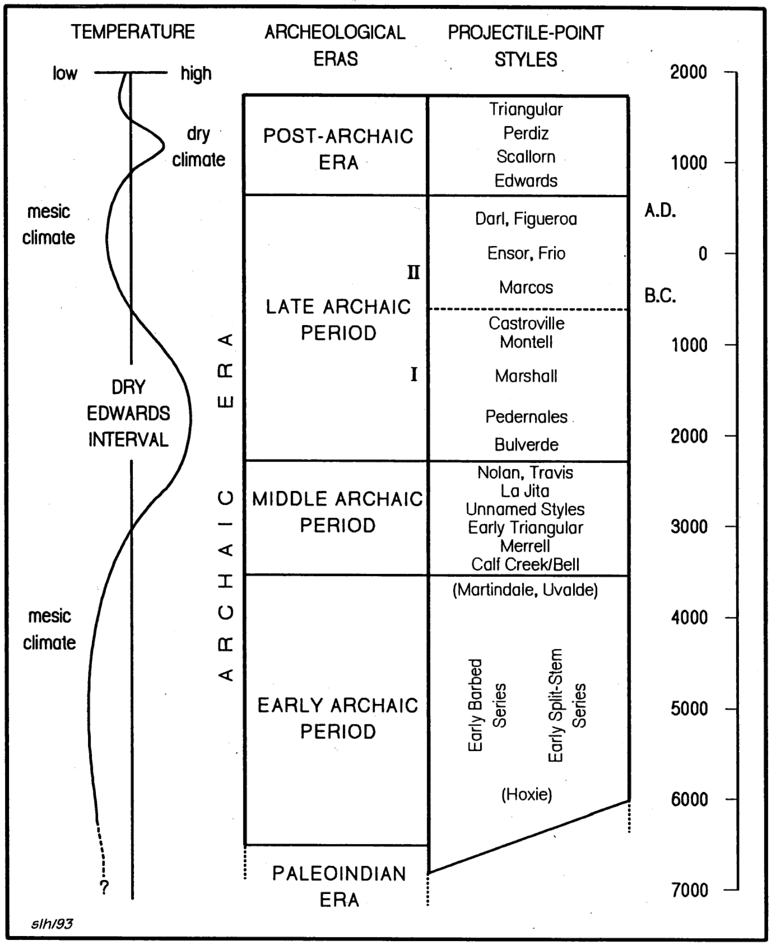


Figure 8. Johnson and Goode's (1994) depiction of the eastern Central Texas chronology is roughly consistent with Johnson et al.'s (1962) formulation, although the Transitional Archaic is no longer used. Used with permission of the Texas Archeological Society.

economic strategies, environmental changes, and technological shifts, particularly in major stylistic markers. He never systematically synthesized the data in an assemblage analysis as did Prewitt, but rather in a narrative way. He referred to the era after the Archaic simply as the "Post-Archaic." From his level of analysis, that of gross patterns, he too saw a rather distinctive continuity between Archaic and the later Late Prehistoric phases or intervals.

The most recent of the comparative chronologies are those by Collins (1995, 2004). Like Johnson's, these are broader chronologies both spatially and content-wise. Whereas Johnson limited his works to the eastern Edwards Plateau, Collins necessarily takes a more general approach that could be comprehensively applied to the entirety of Central Texas, which had long been recognized as a sufficiently diverse realm that archeological trends on one side poorly match those on the other (e.g. Black 1989:22–23; Peter et al. 1982b). Collins (2004:116) provides a "generalized cultural history of central Texas" that relies upon periods and sub-periods as well as stylistic intervals, all juxtaposed with paleoenvironmental (including depositional) factors (Figure 9).

Collins retains the Late Prehistoric designation, but points to the fact that the original basis for its formulation proved false. Suhm et al. (1954:20) defined the Neo-American Stage, which Collins as well as many others subsequently called the Late Prehistoric period, based on the unproven presumption that the bow and arrow, ceramics, and agriculture would be its distinguishing marks. Agriculture, as a primary economic basis, has never been archeologically shown in Central Texas. Consequently, the fundamental economic basis for the definition of the new period or stage never materialized, perhaps lending credence to the many schemes that do not recognize the legitimacy of the cultural break at the end of the Archaic. On a final relevant point, Collins's style intervals and major period breaks precisely correlate with Prewitt's chronological phase divisions for the latter part of the Archaic. For example, Collins's temporal placements of Darl, Ensor, Frio, Fairland, and other points are the same as Prewitt's. Collins points to Loeve-Fox as the only site with components of good integrity for the timeframe, so it makes sense the two are consistent.

A final comparative work, Turner et al.'s (2011) typological guide to Texas stone artifacts, was never designed to be a cultural chronology. Where it is relevant here is that it defines the chronological placement of artifacts and attributes diagnostic forms to particular periods or absolute dates. For example, Ensor points are associated with the Transitional Archaic and

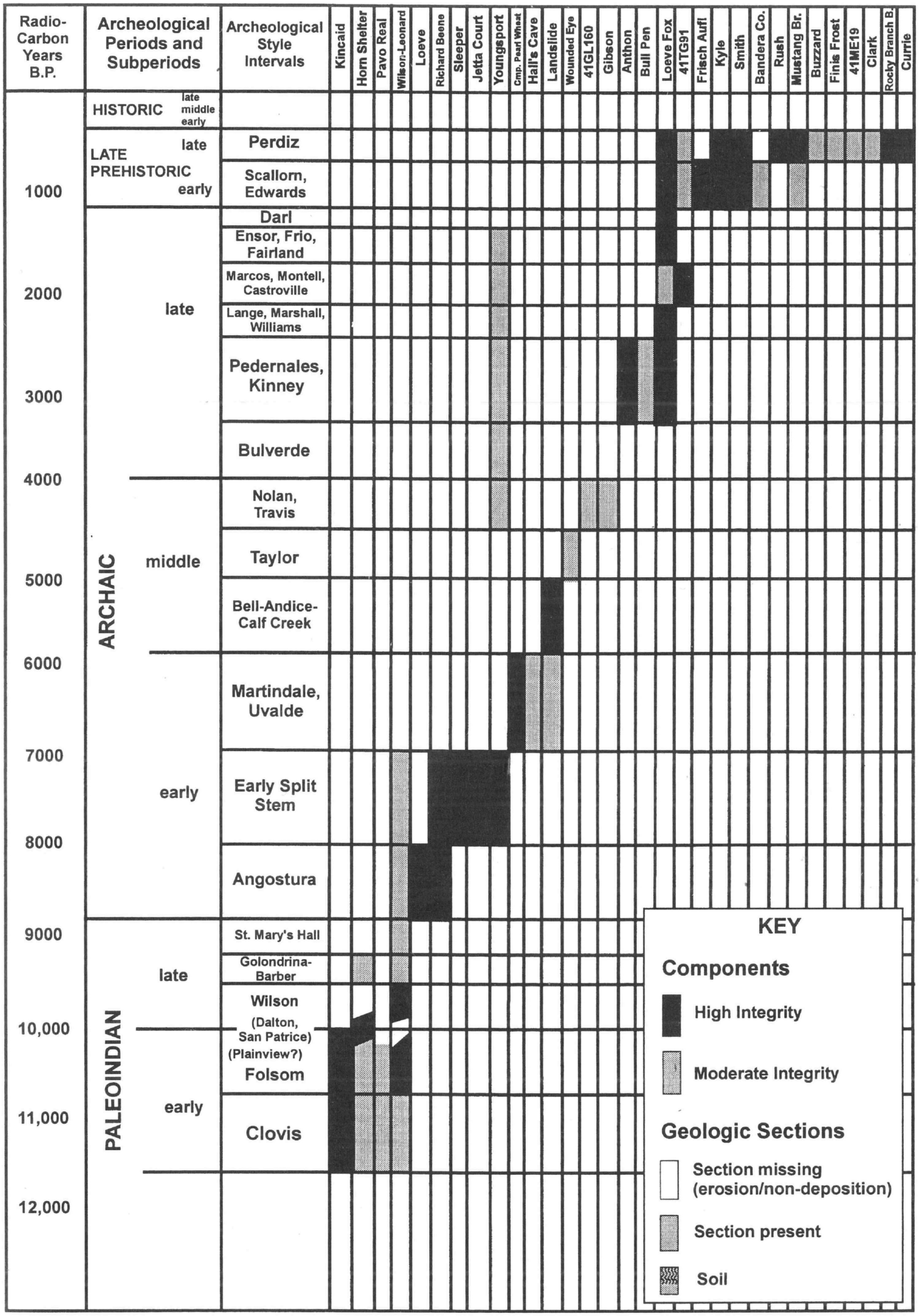


Figure 9. Collins's (1995, 2004) chronology using periods and subperiods, archeological style intervals, and contributing site components. Of note, the chronology for the Late Archaic to Late Prehistoric timeframe is largely based on the Loeve-Fox site. Used with permission of the Texas Archeological Society.

date to approximately 200 B.C. to 600 A.D. or later (Turner et al. 2011:94). As another example, Pedernales points are defined as diagnostic of the Middle Archaic and date to approximately 2000 to 1200 B.C. (Turner et al. 2011:148). Comparison of our data to Turner et al.'s data proceeds cautiously with the full understanding that their designations are highly generalized, often necessarily applicable to regions far beyond Central Texas. However, the main concern here is specifically addressing the correlations, or lack thereof, between the dates and affiliations that they reference and the revised chronological data on the eastern margin of Central Texas. For example, Ensor points may have a different temporal range in some areas compared to those along the eastern Edwards Plateau.

COMPARISON OF THE SIREN SITE TO REGIONAL CHRONOLOGIES

Before launching into comparisons, a few caveats and considerations need mention. Our chronological data are in conventional radiocarbon years before present, which are corrected for carbon isotope ratios but are not calibrated or converted to calendrical dates. Collins's data are likewise in conventional dates. Prewitt (1985:202) presents each date "as the assay date and range stated in radiocarbon years… (years before present, corrected to A.D. 1950)," which we take to mean conventional dates. Black (1989), Johnson (1995), Johnson and Goode (1994), and Turner et al. (2011) all apparently use calibrated dates. On the timeframe of concern (2600 to 900 B.P. or so), the deviation between calibrated and uncalibrated dates is not typically substantial. There was a time when labs did not take readings on the isotope ratios, and so no corrections can be made on dates run in earlier studies. Nevertheless, for the sake of direct comparison, all schemes will be placed on a like scale, in radiocarbon years before present. To do so, calibrated dates are converted back, following Prewitt's (1981) simple conversions for comparative sake, by simply subtracting the dates from A.D. 1950 to get years before present. The method imposes some inaccuracy but provides estimates within a reasonable margin of error for the times of concern here.

One further consideration is that the schemes are not directly comparable since each is dealing with different things, scales, or classificatory units. Some are phases, some are strictly eras, or periods, or stages, or stylistic intervals. Regardless, if limited to the appropriate scale or data category, meaningful comparisons can be drawn for each.

Figure 10 shows the different chronologies side by side. Looking first solely at the major chronological breaks, there are four critical divisions that have broad consensus, give or take a half-century:

- 1250 B.P.: All chronologies place the advent of the Scallorn and Edwards stylistic interval at around this time. Four chronologies define this as the end of the Archaic and the advent of the Late Prehistoric, while Johnson indicates the Post-Archaic perhaps began earlier with smaller dart points. Siren site dates concur with 1250 B.P. as the earliest extreme of the break, although most of the Austin phase dates are between 1100-900 B.P.
- 1800 B.P.: All but Johnson and Goode show a stylistic interval break here, but only two show this to be a major cultural-historical break. The Siren data concur with the existence of a stylistic break at this time, but entirely disagrees with most on which styles are ending and beginning. Collins, Black, and Prewitt place Ensor, Frio, and Fairland points after this time, whereas the Siren site, Johnson and Goode, and Turner et al. show them prior to this time, although the two chronologies also extend them beyond 1800 B.P. as well.
- 2250 B.P.: All but Black show a stylistic interval break at this time, and Prewitt and Turner et al. show the time to be a cultural-historical division. The Siren site data concurs with the stylistic break, notably the advent of Castroville points, but dates them slightly earlier. The earliest range (back to 2300 B.P.) is expected to be too early considering the old wood problem. A series of comparative dates on the Siren site between short-lived species, such as annual lily bulbs, and wood charcoal from the same feature, showed wood dates were consistently older, up to 250 years older.
- 2600 B.P.: All but Black show a stylistic interval break at this time, and Prewitt and Johnson and Goode show it as a cultural-historical division. The Siren site data concurs with the stylistic break, and agrees with Prewitt and Collins on which point type emerged at the time.

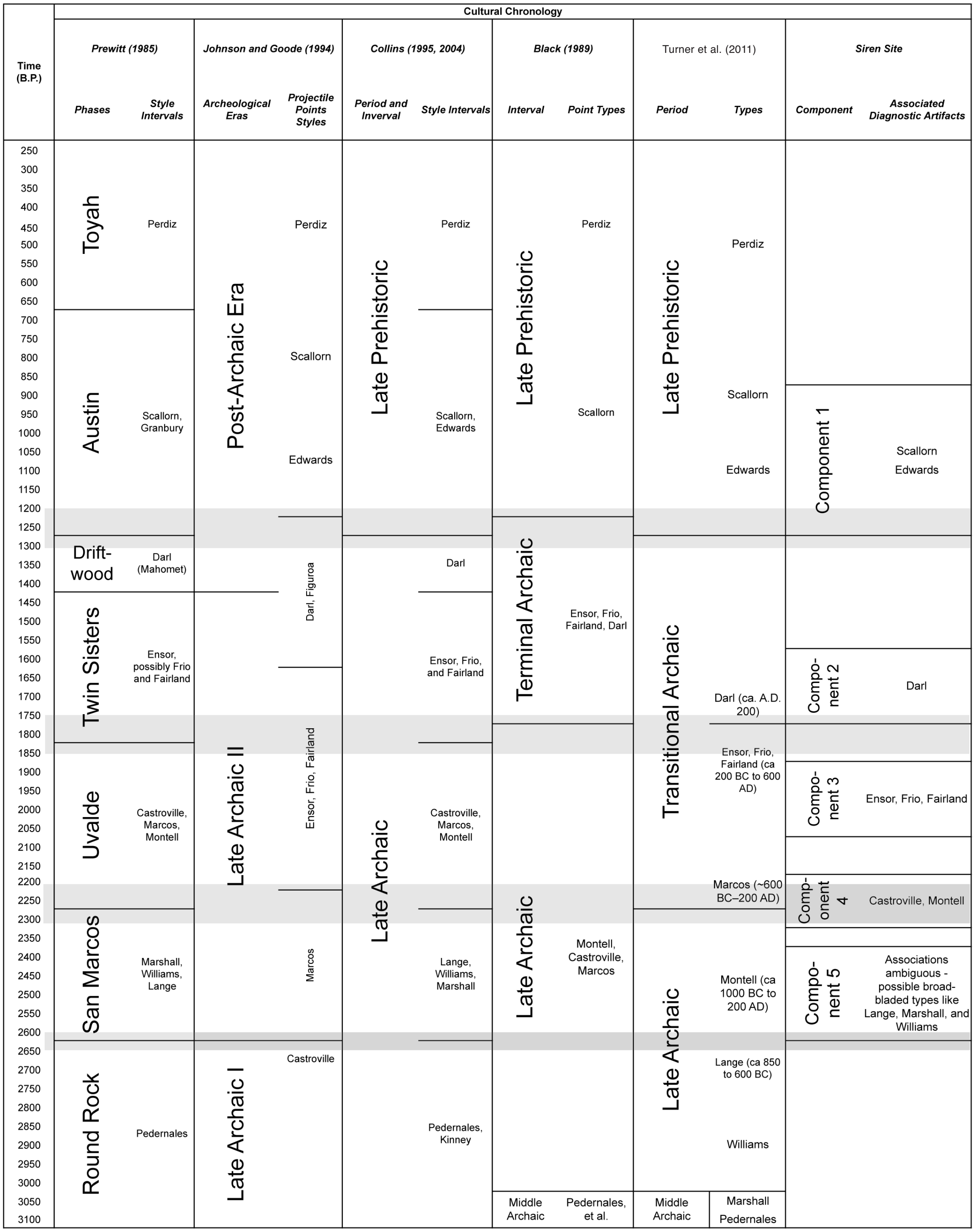


Figure 10. Comparative chronologies. Grayed areas represent concurrence of boundaries among several chronologies.

Besides these major division lines, the only internal partition in the Siren site data that is not reflected in any of the regional chronologies is the stylistic interval line between Castroville and the Ensor, Frio, and Fairland triumvirate. The Siren site data shows a break at some time between

2150-2050 B.P., a division not shown elsewhere, although somewhat consistent with Turner et al.'s dating of the three point types as beginning around 200 B.C. Johnson and Goode (1994:38) noted that the time from 200 B.C. to A.D. 500 is a major cultural-historical division in the eastern United States, but they did not explicitly translate that timeframe into the Central Texas record.

For the most part, the Siren site data concur with most of the regional chronologies until about 2000 B.P. Major discrepancies appear among the various chronologies and with the Siren site data until about 1250 B.P., when the various efforts come back into sync. In Prewitt's chronology, which carries over into Collins's work, the end of the Uvalde, Twin Sisters, and Driftwood phases are key to unraveling the problems. Since Prewitt's scheme is the only one with fine partitions comparable to the Siren site components, his will be the starting point.

UNRAVELING THE TRANSITION FROM ARCHAIC TO THE LATE PREHISTORIC

*Convenience, authority, and tradition rather than strength of evidence are in large part responsible for the widespread acceptance of the conventional factor (*Pribyl 2010:75).

The chronological placement of the Twin Sisters and Driftwood phases has long been criticized as fundamentally flawed, a mismatch of dates with archeological materials. However, until a systematic analysis determines where the problems lie and presents a more viable alternative, the prevailing scheme has served as the default position. The Siren site data do not entirely resolve the issue, but when tied into regional data and past critiques, they point towards a resolution. The Siren data substantially disagree with the timing of the Twin Sisters and Driftwood phase assemblages, and the ending of the Uvalde phase. We hypothesize that the gap in the Siren site's chronological record, which was previously unseen in the Central Texas archeological record, almost entirely accounts for the discrepancies. Before turning to that, the problems with the timing of these critical phases need to be addressed.

More than one author has highly commended Prewitt on his efforts right before raking him over the coals (e.g., Johnson 1987; Ellis 1994:47). In honor of that well-trod tradition, we will do the same. The intent here is not just to tear down, but rather to build upon the more valid aspects of Prewitt's efforts. The reason folks keep coming back to Prewitt's chronology is that he hit a resonant chord—he synthesized the archeological evidence from technology to mortuary practices to economic evidence to compile assemblages at a fairly precise chronological interval. He outran the data, and the theory, perhaps, and has been criticized for it. In moving forward, there are valid critiques that are worth drawing to the forefront, but there are also substantial accomplishments worth retaining as foundations on which to build. Before returning to foundations, we have to turn a destructive glance towards portions of the edifice that are structurally unsound.

Johnson (1987:12) leveled a harsh indictment: "Whatever the cause of the poor correspondence of the phase assays and the phase diagnostics, it clearly exists and places in doubt the temporal details of Prewitt's entire central Texas chronology." Wayne Young (n.d.), in an unpublished manuscript, provided the most thorough, date-by-date analysis of Prewitt's chronology. As a general overview, he noted that of the 147 dates that Prewitt relied upon, 38 were unpublished or insufficiently so to clearly assess their context, six were on snails or soil, seven do not have associations with diagnostic artifacts, 58 are from mixed components, and 22 are associated with phase diagnostics different from that to which they are attributed (Young n.d.:1). Accordingly, only 14 dates could be assigned to "pure" components. Those dates on pure contexts are significant, if looking solely at those for the two components of primary concern here, they are highly consistent with the Siren site dates. A close look at the Uvalde, Twin Sisters, and Driftwood dates unravel some of the long-standing chronological confusion for the final phases of the Archaic.

DRIFTWOOD PHASE RECONSIDERED

The Driftwood phase (1250-1400 B.P. as Prewitt [1981] defined it) has an artifact assemblage that includes Darl points, Hare bifaces, small concave unifaces, gravers, fresh water mussel shell pendants, bone beads, and bone awls. Features consist of medium and small basin hearths.

Burials, based on a limited database, are isolated flexed burials, a distinction between this and the later phases. Subsistence, Prewitt (1981:82) hypothesized, "appears to be a definite emphasis on the gathering aspect in the basic hunting and gathering system."

Regarding the critique of dates used for the Driftwood phase, there are two dates from sites lacking reported provenience tables, none from pure components, five from Driftwood-Austin phase mixed components, two from Driftwood-Twin Sisters phase mixed components, and two dates from contexts lacking Driftwood phase components (Table 3; Young n.d.). Because of the lack of clear associations, none of the dates can be clearly associated with the Driftwood phase assemblage. Two dates (Tx-3404 and Tx-2731, as listed in Table 3) attributed to the Twin Sisters phase are from components that contain Darl points but not Ensor points or other Twin Sisters phase diagnostic artifacts. If the two dates of 1640 B.P. (Tx-3404) and 1740 B.P. (Tx-2731) are the closest there is to a "pure" Driftwood components, then these dates are highly consistent with the dates from Component 2 at the Siren site.

There is additional evidence that suggests the Driftwood phase may have been a longer lived phase than thought, beginning much earlier than the 1400 B.P. start dates depicted by Prewitt (1981, 1985) and Collins (1995, 2004), but consistent with Turner et al.'s (2011) placement. Prewitt (1985:217), using the ratio of components to the duration of the phase in years, inferred a stunning population explosion during the Driftwood phase. Driftwood, according to his formulation, is the shortest lived at 150 years, and so the 63 components attributable to the phase yielded a relative population density nearly twice any other in prehistory. Although he urged caution in relying too heavily upon the data, such a dramatic increase during this short time makes no sense in light of all other lines of evidence, including subsistence, site distribution patterns, socio-economic context, mortuary, supporting paleoenvironmental evidence, or otherwise. There is no evidence of an economic engine (agriculture, for example) for population increase during the time, nor expected changes in residential mobility. Some authors have suggested a widespread collapse of the macroeconomic sphere during this time (Carpenter and Hartnett 2011; Hall 1981). The problem, we surmise, is an unduly short phase that should be 500 years long rather than 150. Recalculating based on that estimate would place the Driftwood population in alignment with the following Austin phase, and much more consistent with expectations derived from the archeological record.

Table 3. Prewitt's Driftwood Phase Dates and Thier Problematic Associations.

Laboratory Number	Conventional Date (BP)	Site	Provenience	Young (n.d.) and Weir (n.d.) Analysis of Associations
RI 1088	990±290	Bigon Kubola	Backhoe Trench, Hearth 3	No direct associations. A Darl and Scallorn were found above feature.
Tx 515	1120±80	Smith Shelter	Stratum 1	Stratum contains 1 Scallorn, 1 Fresno, 2 Young, 16 Darl, 1 Pedernales, 2 Ensor, 2 Abasolo points. Tx 515 date is also used for the Austin phase.
Tx 28	1165±120	Smith Shelter	Stratum 1	
Tx 27	1180±210	Smith Shelter	Stratum 1	
UGa 2471	1155±95	41WM53	Fea 4, Area B & D	6 Darl, 1 Scallorn in Level 4.
UGa 2484	1260±150	41WM53	Fea. 3a	Fairland and Ensor associations in addition to 1 Scallorn, 6 Darl.
Tx 1926	1300±60	Loeve Fox	Stratum 3a	1 arrow point fragment, 7 Ensor, 2 Darl, 1 dart point fragment
Tx 804	1350±70	Dobias-Vitek	Hearth 1	4 sand-tempered sherds in association with hearth.
Tx 2941	1340±60	Bear Creek	na	No provenience tables
Tx 2940	1380±100	Bear Creek	na	No provenience tables

Further evidence of the relatively longer duration of the Driftwood phase comes from several sources. On the early side, as previously noted, the purest dated components associated with the phase assemblage date to as early as 1750 B.P., and these dates are supported by the Siren site dates, but also perhaps those from the Cowdog Crossing site in Fort Hood (Carpenter et al. 2010). While not clearly suggestive of an early date in and of itself, the overlap of Ensor and Darl is seen in a burial from Mather Farm (41WM7), which had a Darl point embedded in the skull and an Ensor point between the second and third ribs (Prewitt 1982:47).

On the later end of the temporal spectrum for Darl points, Suhm and Jelks (1962:179) originally placed the points as extending to A.D. 1000 (roughly 950 B.P.), and other studies, such as at McKinney Roughs (Carpenter et al. 2006) and a site in Young County (Quigg et al. 2011), have likewise suggested the perpetuation of the style interval into relatively late times. On the eastern side of the Siren site, a Darl point was recovered in possible association with dates of about 1050 B.P., but the association in not entirely clear.

Overall, the Siren site data are not strong, but what are there suggests an earlier advent for the Driftwood phase than some chronologies allow. More importantly, the timing of the Driftwood phase needs to be rectified to provide the needed room for the more robust components on the site.

TWIN SISTERS TWISTERS

The Twin Sisters phase (1800-1400 B.P. as Prewitt [1985] defines it) is marked by the appearance of a variety of small, side- and corner-notched dart point types, including Fairland, Frio, and Ensor. Johnson and Goode (1994:37) point to social interaction with the eastern United States as a possible source for these new point types. These projectiles may have been part of a package of new cultural items related to the spreading of Eastern Woodland religious ideas as far as the Edwards Plateau: these included the exotic items noted above such as marine shells and atlatl weights (Johnson and Goode 1994:37).

Young's (n.d.) analyses of the Twin Sisters phase dates are likewise rather critical. The dates include four unprovenienced or unpublished dates, none from pure components, eight from mixed Twin Sisters and Driftwood components, two from Twin Sisters and Uvalde mixed components, and five from components lacking any Twin Sisters phase diagnostics (Table 4; Young n.d:4). With the publication of the Anthon site report (Goode 2002), however, two of the previously unpublished dates are now available for scrutiny. The one seemingly pure date comes from Stratum 4, Feature 31 at the Loeve-Fox site, but was assigned to the preceding Uvalde phase (Table 5). This date of 1960 B.P. (Tx-3407) came from a stratum with five Ensor points and one dart point fragment. Such a date is highly consistent with the Siren site's Component 3, dated to ca. 1900-2000 B.P. This Loeve-Fox date has a 210-year standard deviation, which raises concerns regarding the date's utility. However, it is worth noting that the closest thing to a pure Twin Sisters phase component has a standard deviation that falls entirely outside of his 1400 to 1750 date range for Ensor points and the Twin Sisters phase.

Turner et al. (2011) place the major Twin Sisters diagnostic styles (Ensor, Frio, and Fairland) from A.D. 200-600 (1350-1750 B.P.), and Johnson and Goode (1994) indicate a similar range. The Siren site data show a narrower temporal range, but the shorter timeframe from the site may be a site-specific occurrence. Whereas the site dates support at least a portion of the abovementioned works, the Component 3 dates entirely contradict Prewitt (1981, 1985), Collins (1995, 2004), and Black (1989). The temporal ranges of the stylistic intervals are mutually exclusive. Instead, the Siren site data, which are robust from this component, strongly indicate the major hallmarks of this phase were in place centuries before the 1800 B.P. date asserted by some temporal frameworks. The Siren site indicates the termination of the phase by 1800 to 1750 B.P., but the lack of data on one site cannot be cited as proof positive that the phase did not continue beyond those dates elsewhere. For example, the previously mentioned Mather Farm burial, which contained both a Darl and Ensor point embedded in the skeleton, is compelling evidence for an overlap in at least the stylistic intervals. The duration of the overlap is yet to be determined.

EARLIER PHASES

Prewitt's (1981:81) Uvalde phase, which he dates from 2250-1750 B.P. (although later revised it to end at 1800 B.P.) coincides with a notable increase in bison remains in the archeological

Table 4. Prewitt's Twin Sister Phase Dates and Their Problematic Associations.

Laboratory Number	Conventional Date (BP)	Site	Provenience	Young (n.d.) and Weir (n.d.) Analysis of Associations
Tx-686	1460±80	La Jita	N10/E40 Lv. 2	Mixed Late Archaic and early Late Prehistoric diagnostics, including Edwards
UGa 2481	1460±80	41WM328	Feature 17	Darl beneath hearth suggesting later context than Twin Sisters
UGa 2483	1610±165	41WM328	Feature 15	
Tx 1767	1480±170	Loeve Fox	Stratum 3a	1 arrow point fragment, 7 Ensor, 2 Darl, 7 dart point fragments.
Tx 1927	1480±80	Loeve Fox	Stratum 3a	
Tx 1766	1600±110	Loeve Fox	Stratum 3a	
Tx 2952	1550±60	Loeve Fox	Stratum 3(?)	
Tx 3409	1620±60	Loeve Fox	Stratum 3b	
Tx 1922	1670±100	Loeve Fox	Stratum 3a	
Tx 3404	1640±140	Loeve Fox	Stratum 2	12 Darl, 9 dart point fragments in stratum. No Ensor points.
Tx 2378	1580±60	Anthon	na	"would seem to be a reliable date of Weir's Twin Sisters phase" Goode (2002:200)
Tx 2384	1640±60	Anthon	na	"lacks close association with any features or diagnostic artifacts" Goode 2002:200
Tx 122	1600±70	Pohl	12-18" deep	Late Archaic point found in same unit and level.
Tx 2539	1620±70	41WM53	Level 5, Unit D	9 Darl, 2 Fairland/Ensor from Areas A and B which are adjacent to Unit D. Unit D is not provenienced separately
RI 1586	1700±120	Cervenka	Area D, Fea 16	Associations difficult to determine in Hay (1982), but no diagnostic artifacts recovered from Area D with the date.
Tx 2731	1740±100	Hoxie Bridge	Feature 16	Darl point in situ
UGa 2476	1745±85	Bryan Fox	Feature 1	Fairland/Ensor and 1 Montelll in feature fill
Tx 2942	1570±60	Bear Creek	na	No provenience tables
Tx 2964	1770±140	Bear Creek	na	No provenience tables

record, the lack of clear evidence of extensive trade networks, and an apparent abandonment of midden use so distinctive of preceding phases. Some would argue this last point, however, as Johnson and Goode (1994:35) note, the regional inhabitants continued "baking of semi-succulent xerophytic plants, and accumulated or added to burned rock middens during the same period that they sometimes barbecued buffalo."

Once the major temporal adjustment to the Driftwood phase is made, and the Twin Sisters is accordingly pushed back, the earlier preceding phases begin to align fairly well with the Siren site record, although slight revisions towards greater antiquity are needed. The Uvalde phase marked by Castroville, Marcos, and Montell points, according to the Siren site dates, fall around 2200-2300 B.P., rather than 1800-2250 B.P. as Prewitt (1985:215)

Table 5. Prewitt's Uvalde Phase Dates and Their Problematic Associations.

Laboratory Number	Conventional Date (BP)	Site	Provenience	Young (n.d.) and Weir (n.d.) Analysis of Associations
Tx 233	1865±95	Britton	Feature 35	Godley points, but no Uvalde Phase diagnostics found on site.
Tx 234	1940±110	Britton	Feature 10	
Tx 200	2080±80	Britton	Feature 10	
Tx 119	1870±160	Pohl	B2 and B4	No direct associations
Tx 323	1950±130	Pecan Springs	na	2 Montell points in possible association with cremation
Tx 3407	1960±210	Loeve-Fox	Stratum 4, Fea. 31	5 Ensor, 1 dart fragment
Tx 30	1970±150	Oblate	Zones 1-2	12 Uvalde phase dart points with 1 Bulverde, 15 Ensor, 3 Fairland, 11 Frio, 1 Marshall.
Tx 121	2040±130	Pohl	18-24" deep	Frio point in same square and level as dated hearth
Tx 2959	2110±150	Bear Creek Shelter	na	No provenience tables
Tx 692	1850±180	La Jita	N10/E40, Lev. 4	Montell, Pedernales, Marshall (1 each)

depicts it. Prewitt's San Marcos phase more or less concurs on all fronts (temporally and artifact assemblage-wise) with the Siren site Component 5, although the Siren site would have it end a bit prior to when Prewitt does.

A CRITIQUE OF THE CRITIQUE

The Siren site does not have a single "pure" component and would not stand the stringent criteria used to break down Prewitt's strata and components. So why does the Siren site offer any greater resolution? Because the Siren site chronology is based on the site's structural components, notably features, rather than diagnostic artifacts. The fine art of drawing associations between radiocarbon dates and artifacts is always an interpretive process since artifacts are more conducive to movement than burned rock features. The often palimpsest-like nature of the Central Texas archeological record makes it even more difficult. None of the sites that form the basis for the 1981 chronology have published detailed analyses of site structure. Accordingly, there is no recourse but to critique the associations of dates and diagnostics in the sites used in past chronology building. The distribution of artifacts should not be the sole, or even primary, criteria of integrity. Reanalysis of those important sites from the past may well prove their validity in chronological matters despite intermixed diagnostic artifacts.

Prewitt's Accomplishments

Prewitt's chronological breaks are largely supported by the Siren site data. As has long been pointed out, there is a mismatch between the archeological content of several critical phases. If these are rectified, all of the various chronologies fall into alignment, and, of them all, only Prewitt's chronology provides a detailed, assemblage-based cultural chronology for Central Texas. Many of the particulars in the assemblages need to be reassessed in light of much new data that have emerged since his analyses, but the major components seem to hold up to scrutiny.

As Childe (1956:121) stated, "a culture is not constituted by the few types used as diagnostic fossils but by the whole assemblage of types and traits associated." Prewitt (1981, 1985) provided one of the few systematic attempts to define assemblages that included all archeological classes, as well as behavioral ones. On many occasions, his work has been a lightning rod. For reasons previously discussed, Johnson's critique that phases were inappropriately defined because they lacked social or ethnic correlations is dismissed here. The descriptive and the interpretive ought to remain distinct: there needs to be an archeological unit that classes together similar components from different sites within a region. Regarding another general critique, the assertion that Prewitt's chronology is fundamentally a stylistic interval sequence of projectile points is likewise unfounded. Few if any other Central Texas chronologies are so completely assemblage-based.

The Inability to See What is Not There

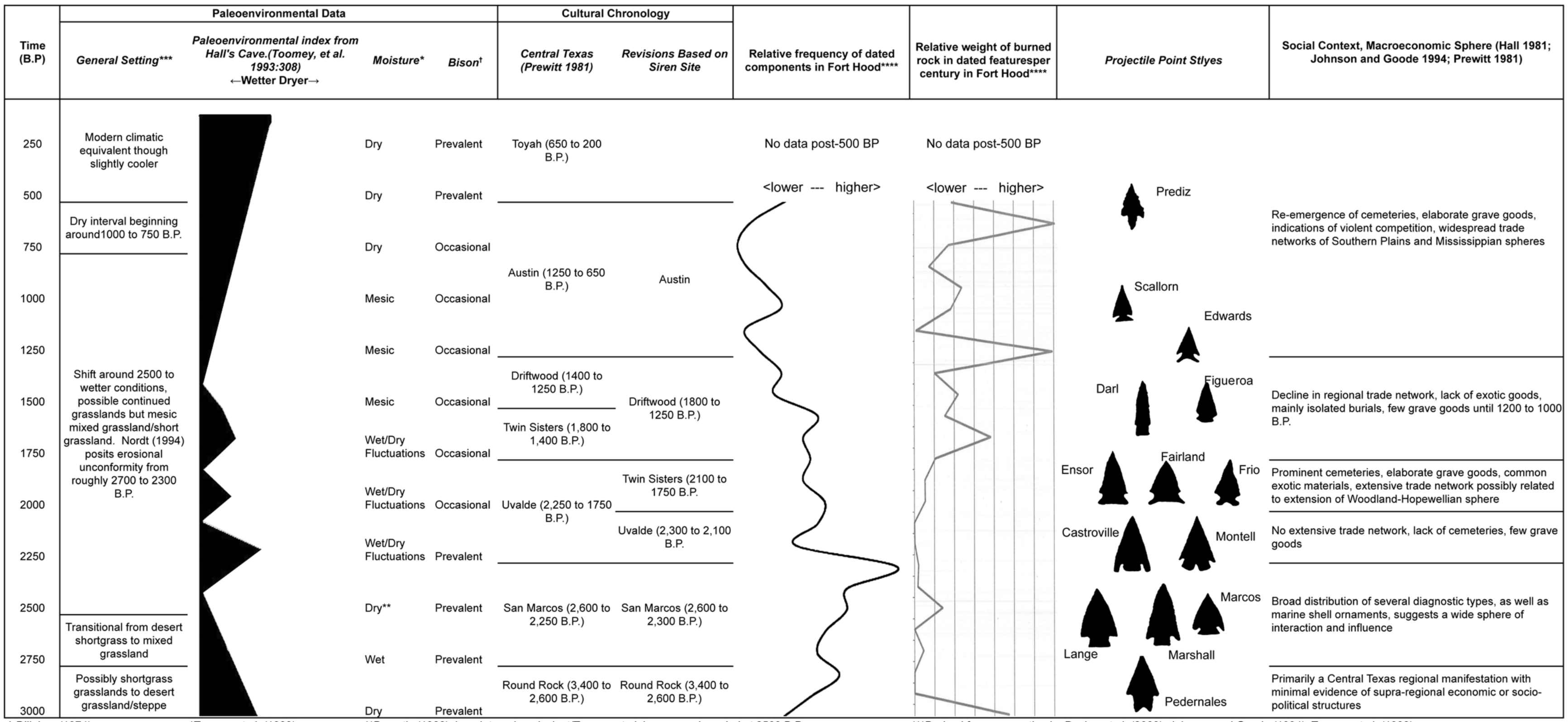
Minds and models typically look at data, not the gaps between the data. Few projects in the past have been afforded such a sweeping suite of radiocarbon samples from a continuously aggrading site. Without this vantage point afforded by the Siren site, in cobbling together the radiocarbon data in a highly piecemeal fashion from widely disparate sites, any gaps can be attributed to the narrow segments of the overall strand that each site provides. A complete picture is difficult to discern given the many biases and other limitations in the archeological record. But, with the donut that is the Siren site, the hole becomes readily apparent, and just maybe the hole offers insights into the whole. The chronological gap from about 1250-1750 B.P. on the Siren site raises important questions that can be answered by other sites. The Siren site yielded 72 Ensor points and three Darl points. The Loeve-Fox site yielded 57 Darl points and 18 Ensor points (Prewitt's 1982:74-78 Variant I; his Variant II equates to this article's Fairland points). Clearly, what is poorly represented on one site is well represented on the other. By matching the two, there are somewhat complementary patterns. Five of the 10 Loeve-Fox radiocarbon dates reported by Prewitt (1982:18) date from 1670-1300 B.P., filling in the gap from 1750-1250 B.P. on the Siren site. The remaining dates reported by Prewitt include four that fall within a Late Prehistoric timeframe from 850-1080 B.P., and one date of 2100 B.P., which was discarded because of an 880-year standard deviation range that eclipsed any confidence in its accuracy.

Accordingly, gaps, if well-bounded, equally contribute to the data. The Siren and Loeve-Fox sites provide highly complementary perspectives on the overall chronology. The Loeve-Fox site captures only a relatively small portion of the Twin Sisters phase, and likely reveals a more extensive Driftwood component than previously envisioned.

SUMMARY

To assume what is true of one site is applicable to all would only contribute to the further discord. Assemblages may have much greater time depth in some areas, but only brief durations elsewhere. However, it is a valid analytical tack to use site-specific data to test generalized models. The results from the Siren site clearly contradict some aspects of the prevailing synthetic chronological frameworks. By defining the discrepancies, the models can be revised to encompass the variation of observed data.

Accordingly, the Siren site supports a growing consensus of major chronological breaks at 2600–2500 B.P.; 2300–2250 B.P.; 1800–1750 B.P.; and 1250–1100 B.P. (Figure 11). Given the old wood problem mentioned above, it appears the younger end of these ranges is likely the more accurate. In addition to these major partitions, the Siren site reveals finer subdivisions, but those listed are the more widely recognized ones found in most, but not all, models. Despite emergent consensus on the *timing* of major changes, the various existing chronologies have widely varying notions on which assemblages and stylistic intervals are associated with these major chronological breaks. The Siren site shows Ensor, Frio, and Fairland points from about 2100-1900 B.P., a timeframe within the ranges presented by Turner et al. (2011) and Johnson and Goode (1994), but entirely contradictory to all other chronologies. Castroville points, possibly contemporaneous with Montell points, occur within a relatively discrete component on the Siren site that dates to between 2300-2100 B.P., a timeframe consistent with the early temporal range proposed by Collins (2004) and Prewitt (1981, 1985). The dates for the Edwards and Scallorn points on the Siren site range from 1100-900 B.P., which is consistent with almost all models. Perhaps the most intriguing aspect of the Siren site is a prominent half-millennium gap in the chronological record from 1750-1250 B.P. This occupational absence, when considered within the context of the regional record, is a keystone in a revised regional chronology. Because of low archeological visibility, the



† Dillehay (1974) *Toomey et al. (1993) **Bryant's (1966) Juno Interval equivalent/Toomey et al. began mesic period at 2500 B.P ***Derived from summation by Decker et al. (2000); Johnson and Goode (1994); Toomey et al. (1993)

****Derived from the Fort Hood database of radiocarbon dates and reports as presented in Carpenter et al. (2010)

Figure 11. Comparative environmental and cultural data for eastern Edwards Plateau and surrounding regions.

timeframe is perhaps an underestimated portion of the regional chronology. If the time that Prewitt (1981, 1985) defines as the Twin Sisters phase is extended, pushing back the dates of the preceding phases and stylistic intervals, the Siren site data fall into full accord with Prewitt's and Collins's chronologies.

The Untimely Death of Phases

Borges (2005) wrote of a mythical figure that eluded capture by dissolving in its own tears. The basic categories of archeological observation, such as *site* or *type* or *phase,* similarly tend to elude clear definition and dissolve into vagaries under the harsh glare of scrutiny. In an informal poll of Central Texas archeologists conducted by one of the authors, there seems to be a common view that the phase concept is dead, irretrievably damaged. There has, however, been nothing to replace it, and chronologies are tending towards greater generalization. Scientific analysis is quite literally the division into finer parts, and broad rubrics such as Late Archaic conceal rather than reveal significant subdivisions in the archeological record.

Johnson's (1987) critique appears to have substantially contributed to the demise of phases. However, he created untenable criteria. By linking phases necessarily to social processes, he created interpretive categories rather than descriptive archeological categories. The theoretical architecture to operationalize his criteria, to bridge the interpretive gap, and to show precisely how social processes become manifest in the Central Texas archeological record given all its problems, is not in place at this time.

If we look to the long debate among archeologists in the eastern United States, arguably the theoretical laboratory in the development of classificatory units such as phases, among the harshest critics there recently seems to be a sense of acceptance of phases if employed within precise confines and relegated to a humble role (Dunnell 2008:64; O'Brien et al. 2002). Phases and types are worthwhile and practical constructs, although only as originally intended. As Willey and Phillips (1953:617) stated, while "archaeo-sociological correlations may eventually be possible, the archaeologist is on firmer footing with the conception of an archaeological culture as an arbitrarily defined unit or segment of the total continuum." Phases should remain in the arsenal of Central Texas archeologists, but the need to plan for their obsolescence is equally paramount, something addressed more fully in the Siren site report (Carpenter et al. 2012). All classificatory categories, such as phases, types, and sites, need to be destroyed in due time, but only upon the emergence of more precise constructs. They are currently useful heuristic devices for finer divisions. Retreating to greater generalization is a poor option.

The phases formulated by Jelks, Weir, Kelley, Prewitt, Sorrow et al., and many others provide a salvageable basis for moving forward, but these need to be subsumed within the larger chronological divisions established long ago but more recently refined by Collins (2004) and Johnson and Goode (1994). Prewitt (1981, 1985) was on the right track when he sought to compile the cumulative assemblage data that covered not only technological and subsistence data, but mortuary patterns, evidence of conflict and trade, site distribution patterns, and other aspects.

ACKNOWLEDGMENTS

The Siren site investigations have been a long and often rocky road, but through it all we hope the contributions prove worthy of those who have fought on the site's behalf. The authors appreciate the auspices and input from Texas Department of Transportation archeologists Jon Budd, Scott Pletka, Jim Abbott, and others. Kevin Miller, serving as Principal Investigator, steered the project from beginning to end. Carole Carpenter assisted with the graphics. Additionally, the study of the site included a cast of many, including Dr. Charles Frederick, Dr. Mary Jo Galindo, Ken Lawrence, Abby Peyton, John Lowe, Laura Acuna, and many expert analysts. And finally, Dr. Tamra Walter and Dr. Timothy Perttula assisted in clarifying what needed clarity, helping craft the final work. For what good and useful contributions may come of this, the credit is fully shared with them. For what of this proves truly useless and offensive, the authors assume responsibility.

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The Bateman Biface Cache (41SM443)

Harry J. Shafer, Mark Walters, and David L. Carlson

ABSTRACT

A cache of 11 chipped stone bifaces was found at the Bateman Site (41SM443), located at a spring in north Smith County, eastern Texas. This article presents the circumstances of the find and a detailed description of 11 bifaces; two other artifacts, another biface and a dart point base, found at the site are also described. The raw material represented in the cache includes quartzite, orthoquartzite, and siltstone, and their source is probably southern and southeast Oklahoma. The date of the cache is unknown, but the forms suggest possibly Archaic or Woodland period. The cache is compared to the Woodland period Tuinier biface cache (41HP237) in order to measure the differences between the two caches. A statistical comparison between the Bateman cache and the Woodland period Tuinier biface cache (41HP237) is presented, along with discussions regarding technology, raw material, and behavioral processes that moved the Bateman bifaces from the point of origin to this site.

INTRODUCTION

The Bateman biface cache of 11 bifaces was discovered near a spring in Smith County in eastern Texas (Figure 1) by members of the Bateman family during mechanical earthmoving on their property. Mr. Bateman contacted Walters, a member of the Texas Archeological Stewardship Network and Smith County resident, about the find in the late spring of 2011 and graciously loaned the artifacts to Walters and Shafer for analysis. Walters recorded the spring area as the Bateman Site (41SM443).

The purpose of the article is to fully describe the bifaces and identify the source of the orthoquartzite and quartzite raw material. The chronological age of the cache is unknown but given the preference for orthoquartzite and quartzite, a Late Archaic or Woodland period date is most likely. Biface caches of orthoquartzite are rare in east Texas although it is the preferred material for Late Archaic and Woodland period dart points (Johnson 1962; McGregor 1987; Perttula 1999; Shafer and Green 2008). The only other cache of orthoquartzite bifaces currently described is the Tuinier cache (Shafer and Green 2008) in Hopkins County (see Figure 1). The two caches are compared statistically to test for similarity and consistency in form. Why the selection of orthoquartzite over finer quality silicious material such as novaculite, Woodford chert, or Edwards chert is a question that is explored along with possible reasons for caching the material.

BACKGROUND

Artifact caches are relatively rare in east Texas and consist mostly of partially reduced bifaces of either Edwards chert from central Texas or siliceous stone from the western Ouachita range of southeastern Oklahoma (Newell and Krieger 1949: 176, 177, Fig. 25J; Shafer 1973:235-237; Shafer and Green 2008; Shafer and Walters 2012; Tomka and Fields 1990). East Texas is not known for good quality siliceous stone such as larger cobbles of chert, fine-grain quartzite, or novaculite. Prehistorically, such raw materials or finished products of these materials were acquired through direct procurement or exchange from sources in central Texas (Shafer 1973:262; Shafer 2005; Shafer and Walters 2010; Tomka and Fields 1990), Oklahoma (Banks and Winter 1975:32-37; Shafer and Walters 2011), or Arkansas (Shafer 1973: 262).

One other cache recently reported from east Texas, is the Tuinier Cache (Shafer and Green 2008) which consisted of 28 orthoquartzite bifaces, a quantity sufficient for statistical comparison with the Bateman Cache. The origins of the material

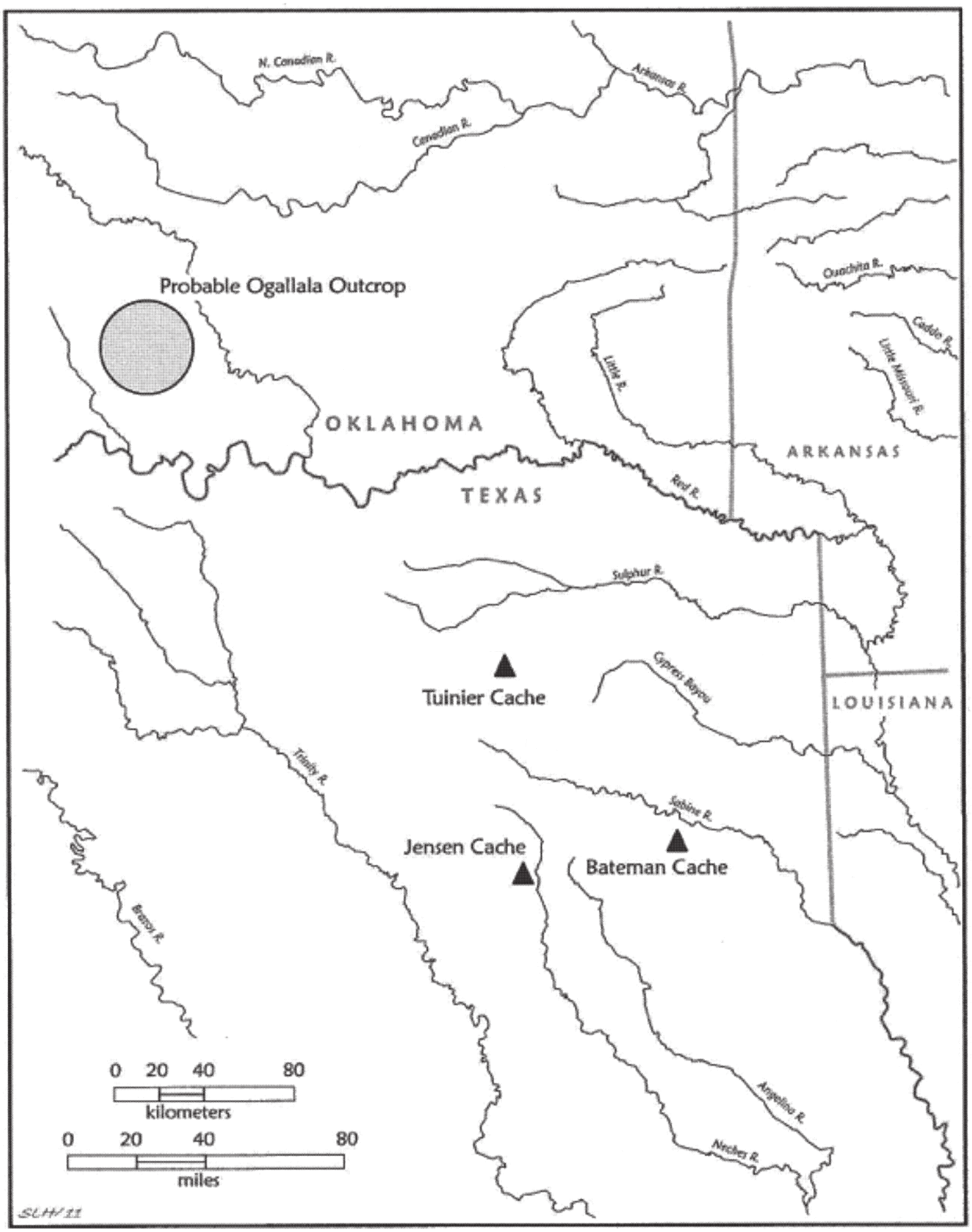

Figure 1. The locations of the three caches discussed in this article, Bateman, Tuinier, and Jensen, are shown. The possible source area of the Bateman cache bifaces is also shown.

in the two caches are different but the reduction technology is similar. Comparison of the two caches distinguishes their differences and shows that they were probably intended for different forms of finished products; thus they may belong to different time periods.

The transportation of partly reduced bifaces from the Edwards chert source area was not uncommon as numerous examples are known in Texas (Miller 2007). Surprisingly, however, little is known of the transport and caching of partly reduced artifacts from sources in Oklahoma. The only other reported cache of Ouachita Mountain, material in east Texas is the Jensen biface cache from Henderson County made of Woodford chert from the Johns Valley shale (Shafer and Walters 2011).

Cache Discovery

The Bateman family resides on property in rural north Smith County, Texas. A natural spring is located on one side of a hill near their residence, the outlet of which was bricked up at some point in the past. Mr. Bateman exposed a small area using a tractor with a frontend loader in an effort to create a small pond from the runoff of the spring. The shallow upland soils at this location consist of gravelly sandy loam formed in sediments consisting of glauconitic materials interbedded with shale and sandy materials.

The Bateman family collected several exposed bifaces from the scraped area adjacent to the flowing spring, all within a meter of each other. The bifaces were probably in a pit originally before their removal (Figure 2). No formal excavations were conducted and additional artifacts in the immediate vicinity are likely present. The only other prehistoric artifacts found at the site include a dart point, a biface, and five Caddo pottery sherds. The pottery was recovered from a landform some 20 m distant from the cache location, but it is not known how the cache relates to these surface finds.

ARCHEOLOGICAL SETTING

The Bateman Site is located on the side of a high, convex ridge top that overlooks Saline Creek. Saline Creek flows in a northeastern direction some 10.8 km to the Sabine River. As the name implies,

Figure 2. Image shows the spring on the Bateman property where the biface cache was found.

there are small salt flats in the general area, which were most likely utilized by previous inhabitants during historic and prehistoric times.

The Saline Creek area, which drains into the Sabine River, is poorly known archeologically (it should be noted that there is another Saline Creek that flows into the Neches River in the southern part of Smith County). There were only two sites recorded in the Saline Creek drainage prior to the recent work: 41SM32, 1 km west of the Bateman site, and 41SM3, which is 4.0 km north of 41SM443. These two sites were recorded by Jack Hughes in 1940, but no information is available about the time periods they represent. Recently Walters and members of the two families have discovered five additional sites on Saline Creek (41SM440-444). All five sites, based on limited non-controlled surface collections plus the Bateman site, have Caddo ceramics that point to Middle Caddo time period occupations in addition to minor Archaic, Woodland, and Historic Anglo-American components.

Description of the Cache

The 11 Bateman Cache bifaces are described and measurements, material type, presence or absence of edge dulling, and heat-treating are provided in Table 1. All of the Bateman Cache bifaces are reduced to blanks, or stage 3 reduction in the linear reduction model outlined by Goode (2002:30-34) and Girard (1995). Stage 3 bifaces are significantly reduced in thickness but are not finished to the point of formal shape and final thinning. Stage 4 reduction of a biface results in the production of a specific style of projectile point. The technology of reduction is suggestive of indirect percussion, a process described in more detail below. The tough, coarse material is difficult to flake under any circumstances (Peter and McGregor 1987), but the short, convex flake scars and small points of impact indicate the use of a punch. Some pressure retouch is evident to more formally shape the edges and for platform preparation. Inspection using a 10x lens revealed that lateral edges were abraded on seven specimens to strengthen the platform for the punch. Closer inspection may show more or all specimens were similarly treated.

The biface forms range from lanceolate to oval; bases on two are convex, five are rounded, and four have cortex. All lateral edges are slightly convex, creating the general ovoid outline. Almost all also show signs of heat treatment.

Cache Raw Material

Materials represented in the cache are all silicified sandstone or siltstone, and grades from quartzite to orthoquartzite, to siltstone. As a group they can be described as clastic sedimentary rocks consisting of quartz sand or silt that has undergone secondary silicification. Nine are classified as orthoquartzite, one is a pink quartzite, and one is siltstone. All are lustrous and with one exception

Table 1. Bateman Cache Biface Descriptions.

No.	Figure	Length	Width (mm)	Thickness (mm)	Material (mm)	Heat-treated	Abraded
1	A	83	44	15	Oqz	yes	yes
2	B	79	40	13	Oqz	yes	yes
3	C	81	39	16	Qz	yes	yes
4	D	77	44	17	Oqz	yes	yes
5	E	73	40	16	Oqz	yes	yes
6	F	61	38	9	Oqz	yes	yes
7	G	62	39	16	Oqz	yes	no
8	H	59	33	11	Oqz	yes	no
9	I	56	38	13	Oqz	yes	yes
10	J	61	32	13	siltstone	yes	no
11	K	51	35	11	Oqz	yes?	no

Oqz=orthoquartzite
Qz = quartzite

have reddish, reddish-brown or reddish tan hues indicating an iron rich matrix. The distinction between the types of the quartzite and siltstone depends upon subjective evaluations of coarseness. The quartzite specimen is the coarsest; the orthoquartzite ones are less so, and the siltstone is the finer material that borders on chert-like quality. The parent source of these rocks is probably from the Ogallala formation south of the Arbuckle Mountains in south-central Oklahoma (Don Wyckoff, personal communication 2011).

A close inspection was made of each of the 11 specimen to see if traces of the original character of the raw material such as cobbles or slab could be ascertained. Specimens A and B exhibit rough crenulated surfaces possibly due to the mass cleavage of parent outcrop. Close-ups of these surfaces on specimens A and B are shown in Figure 5. The unflaked surface on specimen B was first thought to have been caused by thermal fracture, but there are no other signs of thermal damage and flake reduction from both A and B clearly removed some of the crenulated surface. The crenulated fractured surfaces on these artifacts are possibly the rough surface of an exfoliated slab of orthoquartzite. Specimen K has cortex on the base and a crenulated surface on one face. This artifact was perhaps reduced from a split cobble. Three other bifaces have cortex bases (Figure3D-E, J; Figure 4D-E, J) indicating that these were reduced from weathered cobbles, some exceeding 10 cm in maximum dimension.

Statistical Examination of the Bateman Cache

Statistical analysis of the Bateman Cache bifaces was conducted to measure the intra-group variability and consistency in form. Figures 6A and 6B show the relationships among length, width, and thickness, and Table 2 shows the correlations among those variables (all significant at $p<.05$). The siltstone and quartzite specimens fall below both lines indicating that they are narrower for a given length and thickness. The reason for this patterning is not clear, but it could reflect a difference in the size and shape of the blank.

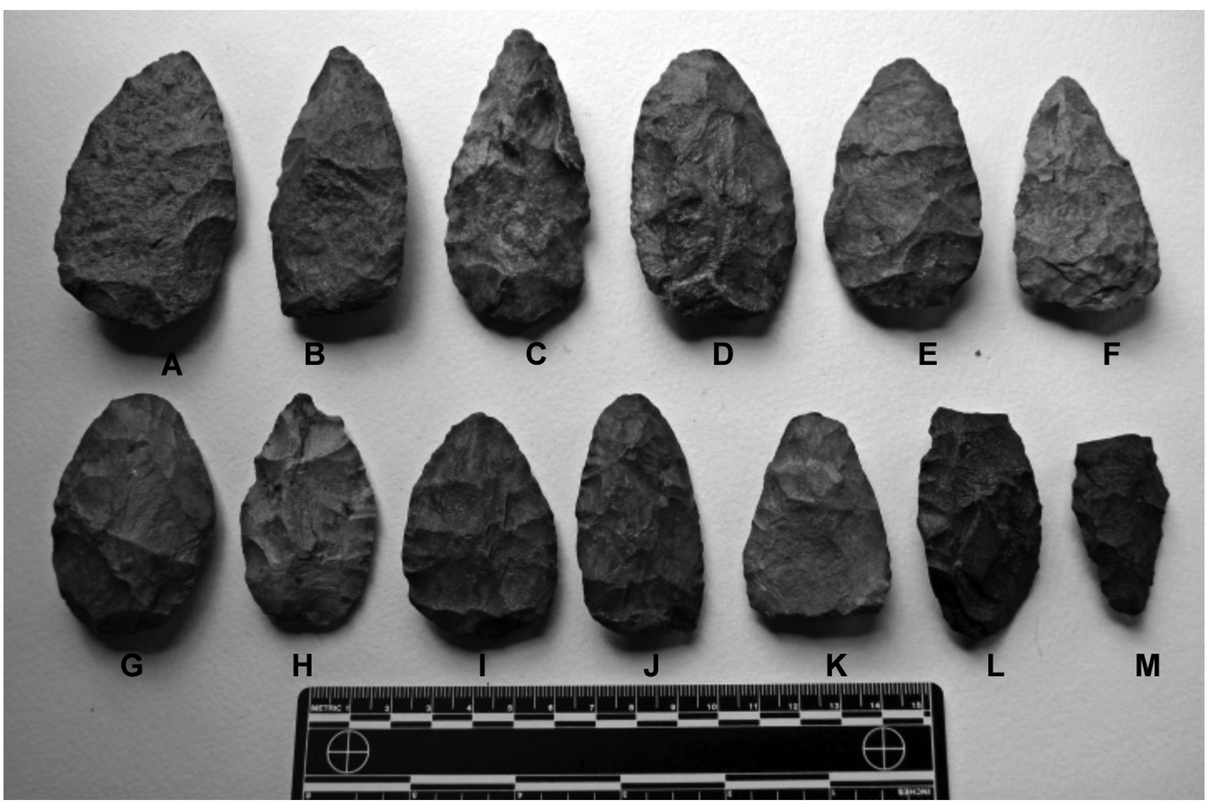

Figure 3. Bifaces from the Bateman collection: A-K Bateman cache bifaces; L, black biface doubtfully associated with the cache; M, contracting stem dart point included in the collection.

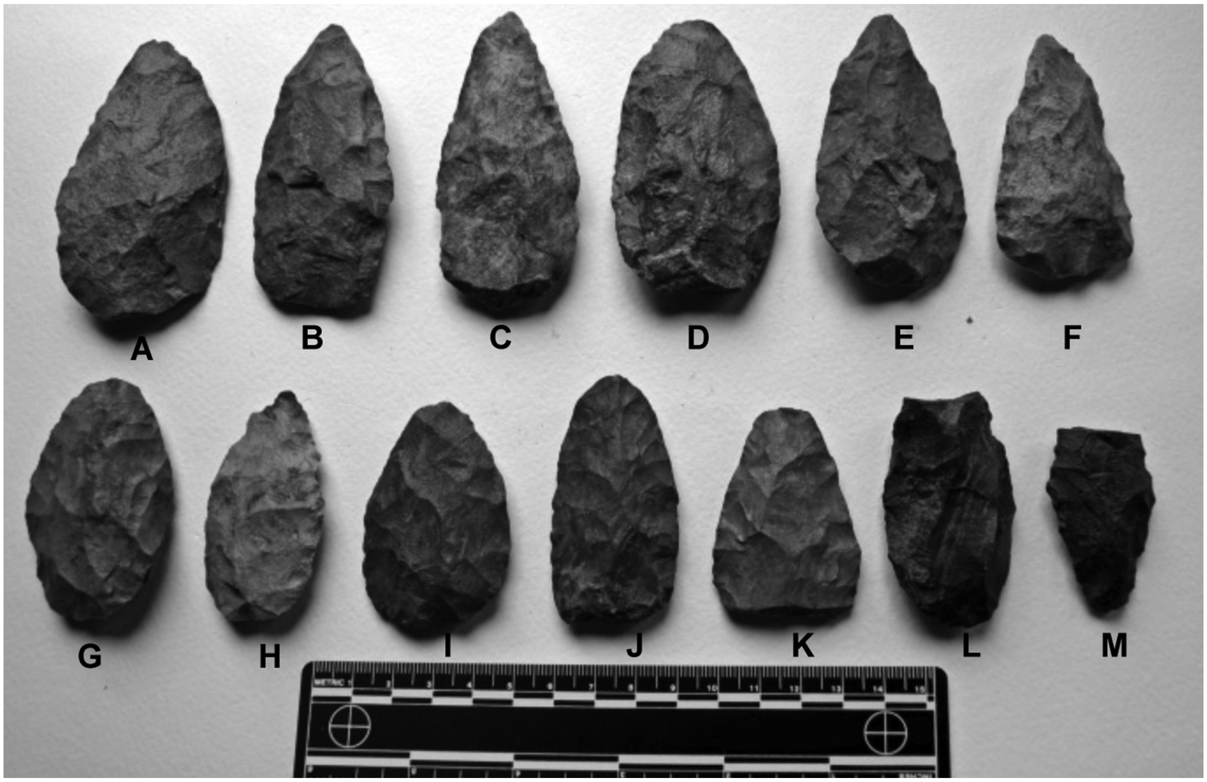

Figure 4. The Bateman collection bifaces: A-K Bateman cache bifaces; L, black biface doubtfully associated with the cache; M, contracting stem dart point included in the collection. Image shows opposite faces from those shown in Figure 3.

Figure 5. Close-up view of Bateman cache specimens Figure 4A and B that shows the crenulated surfaces of the blanks.

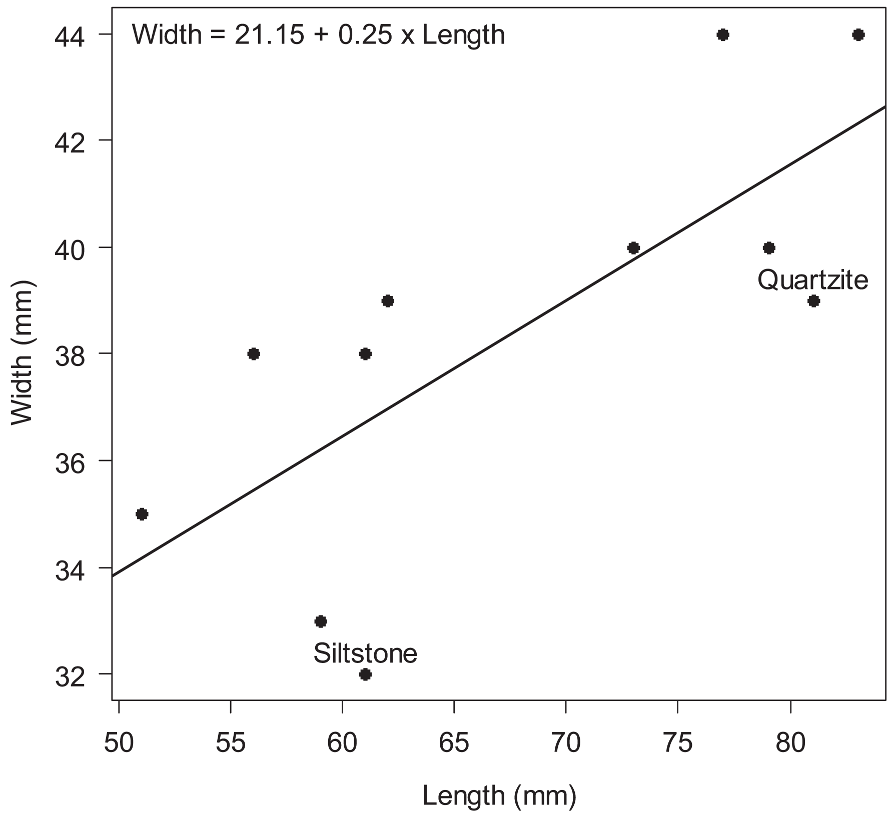

Figure 6A. Relationship between length and width of bifaces.

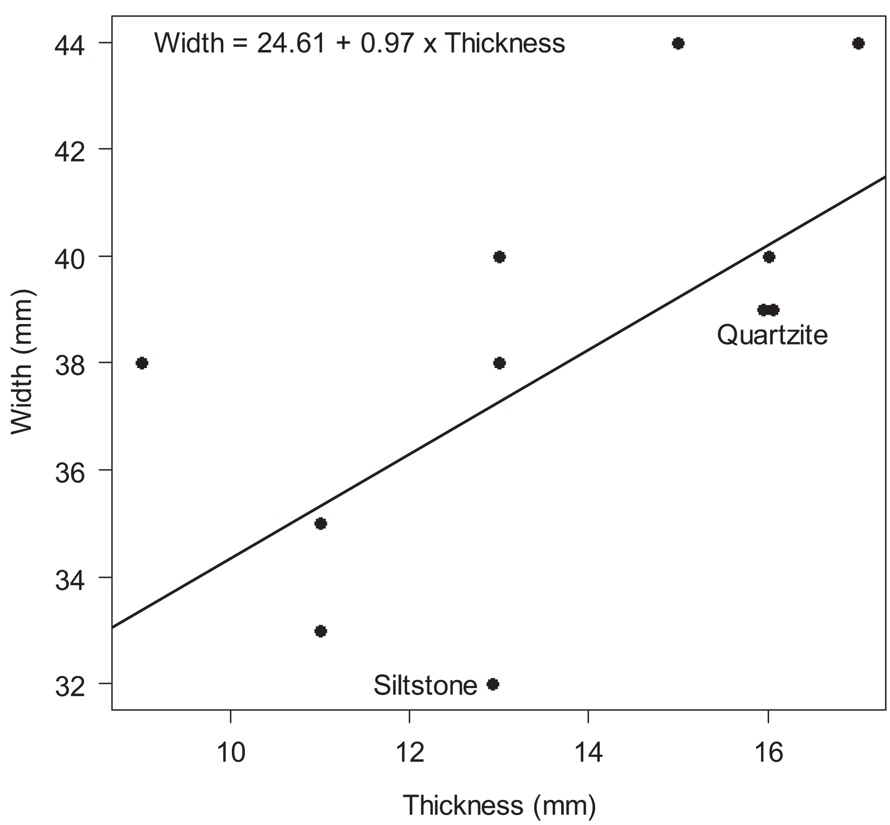

Figure 6B. Relationship between width and thickness of bifaces.

Table 2. Correlations between length, width and thickness (all are significant at p< .05).

	Length	Width	Thickness
Length	1.000	0.739	0.638
Width	0.739	1.000	0.582
Thickness	0.638	0.582	1.000

Table 3 provides the means, standard deviations, and coefficients of variability of the bifaces. The coefficient of variability (CV) is the standard deviation divided by the mean 100 to provide a measure of variation that is controlled by size. Values are provided for all specimens, and values for only the orthoquartzite bifaces, to show that the chert and quartzite specimens are not significantly different. The coefficients of variation show that width has the greatest constraint (the CV values are distinctly lower), but it is not clear if this relates to the raw material size or cultural preference.

OTHER LITHIC ARTIFACTS

Two surface finds, a broken black chert biface, anomalous in both form and material, and a broken base of a Gary-like dart point are described here. These speciments are the only other lithic artifacts recovered from the site but these artifacts are not part of the cache. The black biface fragment (Fig. 3L; Fig. 4L) which lacks the distal tip is 56 mm long, 33.2 mm wide, and 13 mm thick. The technology is similar to that of the cache specimens in that it exhibits the same thinning characteristics consistent with indirect percussion. The degree of reduction and shaping, however, would put it more comfortably in Girard's (1995) Stage 2 rather than Stage 3. The black lustrous chert specimen has gold bands that extend throughout the stone (Fig. 3L; and 4L). The material compares closely to Woodford chert from the Jones Valley Shale in the Ouachita Mountains of Oklahoma (Banks 1990).

The lone projectile point fragment (Figures 3M and 4M) is a crude Gary-like point base of silicified wood that is 44 mm long, 26 mm wide, and 12 mm thick. The stem contracts toward the base but lacks the more convex taper characteristic of Gary points.

COMPARISON OF THE BATEMAN CACHE WITH TUINIER BIFACE CACHE

The Tuinier biface cache consists of 28 heat-treated orthoquartzite bifaces from the Tuinier Farm (41HP237), a multi-component site in Hopkins County (Shafer and Green 2008) (Figures 7 and 8). The site is on Stouts Creek near the community of Pine Forest. The Tuinier cache bifaces were stacked in a small pit about 30 cm in diameter and about 20 cm deep. The size and form of the bifaces suggest they are Gary preforms, and probably date to the Woodland period from about A.D. 1 to 500-600. Since biface caches are rare in east Texas, the Bateman and Tuinier caches are compared for information with regards to possible age and preform characteristics.

Table 3. Mean, standard deviation, and coefficient of variation for all Bateman cache bifaces and for those of orthoquartzite only.

	All Specimens			Orthoquartzite Only		
	Mean	StDev	CV	Mean	StDev	CV
Length	67.55	11.25	16.66	66.78	11.39	17.05
Width	37.83	4.13	10.92	39.00	3.64	9.33
Thickness	13.58	2.47	18.16	13.44	2.74	20.41

Figure 7. Selected examples from the Tuinier biface cache.

There are clear similarities in raw material an overall shape within the Tuinier cache as seen in Table 4. While the Tuinier specimens are a bit shorter than the Bateman specimens, they are wider, thicker, and less variable in length and thickness.

T-tests comparing the two samples in terms of length, width and thickness indicates that width and thickness are significantly different while length is not ($p<.05$). Another difference between the two samples is the correlations among length, width, and thickness (Table 5). Only the correlation between length and width is significant. Neither of the correlations involving thickness is significant. Shafer and Green (2008) mention the thickness of the Tuinier specimens and the challenges of flaking orthoquartzite. The size and shape as well as the hardness of the raw material may explain why the specimens have a very consistent thickness that does not vary with overall size (length and width).

Figures 9A and B show that the Bateman specimens are comparable in length, but narrower and thinner than those from Tuinier. Figure 10 shows the discriminant function that best separates the bifaces from each cache. The separation is complete and reclassification of the bifaces into the two groups results in no errors.

The statistical separation of the two caches could indicate that the ultimate linear reduction trajectory of the two was different. The raw material size was certainly different and this selection could have affected the manufacturing trajectory. The Tuinier cache made of large orthoquartzite pebbles or small cobbles (ranging in size from 53 to 75 mm with an average of 64 mm) was interpreted as Gary point preforms based on their morphology (Shafer and Green 2008). The morphology of the Bateman cache bifaces made from larger cobbles or slabs (ranging in size from 51 to 83 mm with an average of 67.5 mm) is statistically significant. The variation in the morphology suggests that the linear trajectory of these bifaces toward a preform shape also was different.

Figure 8. Selective examples from the Tuinier biface cache. Opposite side shown in Figure 7.

Table 4. Mean, standard deviation, and coefficient of variation for all Tuinier cache bifaces

	All Specimens		
	Mean	StDev	CV
Length	64.36	6.45	10.02
Width	50.14	4.78	9.54
Thickness	18.32	1.87	10.19

Table 5. Correlations between length, width, and thickness (only the correlation between length and width is significant at p< .05).

	Length	Width	Thickness
Length	1.000	0.634	0.267
Width	0.634	1.000	0.169
Thickness	0.267	0.169	1.000

MATERIAL AND TECHNOLOGY

Northeast Texas is surrounded on three sides by regions of excellent siliceous material: novaculite from the Ouachita Mountains of southeastern Arkansas, Boone and Woodford cherts from southeast Oklahoma in the western Ouachita Mountains, and Edwards chert from the Edwards Plateau/Lampasas Cut Plain sources in central Texas (Banks 1990). The most common source of chert in northeast Texas, however, comes from Uvalde Gravels common in upland prairies of north central and northeast Texas along the Sabine River and its tributaries (Banks 1990; Perttula

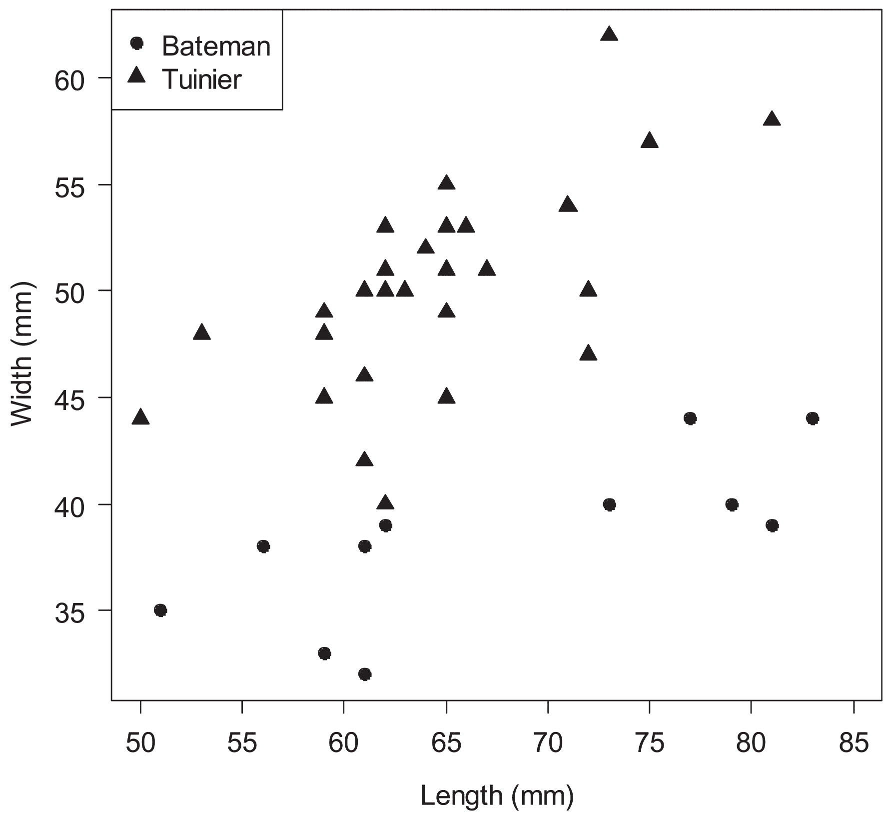

Figure 9A. Comparison of length and width of Bateman and Tuinier bifaces.

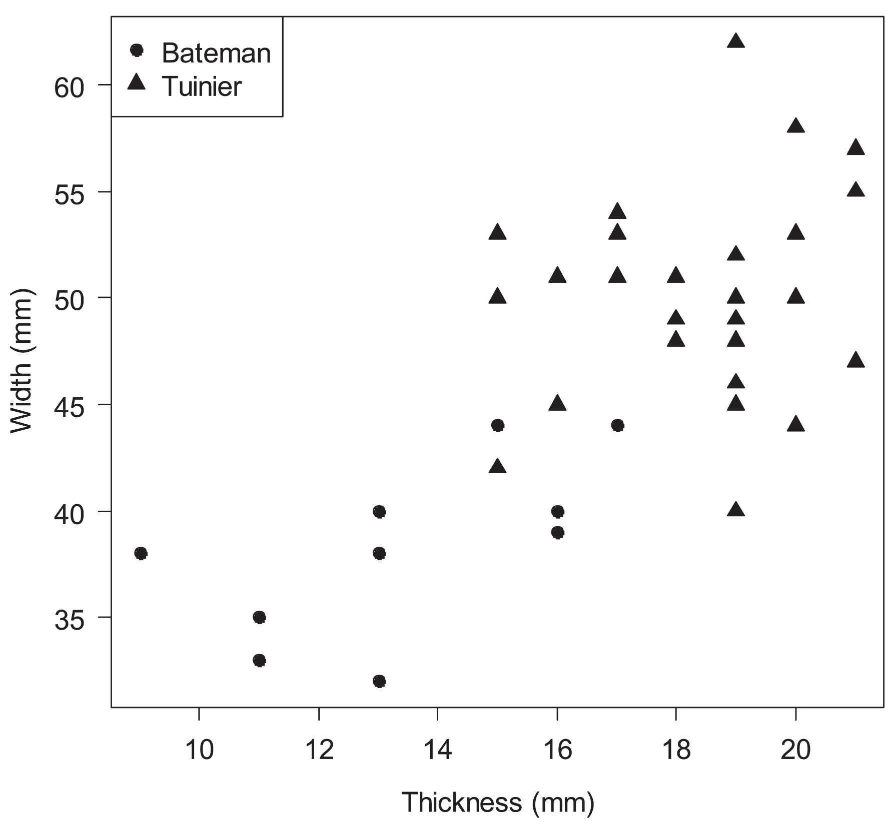

Figure 9B. Comparision of width and thickeness of Bateman and Tuinier bifaces.

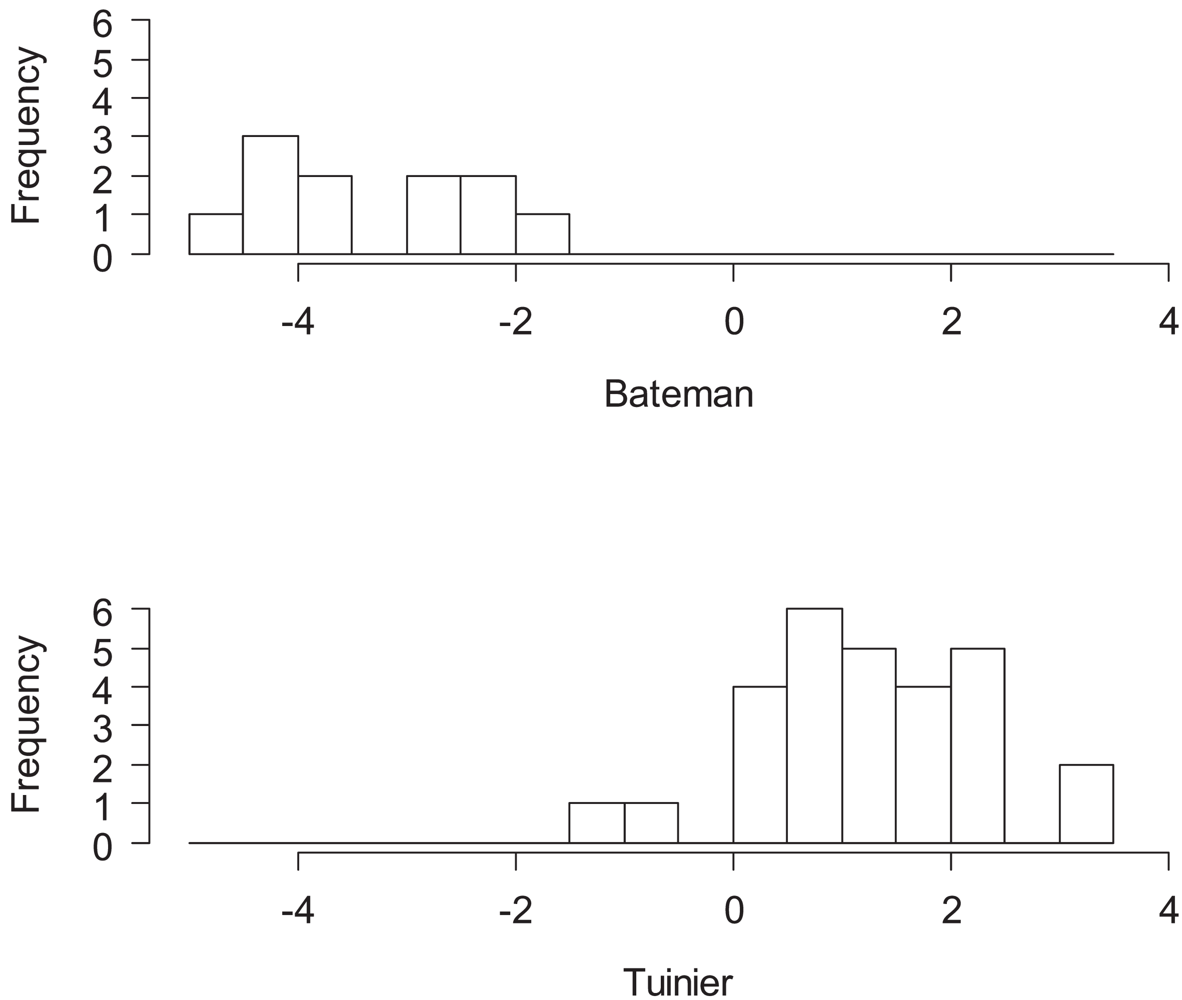

Figure 10. Histograms of the Linear discriminant function values for the bifaces from the Tuinier and Bateman caches. Tuinier specimens have a linear discriminant function score greater than -1.5 while Bateman bifaces have scores less than -1.5. The function separates the caches by giving negative scores to longer bifaces (Bateman) and positive scores to wider and thicker bifaces (Tuinier).

1999:11). Banks (1990:56, 57) traces the source of orthoquartzite in east Texas to the Uvalde Gravels, whose ultimate origin is the Ogallala Formation (Banks 1990; Cliff and Peter 1996: 6). The most common siliceous material in these gravels is orthoquartzite with chert and silicified wood also present (McGregor 1987).

Regardless of the distant proximity of excellent siliceous material, the preference for orthoquartzite for the production of Late Archaic and Woodland Period projectile points such as Gary points is well documented across east Texas (Johnson 1962; McGregor 1987; Perttula 1999; Shafer and Green 2008). Johnson (1962) referred to the orthoquartzite from the Yarbrough site as "reddish-gray chert with sand inclusions" but the senior author's inspection of the Yarbrough site collection at the Texas Archeological Research Laboratory at the University of Texas has identified this material as the typical orthoquartzite found across east Texas.

The origin of the orthoquartzite pebbles and small cobbles in the Tuinier cache is most likely Uvalde Gravels since traces of cobble cortex is evident on some of the specimens. The preference for orthoquartzite from these ancient gravels over efforts to acquire better material from the sources listed above may be due to restricted social boundaries or technological preference. The Late Archaic and Woodland stone workers had a system for working the material that achieved success. Orthoquartzite is difficult material to work by any standards, and accomplished flintknapper J. B. Sollberger found it extremely difficult to biface orthoquartzite cobbles using the conventional direct soft-hammer (billet) method (Peter and McGregor 1987:201-209).

Analyses of lithic assemblages from east Texas have lead some archaeologists to speculate that an alternative method of indirect rather than direct percussion was used to manufacture Gary and other dart points from orthoquartzite (J.E. Dockall, personal information 2011; Shafer and Green 2008). The impact points on orthoquartzite bifaces in both caches are narrow and deep rather than broad and deep as with a hard hammer, or broad and shallow as with a billet. Also, as noted by Shafer and Green (2008) the small mass of orthoquartzite cobbles is not conducive to hard-hammer flaking because of the energy absorption when supported in the hand (see also Peter and McGregor 1987). Indirect percussion employs a punch which is placed directly on the striking platform and struck with a hammer of stone or some other available material (Shafer 2005; Whittaker 1994:33).

CACHING BEHAVIOR

A great deal of literature has been written over the past two decades describing and providing explanations for lithic caches. The Clovis period has especially received attention (see Kilby 2008 for an excellent overview of Clovis cache studies). Studies of Archaic and Late Prehistoric hunter-gatherer cache behavior are less well represented. Collins (1999:73-177), Galan (2007), Miller (2007), Shafer and Green (2008), and Tunnell (1978) have addressed PaleoIndian, Archaic, or Late Prehistoric caches in Texas and have provided possible explanations for the behavior.

Caching may be explained by a number of behavioral actions; caching for later reduction or use; moving into a landscape where one is unfamiliar with the lithic resources; insurance; dedicatory; trade and exchange; and votive offerings (Galan 2007:55-66). Galan, in his analysis of the Hegar (41HR1030) cache, provides an excellent discussion regarding different caching strategies. He lists and discusses several options: provisioning a place for future need; banking insurance caching; trade caching; and ritual caching; some archaeologists see caching as a way of minimizing stress in hunter-gatherer foraging behavior (Gerber et al. 2003:83; Torrance 1983). Galan (2007:58), citing Gerber et al.(2003:83) states that "caching becomes optimal with the abundance of resources decline and the value increases over time." It is one way of leveling the landscape for hunters and gatherers by storing items in resource deficient areas for future retrieval if needed.

Caches deposited for anticipated trade also may be indicative of territorial boundaries (Button 1989: 216; Galan 2007:62; Miller 1993:13-14). Ritual caches deposited as offerings to provision the dead are not common in Texas in the Archaic Period but do occur in the Edwards Plateau (Bement 1994:67-70, 112, 129) and South Texas Coastal Plain (Taylor 1995). Galan (2007:55) aptly notes that all of these behaviors are difficult to prove (with the exception of mortuary associations), but listing them may provide insight into the possible strategies that came into play when depositing but not retrieving the cache. Why the Bateman cache was left by the spring is unknown, but we can speculate that it was either because the spring was a landmark and the cache would be easily retrieved for one or more of the reasons listed above, or alternatively, it was left as a dedicatory cache to the spirits of the spring itself.

One observation that deserves mentioning and is pertinent to interpreting caching behavior is the geographical setting of East Texas. East Texas is surrounded on the northeast, north, and west by regions with excellent quality toolstone, and reflects a consumer area and not a production area with regards to high quality lithic resources (Shafer and Walters 2010). Imported material for chipped stone and celts are recycled to exhaustion in Woodland period and Caddo sites and were reduced to sizes that are too small for further use. This producer-consumer pattern was noted in other lithic deficient areas adjacent to regions that have high quality stone such as northern Belize (Dockall and Shafer 1993) and the Tularosa Basin in far west Texas (Shafer et al. 2001). This is a predictable pattern for people living in a geographic area without high grade chert or some other cryptocrystalline stone such as fine-grain siltstone, novaculite, or obsidian where they must obtain either raw materials or finished products from nearby regions rich in such resources.

SUMMARY AND DISCUSSION

The Bateman cache represents a discrete assemblage of bifaces made of quartzite, orthoquartzite, and siltstone, probably from south-central Oklahoma. All were at Stage 3 in the five-stage linear reduction sequence for dart points. The bifaces are of suitable size to have served as preforms for dart points. The Bateman cache was compared quantitatively to the Woodland period Tuinier cache in nearby Hopkins County (Shafer and Green 2008). The sources of the raw materials are different. Statistically, the differences in size and form hint that the two caches may not be the same chronological age and the final tool form may have differed. Studer (1982) describes a proposed reduction sequence for Gary points from the Icy Eye site in Harrison County and illustrate a series of performs that compare closely to the stage of reduction represented by the Tuinier cache bifaces (Shafer and Green 2008). The Bateman cache bifaces do not compare as well to the Icy Eye examples presented by Studer in that some are sub-triangular rather that lozenge-shaped as are the Tuinier specimens. These differences are subtle, however, and the intended trajectory of the Bateman specimens is unknown.

The stage of reduction in biface caches is informative. Biface manufacture is a system that progresses with the removal of each flake. Some reduction often occurs at the quarry source to reduce the mass for transport to the next site of operation. Bifaces are further reduced by shaping and thinning to a blank stage, at which point they may be either finished into formal tools, or transported as blanks for final thinning and shaping by the recipient of the bifaces (Shafer 1993). This linear, or evolutionary, process was aptly illustrated by W. H. Holmes (1894). The linear reduction system has been applied to east Texas lithics (Girard 1995; Shafer 1973:73-82; Studer 1982) and is useful to help place bifaces in caches in a systemic context. Additional information is gained by tracing the material from the point of origin to the site in which it was found. In the case of the Bateman cache, the size of the parent raw material indicates that it did not come from Smith County, but more likely was transported from natural outcrops in south-central Oklahoma south of the Arbuckle Mountains according to Don Wyckoff (personal communication 2011) (see Figure 2).

The act of moving material from a resource area to one that is deficient in good raw material would most likely be part of an economic trade/exchange system. How did the material end up at the Bateman site and what behavioral processes were involved in the partial reduction and movement of the bifaces? The possible cultural behaviors that led to the deposit of the Bateman bifaces near the spring are numerous. First, the formation of the cache could simply be a product of direct procurement where the flintknapper traveled to the source outcrops to get the material and partly reduce it for transportation. Second, a trader could have partly reduced the material and exchanged it with one or more recipients. Third, a down-the-line recipient in the latter case could have cached the material near the spring for later recovery and use (Miller 2007: 9-12). Fourth, the cache could also have been left as a ritual deposit. We do not know which, or if any, of these behaviors were involved in the final disposition of the cache, but the third possibility is the most plausible.

CONCLUSIONS

Biface caches are not common in East Texas although several have been reported. The one that compares most closely to the Bateman cache is the Tuinier cache (Shafer and Green 2008). These two caches are compared to illustrate their differences and similarities. Shafer and Green (2008) have suggested that the Tuinier cache was part of a linear reduction system geared toward the manufacture of Gary points. The Bateman cache, however, is quantitatively different and we speculate that the form of the final intended product may have been different as well. Walters has observed Caddo ceramics at the site, but it is possible that a Woodland or Late Archaic component may be near the spring as well based on the presence of the contracting stem dart point.

We do not know the chronological age of the cache and are unsure as to which economic process or processes governed the movement of raw materials at the time these Bateman bifaces were manufactured and transported. The parent outcrop was most likely the Ogallala formation in south-central Oklahoma for the cache specimens. The bifaces could have been transported to the Bateman site by a number of different behavioral means.

ACKNOWLEDGMENTS

We would like to thank the Bateman family for allowing the study of artifacts they have collected from 41SM443. The Bateman children are interested in archeology, and are familiar with prehistoric artifacts. In addition to recognizing the cache, they were also involved in the location and recording of four new sites on adjoining property owned by a relative. These two families have shown a keen interest in learning more about the archeological history of their area as well as in preserving that history for posterity.

Thanks also go to Mark Thacker and his family for allowing the study of artifacts collected on their adjacent farm. These families are commended for their interest in adding to the archeological record of east Texas as well as preserving and protecting sites on their property. The authors also wish to thank Al Wesolowsky, Don Wyckoff, and two anonymous reviewers for reading the manuscript. Al supplied many suggestions on wording and style, and Don offered suggestions regarding the origins of the materials represented in the cache.

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Excavations at the Oblate Site (41CM1), Comal County, Texas: The 1963 Texas Archeological Society (TAS) Field School

I. Robert Wishoff and Sean R. Nash with contributions from Michael B. Collins

ABSTRACT

The Oblate Site (41CM1) is an archeological site with multiple buried components preserved within an alluvium-filled shelter cave and an adjacent alluvial terrace. The second field school in Texas Archeological Society (TAS) history (1963) recovered data from the excavations that, when analyzed, confirmed the projectile sequence proposed in 1962 by Curtis Tunnell. Observed and reported data point to episodic occupations at the Oblate site from the Late Archaic through to the Historic period. The records from the excavations were sufficient to create a comprehensive report on the project more than 49 years after the fieldwork was completed.

The primary motivation for the 1963 excavations was to provide a backdrop for the film "Salvaging Texas History," the 6th part of a six part series entitled "Spade Work for History." However, Curtis Tunnell, E. Mott Davis, and Dee Ann Suhm from the University of Texas at Austin, and members of the TAS, used the opportunity to try to confirm the results of the previous excavations at the site.

INTRODUCTION

The Texas Archeological Society (TAS) conducted data recovery excavations at the Oblate site (41CM1) in Comal County, Texas, in June and July 1963 (Figure 1). Currently the site is located on the southern bank of Canyon Lake, which was formed when Canyon Dam was constructed on the Guadalupe River near San Marcos, Texas. This project, however, was undertaken before Canyon Lake was filled. Prior to the filling of the reservoir, the site was located "along the east bank of a small spring-fed creek" that flowed into the Guadalupe River about 400-750 ft. downstream of the site (Johnson et al. 1962:80). The Oblate site is 900 ft. above mean sea level, and about 80 ft. above the Guadalupe River's original channel. The spring-fed creek was located within a limestone canyon. A broad, alluvial terrace slopes 160 ft. up from the creek bed to the base of a limestone cliff. At the base of this cliff, a limestone overhang forms a shelter cave that houses a large portion of the site. Overbank and flood deposits created the sloping alluvial terrace and filled the rock shelter with sediments from the Guadalupe River beginning in the Late Archaic and continuing until Historic times. Terrace deposits are up to 9 ft. deep.

In 1959 and 1960, Texas Archeological Salvage Project (TASP) excavations at the same site recovered data that resulted in a relative chronological sequence for the Central Texas Late Archaic that was the basis for a then-current consensus chronology (Johnson et al. 1962). The primary motivation for the 1963 excavations was to provide a backdrop for the film "Salvaging Texas History" the sixth and final part of a series entitled "Spade Work for History." The University of Texas Radio-Television Department produced the film in conjunction with the U.S. Department of the Interior, National Park Service, Southwest Region. The National Science Foundation contributed funding for production and distribution of the film.

Curtis Tunnell, E. Mott Davis, and Dee Ann Suhm from the University of Texas at Austin, and members of the TAS, used the opportunity to try to confirm the results of the previous TASP excavations at the site and the resulting Archaic chronology. An excavation strategy was formulated to recover evidence of the chronology of occupation at the site. The testing strategy included ten 5 x 5 ft. hand-excavated units. Six of the units were excavated within or immediately adjacent to the shelter. In addition, four units were excavated in the terrace between the shelter overhang and the creek.

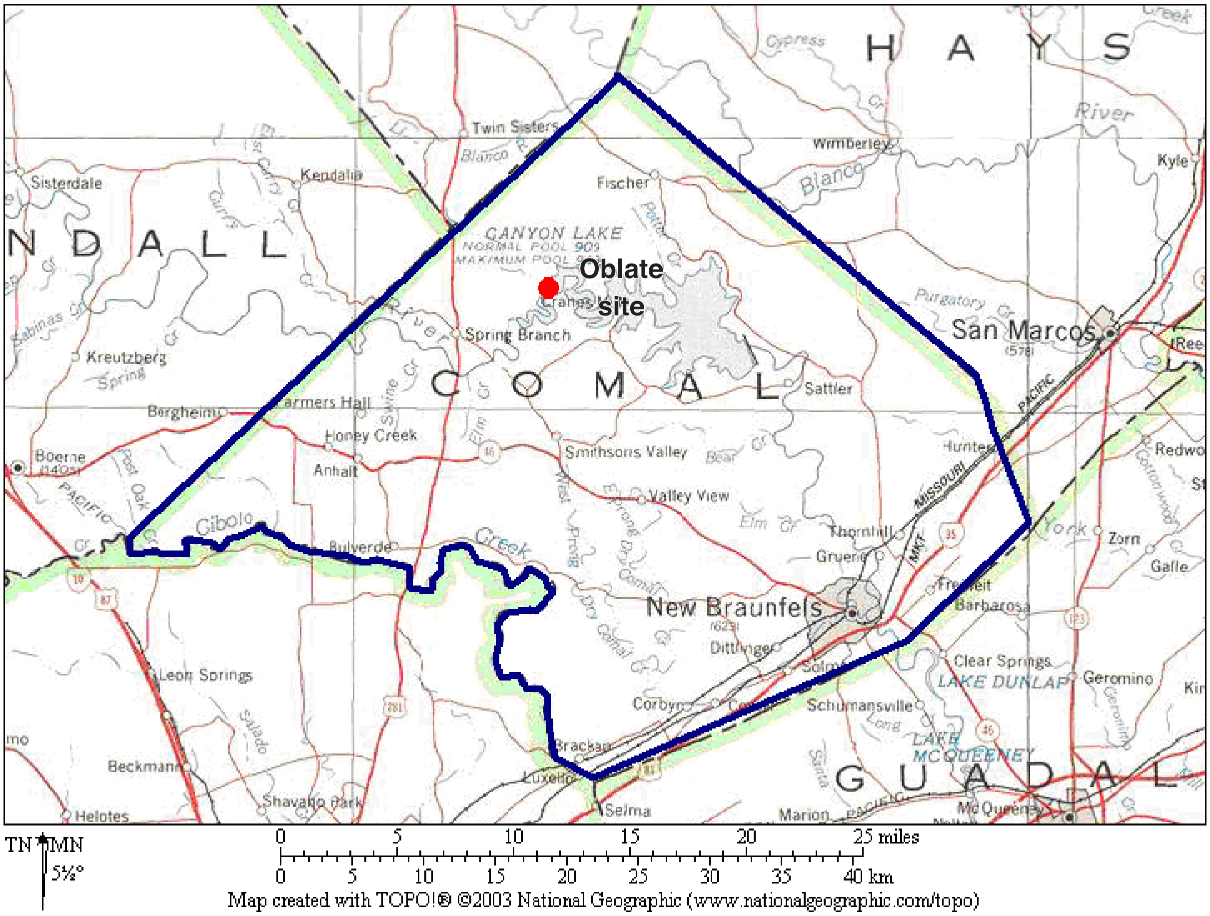

Figure 1. Oblate site (41CM1) location within Comal County, Texas.

Michael B. Collins, then a student at The University of Texas at Austin, started a report on the excavations for a class with Professor E. Mott Davis. Unfortunately, the class was over before the report was complete. Collins, however, did complete a draft of the artifact analysis but never completed the discussion and site analysis sections (Collins 1966). The following discussion, therefore, provides a summary, description, and analysis of the excavations in an attempt to complete the report started in 1966.

Unfortunately, over the years, a few of the artifacts have been lost and some have lost their correct provenience. Discrepancies between the inventories, bag tags, and artifact labels have been found that could not be resolved. As a result, field notes, feature forms, unit/level forms and Collins' (1966) lithic analysis notes are used as the main sources for unit and feature descriptions.

ENVIRONMENTAL BACKGROUND

Physiography

The site is located within the Edwards Plateau physiographic region, which is characterized by rolling to hilly terrain with elevations ranging from 900 to 2,000 ft. above mean sea level (amsl). The shelter at the Oblate site is located at an elevation of about 900 ft. amsl. The surrounding area is comprised of canyon land drained by the Guadalupe River. Currently, the site is located on the southern bank of Canyon Lake, but at the time of the 1963 excavations, the site was located on the east bank of a small spring-fed creek that flowed into the Guadalupe River about 400-750 ft. downstream of the site (Johnson et al. 1962:80; Collins 1966). A broad alluvial terrace slopes 160 ft. up from the flooded creek bed to the base of a limestone cliff.

At the base of this cliff a limestone overhang forms a shelter cave that houses a large portion of the site. During the Archaic through Historic archeological periods, overbank and flood deposits created the sloping alluvial terrace and partially filled the rock shelter with sediments from the Guadalupe River and from the small creek's drainage.

Flora and Fauna

In the uplands, the limestone terrain is typical of the Edwards Plateau and has oak and juniper woodlands, with interspersed grasslands. Trees in lower elevations and bottomlands include sycamore, elm, basswood, pecan, walnut, persimmon, willow, and hackberry (Texas Parks and Wildlife Department 2011). The site lies within Blair's (1950) Balconian biotic province; he lists 57 species of mammals, 16 lizards, 36 snakes, one land turtle, and 22 amphibians. Wildlife commonly observed in the area today include white-tailed deer, badger, fox, raccoon, skunk, armadillo, squirrel, and a variety of small birds, fish, and reptiles.

Geology and Soils

The underlying geologic formation of the site area is the Lower Cretaceous Glen Rose formation, which is exposed at higher elevations within the tributary channel, and possibly the Cow Creek formation. The Glen Rose formation is characterized by alternating resistant and recessive beds of limestone, dolomite, and marl that form a stair-step topography (Barnes 1974). A broad alluvial terrace sloped from the mouth of the shelter cave to the channel of the spring-fed creek. This recent alluvium is set into the Cretaceous limestone canyon.

Prehistoric Background

The Oblate site is in the Central Texas archeological area (Collins 1995, 2004). Prehistoric archeological sites in Central Texas represent continuous human occupation starting around 11,500 years ago. During the prehistoric era, hunting and gathering was the exclusive resource procurement strategy of Central Texans. Sites typically reflect relatively short-term occupations. Deeper sites with large amounts of archeological materials are thought to be camps that were returned to through the years, possibly on a regular basis.

Collins (1995, 2004) authored a synthesis of Central Texas archeology, dividing the prehistory of Central Texas into three time periods: Paleoindian, Archaic, and the Late Prehistoric. Each of these was further divided into sub-periods, such as "early" and "late." Smaller units of time referred to as "style intervals" coincide with the interval of use of a particular point style or group of point styles. These style intervals can overlap or extend over more than one sub-period. Most, however, can be used to divide the sub-periods.

Extending the Prewitt (1995) projectile point distribution study and further refining previous syntheses (Collins 1995, 2004) Collins et al. (2011) expanded the analysis value of Prewitt's distributions by overlaying them with paleoclimate data, thus creating what they term as "realms." In discussing the concept of realms, Collins et al (2011:4) suggested that "at a statewide scale, temporally sensitive artifacts should generally reflect the aggregate response of site occupations to each of the recognized climatic intervals of Texas." Collins' realms concept offers a more pragmatic, behavioral-focused means of discussing the use of various projectile point types across different regions of Texas.

Paleoindian (Before 8800 B.P.)

The archeological evidence (e.g., Meltzer 1993) no longer supports the long-held belief that characterized North American Paleoindians as nomadic bands of big game hunters. Big game hunting did take place, particularly in Folsom times. However, a more generalized hunting and gathering subsistence lifeway is now evidenced at Paleoindian sites across Texas and the rest of North America. The relatively mesic conditions that prevailed beginning about 11,500 B.P. allowed for a high biomass in Central Texas and the surrounding regions (Collins 1995).

Clovis and Folsom style intervals divide Collins' early Paleoindian period (11,200–10,000 B.P.). Clovis is the earliest recognized cultural horizon in Central Texas. Clovis is securely dated to between 11,200 and 10,900 B.P. in radiocarbon years. The Wilson-Leonard, Gault, and Pavo Real sites have recently added new data to the study of these early peoples of what is now Texas. Kincaid Rockshelter and Horn Shelter also have documented Clovis components. Clovis artifacts include prismatic blades, engraved stones, bola stones, and the unique Clovis point (Collins 1995, 2004). Clovis points are usually lanceolate fluted projectile points (Collins 1998).

The Folsom style interval is not as securely dated, and may overlap in time with Clovis. The finely retouched and fluted Folsom points are among the most easily recognized points made in the Americas. In Folsom times, more than at any other interval, people were specialized hunters. Bison kills with associated Folsom points remain the typical Folsom site type. The postulated style intervals following Folsom, known as Plainview and Dalton-San Patrice, are not well known or clearly defined, at least in Central Texas. However, evidence from sites containing related components, such as Horn Shelter 2, indicate an Archaic-like hunter-gatherer lifeway (Redder 1985).

Wilson, Golondrina-Barber, and St. Mary's Hall style intervals make up Collins' (1995) Late Paleoindian sub-period. This sub-period is characterized as intermediate or transitional between Paleoindian and Archaic (Collins 1998:63–64). Burned rock features have been found associated with all three style intervals of this sub-period, but they are substantially smaller and less frequent occurrences than in the Archaic (Collins 1995, 2004).

Archaic (8800–1300 B.P.)

The mesic conditions of the Paleoindian period came to an end during the early sub-period of the Archaic. With the exception of the Bell-Andice-Calf Creek interval of the Middle Archaic sub-period, this was a more xeric time in Central Texas and the surrounding regions. A rise in the number of ground stone tools, specifically manos and metates, in Archaic sites suggests an increased reliance on plant resources (Collins 1995, 2004). Central Texas Archaic sites are characterized by accumulations of heat-altered rock, including those known as burned rock middens (Black 1997).

Three sub-periods are defined for the Central Texas Archaic: Early, Middle, and Late (Johnson and Goode 1994; Collins 1995, 2004). Early Archaic sites (8800–6000 B.P.) are recognized by the presence of Angostura, Early Split Stem, and Martindale-Uvalde points. Unifacial Clear Fork tools and Guadalupe bifaces are found in Early Archaic sites along with ground stone tools and other bifacial and unifacial implements. Early Archaic earth ovens and accumulations of burned rock are found primarily in Live Oak savanna habitats, or those portions of the Edwards Plateau that received the most precipitation. These earth ovens and accumulations of burned rock are considered the technological antecedents of the classic burned rock middens (Collins 1995, 2004). However, at Fort Hood seven burned rock middens were carefully radiocarbon-dated from 5500 B.C. (Early Archaic) to A.D. 1400 (Late Prehistoric) (Quigg and Ellis 1994). Two other burned rock features in Kerr County have been dated to the Early Archaic (Luke 1980).

During the first interval (6000–5000 B.P.) of the Middle Archaic sub-period the climate was somewhat more mesic. Bison populations soared. The technically impressive Bell-Andice-Calf Creek points were likely made primarily for killing these bison (Johnson and Goode 1994). By 5000 B.P., the bison had dwindled and the climate became increasingly xeric. Burned rock middens were likely used to cook sotol and other xerophytes that thrived during these dry years (Johnson and Goode 1994:26). The last 1,000 years of the Middle Archaic (5000–4000 B.P.) are divided into two style intervals: Taylor and Nolan-Travis.

The Late Archaic (4000–1300 B.P.) began during the driest time Central Texans had yet to experience. There was, however, a steady environmental shift from xeric to mesic conditions that peaked in the later part of the Late Archaic (Collins 1995, 2004). Bison returned with the rise of effective moisture. Six style intervals are recognized for the Middle to Late Archaic: (1) Bulverde, (2) Pedernales-Kinney, (3) Lange-Marshall-Williams, (4) Marcos-Montell-Castroville, (5) Ensor-Frio-Fairland, and (6) Darl (Johnson and Goode 1994, Collins 2004).

Late Prehistoric (1300–ca. 500 B.P.)

The beginning of the Late Prehistoric period in Central Texas is defined primarily by the introduction of the bow and arrow. Pottery was also introduced during this time, but unlike many areas in Texas and the rest of the New World, hunting and gathering resource procurement strategies prevailed (Collins 1995, 2004). Not surprisingly, many documented instances of arrow wounds are recorded during this period (Prewitt 1974).

The Late Prehistoric is divided into early and late sub-periods (Collins 2004). Each sub-period has a single style interval. The early sub-period is represented by the Austin style interval and the late sub-period by the Toyah interval (Collins 1995, 2004). Scallorn and Edwards points are diagnostic of the early sub-period and Perdiz is representative of the Toyah interval.

Historic (ca. 500 B.P. to present)

Collins (2004) described three sub-periods for the Historic period in Central Texas: early, middle and late. The early sub-period begins in the late seventeenth century with European contact and the middle sub-period focuses largely on indigenous life at Spanish missions. The late sub-period extends into present day, and documents the fading presence of the Comanche in Central Texas.

PROJECT BACKGROUND

This project was excavated on property formerly owned by the Missionary Oblates of Mary Immaculate (O.M.I.). In 1949, Robert L. Stephenson of the River Basin Surveys performed the first archeological reconnaissance of the proposed Canyon Reservoir. Stephenson (1951:5) designated the Oblate site as 41-63B2-9 and he recommended complete excavation of the site. The Texas Archeological Salvage Project (TASP) of the University of Texas undertook investigations of Oblate and several other sites in the area in 1959 and 1960. In a letter to E. Mott Davis in May 1963, Reverend Gody of the O.M.I. gave his blessing to work at the site and to fish nearby in the "dammed pond" (letter from Rev. Thomas A. Gody to University of Texas archeologist E. Mott Davis, May 30, 1963). According to correspondence with the O.M.I., previous to their ownership the property was part of the San Enrique Ranch. Archeological investigations within the project area continued until 1964. The following discussion summarized these investigations with a particular focus on the 1963 TAS Field School.

Previous Archeological Investigations

The following synopsis of the previous work conducted at the Oblate site is based primarily on Collins' (1966) report. In 1949, Robert L. Stephenson of the River Basin Surveys, performed the first archeological reconnaissance of the proposed Canyon Reservoir. In 1959 and 1960, the Texas Archeological Salvage Project (TASP) of the University of Texas, as a part of the Inter-Agency Archeological Salvage Program, performed excavations at the Oblate site (re-designated as 41CM1) and two other sites threatened by the filling of Canyon Lake (Wunderlich, 41CM3, and Footbridge 9, 41CM2 [Johnson et al. 1962]).

Curtis D. Tunnell supervised the TASP excavation of the Oblate site and completed a report on the excavation and analysis of the site that was published in September 1962. The most significant information recovered by Tunnell was a stratigraphic sequence of artifacts recovered from the excavations, principally projectile points (Johnson et al. 1962). Tunnell's relative chronology of the Oblate site's dart points (Figure 2) resulted in the publication of a tentative chronological sequence of certain Central Texas dart point types that are now defined as Late Archaic (Johnson et al. 1962:117-124).

Current Investigation Background—1963 TAS Field School

In June and July of 1963, the TAS conducted its second field school. The first field school was a very informal affair involving a few weekend excavations at the Gilbert site (41RA13) (Jelks 1967). In that sense, the 1963 Field School at the Oblate site, while still informal, is considered by May Schmidt and other TAS members as the first "real" field school. From these humble origins, the annual Texas Archeological Society Field School, the largest in the United States, has grown.

The purpose of the TAS field school's investigations was to confirm the projectile point chronological sequence reported from the previous excavations at Oblate by Tunnell (Johnson et al. 1962). As previously mentioned, the excavations were also the subject of a film documentary, "Salvaging Texas History," produced by The University of Texas Radio-Television Department and the U.S. Department of the Interior National Park Service Southwest Region.

Many of the founders and early members of the TAS participated in the field school and appear in the video. Some of the members involved in this field school became essential contributors to the growth and development of the TAS. Collins's unfinished reports from his 1966 class with Davis, as well as copious notes taken by many participants, have preserved the bulk of the recovered information recovered from the field school excavations. Since

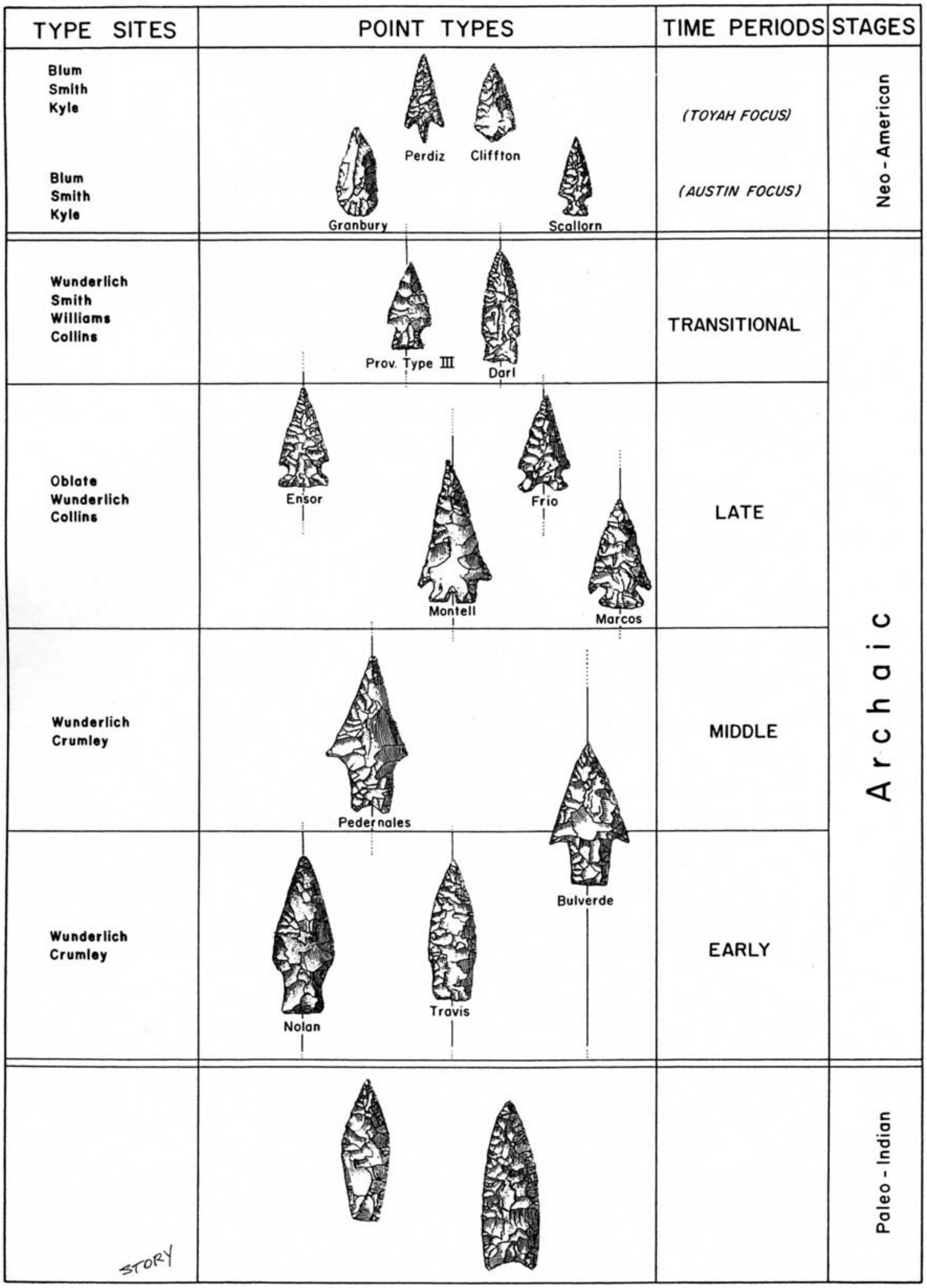

Figure 2. Chronology of projectile points from Johnson et al. (1962:122).

the excavations were completed, a number of other archeologists have started to write reports on this field school's investigations, but for one reason or another, the task has remained unfinished until now.

As an offshoot of the same project, additional excavation occurred at the Oblate site in February of 1964. The artifact collection from this episode of work is not clearly distinguished from the earlier collection and is probably responsible for most of the discrepancies between the various inventories (field, lab, and current inventory). For the purposes of this article, only artifacts confirmed in the TAS Field School notes are included herein.

Site Description

Tunnell gave the following location and description of the Oblate site (Johnson et al. 1962:81-82) (Figures 3-5):

> The Oblate site, 41CM1, is located about 16 airline miles north-northwest of New Braunfels in Comal County, along the east bank of a small spring-fed creek, which flows, into the Guadalupe River. The site lies 400 feet south of the main river channel and has, according to local informants, been subject to occasional inundation during severe floods. [Collins (1966) estimates the site lies 750 ft. south of the river channel based on Tunnell's field survey map.]
>
> The Oblate Shelter was formed by an overhanging ledge of Cretaceous limestone containing great quantities of marine invertebrate fossils. The limestone formation flanking the creek was sculptured into many horizontal ledges and overhangs by the meanderings of the stream during an initial cutting phase.
>
> Subsequent weathering and erosion have caused most of these potential shelters to collapse, but the ledge forming the Oblate Shelter seems to have remained essentially intact for several thousand years. Flooding of the nearby Guadalupe River, combined with weathering of the limestone cliff, has gradually built up a sandy deposit against the shelter wall.
>
> The overhanging ledge extended for some 150 feet along the eastern edge of the creek valley just south of a dry arroyo. The shelter formed by the overhanging ledge was from two to 12 feet deep. A rock fall, located approximately in the center of the overhang, divided the shelter into two sections. The north section, designated Area A, was tested extensively and produced an abundance of cultural material. The south section, Area B, contained shallow deposits, but a test in the center of the area produced only sparse cultural remains. Several massive recent rock falls in Area B seemed to have caused an increase in water erosion, which may have removed floor deposits from that section of the shelter.
>
> In cross section the shelter was shallow, having an essentially flat ceiling, a shelf in the rear wall, and several ledges that formed the rock floor beneath the deposits. These flat, almost horizontal, limestone shelves extend along the entire length of the overhang following bedding planes in the limestone formation. The uppermost ledge beneath the floor deposit averaged about eight feet in width, was about two feet below the deposit surface, and like the ceiling was essentially flat. A vertical drop of from one to one and a half feet separated this ledge, number 1, from the next lower ledge, number 2. The second ledge, also about eight feet in width, dipped outward at a rather steep angle. A drop-off of about two feet separated the second and third floor ledges. Floor ledge number 3, the lowest encountered, was essentially horizontal, rather smooth, and lay some seven to eight feet beneath the surface of the deposit. The outer edge of this ledge was encountered only in the western half of 5-foot square N220-W120. At the north end of Area A, the overhang averaged about five feet above the surface of the floor deposits; this distance increased toward the south until a maximum of about eight feet of headroom was attained. There were eight to nine feet of space separating the upper floor ledge and the overhang throughout the area excavated in Area A.
>
> Evidence that this shelter retained its attraction as a habitation spot until recently

> was found in the form of modern campfire remains, wine bottles, and tin cans on the surface. Some smoke stains on the ceiling probably resulted from these recent fires. Similar rockshelters further west along the Balcones Escarpment sometimes show evidence of aboriginal pictographs and carbon staining on the walls and overhang, but if any such evidence ever decorated the walls of the Oblate Rockshelter it was obliterated by weathering. Ceiling spalls found deep in the excavation showed traces of carbon on one face, and were probably stained by fires, which warmed the shelter in past ages.

Tunnell (Johnson et al. 1962:81-82) further describes the Oblate site's archeological deposits in the following terms (Figure 6):

> The floor deposits consisted primarily of sandy alluvia, derived from periodic flooding of the Guadalupe River and its tributaries, and detritus from the limestone ledge. Beneath the overhang the deposit surface was devoid of vegetation, was relatively loose and dry in texture, and dipped gently from north to south. The depth of the fill ranged from two and a half feet near the rear wall to about eight feet at the edge of the overhang. The only disturbances noted were the rodent burrows and a small test pit dug by the 1949 archeological survey party. Several large limestone boulders lay on the surface in the north section of the shelter. After their locations were recorded, these stones were broken up and rolled away from the excavation area; other boulders encountered during the excavation were removed in a similar manner.
>
> In front of the shelter a broad alluvial terrace sloped for approximately 160 ft. down to the creek channel. This damp sandy soil was covered with a thick growth of native grasses and small trees. Shallow test excavations there produced a considerable amount of cultural material including most of the potsherds recovered. One deep test at N225-W130 encountered mussel shells, burned rocks,

Figure 3. The Oblate site (41CM1) area before the 1963 TAS excavations.

Figure 4. The Oblate site during the 1963 TAS field school excavations. Note filming machinery in background on right.

and scattered cultural debris down to a depth of 9 ft. below the surface.

Geologic Zones and Cultural Stratigraphy

Three stratigraphic zones were recognized by Tunnell (Johnson et al. 1962:82-84) in his excavations at the Oblate site (Figures 7-9). Collins (1966:10) summarized the zones and explained the problems with correlating Tunnell's zones with the profiles revealed in the TAS excavations:

Zone I, the lowest encountered in the site, was a light-colored and moderately-compacted sandy alluvium. Zone II, the middle zone, was a fine, sandy material ranging in color from gray under the overhang to gray-brown in the unprotected slope in front of the shelter. Zone III, the uppermost layer in the site, could be divided into two subzones in the drier portions in the shelter. The lower subzone, IIIa, was a compact tan sand, possibly water deposited, and was less than nine inches thick in the exposures in which it could be recognized. Subzone

Figure 5. View of terrace and Terrace Unit. Note access road crossing V-shaped valley background.

IIIb was a "loose soil with a granular appearance" ranging in color from medium brown to gray-brown.

Tunnell has consistently referred to these as "soil zones," and there is some indication that at least a portion of the changes in texture and color are products of weathering. Demarcations of the zones was not sharp, as along unconformities or bedding planes, and instead were gradational and may represent no geological phenomenon other than leaching.

The geologic zones outlined above were employed by Tunnell in demonstrating the stratigraphic sequence of artifacts recovered in the first two excavations at the Oblate Site. For several reasons this procedure is not practical in the analyses of the specimens recovered in the 1963 excavations. As indicated by Tunnell, zones became indistinct in the terrace in front of the shelter; assignment of the 30 projectile points recovered in this area by the 1963 excavations would, therefore, not be reliable (30 specimens represent

Figure 6. Inside of shelter cave at the Oblate site (41CM1).

approximately 27 of the 108 recovered projectile points). Essentially the same assemblage of artifacts was recovered in the average of three feet of fill excavated in the shelter as in the 12 feet of deposit excavated in the terrace in front of the shelter.

Therefore, the time represented by the extended column in the terrace should be approximately equivalent to that represented in the compressed column inside the shelter. A more detailed sequence of artifacts will ordinarily result from excavations in a relatively deep deposit, such as is the Oblate terrace.

METHODS

The excavation strategy of the 1963 field school was formulated to recover archeological evidence bearing on the chronology of prehistoric occupations at the Oblate site. The strategy included ten 5 x 5 ft. hand-excavated units (Figure 10). Six of the units were excavated within or immediately adjacent to the shelter (Units N240-W100, N230-W100, N215-W100, N210-W100, N205-W105, and N160-W110 or Area B). Squares N210-W100 and N215-W100 are connected along the northern edge of N210-W100. Of these six units, five are contiguous with previous excavation units, and one (N165-W110) is located about 25 ft. south of the southernmost contiguous unit. This one unit set apart from the others is comprised of a 5 x 5 ft. square and an adjacent irregularly-shaped area, approximately (10 x 10 ft.) located east and southeast of that square (Figure 10).

In addition to the six units within or adjacent to the rock shelter, four units were positioned adjacent to one another on the terrace, forming a 10 x 10 ft. block situated between the cave opening and the creek (N240-W120, N240-W115, N235-W120, and N235-W115). Terrace units excavated in the previous investigation were located about 10 ft. north of the field school's block (see Figure 10).

Each unit was oriented north-south using the datum first established by the TASP in 1959. Typically, the units were dug in 0.5 ft. thick (6 in.) levels, and the excavated materials were screened through ½- or ¼-inch screen mesh. Notes were taken describing the depth, soils, stratigraphy, and any artifacts found. Notes taken during the excavation included: a daily journal, unit/level sheets,

Figure 7. Oblate Site profile from uncertain location.

field inventories, and photo data sheets. In addition, photographs were taken of the environmental settings, the units, some individual levels and profiles, and some of the artifacts and cultural features encountered during excavation. This material (along with the artifacts) is currently curated at the Texas Archeological Research Laboratory (TARL) at The University of Texas at Austin.

THE EXCAVATIONS

A total of eleven units were excavated at the Oblate site. Six of them were within or adjacent to the shelter (see Figure 10), and were excavated to about 3 ft below the surface. Four units were placed in the terrace deposits in front of the shelter (Terrace Unit). An extra excavation unit (N165-W110) set apart from the others was referred to in the field notes as the "children's area" (see Figure 10). High school students with the National Science Foundation (NSF) biology program first excavated the unit to 95.5 ft. elevation or approximately 2 ft. below the surface. The unit was then turned over to the Richmond and Hamilton children and Hugh Davis, who all were TAS members "by proxy" because family memberships were not created until the late 1970s. According to May Schmidt (personal communication), one of the Hamilton children, this area received less oversight from the professional archeologists than the other units. However, Schmidt recalls that the young excavators were

Figure 8. Oblate site (41CM1) Terrace Unit profile (note tree root in wall corresponding to tree seen in Figure 7).

quite serious and the notes and drawings from the unit are almost as complete as the adult's.

The excavation descriptions and observations presented below are derived primarily from level notes and additional laboratory notes taken shortly after work was completed. Excavation results are analyzed and discussed in a following section.

Unit N240-W100

Unit N240-W100 is the northernmost 5 x 5 ft. square within or adjacent to the shelter (see Figure 10). Excavations revealed sediments that were 3 ft. thick on the western edge of the unit and more than 4 ft. thick on the eastern edge. The light brown alluvium was underlain by benched limestone. The westernmost bench underlay the eastern three-fourths of the unit. The unit was terminated before reaching the depth of the next (lower) bench surface that was below the western three-fourths of the unit. Roof spalls were found on the surface and throughout the profile. Sediments were a light brown sandy loam with no apparent soil development. Darker soil zones seemed to reflect charcoal

Figure 9. Curtis Tunnell and Dee Ann Suhm in an unknown unit.

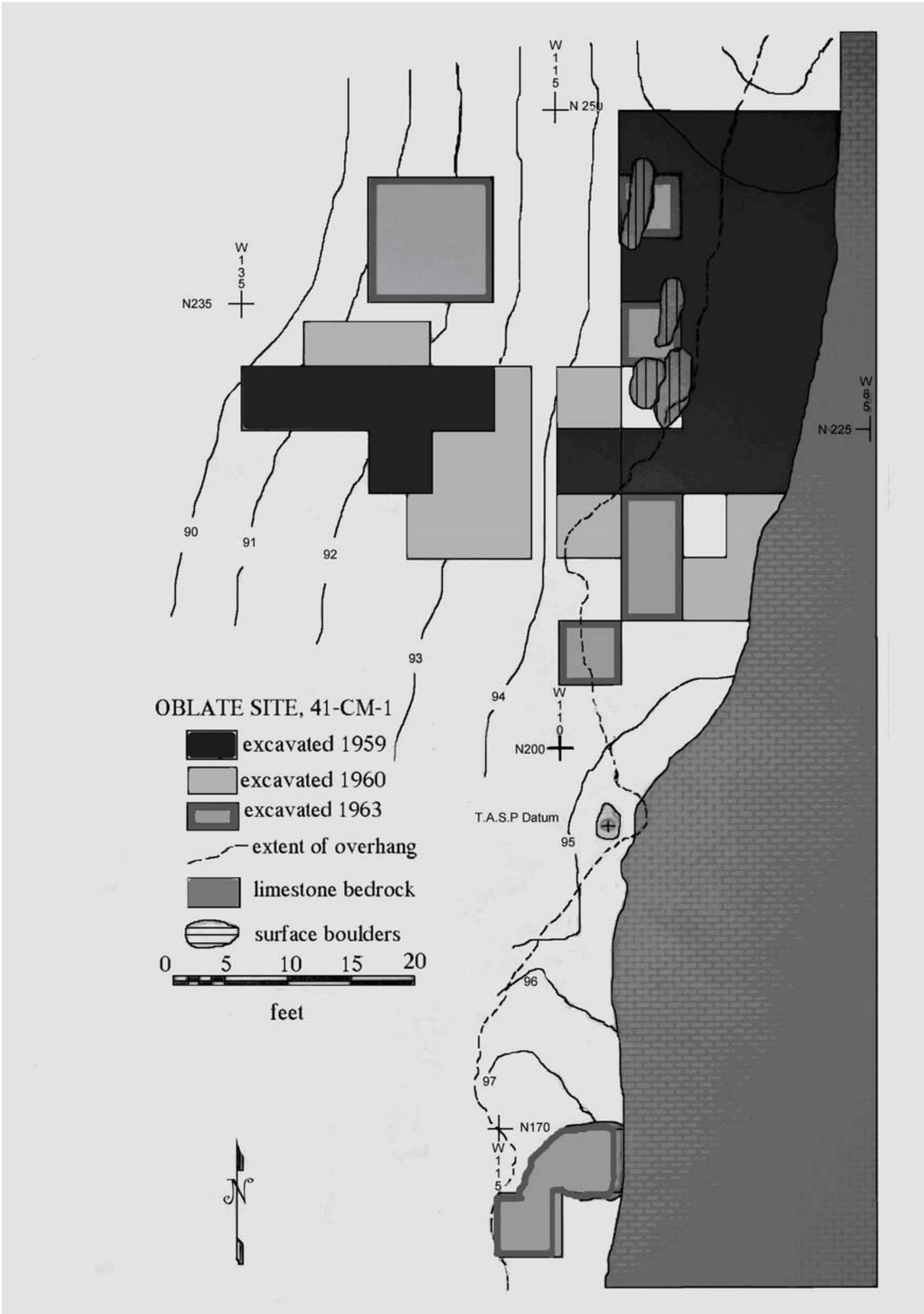

Figure 10. Schematic excavation layout at the Oblate site, adapted from Collins (1966:Figure 1).

from intentional fires and other anthropogenic modifications of the soil.

The surface of unit N240-W100 sloped from east to west, away from the shelter. Profiles (partially extrapolated from TASP excavations) indicate that the surface was at 97.34 ft. elevation in the northeast corner and 97.0 ft. elevation at the western edge. Bedrock was at 94.4 ft. elevation in the northeast corner of the unit. Bedrock had not been reached when the unit was terminated at 93 ft. elevation in the western one-fourth of the unit. Depositional strata in this unit radiated to the west from the face of the easternmost bench. Generally, the angles of the depositional strata increased with depth. These strata became progressively thicker with distance from the bench. Arbitrary 0.5 ft. levels are less likely to be chronologically uniform in undisturbed levels higher in the profile and may be substantially mixed near the bottom of the unit.

The sequence of diagnostic artifacts in the unit suggests that the archeological materials recovered from the deposits appear to be in chronological order. A Montell dart point base (Table 1, Lot 16) and an Edgewood dart point base (Table 1, Lot 16, formerly classified as a Figueroa by Collins [1966]) were the first diagnostic artifacts encountered. These points were found in the second level, 96.0–95.5 ft. (0.4 to 0.9-ft. below the surface at the northwest corner). Two Ensor dart points were also found in this unit. One (Table 1, Lot 56) was found in the next lower level (95.5 ft.–unfinished) below Frio and Edgewood points, and a second Ensor (Table 1, Lot 134) was uncovered in the sediments (level 93.5–93.0 ft.) just below a Frio point (Table 1, Lot 124). An untyped projectile point with a bifurcated base (Table 1, Lot 31) was found in a lower level below the first Ensor point (Table 1, Lot 56). The Frio point was uncovered in the next level (94.0–93.5 ft.). A Marcos dart point and a complete corner tang biface were recovered near the bottom of the unit (level 93-92.5 ft.). No features were found in this unit.

Other artifacts from this unit include a perforated shell fragment, choppers, scrapers, thin bifacial blades and blade fragments, cores, and flaking debitage. Organic materials were also recovered, such as mussel shell, snail shell, bones, antler fragments, teeth, and charcoal.

Unit N240-W100 contains archeological deposits that represent a chronological sequence that starts and ends in the later half of the Late Archaic period. Finding a Montell within 1 ft. of the surface, however, suggests that the upper levels may have been disturbed. Soils are described as dry and loosely compacted above 95.5 ft elevation and becoming increasingly compact below this elevation. This boundary may provide a reasonable limit to the disturbance. Below 95.5 ft., the artifact sequence seems chronologically reasonable, and sloping depositional strata could explain any concerns regarding the superposition of a Frio point above of the Ensor points. However, finding two Ensor points separated by 2 ft. of sediments may suggest that the uppermost Ensor was out of context. This suggestion implies that the disturbance, likely caused by a combination of erosion, rodent burrowing, and human activities over the years, affected excavation levels even below 95.5 ft elevation.

Unit N230-W100

Unit N230-W100 is just outside (west) of the shelter (see Figure 10). The surface slopes

Table 1. Projectile points and corner-tang biface from Unit N240-W100.

Original Lot #	Current Description	Elevation (in feet relative to arbitrary datum).
16	Montell	96.0-95.5ft
16	Edgewood (formerly Figueroa)	96.0-95.5ft
56	Ensor	95.5-unfinished
31	Untyped (Uvalde/Pedernales?)	95.0-94.0
124	Frio	94.0-93.5
134	Ensor	93.5-93.0
102	Marcos	93.0-92.5
Lot 102 Specimen #107	Corner-Tang Biface	92.5 (northwest corner)

from east to west, away from the shelter. Eroded limestone benches beneath the sediments create a "stair-step" down to the creek. The surface and the strata below the surface generally followed the slope. However, the slope of the surface was gentler than the slope of the lower strata. Profiles (partially extrapolated by E. Mott Davis and Michael B. Collins from TASP excavations) indicated that surface elevations ranged from 96.0 to 96.9 ft. with the lowest elevation at the western half of the unit. Excavations revealed brown to tan sandy sediments that were 6-7 ft. thick and underlain by benched limestone. Bedrock was encountered at 94.5 ft in the northeast corner of the unit. In the western three-fourths of the unit bedrock had not been reached when excavation was terminated at 89.8 ft.

The easternmost (first) bench was encountered along the eastern edge at 94.5 ft. elevation and was reached in the eastern three-fourths of the unit by 91.5 ft. elevation. The excavator recorded that the sediments were "full of limestone," referring to the roof spalls that were found on the surface and throughout the profile. Sediments were a light brown sandy loam with no apparent soil development. Darker soil zones were colored by charcoal from intentional fires and other anthropogenic modifications of the soil.

Like Unit N240-W100, the upper levels were described as "surface debris" above 96.0 ft. elevation (Table 2). A Scallorn point, scrapers, and a long, thin, bifacially-flaked blade were found in this "debris" that also included charcoal, mussel and snail shells, and many roof spalls. Below 96.0 ft. elevation, Scallorn, Ensor, Ellis, Frio, Fairland, Montell, and Castroville points were represented (Table 2). The deepest diagnostics, Montell and Fairland dart points (Table 2, Lot 35), were found 6.14 ft. below the northwest stake (91.0-90.5 ft.). The Montell point is one of the oldest diagnostic artifacts from the unit.

Feature 2 was first recognized in the easternmost portion of Unit N230-W100 in Level 96.0-95.5 ft. The feature represents a small hearth, although not clearly distinct from Feature 3 (see below). An intruding boulder or limestone shelf had caused the stratigraphic layers to follow the east to west slope of the limestone's surface. The ashy deposits associated with Features 2 and 3 were 0.3-0.9 ft. thick and sloped from west to east. A careful reading of the level notes, profile drawing, and other notes suggests that the features are exposures of the same feature but in different levels. A Castroville dart point (Table 2, Lot 35) was found beneath Feature 2 at 93.7 ft. elevation.

Other artifacts from this unit include possible knife bases and blade fragments, heat-altered limestone, perforated shell fragment, burin spall, scrapers, thin bifacial blades and blade fragments, and flaking debitage. Mussel shell, snail shell, bones, antler fragments, teeth, and charcoal were also present. Based on the diagnostic artifacts recovered, the archeological deposits in Unit N230-W100 appear to date to the latter half of the Late Archaic. Level notes suggest that the upper levels (96.0 to surface) may have been disturbed.

Table 2. Projectile points from Unit N230-W100.

Original Lot #	Description	Elevation (in feet relative to arbitrary datum).
15	Scallorn	Surface to 96.0
Unknown	Scallorn	96.0-95.5
Unknown	Fairland (Ensor?)	96.0-95.5
18	Ellis	94.5-94.0
18	Ensor	94.5-94.0
73	Frio	94.0-93.5
81	Castroville	94.0-93.5, Feature 2
62	Ensor	93.0-92.5
35	Montell	91.0-90.5
35	Fairland	91.0-90.5

Unit N210-W100 and N215-W100

Units N210-W100 and N215-W100 were completely within the shelter (see Figure 10). The surface of the units is more level than the excavations that extend outside of the shelter although the northwest corner of the block dips slightly north to south. Limestone benches beneath the sediments stair-step down to the creek; the surface and subsurface strata generally follow the slope. However, the slope of the surface is gentler than the slope of the bedrock and the lower strata. Profiles (partially extrapolated from TASP excavations) indicate that the surface is at 96.0 to 97.0 ft. elevation. Excavations encountered brown to tan sandy sediments that are 3 to 4 ft. thick and underlain by benched limestone. Gray soil zones were stained by charcoal from intentional fires and other anthropogenic modifications of the soil. Limestone roof spalls were found on the surface and throughout the profile. Bedrock was encountered at 94.7 ft. in the southeastern corner of the unit and 92.5 ft. in the southwestern corner.

The sequence of diagnostic artifacts in the block suggests that they are in chronological order, and thus that the archeological deposits here are stratified (Table 3). Like other units within and adjacent to the shelter, loose sediments extend from the surface to an uncertain depth. In addition, the eastern one-fourth or more of Unit N210-W100 from the surface to 95.5 ft. elevation was also reported by TAS excavators to be disturbed. A Coke bottle shard was found in the eastern half of Unit N210-W100 at 94.5-94.0 ft.; wall slump in the northwest corner may explain the intrusion. Perdiz, Scallorn (n=2), Figueroa, Clifton, and Pedernales points, and fragments of two untyped bifaces, were found in the disturbed levels above 95.5 ft. elevation.

Feature 1 was located in the northwestern corner of N210-W100, and the southern edge of Unit N215-W100 at 96.0 ft elevation. Unfortunately, this feature was not described and therefore its function is unknown. Arrow points and a metal button fragment were found in this feature (see below). Outside of the feature, two Marcos points were found at 95.0-94.5 ft. (Table 3, Lot 5) elevation in square N215-W100, along with an untyped point and a basally notched drill. An Ensor was found in the same level in Unit N210-W100 (Table 3, Lot 70). Just below this level (94.5-94.0 ft), a Marcos and a Pedernales point were recovered from N210-W100. Ensor and Edgewood dart points were also found in Level 94.0-93.5 ft of N215-W100. The deepest diagnostic was an Ellis dart point recovered from an elevation of 93.5-93.0 ft. elevation (see Table 3, Lot 3).

Other artifacts from this unit included possible knife bases and blade fragments, heat-altered

Table 3. Projectile points from Unit N210 and N215-W100.

Original Lot #	Description	Elevation (in feet relative to arbitrary datum).
7	Perdiz	96.0-95.5
57	2 Scallorn	96.0-95.5
8, 67	2 untyped	Surface-96.0
27	Pedernales	Surface-96.0
27	Clifton	Surface-96.0
7	Figueroa	96.0-95.5
70	Ensor	95.0-94.5
5	Marcos (n=2)	95.0-94.5
5	untyped	95.0-94.5
5	Basally notched drill	95.0-94.5
55	Ensor	94.5-94.0
51	Marcos	94.5-94.0
55	Pedernales	94.5-94.0
3	Ellis	93.5-93.0

limestone, scrapers, thin bifacial blades and blade fragments, and flaking debitage. Additional cultural materials collected include mussel shells, snail shell, bone and antler fragments, turtle shell, deer teeth, and charcoal.

Unit N205-W105

Unit N205-W105 is at the front edge of the shelter. A little more than half of the unit is beneath the overhang of the shelter (see Figure 10). The surface of N205-W105 likely dips to the northwest following the slope, but the notes only indicate that there is a 0.5 ft. elevation difference between the highest and lowest point of the surface. Limestone bedrock is encountered in the northeast corner at 93.36 ft. Excavation of the unit was terminated at 93.0 ft. However, the notes do not indicate if bedrock was reached on the western edge of the unit.

Sandy sediments here were about 4 ft. thick and were light to dark gray in color. Sediments in the western side of the unit (outside of the shelter) were a darker gray in color than sediments on the eastern side (inside of the shelter) of the unit. Some gray sediment zones, particularly those along the edge near the top of the sediments, may be the product of soil pedogenesis, but they were also stained by charcoal from intentional fires and other anthropogenic modifications. However, it is unclear from the field notes which of the described gray soil zones or levels were colored by pedogenic processes or were the product of anthropogenic modification. Limestone roof spalls were found on the surface and throughout the profile.

The sequence of diagnostic artifacts in N205-W105 (Table 4) suggests that the excavated archeological materials recovered from the deposits appear to be in chronological order. Like other units within and adjacent to the shelter, loose sediments covered the surface. Excavator Bob Benfer noted that about 0.17 ft of loose and disturbed soil was removed before screening began at about 97.0 ft. elevation. No other disturbances were noted.

An apparent feature (designated in the original field notes as Feature 1, but referred to here as the N205-W105 Feature to distinguish it from Feature 1 in N210-215-W100) was also recorded in this unit. Unfortunately, very little information was provided for this feature and therefore its function is unknown. The feature was encountered in level 95.5-95.0 ft. and reached a depth of 95.0-94.5 ft. The matrix consisted of light gray ashy deposits. Mussel and snail shells, bones, flakes, and two points (a Frio and a Marshall) were associated with the N205-W105 feature, the bulk of which was located in the eastern half of the unit.

Charcoal found in level 94.0-93.5 ft. (Tamers et al. 1964), 0.5-1 ft. below the feature, was submitted for radiocarbon dating. One single charcoal sample of unknown composition was radiocarbon dated to a one sigma calibrated range of 3318–2850 B.P. and a two sigma calibrated range of 3554-2548 B.P. (Stuiver and Reimer 2011; Tamers et al. 1964). The date ranges with the highest reported probabilities are the one sigma calibrated 3264–2850 B.P. and the two sigma calibrated range of 3485-2703 B.P. No diagnostics were associated with the dated charcoal remains. Few artifacts were found below 94.5 ft. elevation.

One Scallorn arrow point (Table 4, Lot 36), two untyped dart points (n=2), Ensor (n=2), a Frio (Table 4, Lot 37), and a Marshall (Table 4, Lot 37) point were found in undisturbed contexts in these excavations. The Frio and the Marshall were associated with the feature, as mentioned above

Table 4. Projectile points from Unit N205-W105 from highest to lowest elevation.

Original Lot #	Description	Elevation (in feet relative to arbitrary datum).
29	Untyped	96.5-96.0
36	Scallorn	96.5-96.0
Unknown	Ensor	95.5-95.0
Unknown	Untyped	95.5-95.0
121	Ensor	94.5-94.0
37	Frio	95.0-94.5, feature
37	Marshall	95.0-94.5, feature

(Table 4, Lot 37). The deepest Ensor point (Table 4, Lot 121) may also be associated with the feature, as it occurs in the level immediately below it. Other artifacts from this unit included possible knife fragments, bifaces, two unifacial scrapers, heat-altered limestone, blade fragments, and flaking debitage. Mussel shell was present, along with snail shell, bone fragments, a mud dauber nest, and charcoal. Mussel and shell fragments were found throughout the unit. The bones and charcoal were associated only with the feature. The archeological deposits in Unit N205-W105 primarily represent Late Archaic remains similar to those documented in Units N230-W100 and N240-W100, with the exception of the one Scallorn point (Table 4, Lot 36), which is an early Late Prehistoric projectile.

Unit N165-W110 (Children's Area)

The "Children's Area," Unit N165-W110, is just east and southeast of Unit N165-W105 and is completely within the shelter (see Figure 10). Unit N165-W105 was truncated by the back wall of the shelter approximately 3.4 ft. to the east of the W105 line. A test pit from the TASP investigations was located in the center of Unit N165-W105 and two large boulders were located in N165-W110. Excavators reported two rodent holes in the eastern portion of the unit.

This unit was first excavated by students enrolled in the University of Texas at Austin "Summer Science Training Program for High-Ability Secondary School Students." Later, the children of Dr. E. Mott Davis, Hugh H. and Jonathan Davis, the children of Edward Hamilton, May and Toby Hamilton, and the children of Bill and Jean Richmond, John W. Greer, Michael E. Richmond, and Ann D. Richmond, excavated in the unit. Tom Tischler also worked in the unit.

Sediments within the unit were "pale gray silty sand or sandy silt." Many roof spalls were removed from the excavation unit. Most of this unit was apparently disturbed before excavation. Although field notes describe the presence of some rodent holes in the unit, no other description of the nature of disturbance was otherwise noted. Field notes do not indicate which artifacts, if any, came from disturbed contexts and which were from undisturbed areas. Within the unit, the students found a Perdiz point (Table 5, Lot unknown), a Scallorn point (Table 5, Lot unknown), an unidentified point (Table 5, Lot 106), and two bifacially worked blades (Table 5, Lot 106) in the top 1.5 ft of the square. Tom Tischler, Hugh H. Davis, May Hamilton, Toby Hamilton, John W. Greer, Michael E. Richmond, and Ann D. Richmond excavated 1.4 ft. of deposit in the unit (two 6 in. levels and one unfinished level).

Students began their excavations in the unit on July 6, 1963. On July 7, the younger participants took over. A Perdiz (Table 5, Lot 46), and Williams point (Table 5, Lot 84) were recovered from the first and only level they excavated. Directly below level 1, a charcoal concentration was found. It is not clear from the notes if this was the bottom of the sediments or if the unit was terminated arbitrarily. Other artifacts from this unit included possible knife/blade fragments, heat-altered limestone, and flaking debris. There were also mussel shell, snail shell, bone fragments, deer teeth, and charcoal.

Table 5. Projectile points from Unit N165-W105 and N165-W110 from highest to lowest elevation.

Original Lot#	Description	Elevation (in feet relative to arbitrary datum).
Unknown	Perdiz	Surface-95.5
Unknown	Scallorn	Surface-95.5
106	Unidentified	Surface-95.5
106	2 Tortugas (?)	Surface-95.5
Square 165-110		
46	Perdiz	Surface to 17-inches below the surface.
84	Williams	Surface to 17-inches below the surface.

Because only one level was excavated in this unit, there is no basis to assess the chronological sequence of the recovered artifacts except in relation to the upper elevations of the level dug by the high school students. However, the age of the two aforementioned diagnostic artifacts found in context (a Late Prehistoric Perdiz point and a Late Archaic Williams point) from Unit N165-W110 is consistent with the archeological findings at other units (see Table 5).

Terrace Unit

The Terrace Unit is a 10 ft. square block that includes units N235-W115, N235-W120, N240-W115, and N240-W120. The entire block is located outside of the shelter on the terrace (Figure 10). The surface slopes gently away from the shelter, generally southeast to northwest. Limestone benches beneath the sediments step down to the creek. The surface and the strata below the surface generally follow the slope. However, the slope of the surface is gentler than the slope of the lower strata and excavators did not adjust levels to mirror the slope of these depositional strata. Therefore, the deeper depositional units have a stronger slope and excavation levels were more likely to be chronologically inconsistent because they cross-cut deposits of differing ages.

Tunnell and Davis first began the excavation of this unit before the beginning of the TAS field school, and removed the top 2 ft. of fill. During the field school, the unit block was excavated from approximately 93 to 90.5 ft. in the northern portion of the block (N240-W115 and N240-W120), to 85 ft. in square N235-W115, and to bedrock (84.6 ft.) in square N235-W120. According to his July 17, 1963 field notes, Davis later re-opened the block in order to check the elevation of the floors.

Sediments from 93 to 90.5 ft. were described as light tan, fine-grained alluvium and silt. At 90.5 to 89.0 ft., sediments turn grayish-tan in color and were sandier in texture. Below 89.0 ft., sediments were composed of light tan silt with sandy lenses. Gray lenses were associated with the features found in the Terrace Unit, and they probably represented different areas of charcoal staining. The only disturbance noted below 93 ft. elevation was a single rodent hole.

Sediments in the unit seemed to be undisturbed. The sequence of diagnostic lithic artifacts in the block (Tables 6-8) suggests that the archeological deposits within the unit are basically stratified and Late Archaic in age.

Two of the units that make up the Terrace Unit (N235-W120 and N235-W115) reveal a chronological layering of components (see Tables 6 and 7). An Ensor (see Table 6, unknown Lot) and a Marcos point (see Table 8, Lot 42) were found above 93 ft elevation in removed fill. But below 93 ft., Ensor, Frio, Ellis, Edgewood, Marcos, Lange, Montell, Williams, Castroville, and Pedernales points were found in roughly that order, with Pedernales points recovered from the bottom of the Terrace units.

The slope of the terrace strata is evident in the elevation differences of similar projectile points between the eastern squares and the western squares. For example, in the upper portion of the deposits, Ensor points were first found at 92.5-92.0 ft. elevation in the eastern square N235-W115 (see Table 7) and at 91.0-90.5 ft. elevation in the western square N235-W120 (see Table 6). Lower in the unit, Montell points were found at 89.0-88.5 ft elevation in the eastern half and 87.0-86.5 ft. in the western half (see Tables 6 and 7). The deepest Late Archaic dart point type, a Pedernales, was encountered 1 ft. deeper (level 85.5-85.0 ft.) in the eastern half of the Terrace Unit (see Table 6). Feature 6, a small hearth in N235-W120, was associated with Pedernales points in level 85.5-85.0 ft. Charcoal from this feature was radiocarbon dated to a one sigma calibrated range of 4821–3083 B.P. and a two sigma calibrated range of 5583-2349 B.P. (Stuiver and Reimer 2011; Tamers et al. 1964:149). The date ranges with highest reported probabilities are a one sigma calibrated range of 4729–3156 B.P. and a two sigma calibrated range of 5490-2349 B.P.

Three features (Features 4, 5, and 6) were documented for this unit. On July 4, 1963, Suhm reported several hearths in the "deeper levels" that were not recognized until the features had been "partially or entirely" destroyed. Features 4 and 5 represented two such small hearths. Feature 4 was a cluster of burned limestone rocks in the Terrace Unit encountered at an elevation of 89 ft. A portion of the feature was exposed in the southeastern part of square N235-W115. The feature appeared to extend to the south and east outside of any excavated areas. A Montell point found in the same level but outside of the feature may be roughly contemporaneous with it. Feature 5 was 2 ft. below Feature 4 at 87.0 ft elevation in Unit N235-W115 and Feature 6, also described as a hearth, was in Unit N235-W120 at 85.5 to 85.0 ft. elevation.

Table 6. Diagnostics from Unit N235-W120 of "Terrace Unit" from highest to lowest elevation.

Original Lot#	Description	Elevation (in feet relative to arbitrary datum).
Unknown	Ensor	92.0-91.5
Unknown (12?)	Frio	91.5-91.0
Unknown (12?)	Frio	91.0-90.5
Unknown	Ensor	91.0-90.5
94	Ellis	90.5-90
Unknown	Marcos	90.0-89.5
96	Lange	89.5-89
97	Edgewood	89.0-88.5
104	Montell	87.0-86.5
61	Montell	87.2 (measured *in situ*)
127	Marcos	86.5-86.0
103	Pedernales	85.5-85.0
Unknown	Pedernales	85-84.5

Table 7. Diagnostics from Unit N235-W115 of "Terrace Unit" from highest to lowest elevation.

Original Lot #	Description	Elevation (in feet relative to arbitrary datum).
30	Ensor	93.0-92.5
30	Ensor	92.5-92.0
Unknown	Ensor	91.0-90.5
59	Ensor	90.0-89.5
59	Ellis (Edgewood?)	90.0-89.5
79	Montell	89.0-88.5
Unknown	Castroville	88.5-88.0
80	Castroville	88.0-87.5
Unknown (80?)	Williams	88.0-87.5
Unknown (80?)	Montell	88.0-87.5
86	Lange	87.0-86.5
90	Pedernales	86.5-86
88	Pedernales	86-85.5

Table 8. Diagnostics from Units N240-W115 and N240-W120 of "Terrace Unit" from highest to lowest elevation.

Original Lot#	Description	Elevation (in feet relative to arbitrary datum).
Square N240-W115		
12	Frio	92.0-91.5
Square N240-W120		
42	Marcos	94.5-94.0

Castroville and Pedernales points appeared to be in close association with the latter two features.

Among the artifacts from this unit were two unifacial scrapers found in association with Ensor and Ellis dart points at 90.0-89.5 ft. in N235-W115. Also recovered were possible knife bases and blade fragments, heat-altered limestone, scrapers, thin bifacial blades and blade fragments, and flaking debitage. Mussel shell, snail shell, bone fragments, antler fragments, turtle shell, deer teeth, and charcoal were also found in these excavations.

FEATURES

Six features (five hearths, and one ash lens) were individually recognized and recorded in the 1963 Oblate excavations. The following discussion provides a brief description of each of these features.

Feature 1

Feature 1 is a lens of white ash exposed in squares N215-W100 and N210-W100 between 96.2 and 95.5 ft. Excavators uncovered the feature just below the surface at a depth assigned to Tunnell's Zone 1 (Collins 1966). The white ash lens was uncovered in the southern edge of N215-W100 and the northwestern corner of N210-W100 at 96.2 ft. In plan view, the feature is roughly triangular and measures about 3.6 ft. east-west x 4.8 ft. north-south and averages 0.5 ft. in thickness.

After examining the profile of Unit N215-W100, excavators recognized three horizontal layers in the ashy sediments of Feature 1. These three layers, from the uppermost level (A) to the lowest level (C), are described as: a white ash layer (Lens C), a gray ash layer (Lens B), and a dark ashy layer (Lens A) possibly mixed with burned sediment (TAS 1963 field notes). Together, lenses C and B are about 2.5 inches thick. Lens A is about 0.4 ft. thick. Using stratigraphic information from the Unit N215-W100 profile, sediments of the three zones were carefully peeled off and each was screened separately. The matrix of the unit levels outside of the feature was a gray-brown ashy loam.

Scallorn (found in Lens A) and Perdiz points, a metal button core, charred bone scraps, a single hackberry seed, charcoal (of a type not recorded), a fragment of burned antler, and flaking debitage were present in the ash lens. There was no rock-lined basin or any other indication of a discrete hearth present with this feature. The presence of a metal button (if not intrusive) and Late Prehistoric arrow points suggests that activities which occurred in both Historic and Late Prehistoric times contributed to the formation of Feature 1.

Feature 2

Feature 2, located near the center of Unit N230-W100 at an elevation of 94.0 to 93.65 ft., is a concentration of small, burned limestone rocks interpreted as a hearth. Several small (about 10 cm in length) rocks formed an oval measuring 1.9 x 1.0 ft that was 0.35 ft. thick. Among the rocks were small amounts of charcoal and ash within a gray silty matrix.

Bone fragments, snail and mussel shells, and flaking debris were found in the feature. Knife fragments and an Ellis point were located in the same unit/level. The presence of an Ellis point at the same depth as Feature 2, a Castroville point just below the feature, and the proximity of a Frio point one level below that, suggests that this is a Late Archaic hearth feature.

Feature 3

Feature 3 has been interpreted as a small hearth. The hearth is located in the southwest corner of Unit N230-W100 at an elevation of 93.1 ft. The feature measures 1.3 ft east-west x 1 ft. north-south. In Unit N230-W100 an intruding boulder or limestone shelf caused the stratigraphic layers to follow the east to west slope of the limestone's surface. The ashy deposits associated with Features 2 and 3 measure 0.3-0.9 ft. thick and slope from west to east. A careful reading of the level notes, profile drawing, and other notes suggests that Features 2 and 3 are exposures of the same feature in different levels.

A triangular knife base, bone fragments, snail and mussel shells, and flaking debitage were found in the hearth deposits. Just beneath the feature, a Frio point base was uncovered. Field notes mention the collection of charcoal samples from this feature but there are no existing records of either their composition or radiocarbon dates. The discovery of the Frio point base and the Castroville point stratigraphically beneath the feature, suggests that it likely dates no earlier than the latter part of the Late Archaic.

Feature 4

Feature 4 is a cluster of burned limestone rocks in the Terrace Unit (N235-W115) at an elevation of 89 ft. Terrace deposits at 89 ft. were described as light tan alluvium. Only a portion of the feature was exposed in the southeastern part of the square. Four limestone cobbles, including three burned rocks, surrounded an area that was darkened by bits of charcoal. The exposed portion of the feature measured 2.2 ft. north to south x 1 ft. east to west. Associated deposits appeared to extend south and east outside of the unit.

The base of a Montell point was found at the same level in the same unit as Feature 4 and a Marcos point was found in the level below that. Montell and Marcos projectile points typically date to the Late Archaic. Although these points were not found within the feature, their proximity to the feature in combination with their stratigraphic positions, suggests a Late Archaic age for the feature.

Feature 5

Feature 5 is 2 ft. below Feature 4 at 87.0 ft elevation in Unit N235-W115. No clear evidence links the two features. However, a burned limestone concentration and charcoal staining defined the feature boundaries within the unit. The portion of the feature exposed in the level was 1.5 ft. north to south x 1.7 ft. east to west and approximately 0.5 ft. thick.

A Castroville point was found in the same level as the feature. However, only unburned chert flakes, snail shell, and mussel shell occurred in direct association with the feature.

Feature 6

Feature 6 is a hearth located in Unit N235-W120 at 85.5 to 85.0 ft. elevation. The level in which this hearth was located contained a Pedernales point. Moreover, three levels from 86.0 ft. to 84.5 ft. in this unit and the adjacent unit produced one Marcos point and three Pedernales points. These four specimens represent the earliest, or at least stratigraphically the lowest, artifacts recovered from the Oblate site, and therefore are roughly contemporaneous with Feature 6. Unidentified charcoal material from Feature 6 was radiocarbon-dated to a one sigma calibrated range of 3318–2850 B.P. and a two sigma calibrated range of 3554-2548 B.P. (Stuiver and Reimer 2011; Tamers et al. 1964:149).

A possible feature

A concentration of shell and bone, some of which had been burned, occurred in Unit N205-W105 at an elevation of 95.0 ft. The concentration was not adequately documented, and the kinds and numbers of bone and shell, as well as their spatial density, were not provided in the TAS field notes, but it *was* noted as a possible feature. The area of concentration extended approximately 3.5 ft. north to south and 3 ft. east to west.

DISCUSSION AND ANALYSIS

Keeping in mind that the perspective of the film being produced influenced the primary strategy for the 1963 excavation, and that it was a field school where non-professionals were learning new skills, the results fit well with those from earlier work. However, it is important to be objective when analyzing the findings of an investigation, especially an excavation, and so, before discussing data recovered from the field school, we must look carefully at the methodology employed during the project.

Methodology Problems

Typically, the terrace deposits at the Oblate site are sandy brown loams near the surface that grade to light brown loams in the lower levels; beneath these deposits, limestone benches stair-step down to the creek below. The surface and the strata below the surface generally follow the slope. However, the slope of the surface is gentler than the stair-stepped slope of the bedrock. Depositional strata radiate to the northwest from the face of the southeastern-most bench. Generally, the angles of the depositional strata increase with depth. These strata become progressively thicker with distance from the benches. The three soil zones identified by Tunnell appear to be a reflection of weathering, and incipient pedogenic processes (e.g., alluviation and illuviation) that occurred after the sediments were deposited and do not reflect successive depositional episodes. Collins (1966:10) pointed out that the "[d]emarcation of the zones was not sharp, as along unconformities or bedding planes, but were gradational and may represent no geological phenomenon other than leaching."

Tunnell also suspected that this was the case (Johnson et al. 1962). At the onset of the excavations, it became obvious that the soil zones were difficult for the inexperienced excavators to discern clearly, or to follow, so it was decided that unit excavation at the field school would be by 0.5 ft. arbitrary level.

As a result, the deeper levels in the excavation units did not follow the chronologically layered, sloping, terrace strata. In the lower levels, sediments in the south or southeastern part of the unit could be significantly older than those of the north or northwestern part. Undisturbed levels closer to the surface more closely represent the depositional chronology than the lower levels. Units within the shelter are more level than those outside of the shelter. Units within or adjacent to the shelter slope more east to west and the Terrace Unit strata slope more northeast to southwest. For example, the surface of N215-W100 and N210-100W is more level than squares from the Terrace Unit. Simply put, the recovered contents of lower levels are not chronologically consistent across units, and observation of what soil zones comprised each level was also inconsistent, so there are bound to be errors in field interpretations. Collins' lithic analysis disregarded zones and discussed the provenience of artifacts within arbitrary "half-foot" levels (Collins 1966:12). Field notes from the excavation frequently mention confusion over margins between soil zones. They also mention incorrectly noted soil zone references in unit maps.

In addition to the above mentioned inconsistencies, Davis' June 1963 field notes mention finding the three datum points Tunnell established and marked in 1959, but a month later Davis noted that at least one of them was accidently bulldozed, and that datum point locations had been approximated.

Analysis

Results of the 1959 excavations were critical toward the establishment of a sequence, or as Tunnell put it, a "vertical and/or horizontal distribution" for Central Texas dart points (Johnson 1962:120). Tunnell had divided the site's alluvial deposits into three roughly horizontal zones (I, II, and III) based on differences in composition and color of the sediments. All three zones contained archeological materials.

Projectile points from the lowest zone, Zone I, included Bulverde, Pedernales, Marshall, Castroville, and Marcos dart point types. In Collins's (2004) Central Texas chronology, these points represent the earliest four style intervals of the Late Archaic period (see Figure 3). Tunnell (Johnson et al. 1962) placed these points in the Edwards Plateau Aspect, a now defunct term.

Zone II diagnostics included Ensor, Fairland, and Frio dart points. These three points are the markers of Collins' (1995, 1998, 2004) fifth style interval of the Late Archaic. In Johnson et al.'s (1962) chronology these points were also representative of the Edwards Plateau Aspect. In Zone III, Cliffton, Granbury, Perdiz, and Scallorn arrow points, pottery, and European trade goods (a glass bead and metal gun parts) were found. Tunnell assigned Zone III to the Central Texas Aspect, another defunct archeological classificatory term. Collins has assigned these arrow point forms to two different style intervals within the Late Prehistoric (Collins 1995, 1998, 2004). Metal artifacts and a glass bead date to Historic times.

A stated purpose of the field school was to verify Tunnell's original observations, and to see if there was evidence of older occupations. Collins (1966) had intended to conclude his paper on the 1963 field school with an analysis of the total assemblage from the Oblate site, but he never completed that paper. He did, however, complete a descriptive analysis of the artifactual materials recovered from the field school (Figures 11-15).

Though Collins and Tunnell report a variety of arrow points, scrapers, and other artifacts, particular focus is placed upon the dart points. Issues relating to Late and Middle Archaic projectile chronology have historically been the focus of most Oblate site data citations, particularly relating to Pedernales projectile points. For the purposes of this analysis, distribution tables are presented for both the 1963 excavation (Table 9) and a compilation table containing dart point distributions for all of the Oblate excavations (Table 10). The major difference between the two distributions is Tunnell's observation of the presence of Pedernales projectiles at depths below Level 17.

While there have been some changes in projectile typology since the 1960s, these have mostly consisted of acknowledgement of morphological variation within diagnostic types. This is especially true for variants of Ensor, Montell, and Pedernales projectiles. In fact, there is so much stem-form variation within the Pedernales type, that it has caused some scholars to completely reassess it for regional and temporal differences (Turner et al. 2011:148).

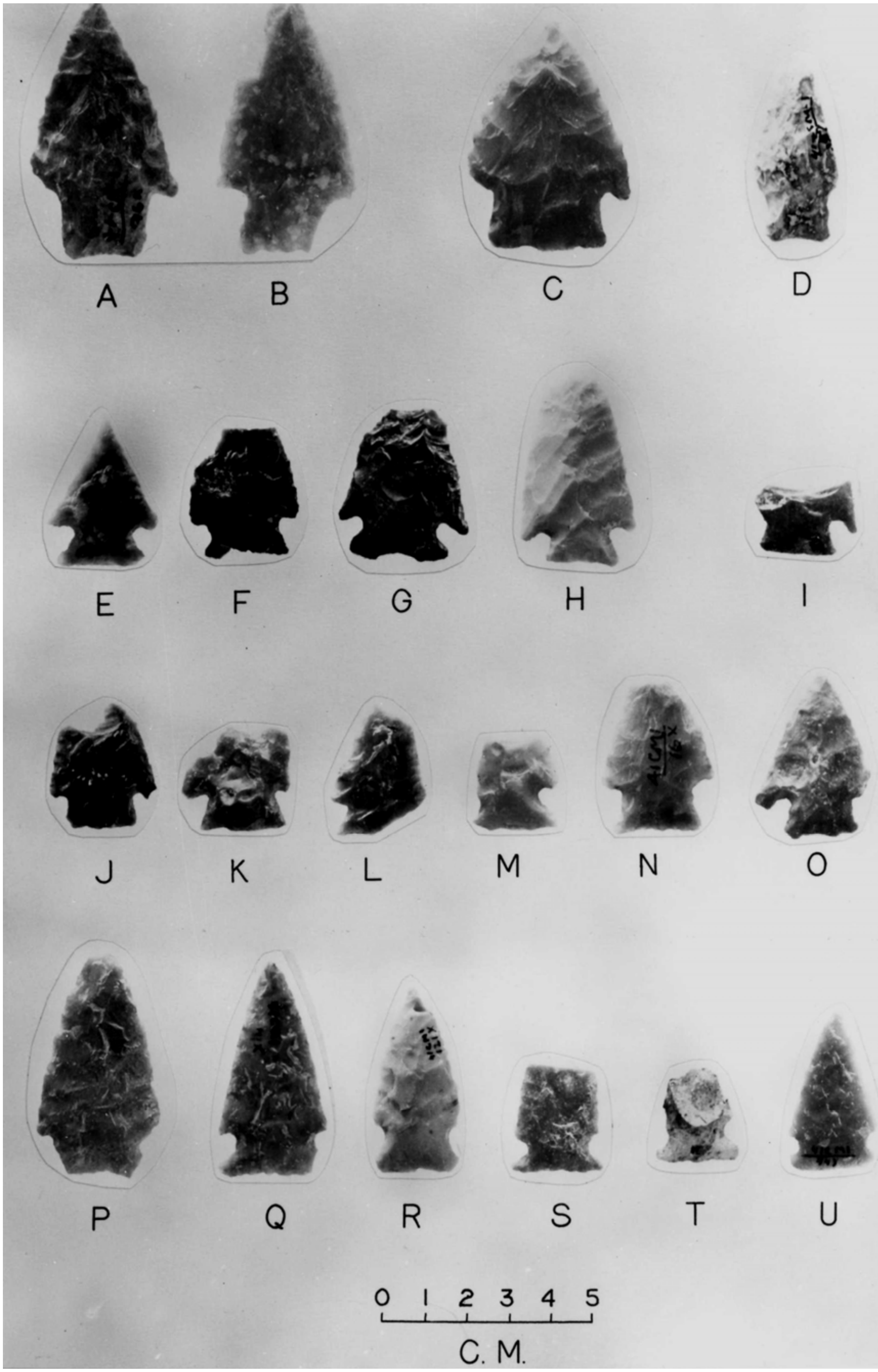

Figure 11. Dart Points: A-B, Bulverde; C, Castroville; D, Darl; E-H Edgewood; I-O, Ellis; P-U, Ensor A (Collins 1966).

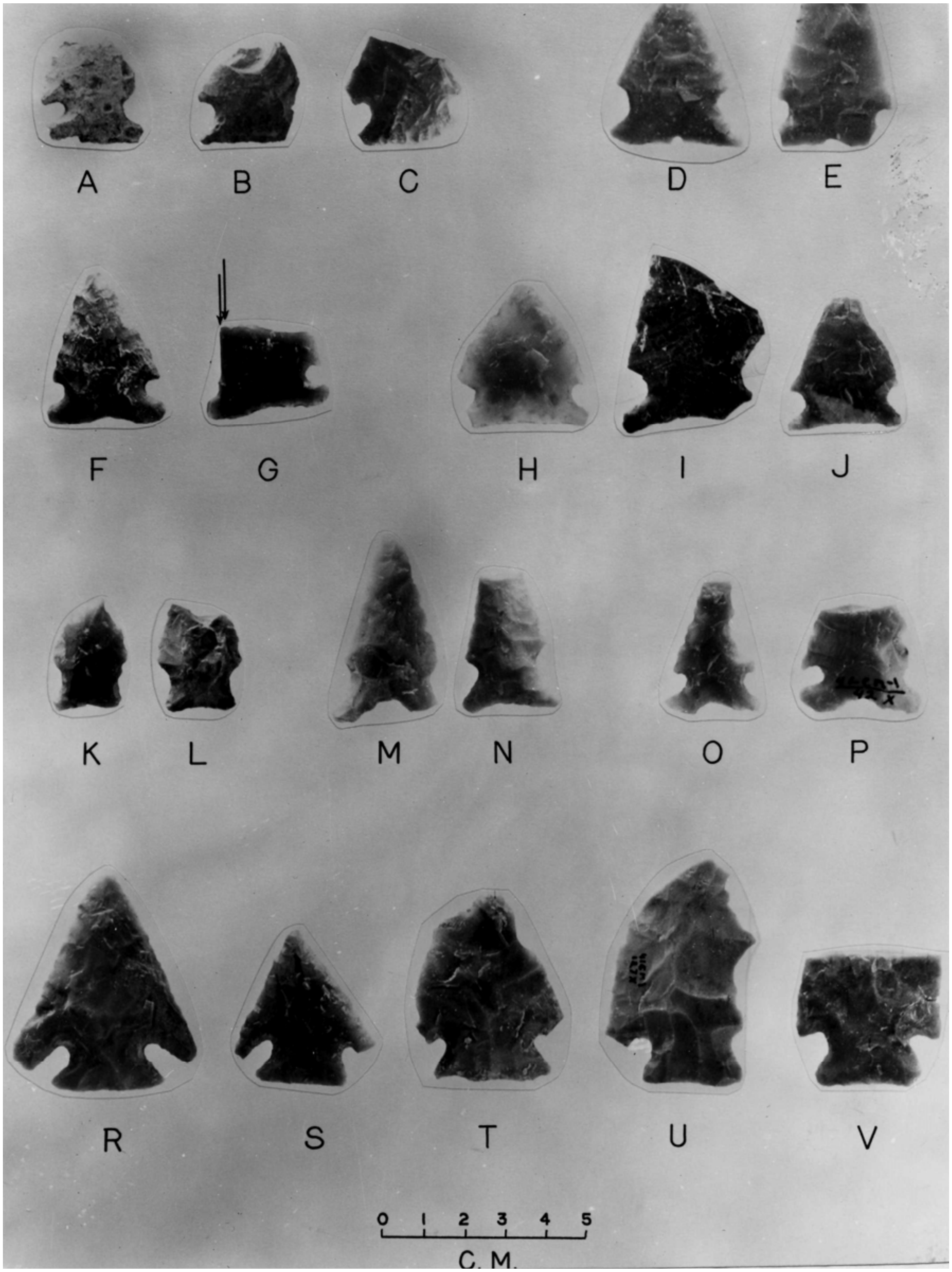

Figure 12. More Dart Points: A-C, Ensor A; D-E, Ensor B; F-G, Ensor C; H-J, Ensor D; K-L, Figueroa; M-N, Fairland; O-P, Frio; Q-V: Marcos (Collins 1966).

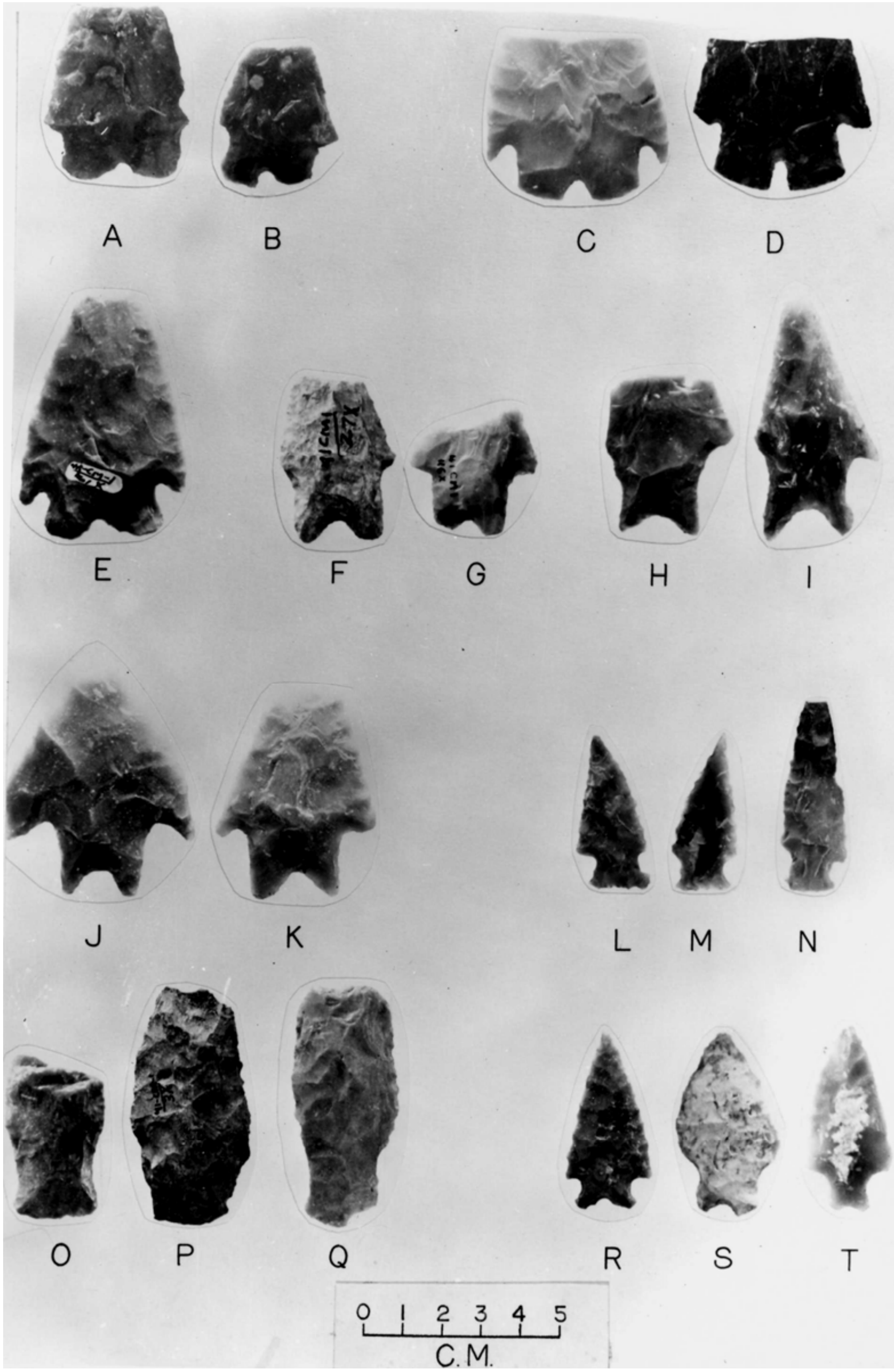

Figure 13. Dart Points: A-B, Montell A; C-D, Montell B; E, Montell C; F-G, Pedernales A; H-I, Pedernales B; J-K, Pedernales C; L-N, Provisional Type I; O-Q, Travis; R-T, Provisional Type II (Collins 1966).

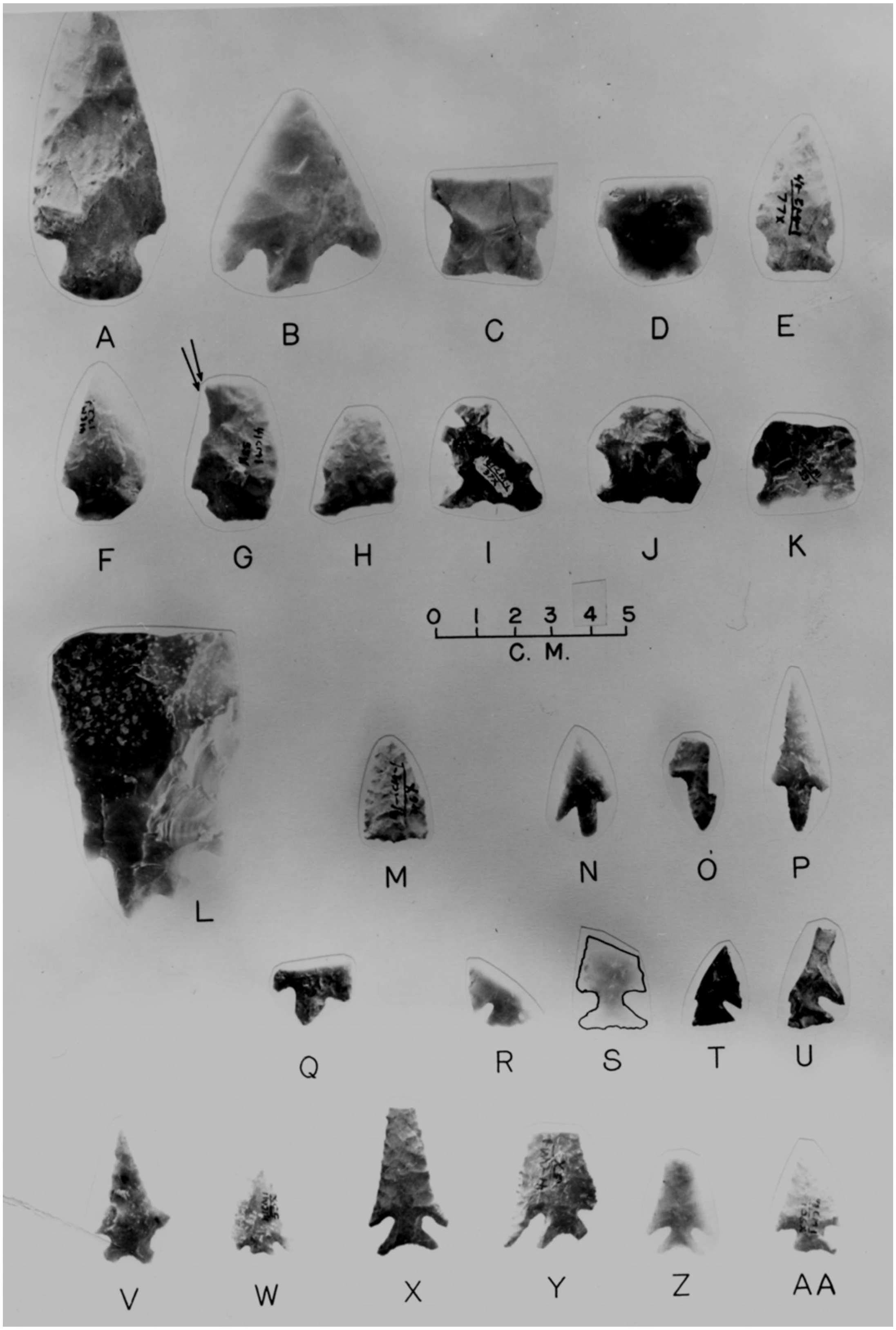

Figure 14. Dart and Arrow Points: A, Williams; B-D, Unidentified dart points; E-K, Miscellaneous side-notched dart points; L, Unfinished Pedernales; M, Granbury; N-Q, Perdiz; R, T-U, Scallorn A; S Scallorn C; V-W, Miscellaneous arrow points; X-AA, other arrow points (Collins 1966).

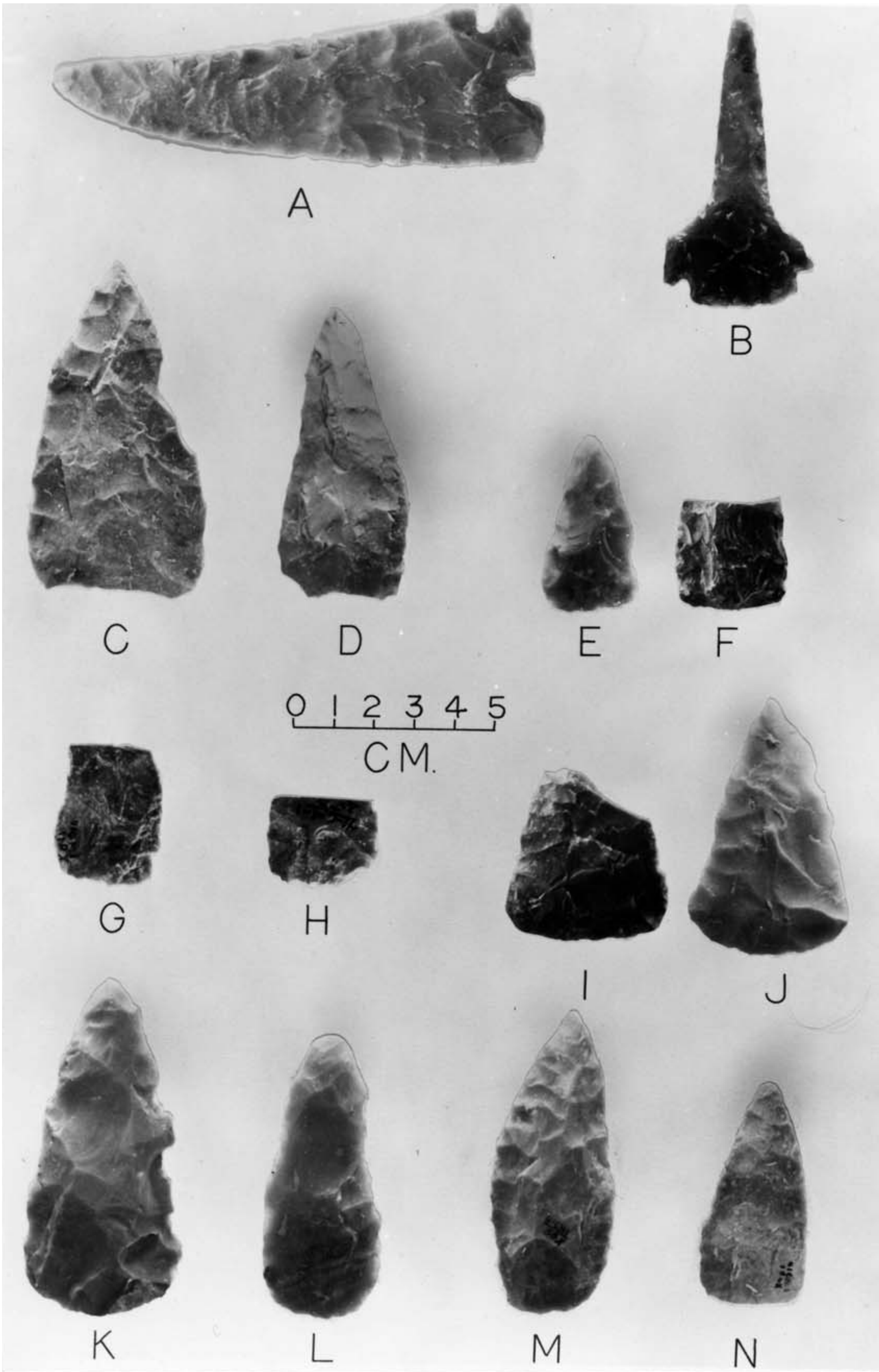

Figure 15. Knives and drills: A, Knife A; B, drill; C-D, K, Knife B; E, N, Knife C; F-H, Knife D; I-K, Knife E; L-M, Knife F (Collins 1966).

Pedernales projectiles (Figure 16) are generally accepted as being associated within the early half of the Late Archaic (3500- 2500 B.P) (Collins 2004). Turner et al. (2011:148) defines this same time frame as being within the Middle Archaic, but time frame terminology aside, there would seem to be agreement between Collins (2004) and Turner et al. (2011) in terms of the overall chronological scheme and within established style intervals.

Comparing Tunnell's projectile point chronology (see Figure 2) to Collin's chronology (see Figure 16), we can see that the major difference is that Tunnell placed the Pedernales within the Middle Archaic. Tunnell collected a sample from what he described as "Mixed Zones I and II" that was defined as late Middle Archaic or early Late Archaic. That sample dated to a one sigma range of 2114-1736 B.P. (calibrated) and a two sigma range of 2313-1571 B.P. (Stuiver and Reimer 2011; Tamers et al. 1964:148-149). The date ranges with highest reported probabilities are a one sigma calibrated rage of 2073-1769 B.P. (one sigma calibrated with 85.3% probability) and 2313-1600 B.P. (two sigma calibrated with a 99.5% probability). Tamers et al. (1964:148-149) noted that the date seemed too recent and given that the sample was collected from a mixed zone of alluvial sands would seem to bear out this observation and negate the results for serious consideration.

A single charcoal sample associated with a Pedernales projectile was also collected, as noted above, from the Terrace unit, and submitted for radiocarbon dating. As with all of the samples taken at the Oblate site, the material composition of the charcoal was not recorded for this critical sample. As noted, the sample dated to a one sigma calibrated range of 4821–3083 B.P. and a two sigma calibrated range of 5583-2349 B.P. (Stuiver and Reimer 2011; Tamers et al. 1964:149). The date ranges with highest reported probabilities are a one sigma calibrated range of 4729–3156 B.P. (one sigma calibrated with a 95.6% probability) and a two sigma calibrated range of 5490-2349 B.P. (two sigma calibrated with a 99.2% probability) (Stuiver and Reimer 2011; Tamers et al. 1964:149). While these dates would seem to bear out a Middle Archaic (6000-4000 B.P., the current accepted age range for the Middle Archaic Period in Central Texas, see Figure 16) distribution for the Pedernales point, the wide range in the reported date for the Terrace unit sample would seem inconclusive. Mueggenborg (1991) reported a corrected radiocarbon date range of 4220-4100 B.P. for charcoal associated with Pedernales points, but it too was composed of a single sample and is controversial.

Since the results of absolute dating of samples collected at the Oblate site seem to be broad and inconclusive, the main focus of any conclusions to be drawn from the research performed there must rely solely on the stratigraphic provenience of recovered artifacts. At the time of the Oblate excavations, the results would have been very informative; however, improved radiocarbon dating techniques and technology, along with an increased number of samples from a larger inventory of prehistoric sites have more precisely defined an absolute chronology of more Late Archaic sites than were known in the 1960s. In addition, Collins (2004) noted the importance of gisements in creating his Central Texas archeological chronology (see Figure 16), something, due to erosion and the slope of described soil zones, the Oblate site lacks.

CONCLUSIONS

Analysis of multiple buried components preserved within an alluvium-filled shelter cave and an adjacent alluvial terrace confirm that there were episodic occupations at the Oblate site (41CM1) from the Late Archaic through to the Historic period. Excavation by the second TAS field school in 1963 successfully recovered archeological data that confirmed previous observations made at the site and verified Tunnell's proposed projectile point chronology (Johnson et al. 1962). Despite some omissions and lack of detail, the available records from the excavations were sufficient to create a comprehensive report on the project nearly 50 years after the fieldwork was completed.

Perhaps the most interesting aspect of the archeological data that has been preserved from the 1963 TAS field school is indirectly related to the chronological sequence that was confirmed by the field school excavations. The Oblate terrace seems to have a well-documented history of alluvial deposition. Pedernales-Kinney interval artifacts were consistently the deepest and oldest components in both the TAS and the TASP excavations. The earliest terrace strata are resting on bedrock. Unfortunately, the radiocarbon date obtained from just above bedrock returned a date range with a very wide standard deviation, and therefore was not very informative. However, the Oblate results

Table 9. Distribution of Projectile Points by Level 1963 Excavations at 41CM1 (Oblate Site).

Levels-->	Unkn.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
TYPE	ft. bs	0.0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5	5.5-6.0	6.0-6.5	6.5-7.0	7.0-7.5	7.5-8.0	8.0-8.5	8.5-9.0	9.0-9.5	9.5-10.0	TOTALS
Bulverde	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2
Castroville	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Clifton	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Darl	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Edgewood	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	4
Ellis	0	0	1	0	0	0	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	7
Ensor	2	0	2	1	1	2	4	1	2	0	1	0	0	0	0	0	0	0	0	0	0	16
Fairland	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	2
Figueroa	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Frio	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Granbury	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Marcos	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	5
Montell	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	5
Pedernales	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	6
Perdiz	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Scallorn	0	0	5	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Travis	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Williams	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Side Notched	0	1	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Unident.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Fragments	1	1	2	0	1	0	1	2	2	2	0	0	1	0	2	0	0	0	0	0	0	15
TOTALS	10	7	14	2	10	9	10	8	6	3	3	1	3	2	3	1	2	2	1	1	2	100

Table 10. Distribution of Projectile Points by Level in 1959, 1960 & 1963 Excavations at 41CM1 (Oblate Site).

Levels-->	Unkn	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
TYPE		0.0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5	5.5-6.0	6.0-6.5	6.5-7.0	7.0-7.5	7.5-8.0	8.0-8.5	8.5-9.0	9.0-9.5	9.5-10.0	TOTALS
Almagre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Angostura	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Bulverde	0	0	0	1	0	1	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0	6
Castroville	0	0	1	0	1	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	6
Clifton	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Darl	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Edgewood	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	4
Ellis	0	0	1	0	0	0	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	7
Ensor	8	1	3	13	13	15	13	12	4	1	3	0	1	0	0	0	0	0	0	0	0	87
Fairland	0	0	1	2	1	2	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	10
Figueroa	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Frio	2	2	3	4	3	4	4	4	2	0	1	0	1	0	0	0	0	0	0	0	0	30
Granbury	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Marcos	2	0	0	2	1	2	0	6	2	0	6	3	1	0	2	0	0	1	0	0	1	29
Marshall	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	4
Montell	1	0	1	1	1	1	1	1	2	0	0	0	1	1	2	1	1	1	0	0	0	16
Paisano	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pedernales	1	1	1	1	2	0	0	1	0	0	0	0	1	2	1	0	1	1	1	1	1	16
Perdiz	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Scallorn	0	0	5	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Tortugas	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Travis	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Williams	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Side Notched	0	1	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Unident.	0	2	2	2	2	6	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	18
Fragments	6	11	12	12	12	9	7	14	4	4	1	3	1	1	2	0	0	0	0	0	0	99
TOTALS	24	22	34	41	43	45	33	45	17	8	13	7	7	7	8	2	5	3	1	1	2	368

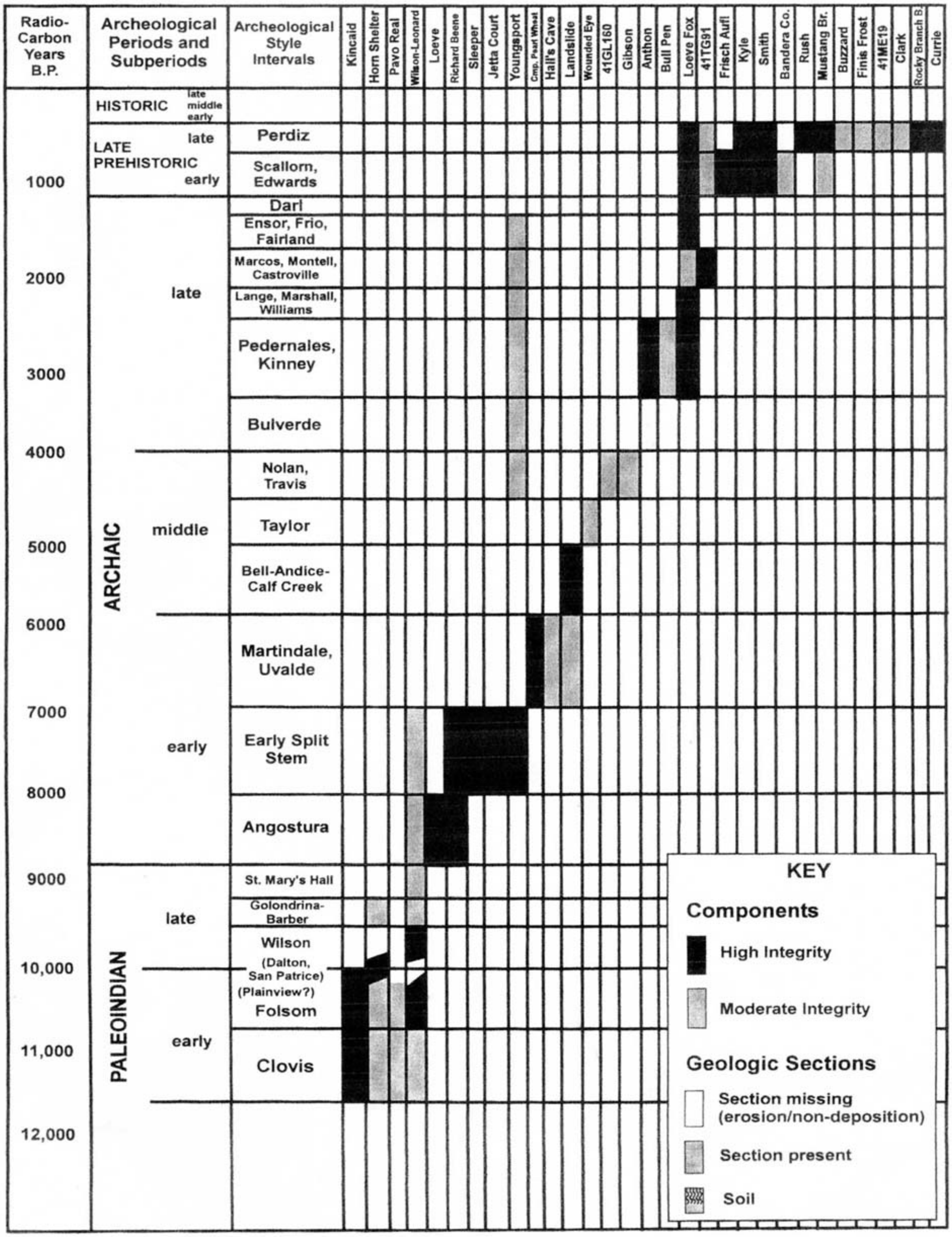

Figure 16. Central Texas archeological chronology, with key gisements (Collins 1995).

were historically significant in that they resulted in an early version of Central Texas projectile chronology that later was built-upon and expanded into our present day understanding.

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Painted Textiles of the Lower Pecos Region, Texas

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ABSTRACT

Ten examples of painted textiles from the Lower Pecos River region of Texas are described; eight of them have been radiocarbon dated to the Middle and Late Archaic periods and one is considered Late Archaic based on its association with projectile points characteristic of that era. The inventory consists of mats, cremation pouches, baskets, a skull cap, and a belt. All are mortuary goods fortuitously preserved by burial in dry rock shelter deposits and all but one were exhumed in the 1930s, either by relic hunters or by institutionally sponsored excavations. The designs are geometric, in keeping with the background medium, and are usually painted with red pigment. The single exception has both red and dark brown lines. It has long been assumed that painted textiles came late in the Lower Pecos sequence but one set of three can now be attributed to the Middle Archaic period, thus extending the range of this particular form of mortuary offering by over 1000 years.

INTRODUCTION

The 10 painted textiles discussed here were exhumed from dry rock shelters in the Lower Pecos region of southwest Texas as long ago as the 1930s and as recently as the 1970s (Figure 1). All are mortuary goods, part of a long-standing tradition of wrapping the flexed body of the deceased in layers of matting and burying this bundle in the dry, ashy shelter deposits. Painted textiles have long been considered a late innovation in the Lower Pecos. This assumption was based in part on a few radiocarbon assays done in the 1970s, some temporally meaningful grave inclusions, and stratigraphic associations. Two of these dates and four AMS assays run for a larger study of this mortuary practice are applicable to the painted textiles in this sample (Table 1). Three of them do fall in the expected Blue Hills subperiod of the Late Archaic period (2300-1300 B.P.), but one is slightly younger and two are over 1000 years older, thus indicating a much earlier starting date for textile painting.

Five of the painted specimens were unearthed by three different institutions during the 1930s rush to the Lower Pecos in search of museum quality artifacts. One was acquired by the Smithsonian Institution, who sponsored excavations in Moorehead and Goat caves on the Pecos River and other sites in the Big Bend region (Setzler 1934; Prewitt 1970; Maslowski 1978). One was in a very elaborate grave uncovered by a Witte Museum expedition to the Shumla Caves, north of the Rio Grande and west of the Pecos River (Martin 1933; McGregor 1992), and three were in one bundle that was discovered by the University of Texas in the Horseshoe Caves south of the small community of Comstock (Butler 1948).

The rest were found by collectors. Two encased the naturally mummified remains of an adult male from a site overlooking the Rio Grande east of Langtry (Turpin et al. 1986); two were from an unspecified site on the Pecos River that were donated to the Museum of the Big Bend in Alpine, Texas, in 1931 (Smith 1933), and the fifth, a belt, was in a bundle opened at Southern Methodist University and reported by Banks and Rutenberg (1982).

DESCRIPTION OF TEXTILES

A Painted Belt, 41VV63

The smallest painted item and the only one that cannot be assigned a specific age based on associations or radiocarbon dates is a belt that had been used to tie a rabbit skin blanket around an infant that was further wrapped in three mats (Banks and Rutenberg 1982:15). As is usually the

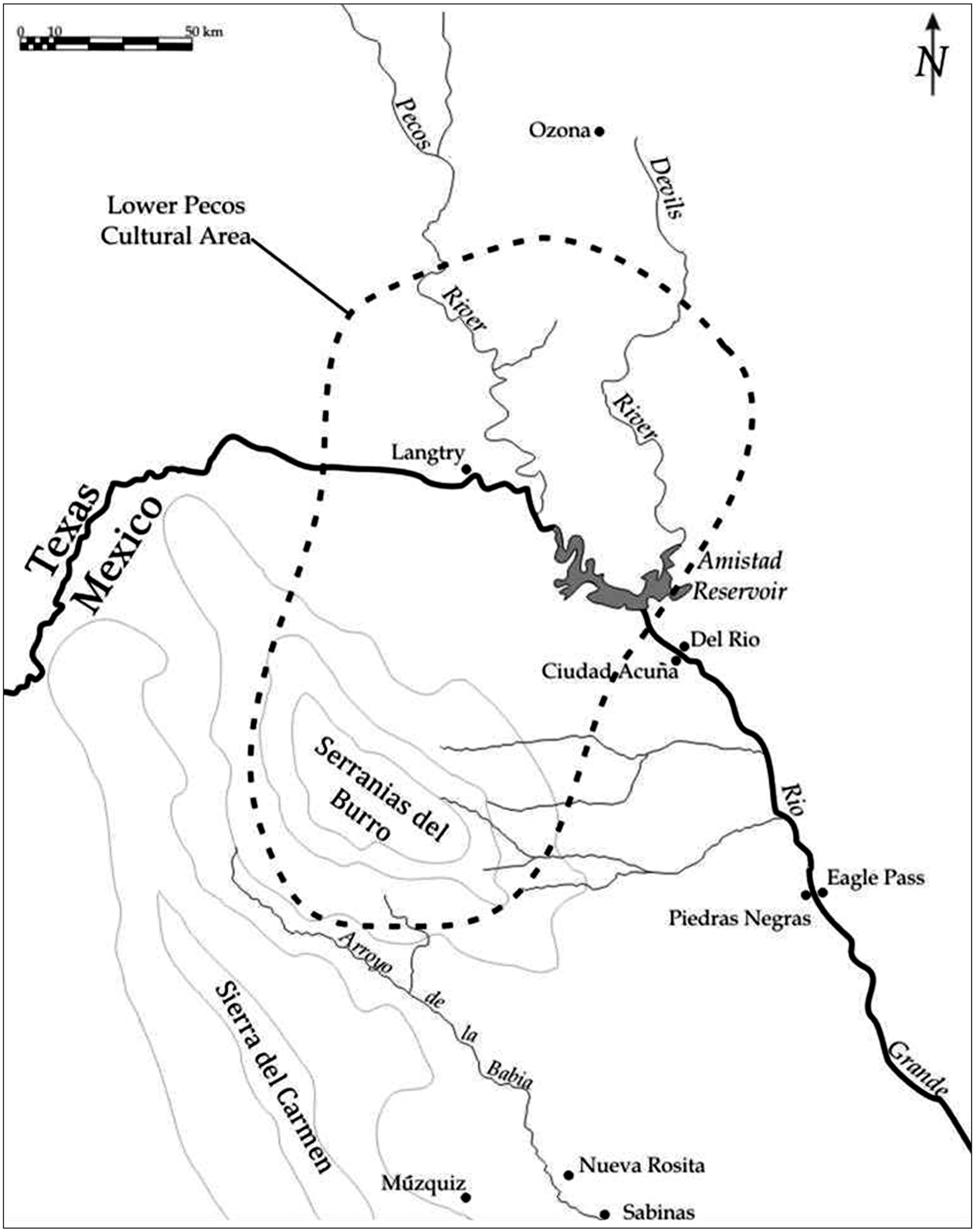

Figure 1. Map of the Lower Pecos region based on the distribution of Pecos River style pictographs. All of the painted textiles came from a very limited area on the north side of the Rio Grande between the small communities of Langtry and Comstock.

Table 1. Radiocarbon assays relevant to painted mats.

C14 Raw Age (B.P.)	Corrected Age (B.P.)	Calibrated age range (95%, 2 sigma) and Intercept	Lab No.	Site, Location	Comments
1150 ± 70	Not obtained	930-1185 BP, AD 765-1020 (AD 900)	TX980	41VV656. private	Adult male bundle, mat (Turpin et al. 1986)
1700 ± 70	1829 ± 134	1605-1915 BP AD 35-345 (AD 340)	SI1131	41VV55 Smithsonian	Adult male, cremation pouch, (Maslowski 1978; Adovasio 1978)
2050 ± 30	2100 ± 30	1990-2150 BP, 40-200 BC (130 BC)	B300561	Museum of Big Bend 1649a	Cremation pouch? (Setzler 1934)
2140 ± 30	2090 ± 30	1990-2150 BP 40-200 BC (100 BC)	B301424	Museum of Big Bend 1648a	Infant, Burial pouch? (Setzler 1934)
3440 ± 40	3480 ± 40	3640-3850 BP, 1690-1900 BC (1780 BC)	B293744	41VV171, TARL	Infant bundle, skull cap, split basket (Butler 1948)
3520 ± 20	3530 ± 30	3710-3890 BP, 1760-1940 BC (1880 BC)	B298515	41VV171, TARL	Infant bundle, skull cap, split basket (Butler 1948)

case, the interior mats were more finely woven than the outer coarser covering. A pad of grass was laid beneath the infant's head between the second and third mats. The only other artifacts were cords and a leather thong that apparently held the bundle together, and several sticks that may have pinned the bundle in place.

The bundle had been exhumed by relic hunters and later analyzed at Southern Methodist University, where the site number X41VV1 [SMU usually put the X first, as in X41VV1 was assigned. In the trinomial system used state-wide, the site is probably 41VV63. The shelter is on the east bank of the Pecos River about 8 km above its confluence with the Rio Grande. Banks and Rutenberg visited the site and noted occupational debris, pictographs, cut marks and polishing facets, as well as shallow depressions that may have been the result of relic hunter activity that removed other burials from the site (Francis Stickney, cited by Banks and Rutenberg [1982:9]).

The belt is now in two pieces that are 5 cm wide and total 70 cm long. Banks and Rutenberg (1982:18) describe it as "woven from cordage made from shredded plant fibers... that were tightly wound together to make the cordage." Red bands, about 2 cm wide and 2 cm apart, were painted perpendicular to the long axis, and leather thongs were woven into the fabric so that they dangled from the lower edge of the belt. Some sort of ornament might have been suspended from these thongs. The belt was probably an item of clothing since similar but unpainted items have been found in the graves of adult women. In one case, a fragment of a woven belt buried with a woman and a child dated to ca. 1825 years ago (Turpin, n.d.). Yet another belt was wrapped around the waist of a woman buried with a cremated man in Moorehead Cave and dated to 1605-1915 B.P. (Table 1; SI1131) (Setzler 1934:35; Maslowski 1978:45).

Cremation Pouches, Moorehead Cave

Double burials are not all that uncommon in the Lower Pecos region but, in the case of Moorehead Cave (41VV55), the fourth of 14 graves excavated by the Smithsonian Institution in 1931 contained both burned and unburned skeletal remains (Setzler 1934; Maslowski 1978:41-52). The cremated remains of an adult male were contained in a painted textile pouch (Figure 2[1]) and laid beside the flexed body of a 35-40 year old female.

The entire bundle was wrapped in five mats, one of which was decorative but none was painted. The woman apparently wore a twill plaited belt and a small skirt or apron made of "a rope of human hair with short, tightly twisted strands of cordage attached" (Prewitt 1970:12, see also Setzler 1934:35; Maslowski 1978:45). Also in the bundle were an unfinished net bag, a lashed twig cone, and two sandals. One of the latter produced a radiocarbon age of 1700 ± 70 B.P., which corrected and calibrated indicates the bundle was interred between A.D. 35-345 (see Table 1). This date is solidly within the Blue Hills subperiod in the local chronology and is consistent with the age of most of the bundled burials that have been radiometrically or contextually dated.

Adovasio (1978:236-241) analyzed the fiber artifacts in the Smithsonian collection and described two of the mats—the cremation pouch, Specimen 358, and one of the outer wrappings, Specimen 357—from Feature 4 under his Type VI, Twill Plaiting, 2/2 Interval[2]:

> The two complete specimens are very large rectangular mats with 90° selvages. Sp. #358 was folded in three more or less equal parts and then sewn on one end. The sewing element has now disappeared. Very complicated shifts are employed in this specimen to achieve an elaborate decorative effect. The normal 2/2 interval is regularly alternated with 2/3 interval to produce a series of linear bands running down the long axis of the specimen. In addition, the outer "side" of the folded specimen has been painted with a red design of cross-hatched lines which bracket circular red dots. Sp. #357 likewise alternates the standard 2/2 interval with a 2/3 interval to produce a linear design running the long axis of the mat. The selvage is one of the 180° self type. The specimen is unpainted.

Burial Pouches, Museum of the Big Bend

In 1931, a Lower Pecos resident donated a collection of grave goods that included three decorative pouches to the Museum of the Big Bend in Alpine, Texas (Smith 1933; McGregor 1992:96). Their provenience was given as "an Indian shelter or cave on the Rio Grande near (about 1 mile from) Shumla, Texas, a few miles above the union of the Rio Pecos and the Rio Grande" (catalog card Specimens 1626 to 30A, Museum of the Big Bend). Specimens 1647 and 1648 were described as burial sacks and the notes state that each contained burned bone, evidently human (see also Smith 1933:65). Specimen 1649a was also called a burial sack, but it was

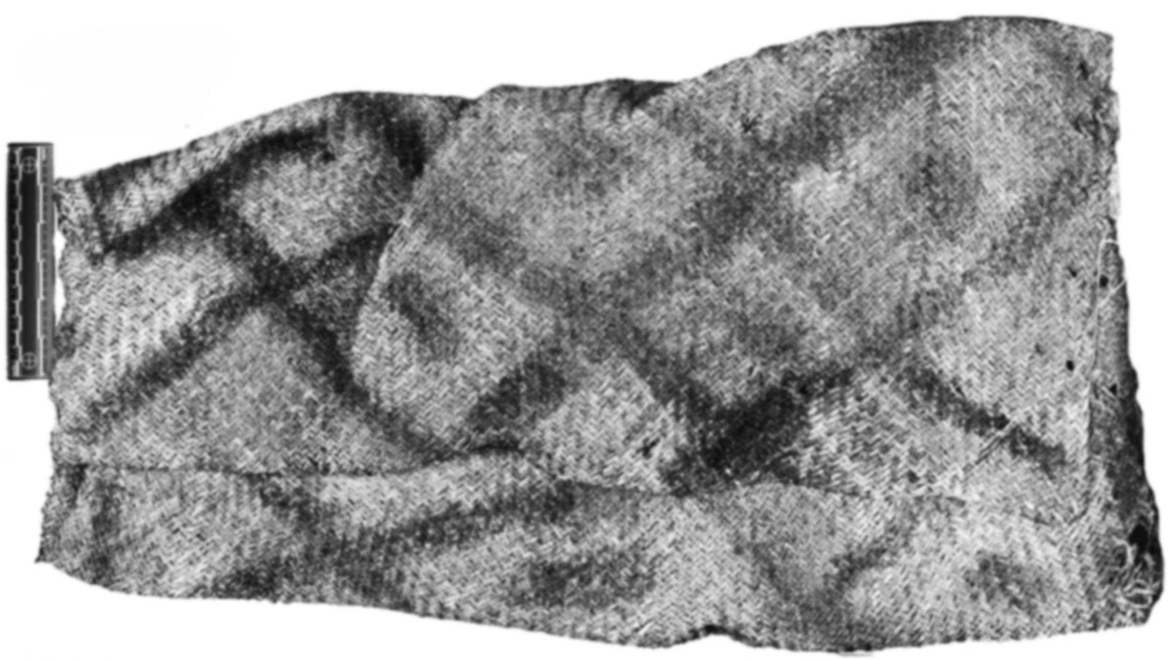

Figure 2. Cremation pouch from Moorehead Cave, 41VV55 (photo courtesy of the Smithsonian Institution).

painted and contained the bones of a small child and seven buckeye beads strung on a thong (Specimen 1653). Other objects in the general collection—matting fragments, basketry, fiber pads and cords—are not assigned to any specific feature.

Specimen 1647, listed as a cremation pouch, is a decorative mat that has been folded into thirds and stitched along the bottom and sides to make a packet 27 cm wide. The mat is not painted but like the mats from Moorehead Cave and Mummy Shelter (see below), the weaver used a series of shifts to create a pattern of linked squares or diamonds.

The same 2/2 interval technique was used to weave Specimen 1649a, which is also a mat folded and sewn along two edges into a package 36 cm wide. The mat had been painted with bold red nested zigzag and straight lines crossed by thick vertical and horizontal dark brown lines of equal width. The intervals between the lines are imprecise but the paint is dense and applied with apparent vigor. The sources of the pigments have not been determined but walnuts produce a dark brown dye and red could be made from leather stem plants (Aggie 2011) or cochineal, the tiny insects that look like fungi growing on prickly pear leaves (Tull 1999:350). Fragments of fiber from this mat produced an AMS date of 2100 ± 30 radiocarbon years ago, which calibrates to the range between 200-40 B.C. (see Table 1).

Specimen 1848a is also a mat folded into a pouch and held together with long red Z-twist cord stitches that crosscut the painted design (Figure 3). Broad red lines parallel the long edges of the mat. Between them, a four-pointed star or cross is also painted in red pigment. This pouch is more frayed and worn than its companions in the collection and is more bag-like than the other sewn "burial sacks." An AMS date of 200-40 cal B.C. places this pouch in the same range as the other painted mat in the collection, well within the Blue Hills subperiod[3].

Painted Pouch, Witte Museum

In 1933, the Witte Museum of San Antonio sponsored excavation of eight dry shelters referred to as the Shumla Caves (Martin 1933). In Cave 5, later designated as 41VV113, they uncovered the most elaborate bundle burial yet found in the

Figure 3. Burial pouch in the Museum of the Big Bend, Alpine. The contrast between the colors has been inverted for clarity so the light streaks are red pigment and the dark background is the natural fiber (photo courtesy of Shirley Mock).

Lower Pecos. An adult male wrapped in a rabbit skin robe, covered by another such robe and layers of matting, was found beneath a bed of twigs that overlay two metates and a mano; one metate and the mano were stained red from grinding paint (Martin 1933:21). With him were a carrying basket, two coiled baskets, and a flat pouch that contained a number of small esoteric items such as strung rattlesnake rattles, fish hooks, a feather cord, bone awls, a bone "pencil," and littler woven packets. Of interest here is the pouch that held the small items. The field supervisor, John Eross (1933 notes, no page numbers), described it as "an envelope shaped pouch of matting, folded and sewed together with rawhide thongs," but failed to mention it was painted (see also Shafer 1986:120): McGregor (1992:87) provides more detail, classifying this specimen as Pouch Type C, made by twill plaiting, 2/2 interval, folded in thirds and tied with leather. Diagonal stripes were painted in deep red pigment.

The bundle has not been radiocarbon-dated but can be assigned to the Late Archaic period by an Ensor dart point that fell from the wrappings. This projectile point style is a hallmark of the Blue Hills subperiod (Turpin 1991) and was popular throughout much of the state between 200 B.C. and A.D. 600 (Turner and Hester 1993:114).

Painted Wrapping Mats

On the more recent end of the temporal scale, two painted mats were used to wrap the remains of an adult male who was exhumed by a local collector in the 1930s (Turpin et al. 1986). The rock shelter where he found the bundle was later given the trinomial 41VV656 and the informal name Mummy Shelter because his hair, skin, and soft tissue were naturally mummified by a combination of the arid climate and burial in dry ashy deposits. This man was interred with a rabbit skin robe, a fiber g-string, and a necklace of stone and bone beads. He was wrapped in a series of mats, two of which were decorative. The simpler specimen has a shift pattern that outlines a square with a hole in each of the visible corners and a red line parallels the upper edge. On the more complicated mat, a series of shifts from 2/2 to 2/3 were used to create linked diamonds that are outlined in red. In 1978, the mummified contents of his digestive tract were analyzed and produced a radiocarbon age of 1150 ± 50 years ago. No correction factor was applied at the time and the original data sheet is missing but the estimated calendric age would fall between A.D. 645 and 1030 (Turpin et al. 1986), slightly later than the Blue Hills subperiod but possibly still within the Late or Transitional Archaic period. The traits that differentiate between the end of the Archaic and the beginning of the Late Prehistoric period are not well dated and there are a number of factors that may have influenced the dating of this mummy.

Three Painted Textiles from Horseshoe Cave, 41VV171

The oldest painted textiles are in an infant bundle attributable to the Middle Archaic period. In 1936, the University of Texas sponsored excavation of two adjacent caves in the Lower Pecos, the so-called Horseshoe Caves, later assigned the trinomial 41VV171. The recovered material was reported by Butler (1948), who designated this bundle as AV1. An infant had been placed on a large twilled mat and covered with a split decorated basket. A fiber skull cap of similar technique had been placed on the infant's head and another was placed with the bundle. Next to and under the body were four shell pendants: two were shaped like diamonds and two were shaped like projectile points. Twelve *Olivella* shells were near the diamond-shaped mussel shells. Four short reed segments decorated with incised lines and lashed together into two pairs and a single reed were placed by the child. The edges of the outer mat were then pulled up to envelope the bundle and the entire package was put in a large netted bag before it was laid on a bed of grass, leaves and twigs that lined a crevice in the rock (Butler 1948:5).

Designs on skull caps and the covering basket were created by a shift from 1/1 to 1/2 that "achieved the affect of a raised line" (Butler 1948:36). The two smaller baskets measured 15 cm in diameter and were 10 cm deep. A pattern of linked diamonds radiated from the base, increasing in size toward the rim (Figure 4). The alternating rows were painted red, emphasizing the design. The larger basket, when split, was 61 cm long and 30 cm wide. The same shift technique was used to create parallel zigzag lines that run from top to bottom (Butler 1948:36); alternating rows were painted red (Figure 5). All three had been finished with a strip of rawhide sewn around the edge to give a spiral effect.

Fragments of the outer wrapping and a minute piece of the single reed segment were submitted for

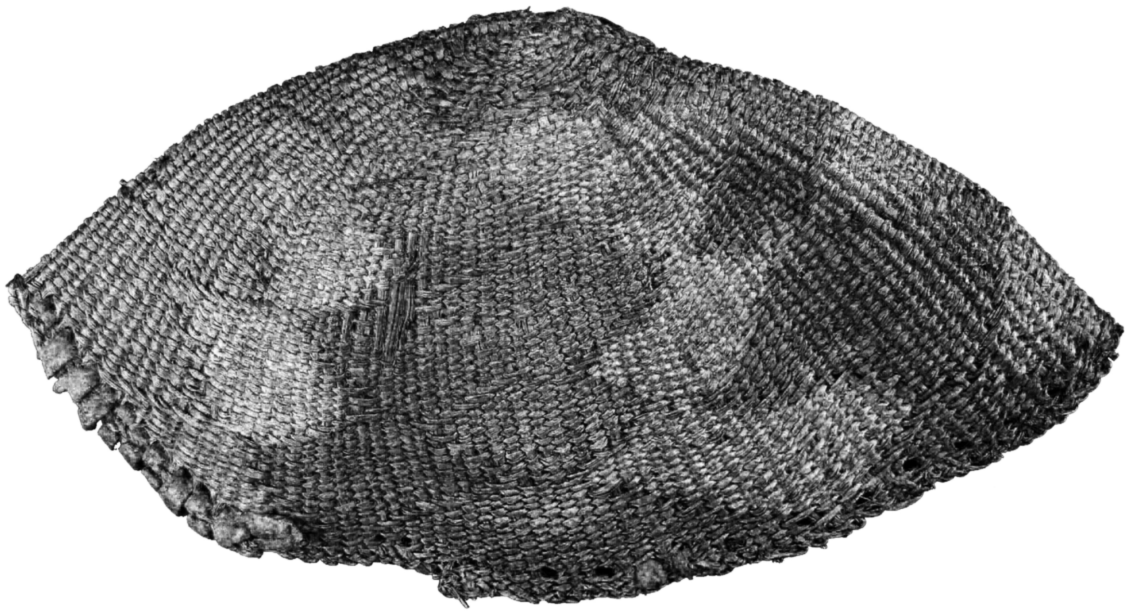

Figure 4. Infant skull cap from Horseshoe Caves (41VV171) (photo courtesy of the Texas Archeological Research Laboratory).

Figure 5. Split basket from infant burial, Horseshoe Caves (41VV171) (photo courtesy of the Texas Archeological Research Laboratory).

AMS assay and returned corrected ages of 3480 ± 40 B.P. and 3530 ± 30 B.P. In calendrical terms, the calibrated dates overlap between 1760-1900 B.C (3710-3850 cal B.P. see Table 1) This places the interment in the middle of the San Felipe subperiod of the Middle Archaic period (3200-4300 B.P.) in the local chronology (Turpin 1991). This was a time of increasing regionalization as manifested in distinct projectile point and rock art styles, providing a context in accord with more elaborate mortuary behavior.

DISCUSSION

These 10 examples of painted weavings are probably but a fraction of the number that was buried in antiquity. Pearce and Jackson (1932) mention painted mats taken from 41VV75 in Seminole Canyon by collectors, and two local men who had worked for Setzler in 1932 told me of others they had seen taken from Goat Cave (41VV67), Moorehead Cave (41VV55), Panther Cave (41VV83), and 41VV75 by relic hunters.

In keeping with the general consensus, the radiocarbon assays reported here confirm that the majority of the painted mats are from Late Archaic graves and date between 930 and 2150 cal. years B.P. The single exception, the infant bundle from Horseshoe Cave, is at least 1000 years earlier than the rest and, perhaps significantly, all of the grave goods in this burial are unique or valuable items, in keeping with the heightened ritual activity during this time period.

The people of the Lower Pecos were adroit exploiters of the local vegetation and the painted textiles are one of the more labor-intensive products of a long-standing tradition of using plants and plant fibers to fulfill both mundane and ritual needs. Both the painted and unpainted mats in these bundles exemplify the skill attained by the weavers. All of the designs are geometric, in keeping with the background medium (Figure 6), but in some cases, structural and non-structural decorations are employed on the same mat with paint serving to emphasize the pattern created by shift changes. In three instances, unpainted mats with some type of structural patterning were paired with painted specimens (41VV55, 41VV656, Museum of the Big Bend). Some of the designs on the Late Archaic mats are made up of swathes of pigment that are broadly applied, making their own design independent of the weaving. In

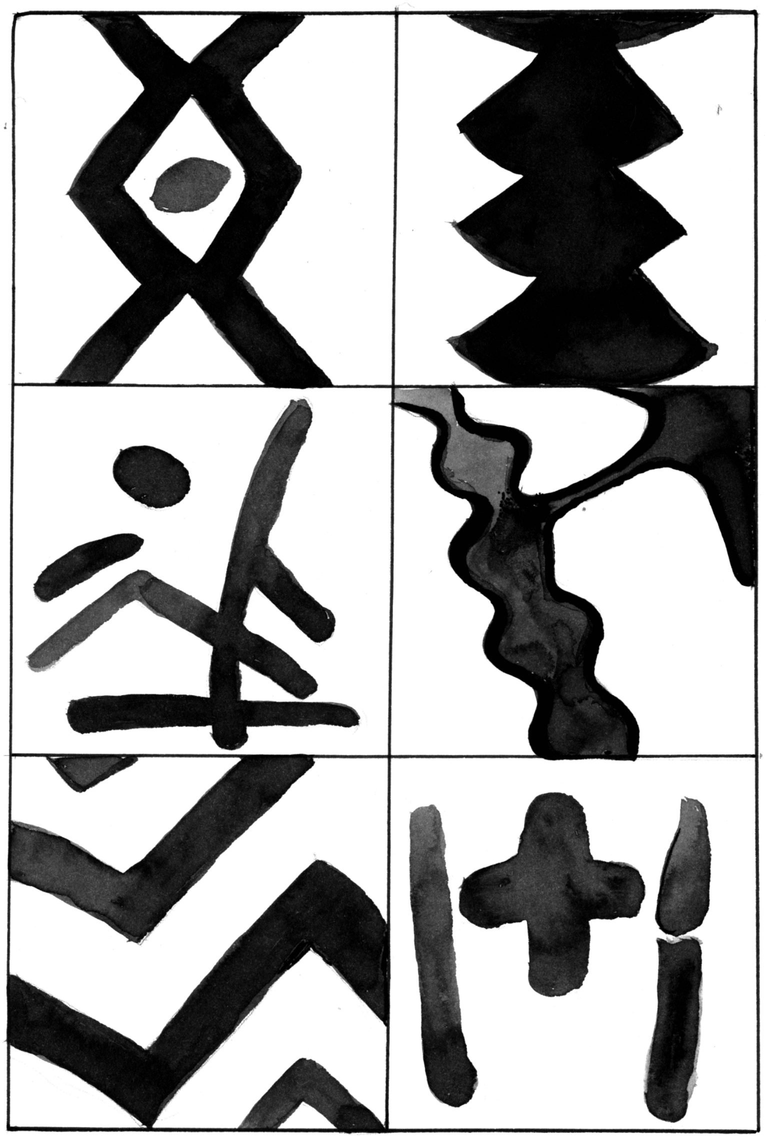

Figure 6. Examples of geometric designs painted on woven textiles, from upper left to lower right: Moorehead Cave, Horseshoe Caves, Museum of the Big Bend, Mummy Shelter, Horseshoe Caves and Museum of the Big Bend (drawn by Margie Greco).

the three Middle Archaic specimens from grave AV1 in Horseshoe Cave, the two design methods are meticulously coordinated to create the finest examples of the weaver's art in this sample.

It is unlikely that these high-energy goods were specifically made as mortuary offerings since interment probably took place shortly after death, at least in the cases where mummification set in. Even the most skilled workers would need time to process the materials, weave the textiles, and paint them. It seems more likely that these artifacts were made for the living and kept with them in death.

Supposedly an egalitarian society, such as that usually attributed to the Lower Pecos hunter-gatherers, grave goods reflect acquired status, earned during life and sustained in death. However, five of the painted textiles were recovered from three infant graves. Another three came from two adult male burials and one contained the remains of a cremated man buried with an adult woman. The age and gender of the person who was apparently cremated and placed in a woven pouch that was later donated to the Museum of the Big Bend are not recorded. No satisfactory reason has been given to explain why and when cremation was preferred over burial, but both infants and adult males were so treated. Status may have been a factor in the more elaborate male burials but that does not explain the care paid to infant bundles, which directly contravenes the idea that egalitarian hunting and gathering groups would not dispose of status items or high energy grave goods in children's graves (Binford 1971:22).

Although the sample is too small for sweeping generalizations, some common threads may be representative of the larger population. That all of the painted textiles were found in mortuary contexts is undoubtedly in part a function of the preservation afforded by tightly bound compact bundles which were usually placed against the rear wall of the shelters where the disturbance from normal occupational activities would be less. Nevertheless, the very presence of these textiles, as well as fur robes, shell, seed and bone ornaments, and baskets in the bundles, indicates that the people of the Lower Pecos honored their dead by sacrificing labor-intensive goods for no tangible return. Such altruism is often rooted in a belief system that anticipates an afterlife where physical needs are met by symbolic offerings of clothing, tools, and luxury goods.

ACKNOWLEDGMENTS

Mary Bones of the Museum of the Big Bend, Laura Nightengale of the Texas Archeological Research Laboratory, and James Krakker of the Smithsonian Institution were extremely helpful, providing information and photographs of items in their respective collections. Jack Skiles of Langtry was his usual font of knowledge about the Lower Pecos. Bob Nichols of San Angelo and Ford and Norma Oglesby of Eldorado generously shared information about early excavations near Pandale crossing. Terry and Kathleen Burgess took photographs of items in the Skiles collection. Kathleen Burgess worked with the photographs in D-stretch so that Margie Greco could better decipher the designs for her illustration. Larry Riemenschneider led me to the collection from High and Dry Shelter and helped document the artifacts.

ENDNOTES

1. The contrast between painted and unpainted sections has been enhanced for publication.
2. Adovasio (1977:99) [1978?] describes described twill as "a variety of plaited basketry in which the weaving elements in one set pass over two or more in the other set at staggered intervals," in this case 2/2.
3. A basket from the same collection but not necessarily associated with any of the painted textiles produced a radiocarbon date ca. 2025 B.P.

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41VV2079—A Rock Shelter Excavated by Ted Sayles in 1932

Shirley Boteler Mock

ABSTRACT

In the 1930s Ted Sayles, working for Gila Pueblo, a private archeological firm of Globe, Arizona, excavated a number of sites in Texas. This article discusses one of these sites, 41VV2079, a small rock shelter located on Pump Canyon off the Rio Grande near Langtry, Texas. Sayles' excavations revealed shallow deposits that dated from the Middle Archaic to the Late Prehistoric period. Sayles also recovered painted pebbles, now curated at TARL, which are the focus of this paper. Building on previous interpretations of the meaning and use of the painted pebbles, the author examines patterns in the imagery through time and reveals new details suggesting possible social or territorial groups and/or connections between communities.

INTRODUCTION

Edward Booth (Ted) Sayles, an early amateur pioneer in Southwestern archeology embarked on an ambitious archeological survey of sites in Texas in the 1930s. At the time Sayles was working for the Gila Pueblo Archeological Foundation, a private research organization of the University of Arizona (Huckell et al. 1997). After the Gila Pueblo foundation was dissolved in 1950, the archives, including notes, photos, and artifacts were donated to Arizona State Museum of the University of Arizona where Sayles' archeological collections, maps, and photos from his fieldwork in Texas were originally catalogued and stored. Arizona State Museum provided Sayles' field notes, maps, and photos to the Texas Archeological Research Laboratory (TARL) of the University of Texas at Austin (Sayles 1932). Among the artifacts that Sayles collected from 41VV2079 were 21 painted pebbles now archived at TARL, only 18 with visible imagery, which are the focus of this article.

Sayle's objective in the 1930s in extending his archeological excavations to Texas was momentous. As he states in his 1935 volume (Sayles 1935:85):

> The purpose of this survey is to define the cultures of Texas and their boundaries; to determine the relations which may once have existed between the tribes of Texas and those of adjoining sections; and to seek traces of the origin, or of the passage, of the Hohokam, the agricultural colonists of southern Arizona, whose provenance has not yet been discovered.

Sayles followed in the path of early Texas archeologists such as Martin (1933) who were adamant in insisting that the Lower Pecos rock shelters were an extension of the Big Bend Basket Makers of the Southwest despite differences between the two areas. At this time little was known about the Lower Pecos region, an area defined by the three rivers which course through its canyons: the Rio Grande, the Pecos, and the Devil's rivers. The region extends roughly 50 miles to the west, north, and east of the confluence of the Pecos River with the Rio Grande, into northern Coahuila, Mexico. The painted pebbles represent one of the oldest and longest traditions of painted mobiliary art in the Americas beginning during the Early Archaic period (8900-5500 BP) and continuing through the Late Prehistoric period (1320-450 BP).

Sayles' 1932 excavations focused on three sites that were given temporary designations. Two sites, TX X: 2:8 (41VV164), and TX X: 2:9 (41VV167 [Eagle Cave also was tested by Sayles]) were located in Mile Canyon, known at the time as Eagle Nest Canyon, one mile east of Langtry. The painted pebbles recovered from the third site excavated by Sayles, TX X: 2:10, now 41VV2079, are the focus of this article. The site is located on the south rim of Pump Canyon, a tributary of Osman Canyon (once known as Langtry Creek) that flows into the Rio Grande. Its name derives from the fact that the early Southern Pacific Railroad had a pump at the bottom of the canyon to carry water up to the steam engine. Jack Skiles recalls as a child climbing the ladder (196 steps) from the bottom of the canyon to the top. From there he and his friends would walk down the tracks to the Langtry grammar school (Skiles1996: 127).

Skiles (personal communication January, 2012) shared his recollections regarding the location of 41VV2079:

> The cave is located about one mile up the canyon from the Rio Grande and on the south bank of the canyon. It consists of two joining shelters, one that had a substantial amount of ashes and the other with mostly solid rock. It was completely excavated but I do not remember who did it. I have looked three separate times for information that I think I have about the excavation of the cave, but I cannot find it in my files.
>
> Before the '54 flood there were pictographs in an overhang very low in Pump Canyon, directly above where the main spring flows out of the base of the cliff. I do not know of any pictures that were ever taken of them and I am quite sure they were never recorded. I looked at the site about five years ago and saw only bits of color.

I anticipated that Sayles' field notes would provide information on the context of the pebbles, thus allowing interpretations as to possible chronological placement and use. The lack of refined excavation techniques at that time, however, prevented a more accurate assessment of chronology and more subtle intrasite and intersite comparisons. Sayles plotted the pebbles on a plan map but unfortunately did not specify an artifact number for each pebble, thus eliminating the possibility of acquiring useful contextual data. These details, however, may not have been of use since the site is shallow (18 inches at the deepest level) and both the actions of ancient occupants and more recent rodents' nests and grazing of goats and sheep compromised stratigraphic integrity. This is not unusual in the Lower Pecos for provenience is often compromised due to stratigraphic mixing, intrusive events, and flooding episodes. Thus, it is beyond the scope of this article to examine the stratigraphic context of artifacts from 41VV2079 in detail.

Regardless of the lack of contextual data, it is important to use Sayles' field notes (1932) and manuscript (n.d.) to write up a brief description of 41VV2079 prior to a discussion of the painted pebbles. Unfortunately, his field notes including lists of recovered artifacts are very vague and some artifacts could not be located. I had hoped to find a more detailed description of artifacts in his chart entitled "Pecos River Cave Dweller," presented in Table 6 of his 1935 volume, *The Archeological Survey of Texas*. In the spirit of the archeological paradigm of the times, Sayles was interested in looking at broad cultural patterns; thus, he combined the archeological materials recovered from 41VV2079 with 41VV164 and 41VV167 in Mile Canyon with other Lower Pecos rockshelters in his chart. As a result, with the exception of the painted pebbles archived at TARL, I was not able to accurately single out certain artifacts or items that were unique to 41VV2079.

THE LOWER PECOS

The Lower Pecos people were diversified foragers and hunters who lived in small kin groups in these rock shelters based on seasonally available food resources in the area. Deep layers of well-preserved cultural materials such as coiled or twilled basket fragments, nets, cordage, sandals, wooden artifacts, burned limestone, stone, bone, and shell have been recovered in the dry midden deposits. Randomly scattered among the fiber layers and in the ashy midden fill are the many river-rolled pebbles, often broken, many of which display painted imagery. The painted pebbles are rarely found outside the Lower Pecos area but a few have been found in the Big Bend area of southwest Texas (Martin and Woolford 1932; Roberts 2010).

The painted pebbles display different distributional patterns through time and space in the Lower Pecos region. For instance, they are not found in all rock shelters. Unpainted stream rolled pebbles were sometimes noted in early archeological investigations but were not recovered due to their great numbers. Apparently, either the imagery was erased or eroded through time or unpainted stones were stockpiled for future use by the inhabitants of the rock shelters. The majority of painted pebbles have been recovered from larger sites such as Eagle Cave in Mile Canyon or Fate Bell in Seminole Canyon, apparently popular locales for long term residence or seasonal aggregations over thousands of years. Sharing few symbols, but co-occurring in some cases with the pictographs in the rockshelters (e. g., Kirkland and Newcomb 1996), the painted pebble tradition highlights the complex cultural matrix and worldview of these people who lived a highly mobile hunting and gathering existence.

My objective was to review Sayles' notes, and examine the painted pebbles archived at TARL, if possible under magnification, and to document them with digital photos and illustrations. Included in my examination was an assessment of the degree of polish indicating curation, alterations such as scratching, incising, over painting, breakage, or type of medium used (e.g., liquid paint or crayon) to detect patterns. Pebbles also may have been selected for qualities such as size, form, smoothness, color, or rarity, choices that also can provide patterns as to individual artists or geographical preferences. The pebbles, in most cases, were not altered to accommodate specific imagery.

In previous papers I proposed that the forms were chosen, painted, and used by women during life cycle events such as puberty or parturition rituals (Mock 2011, 2012). They typically occur in rock shelters where women's social and economic activities as well as child rearing occurred. The painting of the pebbles provided a medium for women to negotiate their gender roles in these intimate social settings (Hays-Gilpin (2004:12). Typically puberty ceremonies among North American Indians encompassed a reenactment of mythic events and a recitation of ancestral histories (Farrer 1988:239). These "coming of age" rituals often involved the use of rock art (e.g., Dubois 1908:93-96). This degree of integration in such rituals, for instance, is recorded in ethnographic accounts of Luiseno "maturation of girls" ceremonies (Oxendine 1980) which had the creative potential to relay many meanings and functions simultaneously. The imagery could relate to stories of ancestors, beliefs about their spiritual world, social networking, or even economic concerns such as the search for food.

First, I will describe and discuss the painted pebbles from 41VV2079, comparing and contrasting them to other painted pebble collections I have studied. Second, I will assign them to specific time periods as established in the Lower Pecos cultural history. Finally, in the ensuing discussion I will address intriguing patterns observed in the painted imagery and possible connections to other sites. The painted pebbles from 41VV2079 may provide a springboard to further examine these patterns in terms of cultural boundaries or population movements on this landscape. When combined with other patterns observed in the archeological record in the future, these observations may further reflect various kinds of internal connections and/or external influences.

DESCRIPTION OF EXCAVATIONS AT 41VV2079

The site is a small rock shelter, around 17-20 ft (5-6 m). across at the mouth and 17 ft. (5 m) deep, with a steeply sloping floor tapering to 2 ft. (0.6 m) toward the rear of the shelter. From Sayles' photos the shelter appears to be high near the canyon rim with a large talus slope of burned rock (Figure 1). His field notes (1932) indicate that the midden deposits in front of the shelter were damp, probably from overhang runoff. Although difficult to access, the shelter faces southeast which made it desirable for occupation in the colder months. Spring-fed pools of water, which still exist below the canyon today, provided additional incentive for occupying the site.

Sayles opened up five units (of varying sizes) in the shelter all of which were excavated to bedrock at around 17-18 inches (43-46 cm), supporting Skiles' recollections that the rock shelter was completely excavated. Sayles' 1932 field notes indicate packed surface deposits under goat and sheep dung and the presence of charred wood stakes or "stalks" that were driven into the deposits to bedrock in an "L" shaped formation adjacent to the burial (Figure 2). It is probable that the stakes, similar to charred stakes recovered at the sites of Fate Bell (41VV74) (Pearce and Jackson 1933:49-51) and Coontail Spin (41VV82) Nunley et. al. 1965), were covered with skins or mats and supported some kind of wind barrier or privacy wall.

Sayles' field notes (1932) emphasize the dense layers of grass bedding, mats, and evidence of fires that suggest repeated, intense occupations of the rock shelter over time. He indicates the

Figure 1. 41VV2079 shelter as it appears high near the Pump Canyon rim with a large talus slope of burned rock.

Figure 2. Charred wooden stakes, running in a north-south line, driven into the deposits next to the infant burial.

presence of scattered lithics or "chipped flint" one of which is an apparent chopper (see Sayles' 1935: Plate XVlld-e). He also makes note of diagnostic projectile points and "variations." Sayles provides an outline and photo of an Ensor point (Sayles 1935:Plate XIXh) recovered in the upper levels of his excavations. Typically, the Ensor is associated with the Blue Hills Subperiod of the Late Archaic (2300-1300 B.P.). On the basis of this projectile point style, Sayles argues for an affiliation with the Central Texas region during this time of transition from Late Archaic to Late Prehistoric lifeways.

The other diagnostic Sayles recovered is a Val Verde projectile point, believed to date to the San Felipe subperiod of the Middle Archaic (4100-3200 B.P.; Turner et al. 2011:168-169; see Sayles 1935: Plate XVIII, g.). Sayles identifies one artifact in his field notes (1932) as an arrow foreshaft, an artifact typically associated with the Late Prehistoric (1320-450 B.P.). Well-stratified Late Prehistoric deposits are rare in Lower Pecos rockshelters due to surface disturbances or a change to more mobile settlement patterns (Turpin 2004). The introduction of the bow and arrow is dated to around A.D. 600 at Arenosa Shelter but the deposits were mixed (Dibble 1967) and a more accurate date may be between A.D. 800 and 1300 (Turpin 1994).

Sayles observes the presence of deep lenses of basket and mat fragments, both simple and diagonal plaited and fine and coarse weave but unfortunately did not provide photos or detailed descriptions. Fiber rings were also noted and may represent the beginning stage of basket manufacture. Other features included what may have been caches of materials used to weave baskets such as those recovered at Moorehead Cave (Maslowski 1978:154). Features of this kind perhaps represented a storage area or cache filled with basket making materials.

Sayles identified bone awls or "tools" presumably used in a variety of tasks such as piercing skins or the manufacture of woven items and the excavation of small caches into the older levels, most likely used for food storage. One storage cache contained grass bundles arranged in an unusual circular pattern. The feature was filled with bean pods (possibly mesquite beans). Other caches were filled with prickly pear pads.

Archeological reports from rock shelters in the Lower Pecos indicate that ancient inhabitants used a variety of cooking and heating methods (e.g., Dering 1999). Indications of fires and cooking activities were likewise documented at 41VV2079. For example, Sayles noted the frequent occurrence of firewood in all the levels, sometimes tied in bunches, possibly to facilitate transportation of wood bundles up the steep canyon to the shelter. In addition to the evidence of firewood, two fire drills were also recovered from his excavations. In describing cooking features, Sayles provided an illustration in his field notes—a circle of burned prickly pear pads in the center of which were remnants of a burned sotol bulb, known as a staple food source among American Indians (Dering 1999). This feature represents a process in which the cactus pads were placed on hot rocks to add moisture to the cooking process. After the sotol was baked, it was pounded and formed into an edible pieces to be dried and stored. Sayles also observed yucca and sotol quids distributed throughout the deposit.

Other items collected during excavations included a pitted stone mano that was probably used to break up walnuts, seeds, or mesquite beans (see Sayles 1935: Plate XVIId) and a probable buffalo gourd and several gourd fragments with an attached string perhaps used as rattles. Evidence for buffalo gourds in the form of seeds was also found at Hind's Cave and dates to the Middle and Late Archaic (Dering 1979, 1999). As a food source the seeds were roasted or boiled, or ground into a meal. The root of the gourd also is known for its medicinal properties.

Significantly, Sayles' excavation notes (1932) reveal the exploitation of fish, smaller animals, and fresh water snails and mussels, for which he did not provide photos or identify as to species or provide photos. Sayles did report the presence of dog bones in the upper deposits, which actually may have been modern day.

INFANT BURIAL

Sayles (1932) reported the recovery of a flexed infant burial, face down and head to the north, inserted into the deposits in the center rear of the shelter. The burial was placed on flat stones on bedrock and a large rock was placed adjacent to the feature. The infant was wrapped in an animal skin bag (the head of the animal skin partly sewn with fiber twine) that was tied around the body with human hair cord (Figure 3). A twill-plaited mat was then wrapped and tied around the burial. Sayles reports that the infant also was wrapped in a rabbit fur robe tied with human hair cord (Figure 4). Rabbit skin robes were usually made of long strips of jackrabbit skins twirled and woven together with some sort of cordage or sinew. A layer of new grass fibers was then placed above the burial. Sayles (1935) reports that the burial was accompanied by

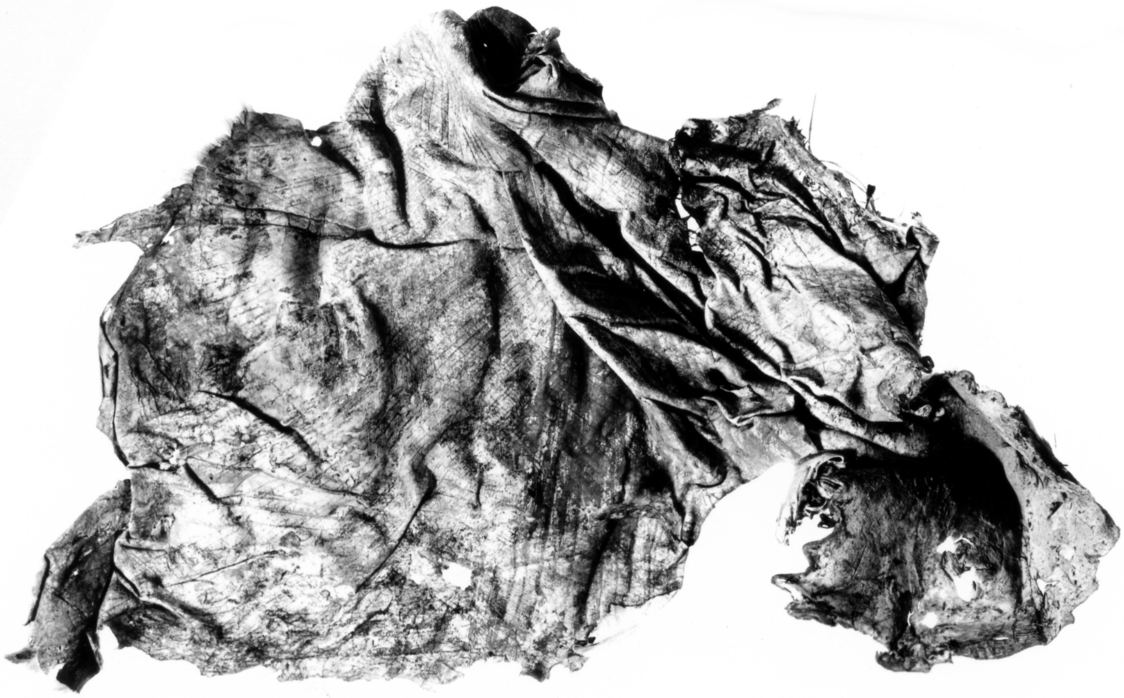

Figure 3. Antelope skin bag (the head of the animal skin partly sewn with fiber twine) in which the infant's body was wrapped.

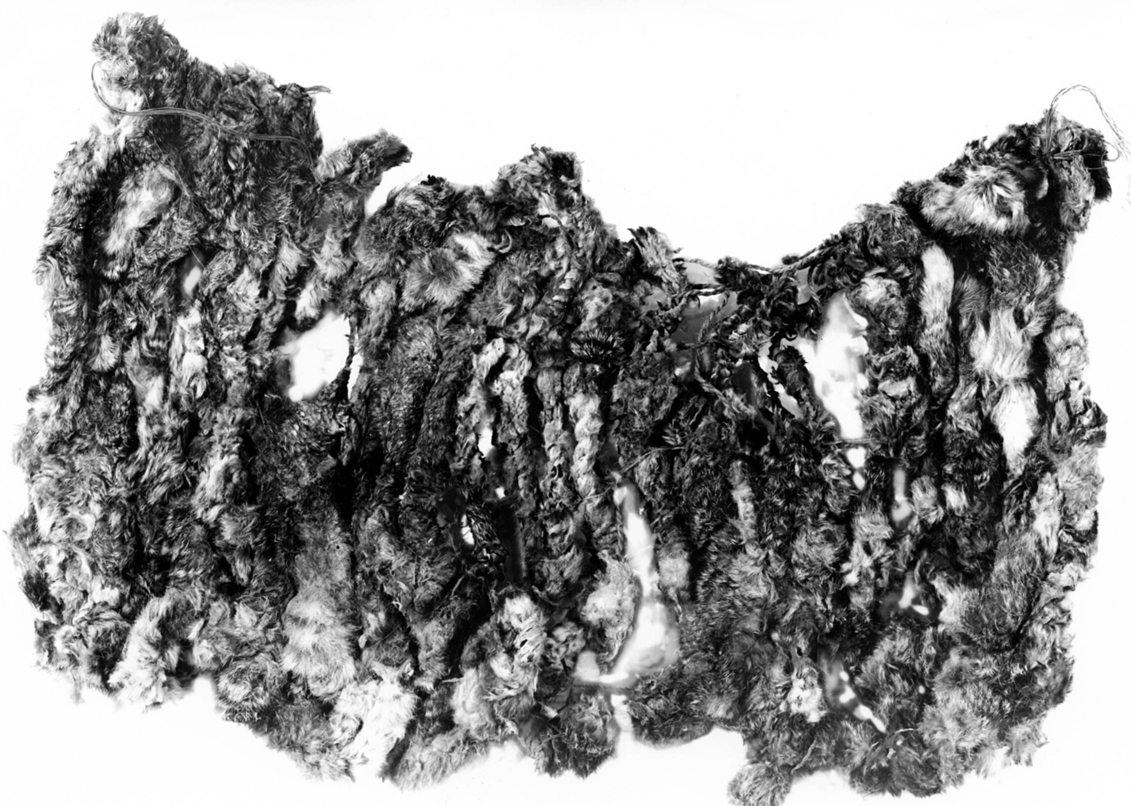

Figure 4. Rabbit skin robe fragment which encased the burial.

two bone objects, one of which was possibly an ornament which he did not describe, and a metate he suggested was used to grind pigment.

During the Late Archaic Blue Hills subperiodperiod infants received special burial treatment, and were wrapped in rabbit skin robes or animal skins tied in bundles with mats and placed on grass beds (Turpin 1992: 7-17; 1994: 69-84). However, Turpin (2011:6) reports that an infant burial recently dated from Horseshoe Ranch Cave surprisingly revealed Middle Archaic dates. As Turpin observes, however, the sample size is small and could easily be changed by more dates.

PAINTED PEBBLES FROM 41VV2079

Now I return to the focus of this paper, the 18 pebbles with visible paint, recovered from 41VV2079.[1] I have arranged the pebbles in a projected chronological sequence based on the recovery of lithic indices and stratigraphic evidence recovered at Lower Pecos sites such as Arenosa (Parsons 1986). The occupants of 41VV2079 for the most part followed the artistic template established elsewhere, choosing stream rolled pebbles from the Rio Grande, Pecos, and Devil's rivers on which to paint to the exclusion of other available stones. I have argued that the characteristics and origins of the pebbles in the rivers were perhaps as important as the image that was inscribed on the pebble (Mock 2011;2012; in press, also see Conkey 1980:245), evoking the power of place (Young 1988:159) and its relation to ancestral happenings in this area of the canyon lands drained by the Rio Grande, Pecos, and Devil's rivers.

The majority of artists from 41VV2079 favored black pigment as a primary medium applied with a fine brush and liquid paint or in crayon-like strokes. The artists also used red pigment to apply, add to, or to superimpose designs or random marks on the pebbles. The back of one pebble with ground edges was smeared with liquid red paint. Whether painted or scraped on the pebble, red pigment had the potential to layer the iconography with additional complex meanings related to blood.

Some of the pebbles display a sequence of additional surface modifications such as scratching, scraping, battering, repainting, directional abrasion, and/or superimposition of other motifs. These actions may have occurred simultaneously or over a period of time in a sequence of ritual events. Some pebbles reveal an oily or greasy surface or exhibit smoothing and polish, more than would be expected if used in a single episode, suggesting curation (Mock 1987, 2011, 2012). Others reveal faint detailed incised lines or lines etched by a sharp instrument such as a flint flake. These additive and subtractive alterations demonstrate a common deep-rooted cosmology (also occurring in the pictographs) and may have been intended to add to or extend a previous message or to nullify a previous meaning (Mock 1987, 2012).

Once painted, many of the pebbles from 41VV2079, as with pebbles from other rock shelters in the Lower Pecos, appear deliberately broken, and rarely are "matches" recovered. This practice suggests that once the ritual act was completed the pebble lost its "power" or the message or story was completed and then was thrown out or effectively terminated; thus, the imagery did not have a perpetual audience as did the more permanent pictographs. This ritualistic template is observed in the disposal and breakage of portable art in cultures around the world. For instance, evidence from Mesoamerica indicates that the separation of the broken parts of a ceramic vessel was a stated goal; the parts could not be put back together again, thus effectively terminating the power inherent in the object (Mock 1999).

MIDDLE ARCHAIC (5500-3200 B.P.)

The earliest period of occupation at 41VV2079 appears to be during the Middle Archaic (5500-3200 B.P.) verified, in part by recovery of a Val Verde point and established painted pebble chronology (Mock 2012; Parsons 1986). The period coincides with a projected increase in populations and density of occupations along with an increase in environmental stress (Bryant 1969; Turpin 1994). This time assignation coincides with the florescence of the polychrome Pecos River Style pictographs considered a hallmark of the Middle Archaic. The polychrome images derive from a shamanic religious tradition of public art and although sometimes co-occurring with the painted pebbles discarded in the midden deposits, share few motifs. Typical of the Pecos River Style are colorful, often large, enigmatic figures displaying both human and animal characteristics painted on the canyon walls (e.g., Kirkland and Newcomb 1967).

The pebbles from 41VV2079 dating to the Middle Archaic reveal some carryovers from the Early Archaic period (8900-5500 B.P.) in the presence of one to four parallel vertical lines extending from the top of the pebble to a horizontal midsection, an iconographic pattern that continues over time, suggesting it is of some significance (Mock 2012). The pebbles suggest that the painting of these lines may have been the first step in the artistic process. Based on my analysis of other painted pebble collections dating to the Middle Archaic, there appears to have been no standardization in choice of pebble sizes or forms on which to paint in comparison to painted pebbles dating to the Late Archaic and Late Prehistoric periods.

Figure 5. Middle Archaic, Group 1 specimen.

Two different patterns in the imagery on the pebbles during the Middle Archaic have emerged based on my examination of the 41VV2079 collection. Whether these patterns relate to the presence of specific groups, their movements, or even subtle chronological differences remain to be further evaluated.

GROUP I: MIDSECTION LOOPS AND CIRCLES

The patterns typical of pebbles in Group I are shown on pebbles in Figures 5-13 (see also Mock 2011: Figure 5, K. The pebble in Figure 5 reveals three vertical line (typically varying from 1 to 4 vertical lines) that extends from the narrow end, often placed above or intersecting with a midsection horizontal band. In the center of this band is a fringed center element (usually a black circle, oval, or irregular shape) topped with characteristic "u"-shaped loops that vary in size and number. The loops often are accompanied by fringed lines (see Sayles 1935: Plate XVIIIb; see Mock 1987: Figure 17a, Figure 18c, h and Figure 19e).

The designs on these two pebbles (Figures 6-7) broken at midsection are eroded but the chevron eyes similar to Figure 5 are distinct. The broadly painted lines appear to have been executed by the same artist. Chevron eyes, however, like the central core midsection, are seen later in the Late Prehistoric.

The midsection of a broken pebble (Figure 8) reveals a large, smudged black area with three top loops and two side loops. The usual interlaced scrolls are broken off. Four more broken pebbles (Figures 9-12) also show portions of the central fringed element or black oval or circular center characteristic of Group 1. This style of painted pebbles extends over a broader area than the Group II pebbles described below to sites further north such as Hind's Cave (Shafer 1986) and shelters in Seminole Canyon such as Fate Bell (see Davenport and Chelf 1941, Plate X-11). It is arguable that the central core element and attached loops and fringe represent the female genitalia (Mock 2011). Further examination of the painted pebble collections archived at TARL should expand the numbers of sites at which Group I painted pebbles occur.

The pebble in Figure 13, tentatively placed in this time period, is double wrapped in frayed agave cordage. This specimen is illustrated in Davenport and Chelf 1941: Plate VIII-20, but the wrapping is not shown. The pebble was purposely shaped to a square by grinding. The imagery, painted on both sides, ignores the contours of the stone. The front

Figure 6. Middle Archaic, Group 1 specimen.

Figure 7. Middle Archaic, Group 1 specimen.

Figure 8. Middle Archaic, Group 1 specimen.

Figure 9. Middle Archaic, Group 1 specimen.

Figure 10. Middle Archaic, Group 1 specimen.

Figure 11. Middle Archaic, Group 1 specimen

Figure 12. Middle Archaic, Group 1 specimen.

displays three vertical parallel lines whereas the back shows a criss-cross pattern, which appears elsewhere, as seen in the abraded stone in Figure 14, also from 41VV2079. Wrapped stream-rolled pebbles with extant imagery are rare. The majority of wrapped stones are not pebbles but shaped limestone spalls (see Davenport and Chelf 1941: Plate IX-10; also see Martin [1933]. Four stones recovered from Bee Cave (41BS8) in Brewster County, Texas were wrapped in grass that contained cactus spines (Coffin (1932:Plate IX). Painted pebbles from the Early Archaic period (8900-5500 BP) in the Lower Pecos feature vertical and horizontal lines that give the appearance of being wrapped or wound with fiber (e.g., Mock 2011:Figures 3-4).

GROUP II: BUTTERFLIES, FLYING INSECTS, AND AVIANS

The painted imagery on the pebbles in Group II is distinctive and appears to represent butterflies (sometimes represented by hearts), flying insects, avians, or flowers (see for example, Mock 2011, 5a, d-j, l-m, p-r). It is significant that the imagery appears to be limited to certain rock shelters at this time: Eagle (Ross 1965), Shumla Caves (Martin 1933), Muertos Cave (on the Rio Grande south of Shumla), and shelters in the Langtry area, all located in or near Mile Canyon. Of course, I emphasize again that this interpretation must be considered with some reservation since all painted/unpainted pebbles were not collected during early excavations in the Lower Pecos.

Of particular interest is the broken stone in Figure 15 for the imagery depicts a section of a fringed butterfly. The imagery in Figure 16 is distinguished by a circular motif encircled by four loops with extended lines. Heart-like butterflies rest on the lines. Interestingly, another broken painted stone from Eagle Cave (Ross 1965) features almost identical butterfly imagery (see Davenport and Chelf 1941: Plate V-9). The two rare stones are flat and do not appear to be the river-rolled pebbles typically preferred by the artists.

Among two types of incised pebbles recovered in Nuevo León and Coahuila, Mexico, by Turpin (2010:125-148) and Turpin and Eling (2003) (Turpin and Eling 2003) are those from the Coconos site. They too are distinguished by a curvilinear

Figure 13. Middle Archaic, Group 1 specimen.

Figure 14. Middle Archaic, Group 1 specimen.

Figure 15. Middle Archaic, Group 2 specimen.

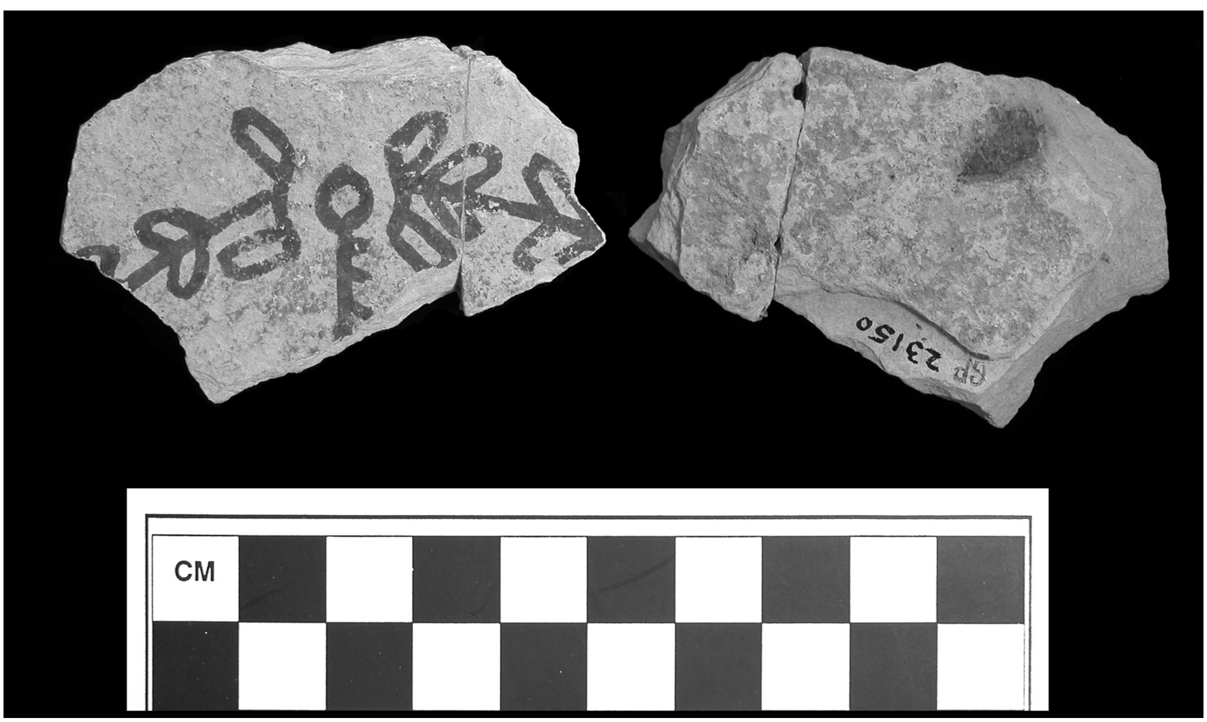

Figure 16. Middle Archaic, Group 2 specimen.

design that the authors interpret as butterfly and flower motifs. Turpin (2010) similarly discusses the butterfly as a symbol of transformation across cultures and proposes that the combination of vulva form and butterfly points to the engraved stones use in puberty or fertility rites.

The interpretation of the motifs in Group II as butterflies, birds, moths or other flying insects is not unreasonable considering the prominent role they played in the mythology and creation stories of many ancient cultures in the Americas (e.g., Fewkes 1910). Butterflies are found among the symbolic repertoire of the Huichol among other cultural groups (Furst 2003). Both the butterfly and the dragonfly had ancient origins in the Southwest and both were wide spread symbols of fertility and transformation (Slifer 2000:121-123). Even today there are modern survivals in ritual paraphernalia and mythology. Hays-Gilpin (2004) reports that butterflies and flowers represented among the Pueblo in dress, rituals, and rock art, many highly conventionalized, are key symbols for the female reproductive cycle and seasonal changes. Thus, the distinctive gendered imagery clearly relates to my contention that the Lower Pecos artists who painted the pebbles, perhaps in "coming of age" or puberty rituals, were female. The imagery also suggests the early influence of ideas emanating from the Southwest.

LATE ARCHAIC, BLUE HILLS SUBPERIOD (2300-1300 B.P.)

The third group of painted pebbles examined from 41VV2079 dating to the Late Archaic (2300-1300 BP..) is not well represented at 41VV2079 in contrast to other sites. During this time period, bison herds retreated as arid conditions set in, perhaps contributing to the expansion of desert-adapted people from Mexico into the area (Turpin 1987, 1990, 1991:33). Three painted pebbles dated to this time period were recovered in a fiber layer at Bonfire Shelter, a bison jump site, located near Mile Canyon (Dibble and Lorrain 1968). The painted pebbles are rarely found outside the Lower Pecos but a few sharing similar imagery have been found in the Big Bend area of southwest Texas (Martin and Woolford 1932; Roberts 2009, 2010).

The complex designs featuring butterflies, avian, and flowers or flying insects, characteristic of the previous Middle Archaic fall out of favor at this time. There is cohesiveness or "cultural buy-in" to a new artistic tradition revealing a preference for anthropomorphic-shaped river pebbles on which to paint. Anatomical details of the female form are represented more realistically with the head, face, and eyes depicted on the constricted end.

The human body, in particular the female form, was used as a model for structuring the natural environment among indigenous people of the Americas and bodily functions mimicked the flow of rivers. Rivers were conceptualized as the vaginal canal, as veins and arteries, or umbilical cords (Mock 2011:118). The vertical midline on the painted forms generally continues but the horizontal midsection now shows new gendered motifs such as variations of the open vulva (represented by motifs such as a bracket, ovals, split ovals, or closed circle), often with pubic hair fringe. The arms are shown outstretched, representing a receptive or breeching position that may suggest sex or birth. Wavy lines often are depicted in this group emanating from the vulva, which may represent water, amniotic fluid, or menstrual blood (e.g., Mock 2011:Figure 6d-e, i). Breasts may be represented by strategically placed black dots. More repetitive patterns of black dots or lines may suggest tattoos or body decorations.

The pebble in Figure 17 exhibits unusual anthropomorphic imagery executed on a very thin abraded spall rather than a river pebble (also see Sayles 1935:Plate XVIIIc). The back of the pebble shows directional diagonal lines scraped from top to bottom in continuous action with a sharp instrument. The central vertical line, rather than a mid-line horizontal that depicts a female vulva or its metaphoric equivalent, features a spider-like element with a small central circle that resembles imagery from the Early Archaic (8900-5500 B.P.)(see Mock 2011: Figures 3-4). The imagery on the second pebble in Figure 18, although eroded, reveals four parallel, vertical lines that extend from the top of the stone and partially down the back, also showing similarity to the Early Archaic. An attempt by the artist to show open arms (the receptive position), a characteristic of this group, is indicated by the crude curved lines on either side of the central element or vulva. A curvilinear design on the back continues the lines from the front of the pebble.

LATE PREHISTORIC (1320-450 B.P.)

The well-preserved pebbles shown here date to the Late Prehistoric, Flecha Subperiod (1320-450

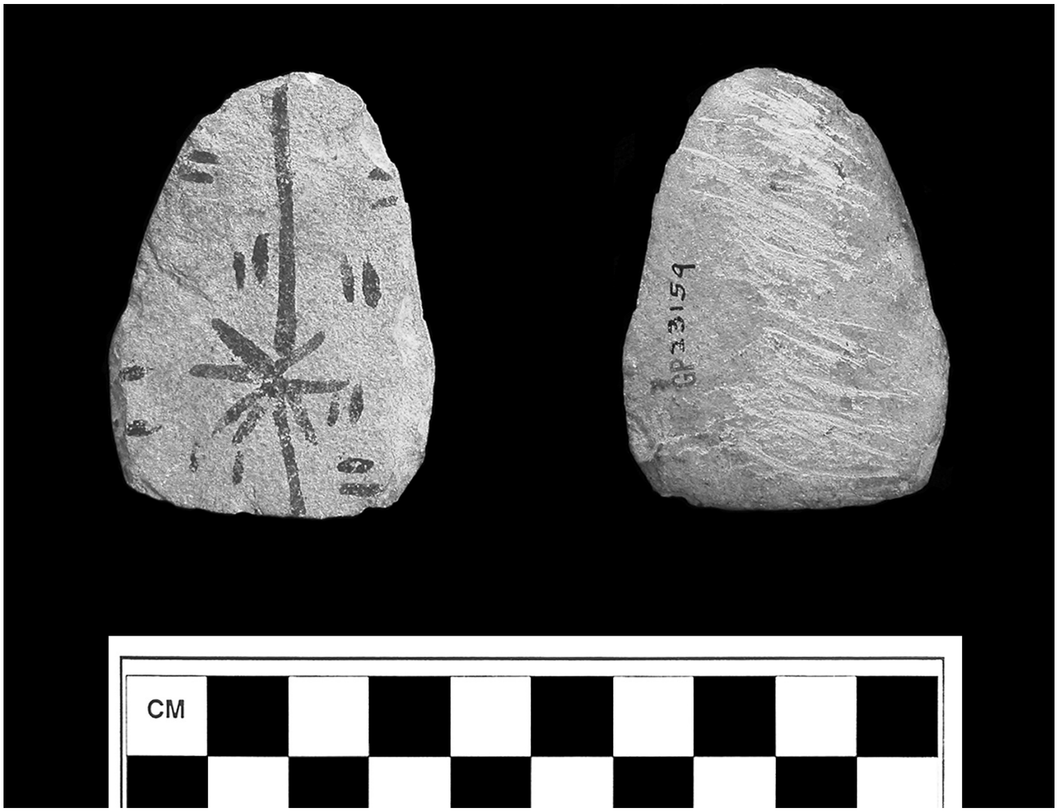

Figure 17. Late Archaic specimen.

Figure 18. Late Archaic specimen.

B.P.) based in part on the recovery of an arrow point shaft in 41VV2079 and previous chronological assessments made by Mock (2011) and Parsons (1986). The earliest appearance of arrow points in the Lower Pecos occurs around A.D. 650 at Arenosa Shelter. The painted pebbles dated to the Late Prehistoric occur in fewer numbers and are typically found in shallow deposits. Pebbles selected for painting at this time by Lower Pecos artists are smaller, ovoid forms. Parallel, vertical lines emanating from the top of the stone continue from earlier periods.

A distinguishing feature of the imagery is the black cap of hair on the front of the pebble that extends to the back (Figures 19 and 20; also see Sayles 1935:Plate XVIII). The cap of hair partly covers chevron eyes as shown in Figure 19. Additional painted chevrons on both sides of this pebble probably represent body decoration or tattoos. The surface shows a series of shallow vertical striations with a sharp instrument as does the broken medial fragment of a pebble, based on the distinct imagery, also placed in this group (Figure 21). The fringed black mouth shown on Figures 19 and 21, and comparison to imagery on other pebbles from sites dating to this time period, suggests that the mouth is a metaphor for the vulva (see Mock 1987:Figure 23c, 2011:Figure 7d). The mouth is more realistically portrayed in Figure 20.

Geometric designs, featuring motifs consisting of interlocking lines often forming zigzag designs, as seen on the back of Figures 20-22, also are a characteristic feature of the Late Prehistoric painted pebbles (Davenport and Chelf 1941:Plates II, 4b, 12a, b). The imagery displays characteristics of the Late Prehistoric Bold Line Geometric Style of rock art which also is characterized by intersecting straight lines forming lattices, zigzags, and other geometric combinations, all typified by the use of bold colors (e.g., Turpin 1995:543-550; also see Schaafsma [1992] for Southwest connections).

Figure 19. Late Prehistoric specimen.

Figure 20. Late Prehistoric specimen.

Figure 21. Late Prehistoric specimen.

Figure 22. Late Prehistoric specimen.

The polished pebble in Figure 20 shows a cross band design on the back also occurring on Figure 14 (See Davenport and Chelf 1941:Plate I-12). The geometric designs (on front and back) as seen on Figure 22 are quite unusual. It is probable that anthropomorphic imagery was present on the broken sections not recovered. Similarities in execution also suggest the pebbles shown in Figures 21-22 were painted by the same artist. One pebble, identical in execution to the pebble shown in Figure 22, was recovered from the Coontail Spin Shelter (41VV82) located on the north wall of the Rio Grande above Comstock (Nunley et al. 1965). Occupation of this large site also dates to the Late Prehistoric period. Closer to 41VV2079 at Eagle Cave (Ross 1965) and Shumla Caves (see Davenport and Chelf 1941:XIII:17a and b; and XI: 3a -b; Jackson 1938: CCXXXII), two other broken pebbles were recovered that display similar geometric imagery. Ross (1965) also shows a broken pebble from the McNutt Collection that features the distinctive imagery. Future examinations of the painted pebble collections may yield similar examples suggesting the movement of people within a prescribed area.

DISCUSSION

Little was known about the Lower Pecos region in the early 1930s when Ted Sayles initiated his ambitious excavations at 41VV2079. Like other archeologists of his time, Sayles focused his attention on developmental sequences, often with research aimed at tracing the origins or influences of one culture on another, either through trade or migration. As stated in the introduction, his intentions were to find archeological evidence of connections of the Lower Pecos to the cultures of the Southwest. His subsequent 1935 publication, *The Archaeology of Texas,* reveals his concern with the big picture for he combines archeological materials from 41VV2079 with those of the other two sites he excavated on Mile Canyon, 41VV167 and 41VV164.

Sayles' 1932 excavation notes of 41VV2079 (1932) are sketchy and do not provide information about the context of the painted pebbles in relation to other recovered materials. What is significant is that he did recover well-preserved painted pebbles in such a small, shallow rock shelter, all apparently painted by a long tradition of artists from the Middle Archaic to the Late Prehistoric. Deposits from the shelter suggest short-term occupation by small groups, perhaps extended families, to take advantage of seasonally available resources near the spring fed creek below. It is probable that these groups traveled between the tributary river canyon sites in this area, and joined larger aggregations at sites such as Eagle Cave (41VV 167) in nearby Mile Canyon to exchange information and facilitate mating networks.

Microscopic examination, as illustrated in this study of the pebbles from 41VV2079, has great potential in the future for a comparison of artistic styles between sites not only in the application of painted images but other preferences in modifications of the stone and selection of designs that may show individual artists at work.

An analysis of the Middle Archaic painted pebbles from 41VV2079 reveals two distinctive pebble styles that may be of temporal or geographical significance. The pebbles in Group 1 display imagery that is more broadly distributed than the pebbles in Group 2. The latter features butterfly/insect/avian imagery that appears to be more territorially limited to sites centered around the Langtry area and Mile Canyon, Eagle and Shumla Caves, and Muertos Cave. The rarity of pebbles dating to the Late Archaic in contrast to other sites suggests that the site was not utilized intensely at this time, perhaps increasing arid conditions dried up the water supply in the canyon below. It is significant that the imagery on painted pebbles dating to the Late Prehistoric period from 41VV2079 is similar to designs at Coontail Spin Shelter, Eagle Cave, and Shumla Caves, which also showSouthwestern influences.

We cannot assume that the Lower Pecos region was an insular area for certainly there were important mechanisms in place to drive human exploration and interaction. Of importance is the fact, that unlike more permanent parietal art, the painted pebbles had the potential to be moved around and thus carry more intimate meanings to different audiences The Rio Grande was a logical channel of communication as it flowed to the gulf, empowered by a number of tributaries in the Southwest area of New Mexico and northern Mexico stretching from Coahuilteco to Tamaulipeco and ultimately to the Tarahumara and Tepehuane. Demographic pressure for a small group to survive within a territory of seasonal rounds and the need to find suitable mates would have been a compelling reason for exploration and interaction between local communities.

It is obvious that the painted pebble tradition was a widespread, long-term phenomenon that despite evolutionary changes, continued to play an integral role in the worldview of the Lower Pecos people. Women, if moving from one group to another through mating networks, perhaps did not always transport the pebbles, but certainly carried recall of the myths and rituals imbedded in history and landscape and continued to gather in the rock shelters to recreate these legacies through the magic of paint in gendered rituals. The longevity of the painted pebble tradition suggest that it may have served as a portable expression of the "mythological charter" of the Lower Pecos people, like a passport to travel across time to their origins (e.g., Malinowski 1954:113).

In conclusion, although the archeological record of 41VV2079 was compromised in many ways, the people who lived here in the Lower Pecos and painted the pebbles have left subtle brush strokes of history to lead us in new directions. Ultimately, detailed and continued recordation of the painted pebble collections may permit additional mapping of specific groups or movement of people or social units on the landscape encompassed by the Rio Grande, Pecos, and Devil's rivers.

ACKNOWLEDGEMENTS

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unanalyzed collections archived at TARL that are a treasure house of potential information to shed light on the history of Texas and I encourage others to take advantage of them. I thank Dr. Tom Hester for his assistance in identifying the lithics and Dr. Solveig Turpin and Roberta McGregor for reading and commenting on initial drafts of the article.

ENDNOTES

1. Three of these pebbles are featured in Plate CCXXXII of Picture-Writing of Texas Indians in the E.F. McNutt Collection and Sayles 1935, Plate XVIIIa-c). Other pebbles are among those illustrated in Davenport and Chelf (1941). Debra Beene's 1988 paper filed at TARL also includes descriptions and illustrations of the pebbles from 41VV2079.

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Transitional Archaic/Late Prehistoric Cooking Technology in the Lower Pecos: Excavation of the Lost Midden Site (41VV1991), Seminole Canyon State Park and Historic Site, Val Verde County, Texas

Tim Roberts and Luis Alvarado

ABSTRACT

In September 2007, a previously unrecorded upland burned rock midden site, the Lost Midden site (41VV1991), was encountered during construction activities near the Visitor's Center at Seminole Canyon State Park and Historic Site, Val Verde County, Texas. Subsequent mitigation measures included the excavation of 18 1 x 1 m test units, as well as several shovel tests and mechanical auger tests. These excavations showed that the site, buried within a large natural soil-filled depression, measured approximately 15 x 26 m in size and included two burned rock middens and an intact roasting pit. Cultural deposits averaged 40 to 50 cm in thickness and contained lithic artifacts, floral remains, snails, and mussel shells and shell fragments. Among the lithic artifacts were 11 diagnostic projectile points and projectile point fragments, including both dart points and arrow points. The projectile points and eight radiocarbon assays indicate that the site was utilized between approximately 1300 and 690 years ago, during the Flecha subperiod of the Late Prehistoric period and very late in the Blue Hills subperiod of the Transitional Archaic. Analysis of the macrofloral remains revealed that sotol and lechuguilla were the likely food sources roasted at the site, while a wide variety of plants were utilized as fuel sources. The location of the intact roasting pit in an area protected from southerly winds may suggest that roasting events were conducted in the spring to early summer, when prevailing winds are from the southeast. If so, it is possible that the site served as a warm weather kitchen for inhabitants of nearby rockshelters.

BACKGROUND

In September 2007, despite at least three separate archeological surveys that included the upland project area, and several previous impacts to the project area, a previously unrecorded burned rock midden site—the Lost Midden site (41VV1991)—was encountered by a Texas Department of Transportation contractor while conducting a backhoe excavation for a recreational vehicle dump station at Seminole Canyon State Park and Historic Site, Val Verde County, Texas (Figures 1-2; Roberts and Alvarado 2011).

Following the accidental site discovery, the senior author traveled to the site and conducted a series of shovel tests (n=9) at 5 m intervals in cardinal directions from the open backhoe pit to try to determine its size. Based on the presence of cultural material (burned rock) in only one of the shovel test excavations east of the backhoe excavation, the site appeared at that time to consist of a single burned rock midden, measuring approximately 22 m north-south by 16 m east-west and encompassing about 0.04 hectares. Roughly 23.8 m^2 of the estimated 359.4 m^2 site, or about 6.6 percent, was impacted by construction activities.

Park staff and volunteers screened over 50 percent of the backdirt from the backhoe excavation, recovering scrapers, utilized flakes, and chipped stone debitage and debris. Fragments of Tampico pearlymussel (*Cyrtonaias tampicoensis*) shells and the shells of two species of terrestrial snails, including *Rabdotus dealbatus* and *Polygyra texasiana*, were also recovered. Burned rock was also identified, but not collected. The overall artifact density was sparse.

In November 2007, Roberts, park staff, and volunteers, excavated a series of 29 mechanical auger tests across the site area and beyond. Thirteen of the auger tests had chipped stone debitage and debris, as well as burned rock. These tests also resulted in the identification of an additional burned rock midden west of the original midden, leading to a modification of the site boundaries. The site

Figure 1. Backhoe excavation at previously unknown site 41VV1991, the Lost Midden site.

had a revised maximum north-south dimension of approximately 15 m by a maximum east-west dimension of about 26 m.

At this early stage of the project, no diagnostic projectile points were recovered from the Lost Midden site; however, end scrapers were found and are known to be one of the diagnostic artifact classes that typify Late Prehistoric Flecha subperiod (1320-450 B.P.) and Infierno phase or interval (450-250 B.P.) sites in the region. These Late Prehistoric sites are also typically found in the same kind of upland settings as the Lost Midden site.

SCOPE AND PURPOSE OF THE LOST MIDDEN SITE MITIGATION

Burned rock midden sites are not uncommon in the Lower Pecos or surrounding regions (see Black et al. 1997:91; Dering 2002:6.3), but these sites, unlike the Lost Midden site, are often found exposed on the surface of stable upland landforms and the materials recovered from these sites are very difficult to temporally separate (Dering 2002:6.4). Furthermore, burned rock midden sites that date to the Late Prehistoric period or include a Late Prehistoric component are relatively rare in the Lower Pecos in comparison to those dating to the Middle or Late Archaic periods (cf. Dering 2002:5.8). Because of the buried context of the Lost Midden site, and the preliminary assessment that it contained Late Prehistoric deposits, the site showed considerable potential to contribute important information about the Late Prehistoric tradition in the Lower Pecos.

As a result of the apparent research potential of the Lost Midden site and the damage that was done during construction activities, the Texas Parks and Wildlife Department, in coordination with the Texas Historical Commission, pursued mitigation of the site. Mitigation included extensive excavations, geomorphological and paleobotanical studies, and other analyses. The fieldwork for the mitigation was conducted by Texas Parks and Wildlife Department staff and volunteers during March, May, and November 2008, under Texas Antiquities Permit No. 4862.

The focus of the excavation was the recovery of data that were sufficient to address six critical research questions about burned rock middens posed

Figure 2. Exposed burned rock midden, Feature 1, within backhoe trench.

by Black et al. (1997) in their burned rock midden study *Hot Rock Cooking on the Greater Edwards Plateau: Four Burned Rock Midden Sites in West Central* Texas. These questions, as they pertained to the Lost Midden site, are:

- When did the burned rock middens at this site accumulate?
- How did these middens form?
- What foods were processed and cooked in these middens?
- How did the middens function within the context of the site?
- Is there variation between the middens at the Lost Midden site; if so, how can this variation be explained?
- Why did these middens form where they did on the landscape?

ENVIRONMENT AND GEOMORPHIC CONTEXT

Located within the 880 hectares Seminole Canyon State Park and Historic Site, in southern Val Verde County, Texas, the Lost Midden site is situated in the northeastern Chihuahuan Desert. The landscape in the area is characterized by narrow drainageways that have eroded and deeply dissected the uplifted and inclined limestone bedrock in the region, creating steep canyon walls in many places (Cliff et al. 2003:3).

Among the most interesting aspects of the Lost Midden site is its physiographic and geomorphic context. The site is situated almost entirely within a large sediment-filled basin of carbonate bedrock on what today is a relatively level upland summit near the western wall of Seminole Canyon, at an elevation of about 422 m amsl. The process by which the basin formed remains uncertain, but it may represent a partially collapsed sinkhole. The basin could also represent a *tinaja*, but it lacks the characteristic form and smoothed surfaces of most features of this type in the area. The bedrock floor of the basin, which was partially exposed by the backhoe excavation, is approximately 1.2 m below the present ground surface and is nearly level. The sides of the basin are more irregular and marked by occasional calcium carbonate 'bubbles.' These bubbles, which are ca. 1 m in diameter and rise up to within about 0.5 m below the present ground surface, were subsequently tested by project geomorphologist Ed Hajic. Test results showed these natural features to be small algal mounds (Ed Hajic, personal communication, October 22, 2009). These algal mounds were formed by calcareous *Halimeda* macroalgae when the area was covered by a sea during the Cretaceous period. This suggests that the basin formation, within which the Lost Midden site is situated, has considerable age.

Within the natural basin, the sediment sequence consists of two soil strata that extend to a maximum depth of approximately 1.2 m (Figure 3). The lower strata consists of dark brown granular to fine gravel silty clay to heavy loam. Sand is abundant, and ranges from fine to very coarse. Not all sand, however, consists of siliciclastic material. In some samples, sand-size grains appear to be rounded aggregates of silty clay. The upper strata consists of very dark brown to dark brown granular to very fine gravel silt loam to loam that more or less coincides with the prehistoric component of the Lost Midden site. Sand content is similar to the lower unit. Angular cobble gravel of the local bedrock is common, sometimes appearing as stone lines in profile in association with cultural deposits and features. The sediment within the basin accumulated as a combination of eolian and local colluvial depositional episodes (Ed Hajic, personal communication, October 22, 2009).

The contact between the two sediment units at the Lost Midden site is clear to abrupt, and somewhat masked by soil formation and likely cultural

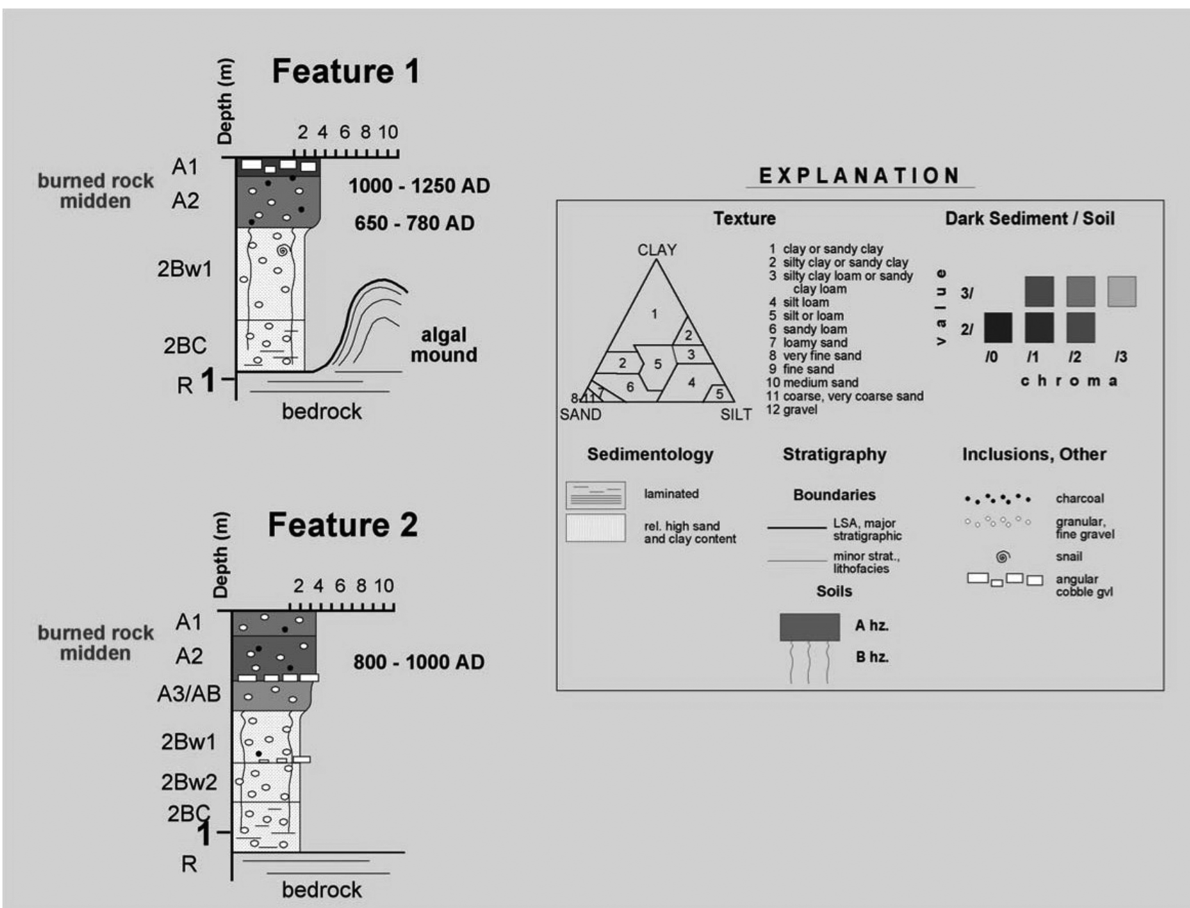

Figure 3. Graphic sediment logs for 41VV1991. Prepared by Ed Hajic, Santa Fe, New Mexico.

activities. In general, the soil exhibits a moderately expressed A1 – A2 – 2Bw1 – 2Bw2 – 2BC – R profile. The soil has granular to subangular blocky structure and a friable consistency. It is unleached, and there is a paucity of whole snail shells. A modest amount of charcoal is dispersed throughout the upper deposits; only a few fragments were encountered in the lower part beneath the cultural deposits (Ed Hajic, personal communication, October 22, 2009).

RESULTS OF PRELIMINARY INVESTIGATIONS

The preliminary shovel tests and mechanical auger tests at the Lost Midden site suggested that the overall artifact density on the site was relatively sparse. Nonetheless, a total of 477 items were recovered during the combined preliminary field efforts at the site, including 76 chipped stone artifacts, 355 floral and faunal specimens, and 46 other items, some of which may not be cultural. With the exception of cores, the chipped stone artifacts represented the entire bifacial reduction sequence, indicating that tool manufacturing, as well as food processing activities, were conducted on the site. Lithic tools included six utilized flakes, three scrapers, and one Late Prehistoric Perdiz arrow point (Figure 4). With the exception of a very small fragment off the distal end, the Perdiz point is complete. The point was produced from a fine-grained light gray chert with no evidence of thermal alteration. The triangular blade edges of this specimen are deeply concave and lightly serrated, and the barbs flare outward. Perdiz points are found throughout most of Texas, and date to the Late Prehistoric period between approximately 750 and 250 years ago (Lohse 1999:265-279; Turner et al. 2011:206).

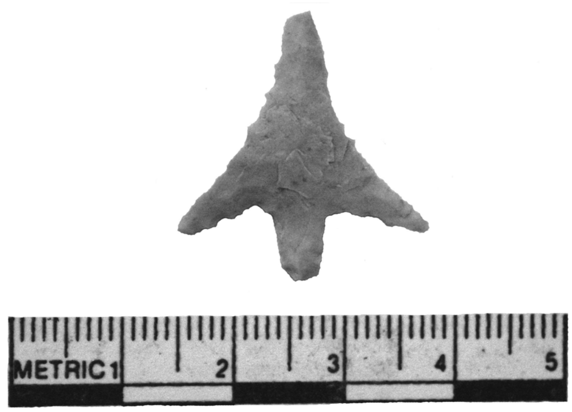

Figure 4. Perdiz arrow point recovered during preliminary investigation of 41VV1991.

RESULTS OF BLOCK EXCAVATIONS

Following preliminary testing, and a geomorphological assessment by the project geomorphologist, the remaining overburden that mantled the Lost Midden site was removed. Most of the soil that mantled the site was removed by heavy equipment prior to the backhoe excavation of the original midden as part of the preparation for constructing the proposed recreational vehicle dump station. As a result, only a thin layer of soil remained across the site. This soil was removed by hand troweling and shovel skimming in order to fully expose the cultural features and any living surfaces that may have been present.

Upon removing this soil and fully exposing the two burned rock middens, the plan view of the site was thoroughly documented through conventional digital photography and low altitude aerial digital photography (i.e. kite photography and blimp photography; Figure 5). A base map of the site was also completed, using a total data station and stadia rod, and Surfer PC software. Eighteen 1 x 1 m units were subsequently placed within the fully revealed cultural features and other areas of the site (Figure 6). Investigations at the Lost Midden site, including the unit excavations, revealed the two previously noted burned rock middens and an intact roasting pit (Feature 3) discovered within the original burned rock midden (Feature 1).

Feature 1

Feature 1 is the large burned rock midden that was originally discovered during backhoe excavations for the proposed recreational vehicle dump station. Evidence of this feature, including an abundance of approximately fist-sized angular limestone rocks, charcoal staining, and occasional chipped stone artifacts, was readily apparent in the soil profiles of the backhoe excavation. The full margins of this feature were exposed during the subsequent removal of the remaining overburden.

Fourteen 1 x 1 m units were excavated within Feature 1. The placement of these units was

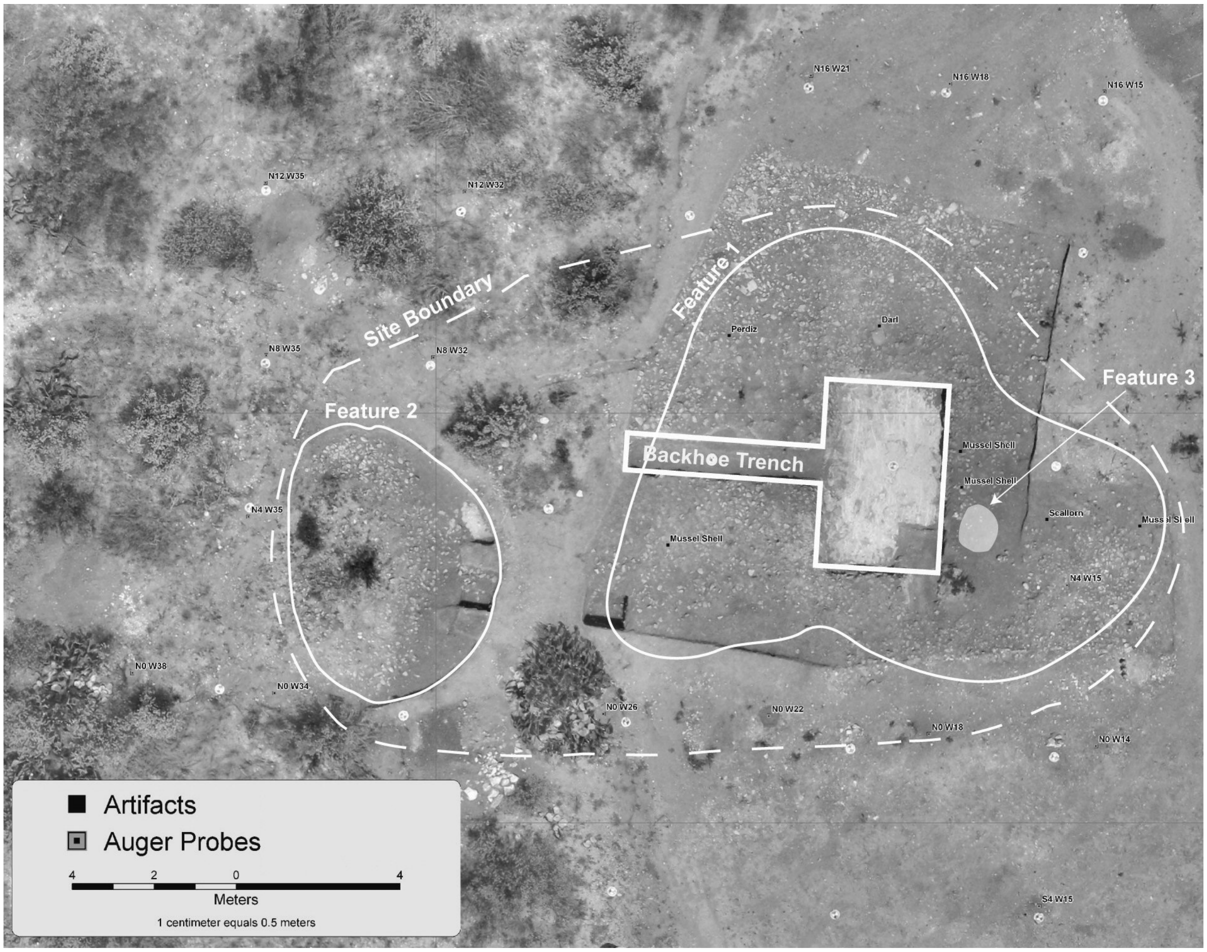

Figure 5. Low altitude aerial image of Lost Midden site area. Photo by Mark Willis, Austin.

determined, in part, by the remaining intact areas of Feature 1, the nature of these areas in relationship to the overall burned rock midden, the abundance of cultural material in these areas, evidence of other possible cultural features, and the geomorphological setting. This distribution of units provided a good cross-section of Feature 1, and resulted in the discovery of an intact roasting pit (Feature 3) in the southeastern part of the midden.

Feature 1 is amorphous in shape, and has a maximum north-south dimension of 10 m by 12.5 m east-west. The maximum depth of this feature is approximately 57 cm bs, but the base of the feature is uneven. The average depth of Feature 1 is approximately 45 cm bs. The area of Feature 1 immediately surrounding Feature 3, an intact earth oven, is reminiscent of a singular ring midden. However, the large, amorphous nature of the broader Feature 1, and the presence of Transitional Archaic dart points and Late Prehistoric arrow points within this feature (see below), suggests that Feature 1 may actually represent remnants of multiple ring middens or crescent middens. While the radiocarbon dates for this feature (Table 1) all fall within the Late Prehistoric Flecha subperiod (1380-510 B.P.), they may still represent at least two use episodes. If Feature 1 does actually represent multiple burned rock middens, it was not readily apparent within the extensive stratigraphic profiles of the original backhoe excavation or the unit excavations.

MATERIAL ASSEMBLAGE

Lithic Analysis

The chipped stone artifacts recovered during block excavations include 53 tools and tool fragments, three cores, and 366 pieces of debitage. The largest sample of debitage (n=307, 84 percent), as

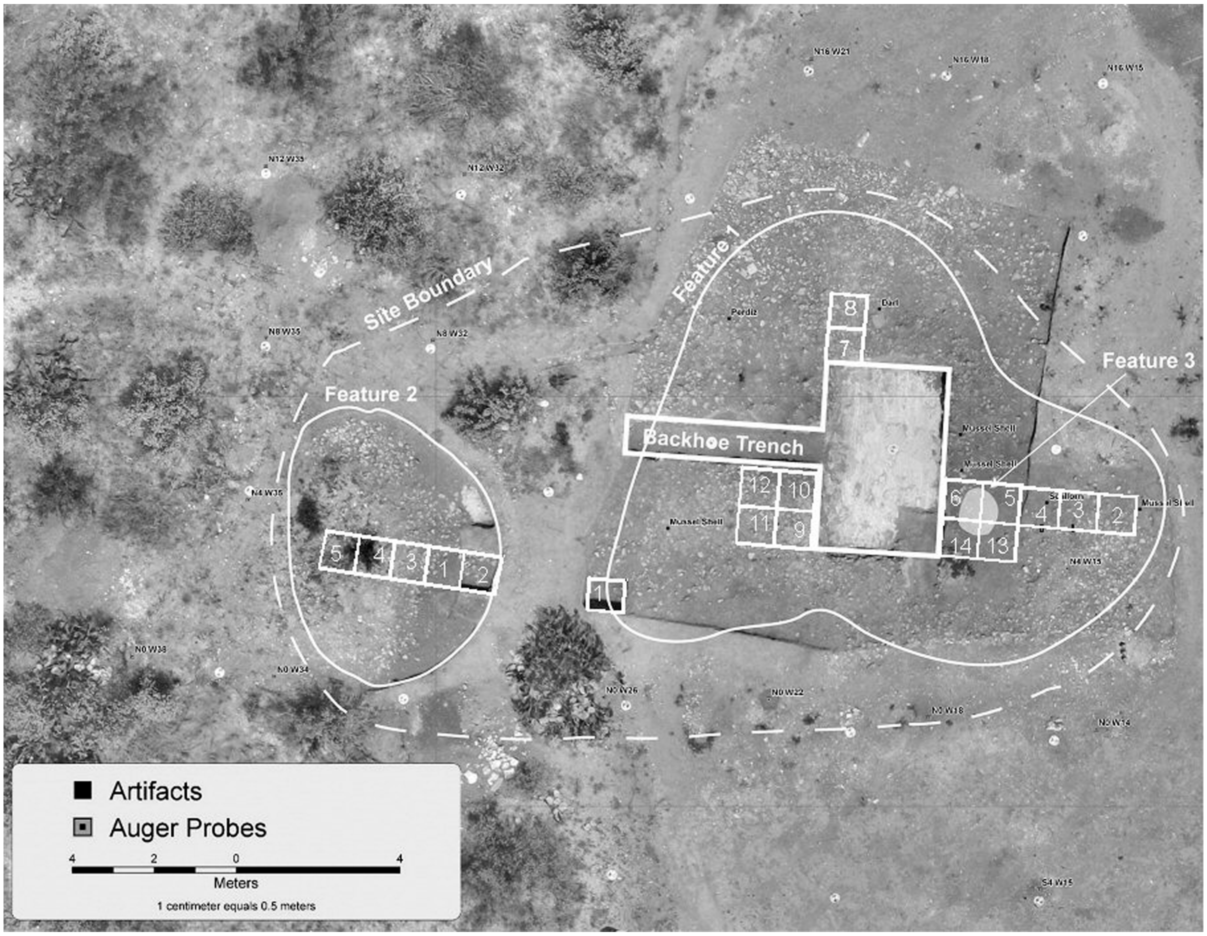

Figure 6. Test Unit locations at 41VV1991.

Table 1. Radiocarbon Dates for Feature 1.

Beta Analytic Sample #	Test Unit	Excavation Level	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age	Two Sigma Calibrated Result
Beta-262708	4	40-50 cm bs	960±40 B.P.	-25.2 ‰	960±40 B.P.	940-780 B.P.
Beta-262709	6	30-40 cm bs	860±40 B.P.	-23.6 ‰	880±40 B.P.	920-700 B.P.
Beta-250376	Original backhoe excavation	43 cm bs	1260±40 B.P.	-22.7 ‰	1300±40 B.P.	1300-1170 B.P.

well as all of the chipped stone tools and cores (n=56) recovered during these excavations, were collected from Feature 1. Tools included five dart points and fragments, five arrow points, eight knives, 11 scrapers, two spokeshaves, one graver, one burin flake, five miscellaneous bifaces, four miscellaneous unifaces, and 10 utilized flakes (Tables 2-3).

All five dart point specimens recovered during block excavations are broken but two retain features sufficient for type identification. The typable specimens include one Darl and one Ensor point (Figure 7).

The Darl point fragment, which was nearly complete, has a long and slender triangular blade

Table 2. Projectile Point Assemblage Recovered from the Lost Midden Site.

Type	Length (mm)	Haft Length (mm)	Blade Width (mm)	Neck Width (mm)	Base Width (mm)	Base Depth (mm)	Thickness (mm)	Material
Dart Points								
Darl	–	4.1	19.7	10.1	11.1	–1	5.8	Fine grained, indeterminate
Ensor	–	4.0	19.1	13.4	15.6	0	5.2	Fine grained, local
Untyped	–	5.2	21.8	13.0	13.7	0	5.8	Fine grained, local
Untyped	–	–	–	–	–	–	2.7	Fine grained, indeterminate
Untyped	–	–	–	–	–	–	4	Fine grained, local
Arrow Points								
Perdiz	29.4	12.3	22.9	4.2	4.2	0	2.1	Fine grained, indeterminate
Perdiz	22.5	–	20.4	4.4	–	–	2.5	Fine grained, indeterminate
Sabinal	–	2.3	21.7	4.4	6.5	0	3.6	Fine grained, non-local
Sabinal	25.4	3.6	16.4	5.7	7	–	2.6	Fine grained, indeterminate
Scallorn	25.4	3.6	16.4	5.7	7	–	3.3	Fine grained, indeterminate
Untyped	–	–	–	–	–	–	3.6	Fine grained, indeterminate

Table 3. Non-Diagnostic Chipped Stone Tools and Cores Recovered from the Lost Midden Site.

Specimen	Completeness	Length (mm)	Width (mm)	Thickness (mm)	Material	Other Observations
Knives						
Bifacial knife	Complete	57	31	10	Fine grained, local	
Unifacial knife	Complete	42	25	5	Fine grained, indeterminate	
Bifacial knife	Proximal fragment	47	25	6	Fine grained, indeterminate	
Bifacial knife	Proximal fragment	32	30	8	Fine grained, local	
Knife	Distal fragment	32	32	9	Fine grained, indeterminate	
Knife	Indeterminate fragment	47	31	10	Fine grained, indeterminate	
Knife	Indeterminate fragment	26	23	11	Fine grained, indeterminate	

Table 3. *(Continued)*

Specimen	Completeness	Length (mm)	Width (mm)	Thickness (mm)	Material	Other Observations
Sotol knife	Unifacial	81	42	9	Fine grained, indeterminate	
Scrapers						
Side scraper	Complete	44	31	15	Fine grained, local	
Side scraper	Medial fragment	51	34	8	Fine grained, local	
Side scraper	Proximal fragment	67	48	13	Fine grained, non-local	
Side scraper	Proximal fragment	69	34	8	Fine grained, indeterminate	
End scraper	Fragment	48	31	11	Fine grained, indeterminate	
Indeterminate	Fragment	40	18	8	Fine grained, indeterminate	
Indeterminate	Fragment	22	32	9	Fine grained, indeterminate	
Indeterminate	Fragment	20	21	5	Fine grained, indeterminate	
Indeterminate	Fragment	31	22	9	Fine grained, indeterminate	
Indeterminate	Fragment	21	7	6	Fine grained, indeterminate	
Indeterminate	Fragment	22	7	6	Fine grained, indeterminate	
Spokeshaves						
Spokeshave	Complete	28	25	7	Coarse-grained, local	Depth of working edge is 3 mm; width of working edge is 19 mm
Spokeshave	Complete	25	42	12	Fine grained, local	Depth of working edge is 3 mm; width of working edge is 13 mm
Graver						
Graver	Complete	32	31	9	Fine grained, indeterminate	
Burin						
Burin	Fragment	40	8	8	Fine grained, indeterminate	

Table 3. *(Continued)*

Specimen	Completeness	Length (mm)	Width (mm)	Thickness (mm)	Material	Other Observations
Miscellaneous bifaces						
Miscellaneous biface	Fragment	32	35	10	Fine grained, local	
Miscellaneous biface	Fragment	31	26	11	Fine grained, indeterminate	
Miscellaneous biface	Fragment	28	41	13	Fine grained, indeterminate	
Miscellaneous biface	Fragment	21	23	5	Fine grained, non-local	
Miscellaneous biface	Fragment	30	28	4	Coarse grained, local	
Miscellaneous unifaces:						
Uniface	Proximal fragment	34	31	11	Fine grained, indeterminate	
Uniface	Proximal fragment	12	21	5	Fine grained, indeterminate	
Uniface	Distal fragment	33	37	11	Fine grained, local	
Uniface	Medial fragment	42	11	3	Fine grained, local	
Utilized flakes						
Utilized flake	Complete	31	16	5	Fine grained, non-local	
Utilized flake	Complete	32	19	5	Fine grained, non-local	
Utilized flake	Proximal	44	45	14	Fine grained, non-local	
Utilized flake	Proximal	37	42	7	Fine grained, non-local	
Utilized flake	Proximal	32	31	15	Fine grained, local	
Utilized flake	Distal	33	40	7	Fine grained, non-local	
Utilized flake	Distal	34	29	5	Fine grained, indeterminate	
Utilized flake	Lateral edge	36	12	4	Fine grained, local	
Utilized flake	Lateral edge	37	16	6	Fine grained, indeterminate	
Utilized flake	Lateral edge	25	12	4	Fine grained, local	

Table 3. *(Continued)*

Specimen	Completeness	Length (mm)	Width (mm)	Thickness (mm)	Material	Other Observations
Cores						
Core	Complete	73	64	50	Fine grained, non-local	Multi-directional, multi-faceted
Core	Complete	47	51	53	Coarse grained, non-local	Multi-directional, multi-faceted
Core	Fragment	35	32	12	Fine grained, indeterminate	Unifacial, multi-faceted

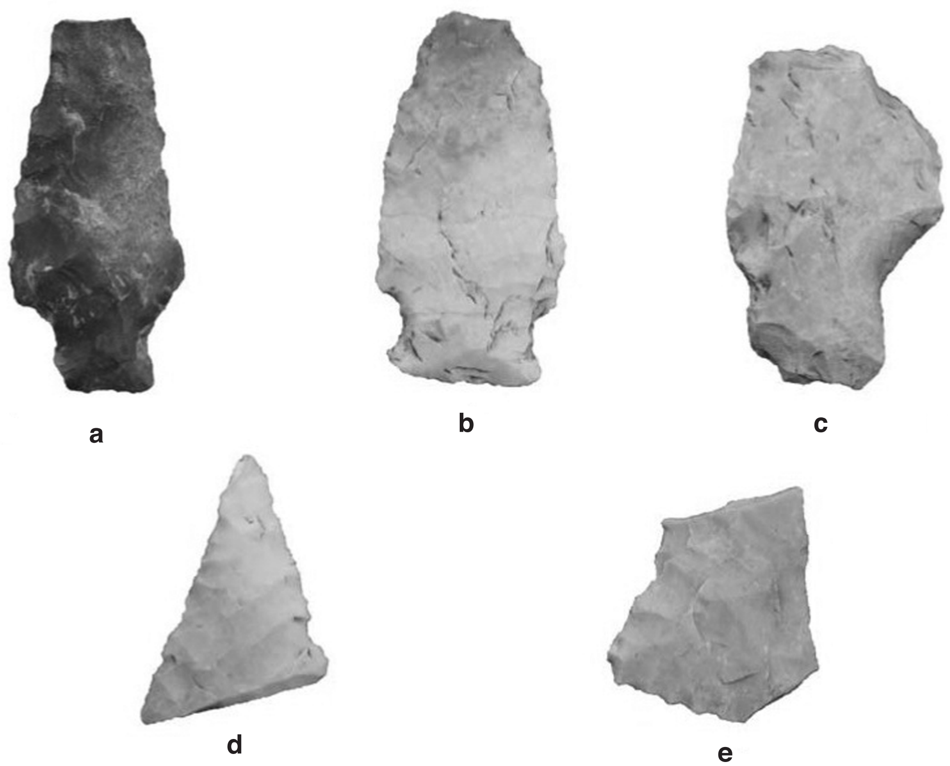

Figure 7. Dart points recovered during test unit excavations, all from Feature 1: (a) Darl; (b) Ensor; (c-e) untyped dart points. Shown actual size.

that is beveled along one lateral edge. The point lacks both barbs, while the distal tip is missing. The distal break is indeterminate but the remaining distal end may be burinated. The specimen also exhibits a slightly expanding and concave stem. Darl points date to the late Late Archaic period, and continued to be used into the Late Prehistoric. Based on recent findings, the dates for these points appear to range between about 1810 B.P. to possibly as recent as 850-900 B.P. (Carpenter et al. 2006; Turner and Hester 1999:101).

The blade of the Ensor proximal dart point fragment is generally triangular in shape but the blade margins are slightly convex. The distal tip is missing but the break type is indeterminate. The shoulders are weak, while the side-notches are shallow and wide. The specimen also exhibits a broad stem and a straight base. Ensor points date to the Blue Hills subperiod, between 2360-1410 B.P. (Turner et al. 2011:94; Turpin 2004:274).

The three untypable dart point fragments consist of one proximal, one distal, and one blank fragment. The proximal fragment appears to have been made on a flake. The blade was heavily resharpened but retains a triangular blade shape, which is beveled along the remaining lateral blade edge. The point fragment lacks both barbs and the distal tip is missing, likely due to a use-related break. The specimen retains a beveled, slightly expanding, and concave stem. The distal fragment is thin and appears to be a finished specimen that exhibits a use-related break. The blank fragment is missing the distal end and was abandoned before a stem was formed. Dart points are generally dated to the Archaic period, between approximately 9000-1400 years ago (Johnson and Goode 1994:5).

The five arrow points collected during block excavations included one complete arrow point, two distal fragments, one proximal fragment, and one medial fragment (Figure 8). Four of the specimens were identified to type (see Table 2).

One distal Perdiz point fragment was collected from Feature 1. The specimen exhibits concave blade margins that are slightly serrated. The barbs are exaggerated to aberrant and flare outward from the specimen's long axis. The one remaining corner notch is wide and deep. The stem is absent on this specimen. The point is made of fine-grained tan chert from an indeterminate source. This point type, which is found throughout most of Texas, dates to the Late Prehistoric period, between approximately 750 and 250 B.P (Lohse 1999:265-279; Turner et al. 2011:206).

One Sabinal proximal fragment and one lateral fragment were recovered from block excavations in Feature 1. The proximal fragment exhibits blade margins that are recurved and slightly serrated, while the barbs are downsloped and flare outward from the long axis. Deep and narrow basal notches define the bulbous stem. The item is made of fine-grained chert from a non-local source. The lateral Sabinal fragment retains most of both blade margins and one intact barb. The lateral blade edge retaining the barb is also recurved and slightly serrated while the remaining barb is downsloped and flares outward from the specimen long axis. The fragment is made of fine-grained chert from an indeterminate source. Sabinal points date between 830 and 700 B.P. (Turner et al. 2011:208).

A fragmentary Scallorn arrow point was recovered from the Feature 1 excavations. The specimen has a thin triangular blade but is missing the distal tip and base due to use-related breaks. The barbs were reworked, while the corner notches are wide and relatively deep. The point is made of fine-grained chert from an indeterminate source. Scallorn points date between about 800-1250 B.P. (Turner et al. 2011:209).

The arrow point medial fragment likely represents a finished or a near finished specimen. It retains one barb fragment and evidence of a second barb and a base. The break surfaces indicate the specimen was broken during use. The specimen is made of fine-grained chert from an indeterminate source. Arrow points date to the Late Prehistoric period, between about 1410-410 B.P. in the Lower Pecos (Johnson and Goode 1994:39-41).

Half of the chipped stone debitage sample from the Lost Midden site consists of complete flakes, with lesser numbers of proximal flakes and chips, and a small amount of angular debris. The breakdown of debitage by flake types indicates that specimens associated with biface manufacture and biface thinning are the most common categories. Biface resharpening flakes represent a small part of the assemblage. Specimens derived from platform/core preparation also comprise a small part of the collection, as do uniface manufacturing/resharpening and notching flakes.

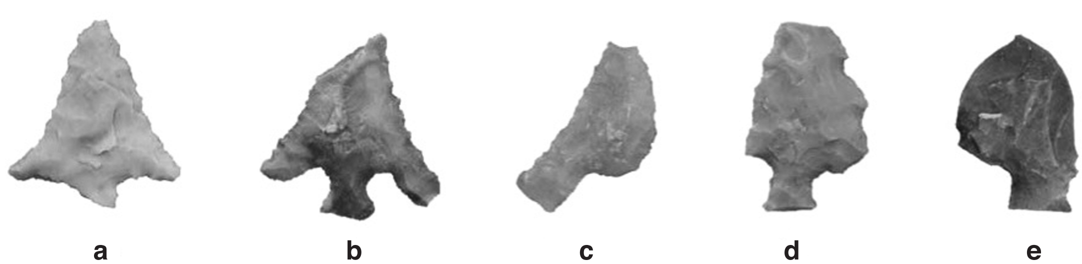

Figure 8. Arrow points recovered during test unit excavations, all from Feature 1: (a) Perdiz; (b-c) Sabinal; (d) Scallorn; (e) untyped. Shown actual size.

The majority of the raw material represented in the chipped stone assemblage is fine-grained chert, which is available in upland outcrops of the Salmon Peak Limestone formation and in Quaternary terrace deposits (Fisher 1977). Of the lithic items that retain cortex, most have areas of polished cortex indicative of riverine sources, while a minority retain rough cortex indicative of upland sources. Other lithic raw materials are represented by coarse-grained chert. Of the five pieces of coarse-grained chert debitage from the site that retain cortex, three (60 percent) have the rough cortex of an upland source, while two specimens (40 percent) have polished cortex indicating its origin from a riverine source.

Two ground stone fragments were also recovered from the Feature 1 excavations. They are small, indeterminate fragments with definite use-wear polish. One fragment is made of red rhyolite and has a highly polished surface; the specimen is 32 mm long, 7 mm wide, and 8 mm thick. The remaining fragment, made of black rhyolite, has a small area of polish; the specimen is 14 mm long, 11 mm wide, and 3 mm thick. The materials for these artifacts were likely obtained from secondary deposits in Rio Grande gravel bars.

Faunal Analysis

The shells and shell fragments of two species of land snails were recovered from Feature 1: *Rabdotus dealbatus* (n=505) and *Polygyra texasiana* (n=429). Irregular-shaped holes were evident in 75 of the *Rabdotus dealbatus* shells, including very small specimens. None of the snail shells showed any obvious evidence of burning or modification for consumption or other use by the inhabitants of the site.

Feature 1 also yielded the shells and shell fragments of one species of mussel. A total of 38 specimens, including both complete and partial shells, were identified as Tampico pearlymussel (*Cyrtonaias tampicoensis*). One of the shells, recovered from level 3 of Test Unit 14 in Feature 1, was burned. This provenience is in close proximity to, but outside of, Feature 3, the intact roasting pit.

Macrofloral Analysis

Charred wood or leaf bases were collected from three different proveniences within Feature 1 (Table 4). In addition, the project geomorphologist recovered a charcoal sample from one of the walls of the original backhoe excavation, which was also within Feature 1 (Table 4). At least 17 species of plants are represented by the macrofloral samples from Feature 1.

FEATURE 2

Feature 2 is a somewhat smaller burned rock midden that was discovered during the mechanical auger testing that followed the accidental discovery of Feature 1. Several angular limestone rocks, approximately fist-sized, were encountered in three of the auger tests. One of the auger tests also produced a secondary decortication flake of Edwards chert. The boundaries of this feature were subsequently exposed during the removal of the overlying soil.

Five units were excavated within Feature 2 (Test Units 1-5). The units were placed to create a contiguous east-west trench across the feature (see Figure 6). The units provided a good cross-section of the feature, which was situated on a slight slope adjacent to the natural basin within which Feature 1 is located. The unit excavations showed that there was no central pit associated with Feature 2; it is possible, however, that a pit was located somewhere within the natural basin, adjacent to this midden.

Feature 2 is a smaller and somewhat more conical or dome-shaped burned rock midden in comparison to Feature 1. This feature is situated on the southwestern edge of the basin. As noted, much of this midden appears to be located just outside the basin, upon gently east-sloping bedrock. There is little actual accumulation of burned rock at the summit of the landform, and no evidence of a pit in the center of the feature or elsewhere in the immediate vicinity. This feature measures 7 m north-south by 6.5 m east-west, and has an estimated maximum depth of approximately 30 cm in its eastern half. Midden deposits thin as one moves from east to west across the feature. Radiocarbon dates for Feature 2 indicate that this feature dates to the Flecha subperiod of the Late Prehistoric tradition (Table 5).

MATERIAL ASSEMBLAGE

Lithic Analysis

No chipped stone tools were recovered from Feature 2, but 52 pieces of chipped stone debitage (14 percent of the total chipped stone assemblage

Table 4. Wood Charcoal and Leaf Identifications from Feature 1.

Provenience	Plant Type	Common Name	Botanical Name
Original backhoe excavation (43 cmbs)	Wood charcoal	Mesquite	*Prosopis* spp.
Feature 1, TU 4, Level 5	Wood charcoal	Acacia	*Acacia* spp.
	Wood charcoal	Unknown	*Colubrina* spp.
	Wood charcoal	Condalia	*Condalia* spp.
Feature 1, TU 6, Level 4	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Mesquite	*Prosopis* spp.
	Wood charcoal	Bumelia	*Sideroxylon lanuginosum*
	Wood charcoal	Cenizo	*Leucophyllum* spp.
	Leaf base	Sotol	*Dasylirion texanum*
	Wood charcoal	White group oak	*Quercus* subg. *Quercus*
	Wood charcoal	Elbowbush	*Forestiera* spp.
	Wood charcoal	Legume family	Fabaceae
	Wood charcoal	Unknown	Undeterminable hardwood residue
Feature 1, TU 9, Level 4	Wood charcoal	Mesquite	*Prosopis* spp.
	Wood charcoal	Plateau live oak	*Quercus fusiformis*
	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Unknown	Indeterminable hardwood
	Wood charcoal	Agarito	*Mahonia trifoliolata*
	Wood charcoal	Verbena family	Verbenaceae
	Wood charcoal	White group oak	*Quercus* subg. *Quercus*
	Leaf base	Unknown	Indeterminable
	Wood charcoal	Acacia	*Acacia* spp.
	Wood charcoal	Baccharis	*Baccharis neglecta*
	Wood charcoal	Mimosa	Mimosa sp.

Table 5. Radiocarbon Dates for Feature 2.

Beta Analytic Sample #	Test Unit	Excavation Level	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age	Two Sigma Calibrated Result
Beta-262710	1	40-50 cmbs	1120±40 B.P.	-23.4 ‰	1150±40 B.P.	1170-960 B.P.
Beta-262711	2	40-50 cmbs	1070±40 B.P.	-25.2 ‰	1070±40 B.P.	1060-920 B.P.

recovered during the excavations) were collected from this feature. The nature of this assemblage is similar to that of Feature 1.

Faunal Analysis

Similar to Feature 1, numerous specimens of *Rabdotus dealbatus* (n=61) and *Polygyra texasiana* (n=53) were recovered from Feature 2. Irregular-shaped holes were evident in nine of the *Rabdotus dealbatus* shells. None of the snail shells from the feature were burned or otherwise modified for consumption or other use by the inhabitants of the site.

A total of six shells and shell fragments of Tampico pearlymussel (*Cyrtonaias tampicoensis*) were recovered from Feature 2. None of these specimens were burned or otherwise modified for use.

Macrofloral Analysis

Fragments of wood charcoal or burned cactus pads were collected from five different proveniences within Feature 2 (Table 6). At least seven species of plants are represented by the macrofloral materials recovered from Feature 2.

FEATURE 3

Feature 3, an intact rock-lined roasting pit (Figure 9), was encountered while excavating Test Units 5, 6, 13, and 14 within Feature 1. Oval in shape, Feature 3 measures 1.4 m north-south by 1.04 m east-west (see Figure 6). All boundaries were well defined and were delineated by semi-vertical alignments of burned tabular limestone measuring less than 24 cm in length, while the interior of the feature was composed of both tabular and nodular limestone rocks of the same size. Basin shaped, its cross section is approximately 16 cm thick along its edges and approximately 24 cm thick near the center of the basin.

The upper portion of Feature 3 originated in the gray matrix observed across the site, while the basin appears to have been partially dug into the orange subsoil. Limestone bedrock underlies the feature; excavations suggest a dip or downward trend in the bedrock toward the northwest. In Unit 13, bedrock was contacted at ca. 30 cm bs, while bedrock is visible in the dump station trench adjacent to Unit 5 at ca. 85 cm bs. Feature elevations indicate that the highest point of the feature was located in the southeast quadrant (48 cm bs) and dips slightly to the northwest (52 cm bs). Feature 3 likely followed the natural contour or dip in the limestone bedrock/caliche located beneath it.

Feature 3 and Feature 1 functioned together as an earth oven and associated fire-cracked rock (FCR) discard area, respectively. The high density of FCR in Feature 3 is probably the result of the central pit not being "cleaned out" after its last roasting episode, or perhaps it was left intact in anticipation of future use. FCR in the vicinity of Feature 1 represent the refuse from repeated use of Feature 3 and other possibly undiscovered rock-lined baking pits.

No temporally diagnostic artifacts were recovered from Feature 3. Four radiocarbon dates for this feature all date to the Flecha subperiod of the Late Prehistoric period, between 930-690 cal. B.P. (Table 7).

MATERIAL ASSEMBLAGE

Artifact recovery at Feature 3 was actually highest in the levels immediately above the feature, while artifact recovery from feature matrix was low. Charcoal flecking was observed throughout the feature matrix but increased near the bottom

Table 6. Wood Charcoal and Cactus Sample Identifications from Feature 2.

Provenience	Plant Type	Common Name	Botanical Name
Feature 2, TU 1, Level 3	Internode (pad)	Prickly pear	*Opuntia* spp.
Feature 2, TU 1, Level 5	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Mesquite	*Prosopis* spp.
Feature 2, TU 2, Level 5	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	White group oak	*Quercus* subg. *Quercus*
	Wood charcoal	Colubrina	*Colubrina* spp.
	Internode (pad)	Prickly pear	*Opuntia* spp.
Feature 2, TU 3, Level 4	Wood charcoal	Acacia	*Acacia* spp.
Feature 2, TU 5, Level 2	Wood charcoal	Lotebush	*Ziziphus obtusifolia*

Figure 9. Photograph of intact earth oven, Feature 3, at the Lost Midden site.

Table 7. Radiocarbon Dates for Feature 3.

Beta Analytic Sample #	Test Unit	Excavation Level	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age	Two Sigma Calibrated Result
Beta-262712	6	72 cm bll*	1120±40 B.P.	-23.4 ‰	1150±40 B.P.	910-850 B.P., 830-690 B.P.
Beta-262713	13	72 cm bll	1070±40 B.P.	-25.2 ‰	1070±40 B.P.	930-740 B.P
Beta-262714	14	71 cm bll	890±40 B.P.	-25.0 ‰	890±40 B.P.	920-720 B.P.,
Beta-262715	15	58 cm bll	820±40 B.P.	-22.5 ‰	860±40 B.P.	910-850 B.P.

*bll=below line level

of the feature at the interface of the gray feature matrix and the orange subsoil.

Lithic Analysis

A total of 231 FCR (104.5 kg) were associated with Feature 3. Other lithic artifacts were limited to four pieces of chipped stone debitage. Chipped stone artifacts from Feature 3 accounted for approximately 1 percent of the total chipped stone assemblage recovered during the excavations of the site.

Faunal Analysis

Four Tampico pearlymussel (*Cyrtonaias tampicoensis*) shells and shell fragments were recovered in Feature 3. Like the specimens recovered from Feature 2 and the vast majority recovered from Feature 1, none of the mussel shell from Feature 3 were burned or otherwise modified.

Macrofloral Analysis

Nine charcoal samples were collected from Feature 3. In addition, three feature matrix/flotation samples were collected from Unit 13 in the southeastern quadrant of Feature 3. Samples 1 and 2 were collected from the upper elevations of the feature, while Sample 3 was collected from near the base of the feature.

The charred wood and leaf samples recovered from Feature 3 represent at least 12 different species of plants (Table 8). Unlike Features 1 and 2, the macrofloral material collected from the Feature 3 earth oven included the Agave family (Agavaceae).

DISCUSSION

Chronology

A total of 11 temporally diagnostic artifacts, all of which were projectile points, were recovered from the Lost Midden site during the present investigations. These artifacts included both dart points and arrow points, ranging in age from the Blue Hills subperiod of the Terminal or Transitional Archaic (2360-1360 B.P.) to the Late Prehistoric Flecha subperiod (1380-510 B.P.). All of the projectile points were from Feature 1 or backdirt associated with Feature 1, which consisted of the larger, dispersed burned rock midden at the site. The period of use of this feature was refined through the radiocarbon dating of seven charcoal samples, including four samples from the intact roasting pit (Feature 3) discovered within Feature 1. The other samples were taken from various levels within the cultural layer of Feature 1. These radiocarbon dates indicated that Feature 1 and the associated Feature 3 were utilized between 940-690 cal. B.P., during the Late Prehistoric Flecha subperiod. However, a separate radiocarbon sample from Feature 1 that was submitted by the project geomorphologist, collected low in the profile of Feature 1 cultural deposits, produced an earlier calibrated age range of 1300-1170 B.P. Nonetheless, this date range also falls within the Flecha subperiod, albeit the earlier part of the subperiod. The date range for Feature 1 fits well with the generally held belief that ring middens became common in the region from the latter part of the Late Archaic period, after 2310 B.P. (Hester 1989a).

The radiocarbon dates from Feature 1 and Feature 3 suggest that little or no mixing of cultural components has occurred within these features. Instead, it is possible that the two identifiable dart points recovered from the site, including one Darl point and one Ensor point, were curated from elsewhere and brought onto the site, or that the age range of these points extends well into the Late Prehistoric (cf. Turner and Hester 1999:101, 114). Such was recently suggested as a result of excavations at the J. B. White site in Milam County, Texas (Gadus et al. 2006), and at the McKinney Roughs site in Bastrop County, Texas (Carpenter et al. 2006). The deepest levels of the J. B. White site, which were dated to about 1360 B.P., produced several Darl points as well as Scallorn arrow points. The occurrence of these points together in this intact context likely represents a period of transition from use of the atlatl and dart to the bow and arrow, a scenario that also appears probable at the Lost Midden site. At the McKinney Roughs site, Darl points were recovered from an occupation zone that was radiocarbon-dated to 850-900 B.P., well into the Late Prehistoric period.

As noted, no temporally diagnostic artifacts were recovered from Feature 2, the smaller, somewhat more conical burned rock midden. True dome-shaped middens have generally been considered earlier than ring or crescent-shaped middens in the Lower Pecos, dating to the Middle Archaic period or earlier (Cliff et al. 2003:37). However, two charcoal samples recovered from Feature 2 produced calibrated radiocarbon dates ranging between 1170-920 B.P. Again, this date range falls within the Late Prehistoric Flecha subperiod.

Site and Feature Formation Processes

It appears that the initial occupation of the site occurred approximately 1300-1170 years ago in the area of Feature 1. Amorphous in shape, this midden has a maximum north-south dimension of 10 m by 12.5 m east-west. The maximum depth of Feature 1 is approximately 57 cm bs, but averages approximately 45 cm bs. Because of the large, amorphous nature of Feature 1, it is possible that it actually represents remnants of more than one ring midden

Table 8. Wood Charcoal and Leaf Base Sample Identifications from Feature 3.

Provenience	Plant Type	Common Name	Botanical Name
Feature 3, TU 5	Wood charcoal	Acacia	*Acacia* spp.
	Wood charcoal	Condalia	*Condalia* spp.
Feature 3, TU 6	Wood charcoal	Mesquite	*Prosopis* spp.
	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Unknown	Indeterminable hardwood
	Wood charcoal	Colubrina	*Colubrina* spp.
Feature 3, TU 6, 66 cm bll*	Wood charcoal	Acacia	*Acacia* spp.
	Wood charcoal	White group oak	*Quercus* subg. *Quercus*
Feature 3, TU 6, 69 cm bll*	Wood charcoal	Acacia	*Acacia* spp.
Feature 3, TU 6, 72 cm bll*	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Legume family	Fabaceae
	Wood charcoal	Colubrina	*Colubrina* spp.
	Wood charcoal	White group oak	*Quercus* subg. *Quercus*
Feature 3, TU 13	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Lotebush	*Ziziphus obtusifolia*
	Wood charcoal	Mimosa	*Mimosa* spp.
	Wood charcoal	Unknown	Indeterminable hardwood
	Wood charcoal	Colubrina	*Colubrina* spp.
	Wood charcoal	White oak group	*Quercus* subg. *Quercus*
	Wood charcoal	Legume family	Fabaceae
Feature 3, TU 13, 72 cm bll*	Wood charcoal	Acacia	*Acacia* spp.
	Wood charcoal	Unknown	Indeterminable hardwood
	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Colubrina	*Colubrina* spp.
	Wood charcoal	Mesquite	*Prosopis* spp.
Feature 3, TU 14	Wood charcoal	Plateau live oak	*Quercus fusiformis*
	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Legume family	Fabaceae
	Wood charcoal	Agarito	*Mahonia trifoliolata*
	Wood charcoal	Unknown	Indeterminable hardwood
	Wood charcoal	Lotebush	*Ziziphus obtusifolia*
	Wood charcoal	Mesquite	*Prosopis* spp.
	Wood charcoal	Mimosa	*Mimosa* spp.
	Leaf base	Agave family	Agavaceae
Feature 3, TU 14, 71 cm bll*	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Oak	*Quercus* spp.
	Wood charcoal	Mesquite	*Prosopis* spp.
Feature 3, TU 14, 72 cm bll*	Wood charcoal	Condalia	*Condalia* spp.
Feature 3, TU 15, 58 cm bll*	Wood charcoal	Condalia	*Condalia* spp.
	Wood charcoal	Colubrina	*Colubrina* spp.

*bll=below line level

or crescent midden. Certainly, the area surrounding Feature 3, an intact earth oven, is reminiscent of a ring midden, and adheres to Black and Creel's (1997:285) view that all burned rock middens are "center-focused accumulations." If Feature 1 does actually represent multiple burned rock middens, it was not obvious within the extensive stratigraphic profiles of the original backhoe excavation or the subsequent unit excavations.

Feature 1 is situated within a 1.2 m deep soil-filled natural basin, possibly resulting from a partially collapsed sinkhole. The sediment within the basin accumulated as a combination of eolian and local colluvial depositional episodes. Because the base of burned rock midden deposits at Feature 1 is at 45 cm bs, it appears that the natural basin was perhaps not entirely filled with soil by the time of the initial occupation of the site. As a result, the location may have retained moisture, perhaps even some standing water, following storms (today, the nearest permanent source of water is Seminole Watering Hole, a spring located about 370 m northeast of the Lost Midden site). The presence of soil and prolonged moisture may have provided an environmental niche where vegetation differed in abundance, foliage, or possibly even diversity compared to the surrounding area. Such characteristics could have provided a visual clue even during drier times of the year to the presence of deeper soils in the area, a beneficial component for the construction of earth ovens.

Following the initial occupation of the Lost Midden site, its use appears to have moved to or expanded to the perimeter of the basin area between 1170-920 years ago. Feature 2, a smaller, somewhat more conical or dome-shaped burned rock midden in appearance, is situated on the southwestern edge of the basin. In fact, much of this midden appears to be located just outside the basin, upon gently east-sloping bedrock. There is little actual accumulation of burned rock at the summit of the landform, and no evidence of a pit in the center of the feature or elsewhere in the immediate vicinity of Feature 2. This feature measures 7 m north-south by 6.5 m east-west, and has an estimated maximum depth of approximately 30 cm bs.

The final occupation of the Lost Midden site is reflected within Feature 1, and dates between 940-690 years ago. Feature 3, an intact rock-lined roasting pit in the southeast portion of Feature 1, also dates to this occupation. The upper portion of the roasting pit originated in the gray matrix in this area of the site, and had similar soil characteristics; as a result, the exact boundaries of this portion of the feature were difficult to determine during the excavations. However, the lower portion of the pit was very obvious; it was partially excavated into the subsoil and lined with both tabular and nodular limestone rocks. Limestone bedrock underlies Feature 3 and excavations suggest a dip or downward trend in the bedrock toward the northwest. The plan view of this feature is oval-shaped, and measures 1.4 m north-south by 1.04 m east-west. In profile, the roasting pit is basin-shaped and the readily identifiable portion of the feature—the rock-lined basin—is 24 cm in thickness. One scatter of burned rock in the southeast part of Feature 1, adjacent to Feature 3, appears to include burned rocks that are generally smaller than those from the remainder of Feature 1 and may represent a distinct cleaning episode of fragmented rock from Feature 3. At the time of its discovery, Feature 3 had not been cleaned of the rocks from its final use as a roasting pit. Perhaps the rocks were left in place by the site's inhabitants in anticipation of returning and re-using the roasting pit, or possibly this was the result of a hasty abandonment of the site. Because of the large amorphous nature of Feature 1, and the prevalence of dark gray midden soil across the remnants of this feature, it is likely that additional roasting pits were associated with this burned rock midden.

Most of the artifacts recovered from the Lost Midden site were found on or within the cultural features of the site. Only sparse amounts of artifacts were recovered from the surrounding area. This pattern may be the result of tasks focused within or immediately adjacent to the burned rock middens, but the paucity of material outside the middens may have also resulted from the gathering of soil in these areas in order to cap the earth ovens and the subsequent disposal of dirt adjacent to the roasting pits when the roasting process was completed. However, one might anticipate a mixing of radiocarbon dates as a result of such a process, which was not the case.

FEATURE VARIATION AND FUNCTION

Because of the relative scarcity of intact earth ovens in the archeological record of the Lower Pecos region, the floral recovery and subsequent analysis at the Lost Midden site was focused primarily on Feature 3. As a result, most of the available data regarding feature function is most directly applicable to Feature 3 and the surrounding burned rock midden (Feature 1). The floral analysis identified the remains of sotol (*Dasylirion*) from Features 1 and 3, and agave, most likely lechuguilla (*Agave lechuguilla*), from Feature 3. Carbonized prickly pear pads were recovered from Feature 2. These findings indicate that sotol and lechuguilla were processed on the site. Prickly pear (*Opuntia*) pads were probably used in the roasting process to protect the food contents from being burned by the underlying hot rocks and coals, and from the overlying cap of soil, while also providing moisture for the foods cooked. A wide variety of woody plant sources were gathered to fuel the fire(s) in the earth oven, including condalia (*Condalia* spp.), acacia (*Acacia* spp.), members of white group oak (*Quercus* subg. *Quercus*), colubrina (*Colubrina* spp.), mesquite (*Prosopis* spp.), lotebush (*Ziziphus obtusifolia*), members of the legume family (*Fabaceae*), plateau live oak (*Quercus fusiformis*), elbowbush (*Forestiera* spp.), bumelia (*Sideroxylon lanuginosum*), acacia/mesquite (*Acacia/Prosopis* spp.), agarito (*Mahonia trifoliolata*), mimosa (*Mimosa* spp.), unspecified oak (*Quercus* spp.), members of the verbena family (*Verbenaceae*), baccharis (*Baccharis neglecta*), cenizo (*Leucophyllum* spp.), stickpea (*Calliandra* spp.), sumac (*Rhus* spp.), and other unidentifiable species. Oak would have been gathered from within the adjacent canyons, while the other species were available on the surrounding uplands.

As reported by Leslie Bush (2009), many of the woody plants recovered from the site have uses other than fuel sources, although these uses are probably less likely in the context of burned rock middens. Several of the trees and bushes from which wood was recovered, including oaks, elbowbush, condalia, lotebush, mesquite, agarito, and sumac, provide edible fruits (Tull 1987). Agarito roots and branches also make a brilliant yellow dye. Bumelia and one species of condalia, *C. hookeri*, have fruits that can be used to make a blue dye (Tull 1987). The young pads of prickly pear and the ripe fruits are edible raw; the fruits can also be used to make a red dye. Sotol and lechuguilla were both used for fibers (McGregor 1992:19). None of these uses necessarily required the construction and use of roasting pits.

Conspicuously absent from the woody plants represented at the site is Texas mountain laurel, a plant that is not uncommon in the Seminole Canyon area today and was presumably available to the Late Prehistoric inhabitants of the area. Perhaps, as suggested by some, the cytisine (the alkaloid in Texas mountain laurel) content of this particular wood made the smoke harmful if inhaled or imparted a bad flavor to food cooked over such wood. But recent experiments by Leslie Bush did not find that the smoke produced by Texas mountain laurel was especially unpleasant or that it affected the taste of food cooked over it. Two other characteristics of this wood may contribute to its absence at the Lost Midden site, however. First, Texas mountain laurel branches do not readily die and drop from the tree, as the branches of oak and many other trees do. As a result, there was rarely any dry Texas mountain laurel wood available for collection unless a whole tree died. Second, the wood generates an abundance of sparks when burned, making it uncomfortable for people nearby, and increasing the risk of spreading a fire unintentionally (Leslie Bush, personal communication, October 20, 2010).

Because the smaller burned rock midden on the site, Feature 2, dates to the same general time period as Features 1 and 3 and is located within a few steps of these features, it seems likely that this midden was probably used to cook the same types of food. As noted, evidence of charred prickly pear pads was recovered from Feature 2; prickly pear pads were commonly used to protect the food contents in roasting pits and to provide moisture. Feature 2 appears to be somewhat more conical in shape than Feature 1, but there is no evidence to suggest that this is the result of a difference in the function of the feature.

Several Tampico pearlymussel (*Cyrtonaias tampicoensis*) shells or shell fragments were recovered from among the two burned rock middens and the roasting pit, and the presence of this type of mussel is reported from a number of other sites at Seminole Canyon State Park that include burned rock middens or burned rock scatters (i.e. possible remnants of burned rock middens). This riverine mollusk is still present today in the local waterways, but the closest source to the Lost Midden site is the Pecos River, three miles west of the site. It is apparent that a concerted effort was made to bring these mussels to the site and to other sites in the area. Nonetheless, modification to these mussel shells as a result of food preparation, cooking, or other uses was noted on only one shell recovered from Feature 1 that exhibited evidence of burning. It is unknown whether the shell was burned intentionally as a result of cooking, or whether it was incidental. If intentional, it seems likely that additional mussel shell specimens would show evidence of burning. Possibly, the mussels were eaten raw, or were perhaps boiled, and these processes, therefore, left no readily apparent signs of modification on the shells.

Likewise, no cultural modification was evident among the *Rabdotus dealbatus* and *Polygyra texasiana* snail shells. Again, perhaps the snails were boiled and this process did not result in recognizable modification to the shells. However, there were no concentrations of snail shells on the site, and many of the shells had holes in them that are the likely result of natural predation.

Regardless of whether mussels or snails were consumed by the inhabitants of the Lost Midden site, it does not appear that roasting was the technique by which they were prepared. The features at the site were apparently limited to the roasting of vegetal materials. This is consistent with the general notion that burned rock middens represent specialized plant-processing areas (cf. Shafer 1981; Hester 1989b; Black and Ellis 1997:777-783).

Artifact Function(s)

Based on the lithic assemblage recovered from the Lost Midden, other activities conducted at the site, in addition to the actual roasting of foodstuffs, included the preparation of sotol or lechuguilla for cooking; seed processing; chipped stone blank and perform manufacture; possible hide processing; and woodworking. Although no animal bone was found, the recovery of five dart points and six arrow points or point fragments suggests that hunting and meat processing also occurred.

Plant processing is reflected in the eight knives or knife fragments recovered from the site, including a specimen that shares characteristics of other tools typically identified as Sotol knives. At least some of the 14 utilized flakes were possibly used for the processing of plant foods. Two groundstone fragments are more specifically attributable to seed processing at the Lost Midden site.

Hide processing may be indicated by the presence of several end scrapers and side scrapers, as well as utilized flakes that were apparently used for scraping. A graver, one burin, and at least one multi-functional utilized flake that functioned as a scraper and burin were probably used for working hides.

The recovery of three spokeshaves suggests that at least some woodworking, such as the shaping of dart and arrow shafts, was also an activity that took place at the site.

Although a large part of the chipped stone debitage sample collected from the Lost Midden site is decorticate that mostly falls into the 11 to 20 mm size range, the collection is not diagnostic of late stage reduction and the production of finished stone tools. Instead, given the large percentage of biface manufacture flakes (47 percent) and the small percentage of biface thinning flakes (10 percent), the debitage is generally more indicative of blank and preform manufacture. Given the ready availability of local chert resources from erosional exposures on the Lower Cretaceous Salmon Peak Limestone and Quaternary Pleistocene fluviatile gravel deposits in the uplands of the area, and from gravel bars once found in the Rio Grande, it is likely that biface manufacture probably began with naturally occurring chert nodules. However, given the large percentage of decorticate debitage, it is possible that some of the very early stages of lithic reduction occurred on or near the source locales rather than at the Lost Midden site.

Site Patterning

The placement of the Lost Midden site on the landscape was dictated, at least in part, by the presence of extensive soil deposits and perhaps seasonal water and a greater abundance of potential fuel sources resulting from the natural basin at the site location. The placement of Feature 3 adjacent to the southeast wall of the natural basin may offer a clue as to intrasite patterning, as well as possible seasonality at the site. The location of Feature 3 was optimal for sheltering it (more specifically, it would have protected the users of the roasting pit from blowing ash and embers) from the prevailing southeasterly winds that occur between April and October in the Lower Pecos. The apparent absence of hearth features may further support warm weather use of the site. Historically, many Native American groups harvested “female” lechuguilla and sotol plants as they began to send up flower stalk, from late spring through midsummer (usually in May and June); this is when the plants contained the most water and sugar-converting enzymes (Brown 1991:105; Cheatham et al. 1995:143-144). However, while it is suggested that the Lost Midden site was perhaps utilized during the late spring or early summer, its use during warm weather is not certain. The inhabitants could have gathered succulents at any time of the year if food was scarce, such as has been documented for the Mescalero Apache (Basehart 1960:10).

No general site distribution pattern was recognized between the major rockshelters at Seminole Canyon State Park and Historic Site and open burned rock midden sites such as the Lost Midden site. It is possible that the Lost Midden site functioned as a 'summer kitchen' of sorts for inhabitants of the nearby Fate Bell Shelter or Fate Bell Annex, keeping the heat generated by the roasting process out of the otherwise cool rockshelters. While no association can be determined with certainty between the occupants of the Lost Midden site and Fate Bell Shelter or Fate Bell Annex, there are Late Prehistoric pictographs at both of these rockshelters that could fall within the Flecha subperiod. Among the rock imagery at Fate Bell Shelter are Red Linear images, while Red Monochrome style paintings have been noted at Fate Bell Annex. A probable Late Prehistoric shield-bearer figure is also present at Fate Bell Annex.

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Among the interesting and important aspects of the present project was the geological and geomorphological setting of the Lost Midden site, and the macrofloral assemblage recovered from the site. Dr. Michael Collins, then at the Texas Archeological Research Laboratory, The University of Texas at Austin, and Elton Prewitt, provided helpful comments regarding the possible geological/geomorphological setting of the site during the early stages of this investigation. Dr. Edwin (Ed) Hajic, Santa Fe, New Mexico, provided the results of detailed geomorphological and geological analyses. Dr. Leslie Bush, Macrobotanical Analysis, Manchaca, Texas, analyzed the macrofloral specimens from the site.

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Contractor Mark Willis, Austin, conducted low altitude kite and blimp aerial photography of the site, providing the resulting imagery for this article and producing a related poster for use in public outreach for this project. Several people contributed to the mapping of the Lost Midden site, including TPWD personnel Rich Mahoney, Logan McNatt, and Kent Hicks, and former TPWD employee Todd McMakin. Margaret Howard, also with TPWD, reviewed a draft copy of the original report and provided helpful comments and advice. Avram Dumitrescu, with the Center for Big Bend Studies, Sul Ross State University, Alpine, Texas, drafted several figures in the original report.

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