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North Texas Archeological Society

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The Journal of the North Texas Archeological Society

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Cover Image: Hematite Pendant from the Franty Watson Site.

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COMMENTS

THE PREHISTORIC AND HISTORIC OCCUPATION OF THE FRANTY WATSON SITE (41PP116), PALO PINTO COUNTY, TEXAS

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ABSTRACT

Testing of the Franty Watson site (41PP116) in north central Palo Pinto County, Texas took place as part of the Palo Pinto County Archaeological Survey in 1979, which was conducted by an archaeological team from Southern Methodist University. The multi-component rockshelter site is located under a rock overhang about 20 meters from Eagle Creek, just upstream from its confluence with the Brazos River. Radiocarbon dates, vertical stratigraphy, and the presence of diagnostic Bulverde and Pedernales dart points and a bevy of arrowpoints indicate that the overhang was used repeatedly as a campsite shelter for almost 2,000 years beginning in the Late Archaic. The presence of a diverse chipped-stone assemblage recovered from depths of over three meters in places made it possible to confirm site occupation from the Late Archaic into the Late Prehistoric period. More recent site habitation occurred in the 1930s Depression Era and left behind metal, glass, and animal bone artifacts as well as a hearth feature.

The Franty Watson site (41PP116) is in north central Palo Pinto County, Texas on the west side of the Eagle Creek valley near its confluence with the Brazos River (Figure 1). Site testing occurred in the spring of 1979 as part of the Palo Pinto County Archaeological Survey (PPCAS) conducted through the Archaeology Research Program at Southern Methodist University (SMU). The archaeological site survey began in the late winter of 1979 and continued into the spring and was sponsored by the Texas Historical Commission, SMU, and a variety of individuals and businesses from throughout Texas.

The site is located in the Carbonate Cross Timbers sub-ecoregion of Texas that is a part of the larger Western Cross Timbers ecoregion (Griffith et al. 2007). The defining characteristic between the two is based on the extent of the underlying limestone geology, which affects the overlying natural vegetation and topography of the region. The geology in Palo Pinto County consists of limestone bedrock in the northwestern half and sandstone bedrock in the southeastern half (Bureau of Economic Geology 1972; Plummer and Hornberger 1935). The geologic setting of the site is characterized by Pennsylvanian-age limestone and shale along with Cretaceous-age deposits near the bank of Eagle Creek. The valley soils include low terrace deposits near the floodplain level (Moore 1981:26-28) and bedrock in stream channels with depths of up to 25 feet.

The topography of the Carbonate Cross Timbers sub-region differs from the surrounding area because it consists of low, rounded hills, often referred to as the Palo Pinto Mountains. This contrasts with the alternating ridges and shallow basins more common in the surrounding Western Cross Timbers. The limestone substrate is apparent in the vegetation cover, which is reminiscent of the vegetation of the Edwards Plateau to the south. The landscape includes more live oak, honey mesquite, and pure ashe juniper woodland than in other surrounding Cross Timbers areas (Griffith et al. 2007). The rolling hills are surfaced by stony clay and clay loam soils that support scrub brush, mesquite, cacti, and grasses. The site location is on the divide between the Juniper-Oak Savanna to the west and the Cross Timbers on the east (Küchler 1964). In 1931, R. H. Cuyler studied vegetation as an indicator of Cretaceous formations in Texas and found that Pennsylvanian-Cretaceous formations were commonly marked by post oaks and

blackjack oaks on the Cretaceous side of the contact (Dyksterhuis 1946). Blair (1950) classifies this area as belonging to the Texan biotic zone where animals like deer, rabbit, and gopher are common.

The Brazos River snakes through the northern and eastern parts of Palo Pinto County and is fed by long and short intermittent tributaries. The Brazos River and tributary channels have cut into the bedrock below the generally level upland surface. Eagle Creek originates from the southwest and runs north-northeast to its confluence with the Brazos River.

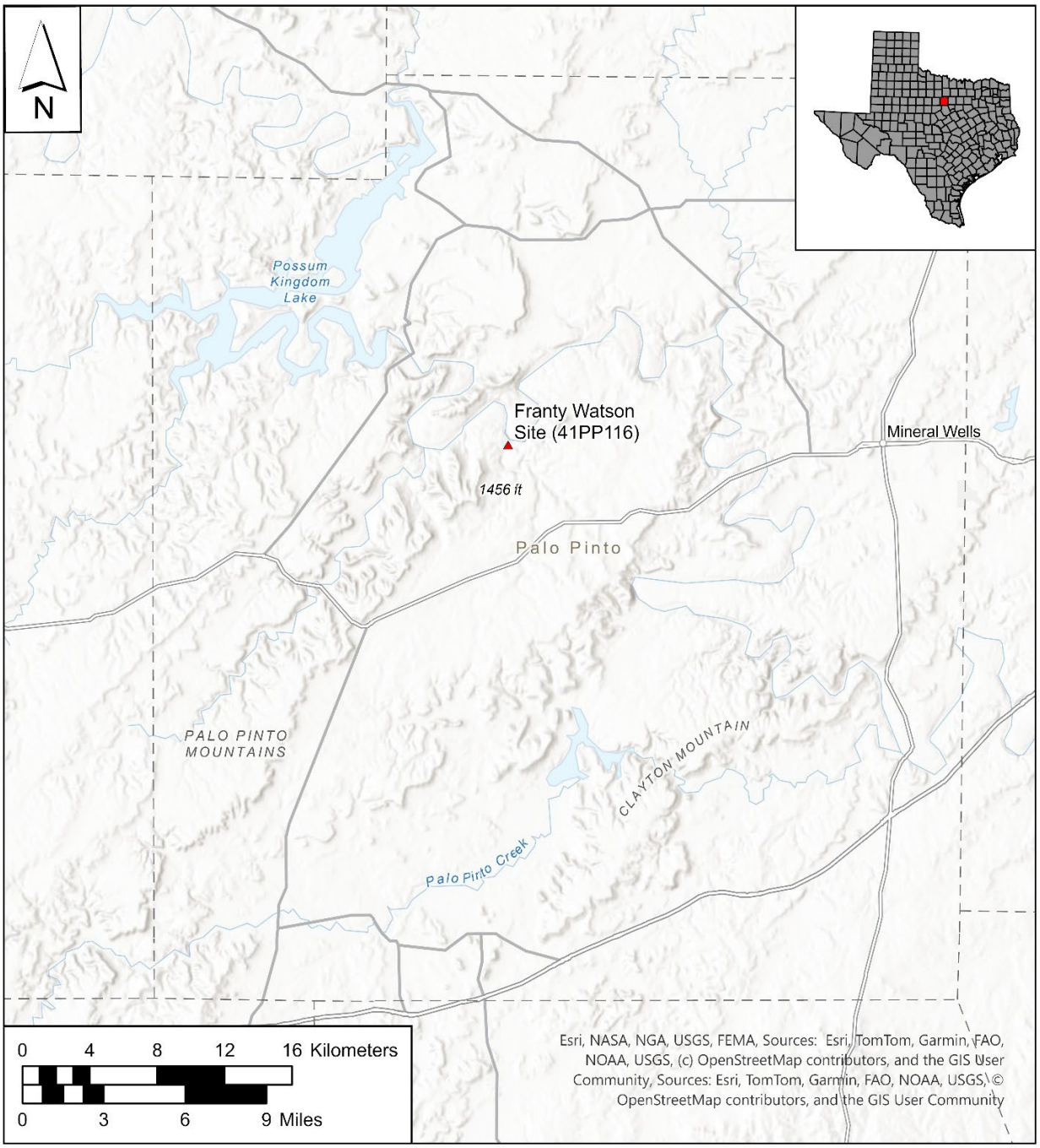

Figure 1. Site location within Palo Pinto County shown on a relief map of Palo Pinto County, Texas.

Little was known about the prehistory of Palo Pinto and adjacent counties in 1979. Cursory survey in the area included the Possum Kingdom Lake area before the construction of the Morris Sheppard Dam in 1941 (Handbook of Texas Online 2010; Hughes 1942; Treece and Powell 1988) and a brief survey of the proposed Turkey Creek Reservoir area (Jelks 1954). Work upstream at the Harrell site in Young County was reported by Krieger (1946:87-120) and some sites had been recorded by avocational archaeologists (Smith 1967).

Since 1980, limited cultural resource studies have been conducted in Palo Pinto County (Glander 1984; Peter et al. 1990; Tinsley et al. 2009; Tinsley and Frederick 2010; Tinsley 2015). However, these investigations have not compiled a comprehensive review of prehistoric or historic sites in Palo Pinto County. Evidence from these limited survey studies indicated that prehistoric burned rock middens, small rockshelters, and lithic workshop sites were present in the county. The PPCAS was the first widespread survey in the county and it recorded 73 new prehistoric sites and 16 historic sites along with 2 rock art sites; this did not result in a comprehensive sample of archaeology in the county.

After intermittent work in the Central Brazos River Valley between Lake Whitney and Graham and with the anticipated publication of reports on the Horn Rockshelter II (Forrester 1985, 1996; Redder 1985; Watt 1978), it was expected that a site like Horn Rockshelter might be present in Palo Pinto County. An archaeological team from SMU carried out a four-month survey of accessible parts of the county to record sites and to try to locate a well preserved and vertically stratified rockshelter in a geologic setting like the Horn Rockshelter II. Sites were evaluated based on the findings of previous investigations in Central Texas and downstream in the Central Brazos River Valley. These investigations include surveys and excavations of the Whitney Reservoir and De Cordova Bend Reservoir areas (Skinner 1971; Stephenson 1970), specifically at the Kyle and Ham Creek sites, as well as the Bear Creek, Sheep, and Blum shelters (Forrester 1964; Jelks 1953, 1962; Lynott 1978). The Franty Watson site (41PP116) was selected for testing based on physical characteristics that appeared similar to Horn Rockshelter II, and because a Plainview dart point was reported by a collector to have been found on the talus downslope from the site overhang. Unfortunately, this report was not able to be confirmed.

SITE BACKGROUND

The site deposit is located under a rock overhang that overlooks the northwest side of the Eagle Creek floodplain (Figure 2). The confluence of Eagle Creek with the Brazos River is approximately 500 meters downstream. Bedrock is exposed in many areas along the creek and rock overhangs are common. The Eagle Creek floodplain is narrow (Figure 2), and a collapsed rock and dirt talus is present that slopes steeply from the drip line of the shelter down to the outer edge of the floodplain. The overhang is approximately five meters wide, 30 meters long, and has an average roof height of around 2.75 meters (Figure 3). The creek was flowing in the spring of 1979 when the site was tested but it is mapped as an intermittent drainage and is likely dry part of most years.

When first inspected, the overhang floor was covered with leaves resting on a layer of limestone dust and fragments that appeared to be bedrock. The talus was covered with grass, dry leaves, and scattered trees. Artifacts were not abundant on the surface, but lithic debris and mussel shell fragments were evident in the edges of what seemed to be looters' holes. Artifacts were ultimately discovered scattered about the floor as well as on the surface of the bluff above the overhang.

Excavation of nine units (Figure 4) began by establishing an east/west baseline that ran roughly parallel to the shelter dripline.

Measurements were taken off this baseline and a field site map was created by Omega surveyors using half-meter contours. Unit 1 is a backhoe trench that was opened and ultimately provided a profile of the buried deposit on the talus outside the shelter dripline (Figure 5). Five 1 x 1-meter test units were excavated to various depths underneath the overhang (2-5 and 8). A single 1 x 2-meter test unit (6) was dug on the talus slope, and a hand-dug step trench was excavated (Unit 7) downslope and well outside the shelter limits. Unit 9 was excavated into the floor of trench Unit 1. This provided a glimpse of the buried sediments below those uncovered in Unit 1 and in test pits 2-6 and 8. Fill from the trenches (Unit 1 and Unit 7) was inspected but was not generally screened and no artifacts were recorded or collected from either excavation unit. Fill from all the test units was excavated in arbitrary 10 cm levels and screened through ¼" mesh hardware cloth. Matrix samples from these units were collected for water screening.

Site Stratigraphy

Some of the stratigraphic notes and profiles from the site are missing and not all the excavation information was present after more than 40 years of storage. In some cases, matrix composition was not described in the excavation forms or in field notes or was simply reported as soil. In addition, the depths and descriptions of some levels are missing and in other cases the Munsell colors were not recorded. The stratigraphy and profiles are described and presented below as best they can be with the available information. Descriptions of each excavation unit and stratigraphic profiles from Units 1, 7, 8, and 9 are used to relate the geomorphology throughout the site. During excavation it became apparent that bioturbation in the form of small rodent burrows was present at the site.

Two stratigraphically separated artifact components are present at the Franty Watson site. The first is a prehistoric component located under the overhang and on the talus slope, while the second is a historic component limited to under the overhang. Ninety-three percent of the historic artifacts were recovered in the upper 30 centimeters below the surface (cmbs) while 7% were found below this depth. Of the prehistoric assemblage numbering over 13,000 artifacts, only 34 flakes and two biface preforms were found in the upper 30 cm of all units. Mixing of historic and prehistoric material did occur to a small degree at the site based on the activities of burrowing rodents and looters, but there appears to be a stratigraphic distinction between Native American material and Euro-American material somewhere around 40 cmbs. This depth is used to distinguish historic and prehistoric material throughout the report.

Unit 1 was a trench begun near the center of the rock overhang, adjacent to where Unit 2 was ultimately placed. The trench was slightly more than 0.6 meters wide and extended 9.5 meters south (towards Eagle Creek) from the overhang dripline. The trench was excavated using a backhoe with a 24 in wide bucket to a depth of about 215 cmbs and the stratigraphic profile is shown in Figure 6. The upper layer consisted of yellowish red (5YR4/6) sandy clay that extended to 95 cmbs on the north end at its deepest and thinned out as the terrain gently sloped down towards Eagle Creek. The next layer was a dark reddish brown (5YR3/2) rocky matrix that extended from 95 cmbs to 225 cmbs and contained a rock concentration. At the lowest southern end of the trench, the yellowish red sandy clay layer was again present at the surface and extended to 90 cmbs. Unit 9 was excavated into the floor of Unit 1.

Figure 2. Eagle Creek and associated floodplain with the terrace sediments to the left extending upslope to the limestone-roofed shelter overhang.

Figure 3. Beginning the backhoe trench (Unit 1) under the shelter drip line looking upstream into the western part of the shelter.

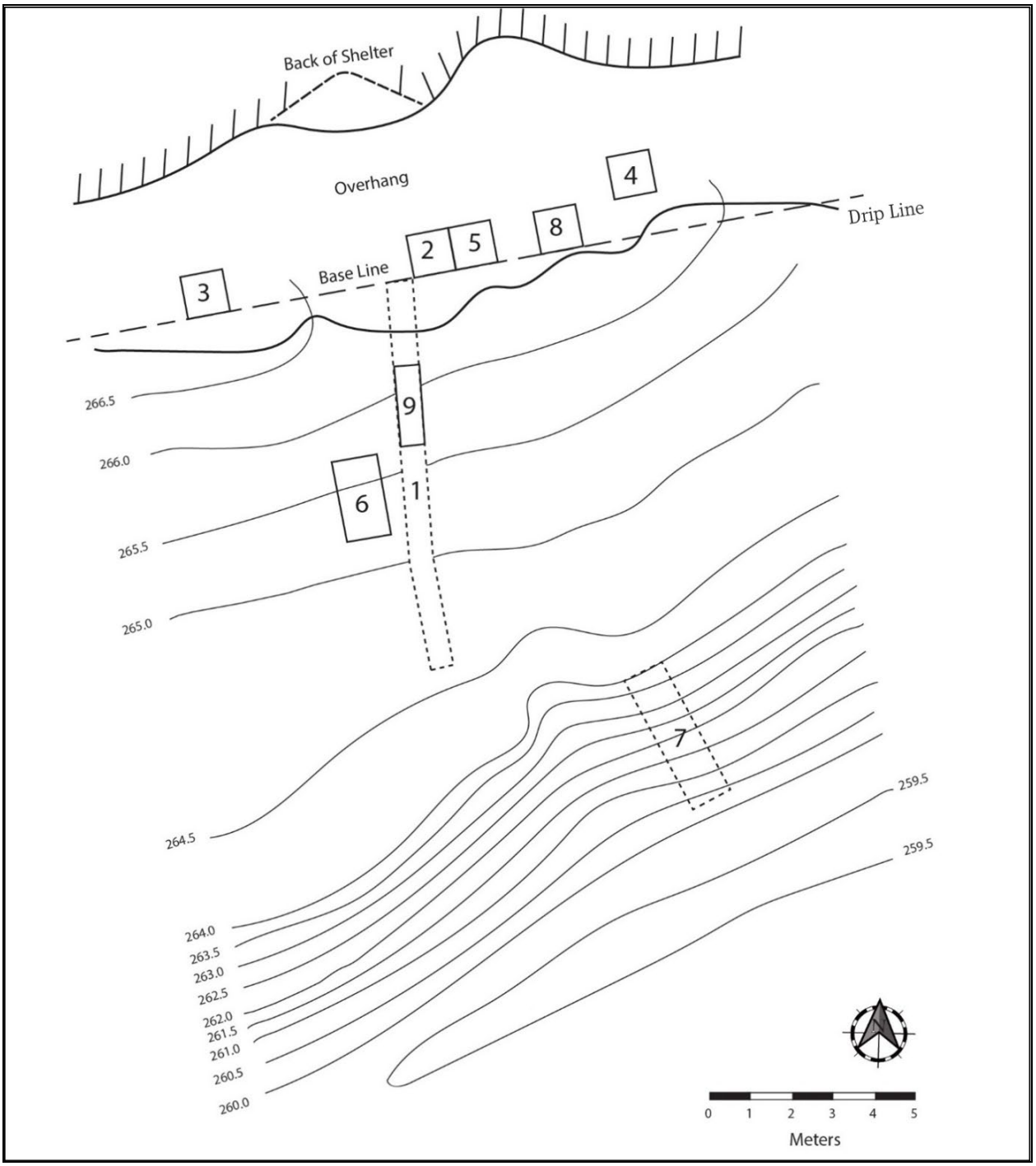

Figure 4. Half meter scale site topographic plan map of the Franty Watson site showing test unit locations. Dashed lines indicate units that were not screened.

Figure 5. Francis Stickney is in the foreground with Al Redder upslope in the background and they are clearing the east wall of Unit 1, the backhoe trench.

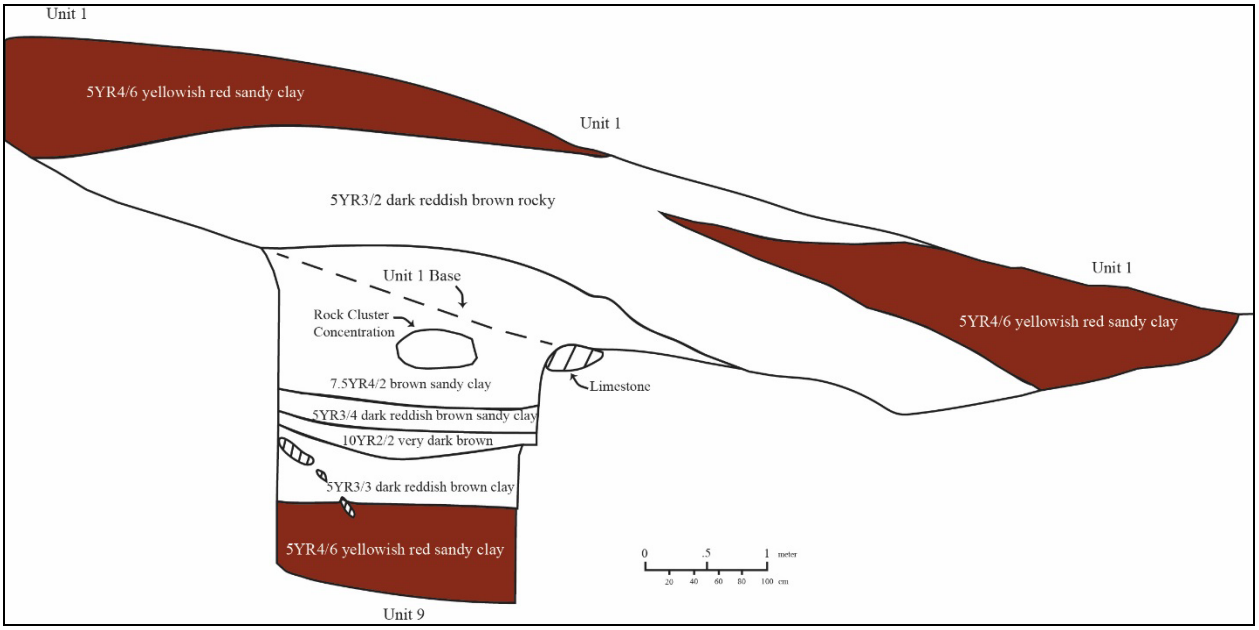

Figure 6. Stratigraphy revealed in the east wall of Units 1 and 9.

Unit 2 was a 1 x 1 m test pit begun near the center of the rock overhang adjacent to the north end of Unit 1 (Figure 7 and Figure 8). From 10-20 cmbs there was a hearth and an ash lens that extended from the base line towards the center of the unit. The soil at 30-40 cmbs was red sandy clay. At 40-50 cmbs there was dark gray silt on top of redder clay. A white ash lens with bits of charcoal was found between 50-70 cmbs and at 85 cmbs red clay began. At 80-90 cmbs the clay remained red with brown inclusions and several concentrations of white and black wood ash and charcoal that continued to 100 cmbs. Below this was a 5-cm-thick layer of dark brown soil on top of another layer of red clay. Between 110-120 cmbs there was another layer of dark brown soil that continued to have charcoal and ash with large flat hearth rocks. The amount of ash and charcoal increased between 140-150 cmbs. At a depth of 160 cmbs there was a 20-cm-thick ash and charcoal deposit. The next layer, 190-200 cmbs, consisted of a black sandy loam midden with red sand in the north portion leading towards the back of the shelter that spreads across the entire unit by 210 cmbs. A large concentration of charcoal was found in a layer of red sand between 221 and 226 cmbs. Beginning at 230-240 cmbs, a dark soil existed above another layer of red clay that rested on dark soil that continued to 250 cmbs. From 250-270 cmbs the dark soil continued but the blue clay became harder (Figure 9). Bedrock was not encountered in the unit.

Charcoal samples were submitted for macrobotanical analysis (Bush 2014) which positively identified carbonized bur oak, white oak group, elm, and juniper. Seven charcoal samples from Unit 2 were dated by the Radiocarbon Laboratory at The University of Texas at Austin and were calibrated with OxCal v4.2.4 (Bronk Ramsey 2009) by C. Britt Bousman. These dates are used to temporally associate levels from units under the overhang (Units 2-5, 8). A single anomalous modern date from 60-70 cmbs is attributed to bioturbation and the movement of material by small rodents. Resulting age distributions are arranged stratigraphically from top to bottom (Table 1 and Figure 10) using the OxCal stratigraphically constrained model that considers the sample depths (Bronk Ramsey 2008).

Figure 7. Al Redder and Janet Holland are in the left foreground excavating Unit 2. Teddy Lou Stickney is standing in the center of the picture. Roy Dickinson and Bill Dennis are excavating in Unit 4 in the center background.

Figure 8. Excavation of Units 2 and 5 in foreground with Unit 8 beyond. Janet Holland and Al Redder are in the foreground.

Figure 9. Al Redder standing on the floor of Unit 2.

Table 1. Calibrated ages and 2 sigma ranges from Unit 2.

Sample	Depth (cmbs)	14C Age BP	sigma	Cal μ Age	Cal Lower	Cal Upper
UT-3590	65	1,030	410	1031 AD	804 AD	1191 AD
UT-3591	70-80	Modern	-	-	-	-
UT-3589	85	1,040	80	972 AD	779 AD	1101 AD
UT-3588	102.5	1,510	150	920 AD	760 AD	1024 AD
UT-3585	165	1,290	90	734 AD	669 AD	818 AD
UT-3586	175	1,100	100	704 AD	637 AD	796 AD
UT-3584	265	1,850	150	436 AD	269 AD	634 AD

Unit 3 was a 1 x 1 m test pit located on the western side of the rock overhang (Figure 11). The upper 20 cmbs consisted of black loam intermixed with dark reddish gray (5YR4/2) and blue clay. Between 20 and 35 cmbs there was an ash lens with charcoal, fire-cracked rock (FCR), and yellowish red (5YR5/6) clay. At 35-50 cmbs there was dark grayish brown (10YR4/2) clay mottled with red clay that sat above 25 cm of rock inclusions and dark grayish brown (10YR4/2) clay. Situated between two thin layers of ash, charcoal, and FCR from 80-100 cmbs there was a dark grayish brown (10YR4/2) clay, and a hearth was discovered near the bottom of the unit between 110-125 cmbs in a matrix of dark grayish brown (10YR4/2) clay. Excavation continued to 158 cmbs and a rock-lined hearth was exposed in the unit floor. Bedrock was not reached in this unit.

Unit 4 was a 1 x 1 m test pit located in the eastern part of the rock overhang. The top 25 cmbs consisted of dark brown (10YR3/3) soil with some small limestone inclusions. At 15 cmbs there was a lens of strong brown (7.5YR4/6) soil, and from 25-45 cmbs there was a dark reddish brown (5YR3/4) soil. The next layer, 45-65 cmbs, consisted of brown (10YR5/3) soil with a gray-white ash lens. From 65-75 cmbs there is yellowish red (5YR4/6) clay. There was a thick deposit (75-155 cmbs) of very dark grayish brown (10YR3/2) soil with lenses of gray-white ash at 85, 90, and 140 cmbs. Finally, from 155-160 cmbs there was yellowish red (5YR4/6) clay, but no bedrock was encountered.

Unit 5 was a 1 x 1 m test pit located in the center of the rock overhang, adjacent to the east wall of Unit 2. The upper 30 cmbs was ashy loamy sand with some charcoal. From 30-40 cmbs there was yellowish red (5YR4/6) sandy clay, and at 40-70 cmbs a similar yellowish red (5YR4/6) clay. Between 60-70 cmbs an ash lens was in the northwest corner. The next layer was red clay at a depth of 80-90 cmbs, and at 90-100 cmbs a partial fire pit was in the northern corner. Unfortunately, the soil matrix descriptions from 90-190 cmbs were lost. There was considerable rock in this intervening matrix. Excavation continued to 220 cmbs but bedrock was not reached.

Unit 6 was a 1 x 2 m test pit located downslope from the dripline on the talus slope extending towards the Eagle Creek terrace edge. The upper 40 cmbs of soil was black charcoal color in the upslope half of the excavation unit and a red clay in the downslope half of the unit. Charcoal colored soil was present between 40-60 cmbs in the northern unit and partially extended into the southern unit. There was no detailed soil color description in the field notes from 40-100 cmbs. A 10-cm-thick charcoal-impregnated clay and sand began at 100 cmbs. From 110-120 cmbs there was very dark soil with charcoal and FCR inclusions. Between 120-160 cmbs the soil is described as a dark stain, from black to brown. At the base of the unit between 170 and 200 cmbs there was brown sandy soil with numerous pieces of limestone, but the bedrock was not reached.

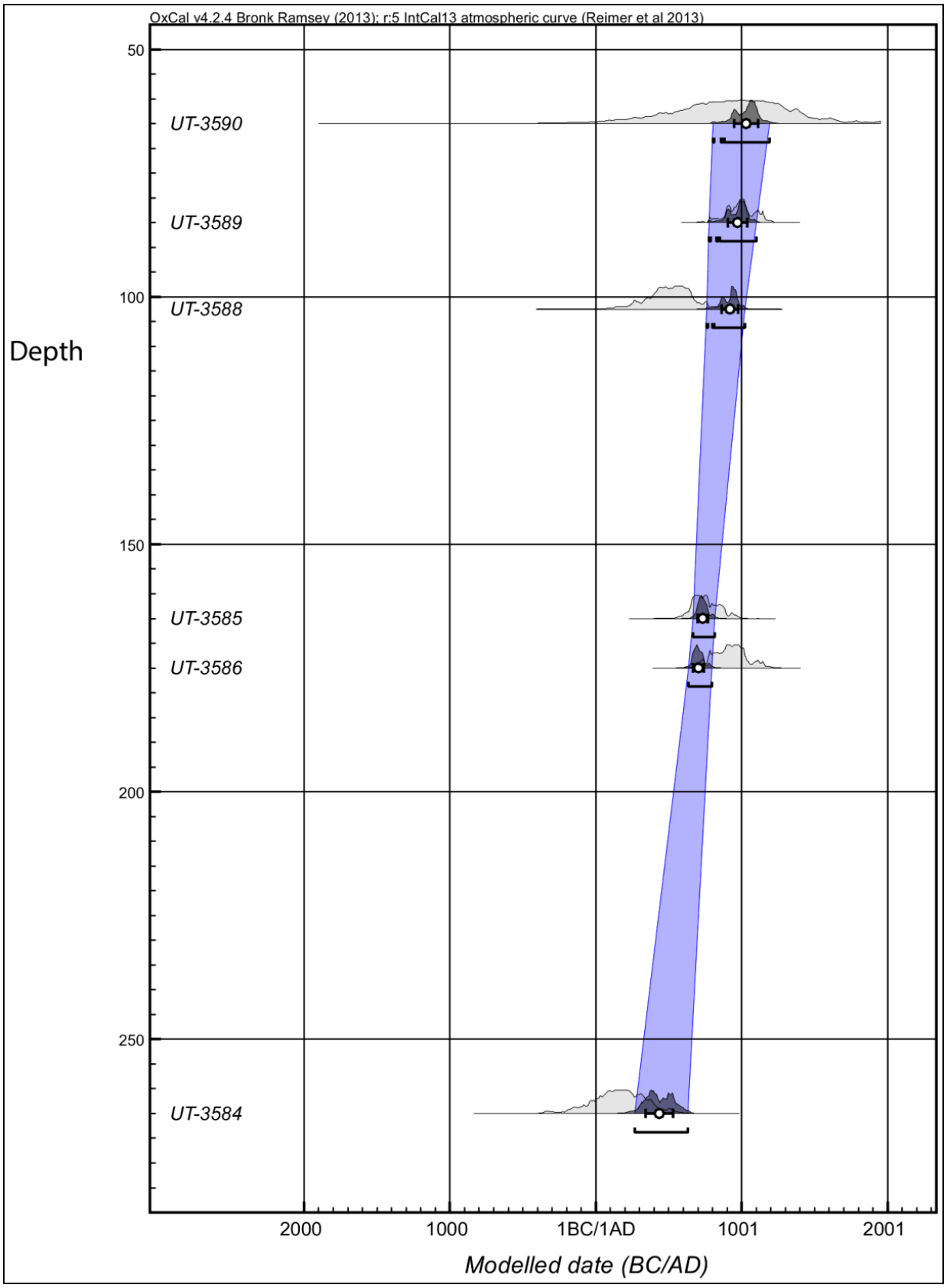

Figure 10. Calibrated and modelled radiocarbon ages from Unit 2.

Figure 11. Woody Meiszner excavating Unit 3 in western part of the shelter.

Unit 7 was a step trench excavated into the terrace sediments below the overhang (Figure 12). The trench units were 1 x 1.5 m rectangles (Figure 13) which extended downslope to the terrace toe at the floodplain level. The east wall of the upper two units was profiled. The stratigraphy of the levels tapers off towards the creek. On the northern end of the trench from 0-60 cmbs there was yellowish red (5YR4/6) clay. The 60-70 cmbs consisted of a thin layer of dark grayish brown (10YR4/2) clay mottled with red clay. At a depth of 70-80 cmbs there was yellowish red (5YR4/6) clay on top of dark grayish brown (10YR4/2) clay that was underlaid by yellowish red (5YR4/6) clay between 80-90 cmbs resting on top of a thin layer of dark grayish brown (10YR4/2) clay. Starting at 95 cmbs and extending to 120 cmbs, yellowish red (5YR4/6) clay marked the top of the southern half of the unit. From 125-130 cmbs there was very dark gray (5YR3/1) clay, and from 130-170 cmbs yellowish red (5YR4/6) clay layer thinned toward the south. As the unit continued down to 280 cmbs, the stratigraphy continued to alternate between approximately 10-20 cm of very dark gray (5YR3/1) clay and yellowish red (5YR4/6) clay.

Unit 8 (Figure 14) was a 1 x 1-meter test pit located on the eastern part of the rock overhang, between Unit 5 and Unit 4. The upper layer, from 0-30 cmbs, consisted of ash and charcoal stains in dark reddish brown (5YR3/3) sandy clay. From 30-60 cmbs yellowish red (5YR4/6) sandy clay was present with streaks of blue clay. The next layer, 60-90 cmbs, transitioned from reddish brown to yellowish red sandy clay that became a layer of white sandy clay mixed with red and gray clay between 90-100 cmbs. The bottom layer was dark reddish brown (5YR3/2) midden soil with charcoal and gray ash. This lower level contained a level deposit of compact gray ash between 125 and 140 cmbs (Figure 15). Bedrock was encountered in the floor of the unit (Figure 14).

Figure 12. Hand excavation of step trench Unit 7 looking north toward the shelter opening along the limestone bluff.

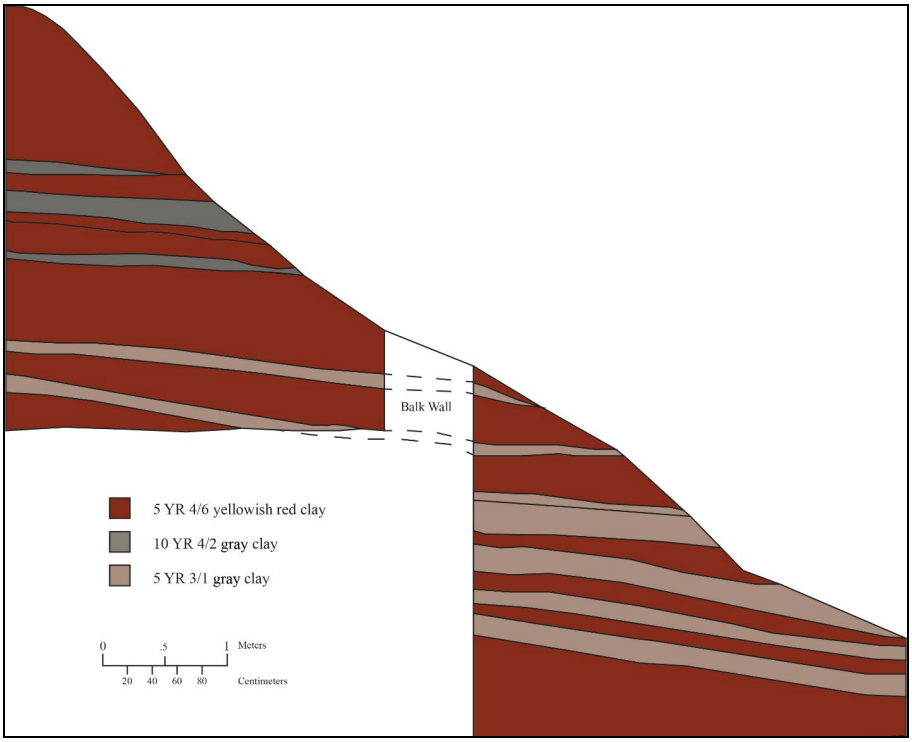

Figure 13. Profile of the east wall of the upper two units of excavation Unit 7.

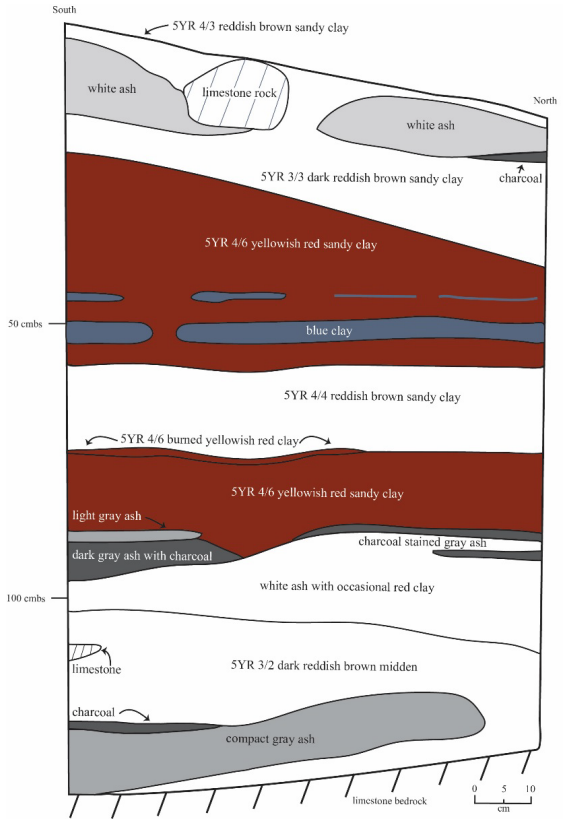

Figure 14. Profile of the east wall of excavation Unit 8.

Figure 15. Dr. RuthAnn Erickson sitting in the bottom of Unit 8.

Unit 9 was a 2 m long test pit excavated into the floor of Unit 1 beginning at the depth of 160 cmbs in the west corner of Unit 9 (Figure 6). The first stratum was just over a meter thick and was brown (7.5YR4/2) sandy clay that contained scattered limestone chunks and scattered charcoal flecks. The second stratum was a 20 cm thick layer of dark reddish brown (5YR3/4) sandy clay that overlaid a slightly thinner very dark brown (10YR2/2) loamy clay (Stratum 3). Stratum 4 was a 50 cm thick dark brown (5YR3/3) sandy loam that contained roof fall on the west side. The bottom zone was yellowish red (5YR4/6) sandy clay that was at least 35 cm thick. Bedrock was not encountered in the bottom of the unit.

The stratigraphic profiles from Units 8 and 1/9 (the backhoe trench) (Figure 6 and Figure 14) make it possible to tie together the area under the overhang to the talus slope. Vertical stratigraphy from units excavated under the overhang was intact. The most prominent layer was yellowish red (5YR4/6) clay and sandy clay alluvial sediment deposited by Eagle Creek flooding. On the talus slope, this layer was exposed on the surface and again at the bottom of Unit 9 under the overhang. This red clay layer was present in Units 2-5 and 8 and was buried under 30-40 cm of brown to reddish brown sediment. This upper layer contained the historic occupation under the overhang, which overlaid yellowish red clay and sandy clay layer that extends out to the surface of the talus slope.

A similar, but slightly more complex, stratigraphic profile was visible in Unit 7, which is located closest to Eagle Creek. Again, the yellowish red (5YR4/6) clay was visible on the surface. The profile alternates between this yellowish red clay and gray (10YR4/2 or 5YR3/1) clay that ranged in thickness from 10 and 30 cmbs. The stratigraphic profile from this unit indicates several flooding events. The yellowish red clay and sandy clay that was visible on the surface of the talus slope and buried under the historic material

from under the overhang, ties the different areas of the site together. Although no artifacts were collected from Unit 7, buried cultural deposits could be present between the bank of Eagle Creek and the base of the terrace slope, thus, potentially increasing the size of the Franty Watson site. The presence of the alluvial yellowish red clay deposit from Eagle Creek indicates a series of flooding events as high as the floor of the rockshelter. The fact that this deposit was also identified under the overhang indicates that some were quite high and confined in the river and creek valleys.

While charcoal, ash lenses, and stains were encountered throughout the site sediments, only a small number of distinct features were encountered. These include hearth layers, and rock-lined hearths. There were also a couple of FCR concentrations, but these could not be directly tied to any hearth features. Hearth features were in Unit 3 at a depth of 110-125 cmbs, Unit 2 at 10-20 cmbs and 120-140 cmbs, and Unit 5 at 90-100 cmbs.

PREHISTORIC ARTIFACT ASSEMBLAGE

Chipped Stone

A large assemblage of chipped stone artifacts was collected from the Franty Watson site including cores, projectile points, bifaces, bifacial knives, retouched flakes, gravers, drills, scrapers, celts and a pendant made of hematite, and over 13,000 pieces of debitage. Nearly all the chipped stone assemblage was made of chert. Uvalde gravels, that comprises about 10% chert, are present in upland areas in the region (Banks 1990:56-57; Byrd 1971:29, Figure 28; Plummer and Hornberger 1935:214). Whereas the chipped stone assemblage was predominantly made from chert, ground stone artifacts were predominantly made of sandstone. Ground stone artifacts include manos, metates, nutting stones, celts, and a pendant. Six quartzite hammerstone and hammerstone fragments were also recovered (Table 2).

The term flake as used here refers to a piece of debitage that retains its striking platform, while chips do not retain platforms (Skinner 1971: 158-160). The dorsal surface of primary pieces of debitage is fully covered with cortex while interior pieces exhibit no cortex. Secondary pieces have some cortex on the dorsal surface. Primary flakes and chips were poorly represented in the assemblage and showed that cortex removal from cobbles was not the most important task done at the site. Secondary flakes (999) and interior flakes (945) were about equally represented while more than twice as many interior chips (7,214) than secondary chips (2,996) were recovered. The large number of interior chips may represent tool resharpening. A considerable amount of knapping was done at the site based on the number of flakes (2,241) that had been removed primarily from biface preforms and some cobble cores.

Twenty-five cores and core fragments made from chert cobbles were recovered. Of these, fourteen are multidirectional cores indicating that flakes were removed in an unsystematic manner. One core exhibits flake scars emanating from a single platform while a second has overlapping flake scars emanating from platforms on opposite ends. Nine of the cores are classified as core fragments.

In total, 172 technologically and temporally diagnostic projectile points and point fragments were collected from the test units (Table 3). The assemblage includes both arrow points and dart points ranging from the Late Archaic period (2000 BC-AD 800) to the Late Prehistoric/Historic period (AD 800-1700) (Collins 2004; Turner et al. 2011; Boyd 2012). No projectile points were found above the 40-50 cmbs level, which is expected based on the stratigraphic distinction between historic and prehistoric material between 30-40 cmbs. Here, diagnostic projectile points are those that contain at least the base or hafting element allowing for the classification of an artifact into types (Figure 16). Non-diagnostic projectile points are typically comprised of body elements that

are lacking or missing enough of the haft element to allow for classification. Non-diagnostic projectile points were assigned as dart or arrow points based on size, the assumption being that dart points are larger than arrow points. The first projectile point type recovered stratigraphically at 40-50 cmbs was a Fresno arrow point. Pedernales dart points were recovered from the lower levels of the cultural deposit at 300-340 cmbs.

Two of the non-diagnostic dart points exhibit alternate beveling on the right-hand side of each face resulting in rhomboidal cross-sections. These specimens were curated by prehistoric peoples, and it appears that the alternate beveling on these pieces is a reworking technique, as discussed by Goodyear (1974) regarding Dalton points. He postulates this technique of rework by alternate beveling was part of a resharpening process that allowed the reuse of points with dulled body margins. A similar set of observations have been made about Thinned-base Early Triangular points from the Panther Springs Creek site in south-central Texas (Black and McGraw 1985:132). While these two points from the Franty Watson site appear to be consistent with this technological concept, they are not Dalton points. Beveling is not limited to just Dalton points and Turner et al. (2011) note several chipped stone biface projectile points from across Texas that display this technique throughout prehistory.

A single burinated Yarbrough dart point was found in Unit 6 (Figure 16m and Figure 17b). This feature is frequently found on Paleoindian point styles, although a few have been found in Archaic components (Epstein 1963:187). The specimen from the Franty Watson Site is an example of a single-angle, distal-fractured burin, with the spall extending almost the full length of the projectile point.

Non-diagnostic biface is used here as an umbrella category covering finished bifacial tools that lack diagnostic features or hafting elements as well as those that are not considered projectile points such as knives. Bifaces were classified and grouped based on their stages of production. The biface preform category includes the early stages of biface production, what might be classified as roughouts, blanks, and preforms that are both complete and fragmentary. Biface fragments are pieces of finished bifaces that do not contain diagnostic features allowing for classification as either dart or arrow points.

Three large, bifacial, chert knives were found at the site. One knife is like the Covington (Figure 16o and Figure 18) knife variety described at the Kyle site (Jelks 1962:42). This knife has a barely rounded base and lateral edges that are parallel for at least one-third the total length of the artifact. The edges of the blade have been finely pressure flaked producing a slightly serrated appearance. There is also a curved, pointed knife like those discussed at the Kyle site (Jelks 1962:47). It has a pointed tip at the distal end and an unworked base. One side of the blade is convex and the other concave giving the knife a distinct curved shape. The third biface knife is laterally worked on one edge while the other is cortex. This cortex-backed knife has been extensively retouched along the blade, giving it an acute angle (Figure 16p). All three knives were associated with Archaic dart points.

Table 2. Prehistoric Artifact Counts by Unit.

	Unit 2	Unit 2/5 Wall	Unit 3	Unit 4	Unit 5	Unit 6	Unit 8	Unit 9	Total
Chipped Stone									
Debitage	2,533	-	1,373	1,657	1,596	1,867	625	3,511	**13,162**
Retouched Flake	25	4	3	10	2	5	3	10	**62**
Graver	-	-	1	1	-	-	-	-	**2**
Scraper	1	-	-	-	-	-	-	-	**1**
Drill	1	-	1	3	2	2	1	1	**11**
Core	8	2	1	2	1	4	4	2	**24**
Biface Preform	18	1	7	14	6	15	8	24	**93**
Non-diagnostic Biface	-	-	-	-	-	2	-	3	**5**
Biface Fragments	2	-	-	1	1	1	1	2	**8**
Diagnostic Dart Point	3	-	-	-	2	2	1	21	**29**
Non-diagnostic Dart Point	2	-	-	-	2	3	-	13	**20**
Diagnostic Arrow Point	28	3	8	12	14	6	13	-	**84**
Non-diagnostic Arrow Point	7	3	8	8	3	3	6	1	**39**
Ground Stone									
Celt	-	-	-	1	1	-	-	-	**2**
Mano	1	-	2	1	1	3	-	3	**11**
Metate	1	-	2	-	-	-	-	4	**7**
Nutting Stone	-	-	-	-	-	-	-	2	**2**
Hammerstone	2	-	-	-	-	3	-	1	**6**
Stone Pendant	-	-	-	1	-	-	-	-	**1**
Worked Bone									
Bone Awl	8	1	3	1	2	-	1	-	**16**
Bone Tablet	2	-	-	-	-	-	-	-	**2**
Antler Tine	1	-	2	-	-	1	-	-	**4**
Ceramic									
Ceramic	1	-	-	-	-	-	3	-	**4**

Table 3. Projectile Point Counts by Unit. Date Ranges are from Turner et al. 2011.

Projectile Point Types	Unit 2	Unit 2/5 Wall	Unit 3	Unit 4	Unit 5	Unit 6	Unit 8	Unit 9	Total
Arrow Points									
Perdiz *AD 1200-1700*	7	-	-	-	6	-	4	-	**17**
Perdiz-Like *AD 1200-1700*	2	-	-	-	-	-	-	-	**2**
Cliffton *AD 1200-1700*	3	-	2	1	-	-	1	-	**7**
Alba *AD 900-1500*	3	1	-	1	1	-	2	-	**8**
Edwards *AD 900-1000*	1	-	-	-	-	-	-	-	**1**
Bonham *AD 800-1300*	3	-	2	2	1	-	3	-	**11**
Scallorn *AD 800-1250*	-	-	-	4	2	-	-	-	**6**
Toyah *AD 1300-1700*	-	-	4	2	-	6	-	-	**12**
Fresno *AD 1300-1700*	4	-	-	2	4	-	1	-	**11**
Washita *AD 1300-1700*	5	2	-	-	-	-	2	-	**9**
Non-Diagnostic Arrow Point	7	3	8	8	3	3	6	1	**39**
Total	***35***	***6***	***16***	***20***	***17***	***9***	***19***	***1***	***123***
Dart Points									
Darl *200 BC - AD 700*	1	-	-	-	-	-	-	2	**3**
Frio *200 BC - AD 600*	-	-	-	-	2	-	-	1	**3**
Ensor *200 BC - AD 600*	1	-	-	-	-	-	-	3	**4**
Edgewood *300 BC - AD 700*	-	-	-	-	-	-	-	2	**2**
Godley *400 BC - AD 600*	-	-	-	-	-	2	1	1	**4**
Montell *800-400 BC*	-	-	-	-	-	-	-	1	**1**
Yarbrough *1000-300 BC*	1	-	-	-	-	-	-	6	**7**
Pedernales *1500-500 BC*	-	-	-	-	-	-	-	4	**4**
Bulverde *2000-1500 BC*	-	-	-	-	-	-	-	1	**1**
Non-Diagnostic Dart Point	2	-	-	-	2	3	-	13	**20**
Total	***5***	***-***	***-***	***-***	***4***	***5***	***1***	***34***	***49***

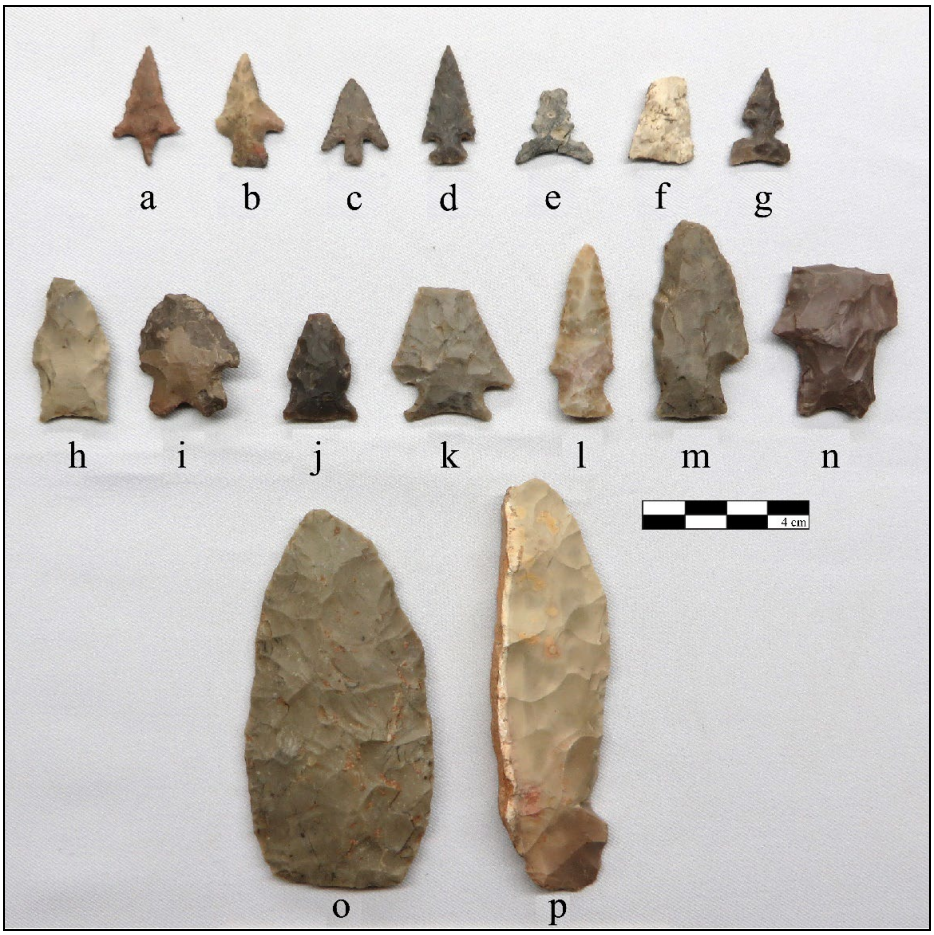

Figure 16. Diagnostic Projectile Point Types and Bifacial Knives from Franty Watson. a. Perdiz; b. Alba; c. Bonham; d. Scallorn; e. Toyah; f. Fresno; g. Washita; h. Darl; i. Frio; j. Ensor; k. Edgewood; l. Godley; m. Yarbrough; n. Pedernales; o. Bifacial Covington Knife; p. Cortex-backed Bifacial Knife.

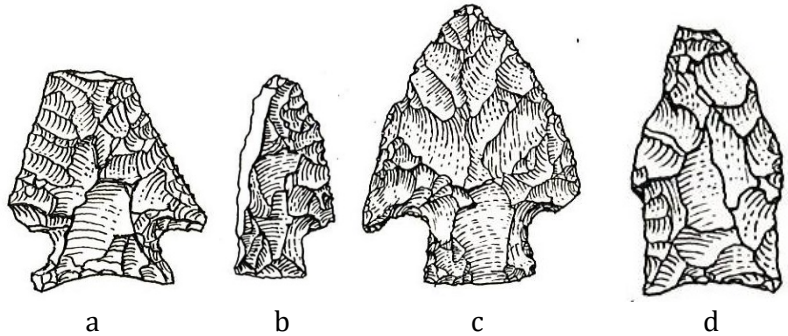

Figure 17. Stratigraphically arranged dart points from Unit 9. a. Edgewood; b. Single-angle, distal fractured burinated Yarbrough; c. Bulverde; d. Darl. Illustrated full size by Virginia Geis of the Tarrant County Archeological Society.

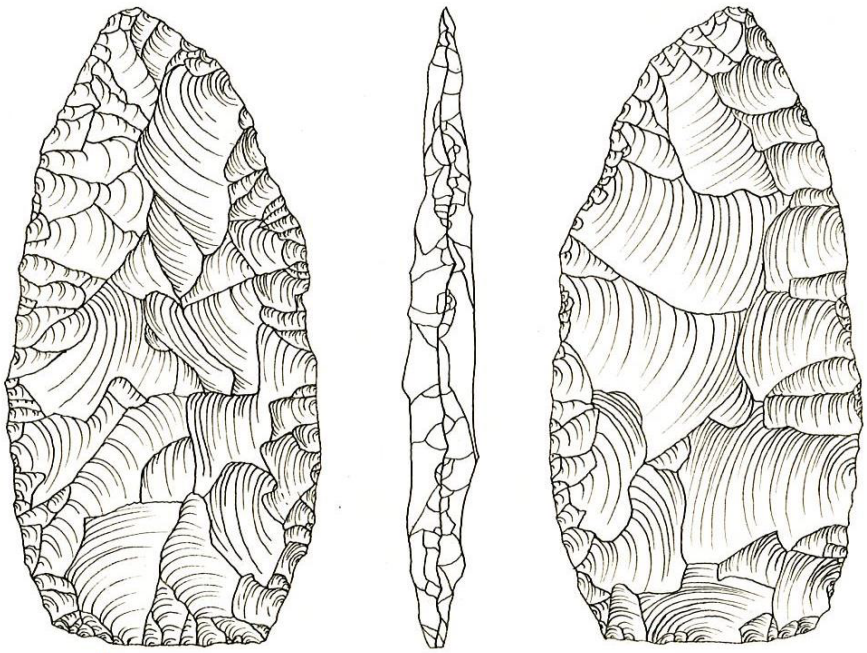

Figure 18. Covington knife showing both faces and profile. Full-size illustration by Virginia Geis of the Tarrant County Archeological Society.

Ground Stone

Eleven manos and seven metate fragments, all made of sandstone, were recovered during excavation. Three of the manos are complete and eight are fragments most of which have signs of pecking and wear on both faces. The five largest metate pieces show depressions from wear, which are basin-shaped and smooth to the touch while one shows signs of pecking. Unit 9 contained seven of the manos and metates all of which were recovered below 240 cmbs. The eleven other manos and metates were recovered in Units 2-6 and came from above 240 cmbs, mostly between 90 and 160 cmbs. Similar in size to the manos, two nutting stones may have been used to crack open nuts which left a small depression on one face. Both are made of sandstone and it appears that one might have also been slightly used as a mano.

Three small, bifacial celts (Figure 19a and Figure 19b) made of polished hematite were recovered at the Franty Watson site; the third specimen was not illustrated. Celts are common in north-central Texas, and they appear to be concentrated in the Western Cross Timbers ecoregion (Moseley 1996). Two of the celts came from 110-120 cmbs. The largest celt is from Unit 4. It weighs 27.4 g and measures 4.13 cm long by 3.14 cm wide by 1.2 cm thick and is ground smooth to form the sharp bit. This specimen is slightly magnetic while the other two are not. The second, from Unit 5, is a bit fragment that appears to have been dulled because of being hit on the edge which caused flake removal on both faces of the ground bit surface. The third celt was found on the surface of the site inside the dripline (Figure 19b). It weighs 9.33 g and measures 3.19 cm long by 2.51 cm wide. It is 0.57 cm thick.

A circular coin-sized sheet of sandstone was recovered from between 80-90 cmbs in Feature 2. The piece weighs 4.51 g and ranges from 2.27 to 2.39 cm in width and is 0.43 cm thick. The interior of the specimen is a cemented reddish yellow color (7.5YR6/6) and the exterior of both outer surfaces is a layer of reddish-yellow (7.5YR6/6) sandstone that is 1-2 mm thick.

A pendant (Figure 20) was collected from Unit 4 between 100 and 110 cmbs. It is teardrop-shaped and made of a dusky red (10R3/2) piece of hematite where it was not ground and reddish black (10R2.5/1) where it has been ground, which has been ground to a mostly smooth finish on the convex face. Based on remnant flake scars on the dorsal surface, it appears that the pendant was chipped into its current shape before being ground. Scratch marks are apparent on both surfaces where an abrasive material was used to grind much of both faces to a smooth finish. A small hole approximately 1.5 mm in diameter has been bi-conically drilled into the narrow end. The pendant measures 5.2 cm long, 2.7 cm wide, 0.4 cm thick, and weighs 15.7 g.

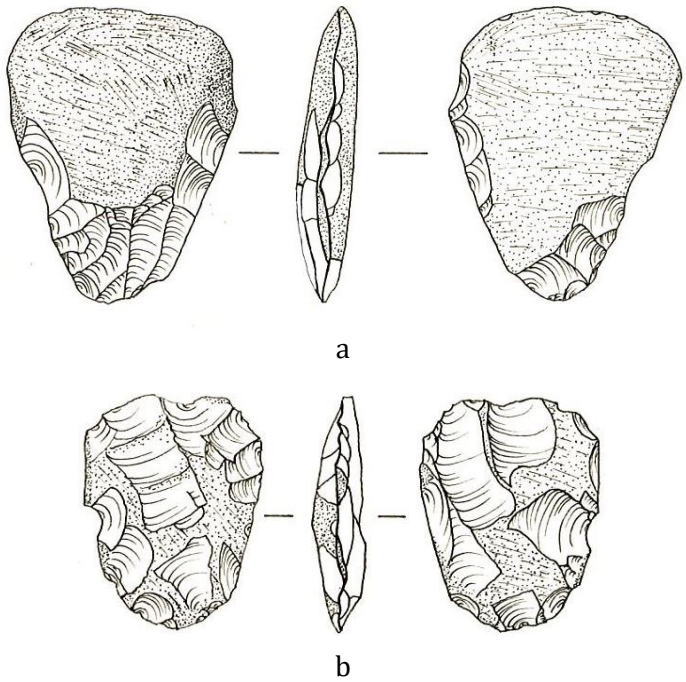

Figure 19. Two complete flaked and polished celts were recovered at the site. a. was from Unit 4 and b. was from the surface of the shelter inside the dripline. Both were illustrated full-size by Virginia Geis of the Tarrant County Archeological Society.

Figure 20. Illustrations of the hematite pendant. Drawing prepared by Virginia Geis of the Tarrant County Archeological Society.

Bone and Shell Tools

Tools and tool fragments of bone and shell were also recovered at the site. Most of these are made from long bones, which have been polished to a high sheen through use (Figure 21). Five identifiable bone awls (two complete and three tips) were recovered of which four are made from the long bones of medium-sized mammals, while one is from a bird. There was a concentration of fourteen pieces of worked bone in adjacent Units 2 and 5, and five pieces of worked bone in Unit 3. One sub-adult mussel shell used for scraping was recovered from Unit 2 80-90 cmbs. The outermost edge of the shell has been worn through extensive use as a scraping tool (Figure 22).

Figure 21. Bone awls and polished bone.

Figure 22. Ground mussel shell edge. The bottom left half of the original edge of the shell has been worn dull, and the right edge has been worn thick and reshaped.

Ceramics

Prehistoric pottery is not common in this assemblage as a total of four sherds was found at the site. Only one of the pottery sherds was identifiable to a specific type. The largest fragment is an example of Bullard Brushed. This is principally a Frankston Focus type but also occurs in Titus Focus components. Bullard Brushed is one of the three main utility wares of these two foci. Perttula (2013:193, 198-199) dates this pottery type in the Late Caddo period between AD 1450-1680. It generally has clay-grit temper and a coarse texture. It is crudely finished inside, and its outer surface is roughly brushed. Three smaller fragments of non-diagnostic style were also recovered. These pieces are plain on both the inside and outside and have dark inner cores with grog temper. Three of the four fragments came from Unit 8; the other was from Unit 2. All were recovered from the same stratigraphic level at 70–80 cmbs.

Faunal Remains

Identification of faunal remains was made in 1998 by Bonnie Yates using the comparative collection of the Institute of Applied Sciences at the University of North Texas. The faunal remains from the site are well preserved with 731 of the approximately 1,800 bones identifiable to species, or at least family level (Table 4 and Table 5). In general, the species represent fauna still available in the area today. They characterize a habitat of mixed grasslands and prairies with perennial waterways. The Franty Watson assemblage is predominately comprised of rabbit, deer, and soft-shelled turtle. Mammals make up 45% of the identified vertebrates with rabbit, deer, and woodrat having the most elements identified. Rodents are moderately represented and of interest as elements of each species show evidence of burning. Burnt fragments were also found of larger rodent-sized mammals such as rabbit. Most of the medium-sized mammal remains, specifically deer, consist primarily of fragmentary feet elements. Additional medium-sized mammals are represented by a small number of raccoon, dog, beaver, skunk, and possibly mountain lion elements.

Table 4. Vertebrate Faunal Remains by Class.

	Total Sample		Burned Sample	
Vertebrate Class	**N**	**Percent of Total Specimens(%)**	**N**	**Percent of Class(%)**
Mammals	331	46	126	38
Birds	17	2	-	-
Reptiles	221	30	104	47
Amphibians	7	1	2	29
Fish	155	21	47	30

Table 5. Faunal Remains by Species.

						Concentration Locations	
Common Name	**Scientific Name**	**Total**	**% of Total**	**% Burned**	**MNI**	**Unit**	**Depth (cmbs)**
Opossum	*Didelipis virginiana*	1	0.1	-	1	2	30-40
Eastern Mole	*Scalopus aqaticus*	1	0.1	-	1	6	110-120
Rabbit	*Sylvilagus* cf. *floridanus*	61	8.4	43	7	2,8	80-130
Blacktail Jackrabbit	*Lepus califonicus*	16	2.2	56	2	-------dispersed-------	
Squirrel	*Sciurus* cf. *niger*	1	0.1	100	1	5	180-200
Pocket Gopher	*Geomys* cf. *bursarius*	10	1.4	20	1	-------dispersed-------	
Hispid Pocket Mouse	*Perognathus hispidus*	3	0.4	-	1	-------dispersed-------	
White-Footed Mouse	*Peromyscus* sp.	2	0.2	100	1	-------dispersed-------	
Hispid Cotton Rat	*Sigmodon hispidus*	14	1.9	21	4	2,5	100-120
Woodrat	*Neotoma* sp.	45	6.2	27	9	2,5	70-120
Beaver	*Castor Canadensis*	3	0.4	33	1	2	190-240
Dog	*Canis* sp.	9	1.2	33	2	-------dispersed-------	
Raccoon	*Procyon lotor*	2	0.2	-	1	6	40-170
cf. Skunk	*Mephitis* sp.	3	0.4	67	1	-------dispersed-------	
cf. Mountain Lion	*Felis concolor*	2	0.2	-	1	5,6	160-220
Deer	*Odocoileus* cf. *virginianus*	92	12.7	43	4	2 2 6	70-120 210-260 140-200
cf. Pronghorn	*Antilocapra americana*	3	0.4	-	1	-------dispersed-------	
cf. Goat	*Capra hirca*	1	0.1	-	1	4	20-30
cf. Bison	*Bison bison*	6	0.8	33	1	9	240-280
Large Mammal Elements		4	0.6	1	-	-	-
Medium Mammal Elements		14	1.9	36	-	-	-
Small Mammal Elements		3	0.4	100	-	-	-
Rodent Mammal Element		37	5.1	49	-	-	-
Prairie Chicken	*Tympanuchus* sp.	1	0.1	-	1	5	140-170
Bobwhite	*Colinus virginianus*	1	0.1	-	1	5	210-220
cf. Pigeon	*Columbidae*	2	0.2	-	1	2,6	150-200
cf. Hawk	*Buteo* sp.	2	0.2	-	1	2,8	70-140
Duck	*Anas* sp.	1	0.1	-	1	5	wall
cf. Goose	*Anserinae*	10	1.4	-	2	2,6	80-150
Non-Poisonous Snake	*Colubridae*	5	0.7	40	1	2,9	230-340
Poisonous snake	*Viperidae*	11	1.5	-	1	6,8 2	80-120 220-260
Snake sp.	*Serpentes*	4	0.6	50	-	4,6	120-160
Box Turtle	*Terrapene* sp.	6	0.8	-	1	2,4 2	130-170 230-260
Pond Slider	*Chysemys* sp.	12	1.7	17	2	6 2	80-110 190-270
Musk/Mud Turtle	*Kinosternidae*	11	1.5	-	4	-------dispersed-------	
Soft-Shelled Turtle	*Trionyx* sp.	65	8.9	62	2+	-------dispersed-------	
Turtle sp.	*Testudines*	107	14.7	54	-	-------dispersed-------	
Bullfrog	*Rana catesbiana*	5	0.6	40	1	-------dispersed-------	
Frog/Toad sp.	*Anura*	2	0.2	50	-	2	100-180

						Concentration Locations	
Common Name	**Scientific Name**	**Total**	**% of Total**	**% Burned**	**MNI**	**Unit**	**Depth (cmbs)**
Alligator Gar	*Lepisosteus spatula*	4	0.6	-	1	-------dispersed-------	
Gar sp.	*Lepisosteus* cf. *osseus*	18	2.5	28	1	-------dispersed-------	
						6	80-160
Catfish sp.	*Ictalurus* sp.	25	3.4	36	4	5	18-220
						2	230-270
Bass sp.	*Micropterus* sp.	4	0.6	50	1	2	80-260
Bass/Sunfish	*Centrarchidae*	2	0.2	-	-	2,5	100-170
Freshwater Drum	*Apoldinotus grunniens*	39	5.3	46	10	-------dispersed-------	
Fish sp.	*Pisces*	63	8.7	19	-	-------dispersed-------	

Remains of small terrestrial species occur in higher frequency than medium/large terrestrial species. Two of the six rodent species are likely intrusive (pocket mouse and mole) based on their burrowing habits and the lack of burned elements. The woodrat species in this sample is probably the Eastern Woodrat (*Neatoma floridana*), even though Palo Pinto County is considered outside its present range (Davis 1974). Although the gray woodrat (*Neatoma micropus*) currently ranges in Palo Pinto County, the bones of this species are smaller than those recovered from the Franty Watson site. Furthermore, the gray woodrat prefers arid conditions while eastern woodrats can tolerate a wide variety of habitats, including river bottoms (Davis 1974). The minimum number of individuals (MNI) of woodrat in the assemblage is nine and 27% of the assemblage has been burned. Davis (1974) notes that woodrats are easily procured, and owing to the visibility of their ground nests, were probably suitable prey for prehistoric hunter-gatherers.

Cottontail rabbit (MNI=7) was recovered from each unit ranging in depth from 60 to 280 cmbs. Of the rabbit assemblage, 41% are burned long bones. Of the head and foot elements, 73% are unburned possibly implying a skinning technique in which the head and feet were removed, the animal skinned, and the carcass cooked in a fire. However, owing to the small sample size of 61 identifiable bones, other explanations are possible.

Eighty-eight percent of the deer (MNI=4) elements come from non-meaty parts of the body. Cranial elements (teeth, antlers, mandibles) and lower limb bones (metapodials, carpals/tarsals, phalanges) do not provide much meat when compared to upper limb and torso regions. The bones show few butchering marks although a calcaneum fragment from Unit 6 (170-180 cmbs) is cut and charred; and a burned antler fragment possibly shows two faint cut marks.

Four other mammals were only tentatively identified due to the fragmentary nature of the elements and the lack of diagnostic elements: mountain lion, pronghorn, bison, and modern goat. The tooth fragment from a goat should be dismissed from interpretation of the prehistoric assemblage as it was recovered 20-30 cmbs in a level associated with the historic occupation. Of the six specimens reported as bison, only three elements were positively identified. The other three fragments were attributed to this species based on size and association with the three identified elements. Bison and pronghorn are found on the prairie, which suggests their procurement involved travelling some distance from the shelter. Considering the ecotonal character of the Texan biotic province, this distance may not have been too great. Besides the meager evidence of large prairie dwellers (bison and

pronghorn), jackrabbit and two species of prairie birds suggest some utilization of grassland habitats as well as the wooded riverine environments surrounding the site.

Aquatic species can be acquired year-round in Texas even in the cold months and include waterfowl, turtles, and fish. Turtle represented almost 25% of the total identified assemblage while fish remains make up 21%. The bulk of reptilian material is composed of turtle shell fragments (91%) of which 47% could be classified to either the family or the genus level. Species identification could be made for 59% of the total fish assemblage. If fish remains preserved better, this percentage would likely be much higher, especially for small fish such as bream and shad. Two fish species identified from this sample, drum and catfish, suggest that the body of water exploited was a perennial stream or a small lake with ample vegetation and soft substrate (Cleland 1966; Zim and Shoemaker 1956), such as Eagle Creek.

Historic Artifacts

Most historic artifacts were found in the first 20 cmbs at the site. Historic artifacts were only found in units excavated under the rock overhang (units 2-5, 8) and not on the talus slope (Table 6). Wire nails were the most prevalent historic artifact found throughout the shelter with concentrations in the center of the shelter in Units 2, 5, and 8 at depths ranging between 10 and 30 cmbs. Clear glass is found throughout the shelter with amber glass found only on the eastern and western edges of the shelter, while blue glass was only found on the western edge. Metal artifacts recovered include wire nails, aluminum foil, steel, and steel cans, all of which are helpful in dating the historic component and is discussed in detail below.

Table 6. Historic Artifacts by Unit.

Historic Artifact Type	Unit 2	Unit 3	Unit 4	Unit 5	Unit 8	Total
Ceramic	-	-	1	-	-	**1**
Plastic	-	-	1	-	-	**1**
Glass						
Amber	-	2	1	-	2	**5**
Blue	-	3	-	-	-	**3**
Clear	2	2	12	3	-	**19**
Metal						
.22 Shell	3	-	-	-	-	**3**
Aluminum Foil	1	1	-	-	-	**2**
Baking Powder Lid	-	-	1	-	-	**1**
Barbed Fishhook	-	-	-	-	1	**1**
Barrel Strap with Rivet Hole	-	-	-	1	-	**1**
Can	-	1	-	2	-	**3**
Can Key	-	-	1	-	-	**1**
Can Top	-	-	20	-	-	**20**
Cotter Pin	-	1	-	-	-	**1**
Nail	-	-	-	3	-	**3**
Wire Nail	21	56	6	12	11	**106**
Spoon	-	-	1	-	-	**1**
Tobacco Can with Lid	-	-	1	-	-	**1**
Wire	8	-	1	2	2	**13**
Unidentified	-	-	-	2	-	**2**
Lead	-	3	-	1	-	**4**

Discussion

Cultural materials recovered during testing can be used to place the shelter occupation within a temporal framework. The presence of Bulverde and Pedernales dart points in the deepest levels of Unit 9 indicate occupation of the site extends back to at least the Late Archaic, while diagnostic arrow points and ceramics found above these levels brings occupation into the Late Prehistoric and possibly the Historic Native American periods.

Of all the prehistoric and historic artifacts recovered in the shelter, a single prehistoric celt was found on the surface. Most of the historic artifacts, 163 of the 175, came from the top 30 cmbs. Nine nails were found 30-40 cmbs while three nails were found below this depth. Of the large prehistoric assemblage, 34 flakes and two biface preforms were found in the top 30 cm across all units. Although some mixing occurred, there is a recognizable separation between Native American material and Euro-American material at 30-40 cmbs.

PREHISTORIC OCCUPATION

The presence of numerous diagnostic projectile points is important as it allows a chronology to be built around temporal markers. Projectile point types were identified following descriptions in Collins (2004) and Turner et al. (2011). The shift in weaponry from atlatl and dart to bow and arrow is dated to about AD 800 in central Texas (Collins 2004). This change in technology can be seen at the Franty Watson site and the chronology fits with the generalized timing of this event.

While not at the deepest depth of excavation, a single calibrated radiocarbon age of AD 436 (UT-3584) from 260-270 cmbs in Unit 2, anchors the projectile point chronology at the site with reported dates associated with specific dart point types. Due to disordered recording, the provenience of many dart points spans many levels making it difficult to order the dart point sequence stratigraphically. Types of dart points recovered include Bulverde, Pedernales, Yarbrough, Montell, Godley, Edgewood, Ensor, Frio, and Darl. Radiocarbon ages from Unit 2, 160-180 cmbs, date to just less than 1,300 years BP and the transition to the Late Prehistoric. At this depth, the presence of dart points is on the decline. However, it is at these levels located under the overhang that a vast majority of the diagnostic arrow points first appear. The increased presence and continuation of various diagnostic arrow points continues into the upper levels of the stratigraphy. Examples of Washita, Fresno, Toyah, Scallorn, Bonham, Edwards, and Alba points span the known temporal and typological distribution of arrow points during the Late Prehistoric period in central Texas. The presence of diagnostic dart points with the Late Prehistoric assemblage possibly indicates that atlatl and dart weaponry continued after the adoption of the bow and arrow. The presence of a Fresno point, the shallowest arrow point encountered in the assemblage, at 40-50 cmbs lends to the notion that the last Native American occupation was likely Late Prehistoric and not from the Historic period. This is since Fresno points are typically associated with dates ranging from AD 700-1500 while points such as Cliffton and Perdiz, which date from AD 1200-1700, were found in levels below the Fresno point.

Although arrow points occur in greater frequency than dart points, 123 to 49 respectively, this does not likely indicate an increased use of the site during the Late Prehistoric. Differences in square meters excavated and the fact that most of the Late Prehistoric components are in the rockshelter, while the bulk of the Late Archaic component comes from the talus slope area in Unit 9 are influencing factors. Unit 9 was a rectangular 1.2 square meter excavation unit that started 160 cmbs at the bottom of backhoe Unit 1 (artifacts were not recorded in the trench) and went to a depth of over 400 cmbs. Unit 9 contained 34 of the 49 dart points and over 3,500 pieces of debitage. This

presents an interesting temporal distribution of artifacts within the site. While some Late Archaic dart points and a single Late Archaic radiocarbon date on charcoal exist from under the overhang, these units contain most of the Late Prehistoric component. Little Late Archaic material was present under the overhang. Most of the Late Archaic material comes from outside the rockshelter on the talus slope. Due to time constraints, only Unit 9 was completely excavated outside the rockshelter with Unit 6 partially excavated to a depth of 200 cmbs before time ran out. All things considered, if the excavation in this area outside the rockshelter were larger (9.4 m^3 overhang to 6.1 m^3 talus excavation volume) then it is likely there was a larger Late Archaic component at the site than is being reported. This pattern is spatially interesting as it does not appear the overhang extended any further out in the past than it does today as there is no evidence of collapse during the occupation periods. This artifact distribution could represent erosional activity at the site or perhaps a cleaning episode from under the overhang onto the talus slope near the start of the Late Prehistoric. However, based on the information at hand these are only speculations.

Debitage counts from the Late Prehistoric upper levels do not differ significantly from the lower Late Archaic levels. As discussed with the projectile points, this is likely due to a disproportionate amount of excavation that took place in areas with deeper stratigraphy. The lower Late Archaic debitage material would likely be larger if more area had been excavated to a deeper depth as only two units go well below 200 cmbs. There is also no significant difference in debitage count by level within the two areas (shelter and talus slope) or in units within the two areas. The only possible increased debitage activity from the area under the overhang occurs in Unit 2 at around 200 cmbs where over 900 pieces of debitage were recovered. Otherwise, within the upper 200 cmbs debitage counts by level remain relatively consistent averaging about 145 per level under the overhang area of the site. The single anomaly being Unit 8, which has a much lower debitage count, totaling 625 pieces or about 78 flakes per level. In examining the chipped stone assemblage of debitage, bifaces, arrow points, and dart points, no clear patterns or activity areas were evident horizontally or vertically at the site.

Collins (2004) notes that apart from the shift in weapon technology there is little change in the lithic technological organization or subsistence strategies in central Texas from the Late Archaic to the Late Prehistoric. The Franty Watson site appears to fall within this regional pattern. Apart from a visible transition from atlatl and dart to bow and arrow based on recovered diagnostic projectile points, there are no significant changes or patterns in the chipped or ground stone technology at the site.

The ecotonal character of the Texan province accommodates for diversity of habitat types and animal life allowing for a wide breadth of subsistence options. Remains of aquatic and small terrestrial animals at the site in high frequency suggest these species were used as food sources. Large mammals are under-represented, except for some tool use, and the abundance of non-meaty elements indicates their having been dispatched, processed, and consumed out of the excavated area. Based on the investigation at the site, it does not appear to represent a kill or large-mammal processing site. Most of the faunal diet breadth comes from prey that would have been easily accessible near the site.

Rockshelter Study

To gain an understanding of how the Franty Watson rockshelter compares to other shelter sites, a regional survey of prehistoric rockshelters was conducted of the central Brazos River Watershed. Site information gathered during the Palo Pinto Archaeological Survey was referenced to identify rockshelter sites, as well as a review of the Texas Archeological Site Atlas (TASA) for

"rockshelter" or "shelter" keywords to filter site forms from Palo Pinto, Parker, Johnson, Hood, Somervell, Hill, Bosque, and McLennan counties (Table 7). A total of 91 rockshelter sites from these eight counties were identified in this manner.

As required site information varies, having changed over time as well as reporting, general information was collected about each site. Information collected includes the amount of protected ground space under the overhang (m^2), distance (m) to a perennial river or stream, such as the Brazos River or a tributary, and recorded cultural occupation affiliations. Rockshelter size was broken into tiny (<25 m^2), small (25-100 m^2), medium (101-300 m^2), and large (>300 m^2), while distance to perennial water source was broken into 201-500 m, 501-1,000 m, 1,001-5,000 m, and >5,000 m. This allowed for a region-wide comparison to look for patterns in rockshelter size and their location on the landscape through time. Data from each site is presented as best it can be (Table 8 and Table 9). Age affiliations of rockshelters were not always reported for several reasons including surface identification of prehistoric material without excavation, lack of temporal diagnostic artifacts, and lack of radiocarbon dates. Different periods and/or aspects to identify temporal cultural signatures in the archaeological record from across this region were synthesized into three periods for analysis: Paleoindian, Archaic, and Late Prehistoric periods. Site size was not always present either leading to Not Available (NA) descriptions or simply assigning a site size based on descriptions in the site form. Therefore, this study, while not complete, uses the best data available to synthesize the information on rockshelter size, distribution, and occupation for the central Brazos River Watershed.

Table 7. TASA Review of Rockshelter Size and Distance to Perennial Water from USGS maps.

Site Number	Approximate Site Size (m^2)	Approximate Distance to Perennial Stream/River (m)	Period
41BQ2	115	1,800	NA
41BQ7	220	2,400	NA
41BQ13	33	1,860	NA
41BQ14	82	1,910	NA
41BQ20	700	2,500	NA
41BQ34	NA	140	NA
41BQ42	110	4,400	Late Prehistoric
41BQ46	344	30	Paleoindian, Archaic, Late Prehistoric
41BQ47	92	30	Paleoindian, Archaic, Late Prehistoric
41BQ48	23	25	Late Archaic
41BQ49	25-100	20	Archaic
41BQ50	160	15	Late Prehistoric
41BQ51	18	76	Archaic
41BQ52	1360	100	NA
41BQ53	>300	270	Archaic
41BQ54	69	420	Archaic, Late Prehistoric
41BQ55	115	25	NA
41BQ59	7	97	Late Prehistoric
41BQ62	28	80	NA
41BQ63	83	70	NA
41BQ64	7	60	NA
41BQ70	69	2,350	NA

Site Number	Approximate Site Size (m^2)	Approximate Distance to Perennial Stream/River (m)	Period
41BQ240	144	215	NA
41BQ245	NA	6,600	NA
41BQ265	112	4,350	NA
41BQ280	88	3,750	Archaic, Late Prehistoric
41BQ293	100	1,840	Late Prehistoric
41BQ295	300	1,950	Late Prehistoric
41BQ296	144	2,000	NA
41BQ297	152	2,050	NA
41BQ331	240	3,000	NA
41HI1	330	800	Late Prehistoric
41HI8	220	40	Late Prehistoric
41HI15	45	1,000	NA
41HI16	20	1,775	NA
41HI17	225	2,175	Archaic, Late Prehistoric
41HI20	143	590	NA
41HI21	91	420	NA
41HI22	113	330	Archaic, Late Prehistoric
41HI23	49	240	Late Prehistoric
41HI32	74	2,350	NA
41HI52	NA	1,450	Late Prehistoric
41HI53	111	960	Late Prehistoric
41HI54	172	500	Late Archaic, Late Prehistoric
41HI55	378	1,150	Archaic, Late Prehistoric
41HI56	91	1,700	NA
41HI304	1200	200	NA
41JN14	28	670	Late Prehistoric
41ML63	299	740	Paleoindian, Archaic
41ML119	NA	1,160	Archaic, Late Prehistoric
41ML122	>300	100	Late Prehistoric
41ML123	25-100	340	NA
41ML124	101-300	520	NA
41ML223	240	185	Late Prehistoric
41ML224	48	185	Late Prehistoric
41ML225	NA	100	Archaic
41ML281	11	845	NA
41PP2	25-100	130	NA
41PP7	45	30	NA
41PP66	363	140	NA
41PP80	100	50	NA
41PP86	122	115	NA
41PP104	24	360	Late Prehistoric
41PP116	150	85	Archaic, Late Prehistoric
41PP117	28	420	NA
41PP131	8	80	NA
41PP137	54	115	NA

Site Number	Approximate Site Size (m^2)	Approximate Distance to Perennial Stream/River (m)	Period
41PP163	25	650	NA
41PP165	10	480	NA
41PP172	230	73	NA
41PP176	21	740	NA
41PP206	30	225	NA
41PP233	20	95	NA
41PP236	NA	80	NA
41PP240	5	45	NA
41PP264	60	450	NA
41PP269	18	1,120	NA
41PP270	18	1,030	NA
41PP365	320	1,950	Archaic
41PP366	360	2,000	Archaic
41PR37	9	260	Late Prehistoric
41PR134	11	430	NA
41SV60	35	17,300	Archaic, Late Prehistoric
41SV83	16	13,670	NA
41SV105	1 25-100, 1 101-300	16,300	Late Prehistoric
41SV106	NA	14,200	Late Prehistoric
41SV107	32	13,950	Late Prehistoric
41SV116	95	15,900	Late Prehistoric
41SV125	28	19,500	Late Prehistoric
41SV134	70	240	NA

Table 8. Site Size and Distance to Perennial Stream/River.

	Site Size (m^2)					
Distance to Water (m)	**<25**	**25-100**	**101-300**	**>301**	**NA**	**Total**
<200	7	9	7	5	3	**31**
201-500	4	8	3	1	0	**16**
501-1,000	3	2	4	1	0	**10**
1,001-5,000	3	7	9	4	2	**25**
>5,000	1	5	1	0	2	**9**
Total	**18**	**31**	**24**	**11**	**7**	**91**

Table 9. Rockshelter Site Size and Distance to Perennial Stream/River over Time.

Site Size (m^2)	Paleoindian	Archaic	Late Prehistoric	Total
<25	-	2	3	**5**
25-100	1	5	12	**18**
101-300	1	5	10	**16**
>301	1	5	4	**10**
NA	-	2	3	**5**
Total	***3***	***19***	***32***	***54***
Distance to Water (m)				
<200	2	7	9	**18**
201-500	-	4	6	**10**
501-1,000	1	1	3	**5**
1,001-5,000	-	6	8	**14**
>5,000	-	1	6	**7**
Total	***3***	***19***	***32***	***54***

After incorporating all lines of evidence, it appears the prehistoric occupation of the rockshelter can be described as a temporary campsite based on a few factors: its location under a rock overhang; the variety of lithics representing later stages of tool manufacture, use, repair, and discard; the existence of hearth features; and the amount of easily available near-site faunal remains. The Franty Watson site is approximately 150 m^2 and is approximately 500 m from the Brazos River. The rockshelter size and distance to a perennial stream or river fits within the regional settlement patterns and subsistence strategies of those inhabiting central Texas during the Late Archaic and the Late Prehistoric periods.

The rockshelter study indicates that the Franty Watson site fits into the general rockshelter patterning for its known occupational history. The size and distance to water fall into the mean groupings of both for the Archaic and the Late Prehistoric periods.

HISTORIC OCCUPATION

Historic artifacts recovered during testing and historic photographs of a second rockshelter site (41PP172), located approximately 100 m downstream occupied historically at the same time, complement each other in addressing the historic occupation of the site. The Franty Watson site is known to have been occupied in historic times and the occupation can be described as a sedentary site type that was inhabited for a relatively short time during the Great Depression sometime in the 1930s. There is a strong distinction between Native American and Euro-American cultural remains below and above 30-40 cmbs, respectively.

In America, the production of wire nails began by the 1880s. However, wire nails were not widely utilized until the early 1900s. Prior to this date, cut nails predominated (Adams 2002). The assemblage contains a variety of nail types and lengths, although wire nails predominate. Lengths vary from 0.75-5 in. and a large number are bent at right angles. Many of these angled nails appear in the remains of a hearth in Unit 2 between 10 and 30 cmbs. Unit 2 is the only unit with a historic hearth feature. In adjacent Unit 5 and the nearby Unit 8, charcoal and ash were recorded from the same levels as the hearth.

One inference is that this nail cluster resulted from the use of river debris for firewood (Albert C. Redder, personal communication). Burning wooden boxes and crates could have left several angled nails in the hearth. The site's location at the confluence of Eagle Creek and the Brazos River would have provided opportunities to cull firewood from floating structural debris. A single nail with "Philip Carey" printed on the head was manufactured by the Philip Carey Corporation, a long-time manufacturer of roofing and insulation products that were available for order through catalogs such as the 1930 publication, "A Guide to Better Homes With Dependable Carey Building Materials" (Philip Carey Co. 1930).

Scraps of aluminum foil were found in Units 2 and 3. The aluminum foil indicates an occupation no earlier than World War I at the site. Commercial production and use of aluminum foil for candy, gum, and cigarettes began in 1913 and did not appear in the household market until the late 1920s (Robertson 2012). In addition, several metal containers were recovered from the site. One is a tobacco can of the Prince Albert type in use from 1913 to 1960 (Rock 2015). A second exhibits a crimped rather than soldered base that became common in the 1920s-1930s (Busch 1981).

A molded glass bottle with two side seams and a suction scar on the bottom further supports historic occupation after 1910 (Miller and McNichol 2012); unfortunately, its provenience has been lost. The bottle in question is machine-made, and dates from the 1910s to the 1930s. The presence of this machine-made bottle as well as aluminum foil help narrow down the occupation to the 1920s or just after, all of which fit with the known Great Depression era occupation.

Eighty-eight percent of all metal can fragments and some amber glass were concentrated in the eastern part of the shelter in Unit 4, possibly indicating that the area was used as a refuse discard area. Further evidence is the fact that the only domestic faunal remain (goat) was recovered in this unit between 20-30 cmbs. The single goat bone represents nearly all the faunal remains recovered from the historic occupation. Unit 4 to the east of the hearth area in Unit 2 could have served as a refuse area associated with the cooking area found in and around Units 2, 5, and 8.

Historic photographs from the Twin Cave site (41PP172), a second rockshelter site located less than 100 meters downstream from Franty Watson, provide a glimpse of what historic life in the area looked like during this period. It is very possible that the two rockshelters were occupied at the same time based on the dates of the historic artifacts and the known Depression Era photos. If this is the case, then the photographs (Figure 23, Figure 24, and Figure 25) can be used to make direct analogies between the sites and expected activity areas. Evidence of a cooking area likely associated with a hearth, a storage area, and a sleeping area can be positively identified in the photos. Going further, it is likely that a refuse area is located near the cooking and storage area. In comparing the historic photographs to the archaeological data at Franty Watson comparisons can be made between the two. The hearth feature and likely refuse area from Franty Watson could have looked like Figure 24 with a designated kitchen and cooking area with storage located nearby. At Franty Watson the historic artifacts recovered do not shed any light on where the sleeping area would have been in the shelter. At present, the best guess is that the western section of the shelter, near Unit 3, was used as a sleeping area while the eastern section was used for cooking and refuse/disposal.

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Figure 23. Historic photograph showing hanging cookware at 41PP172 rockshelter.

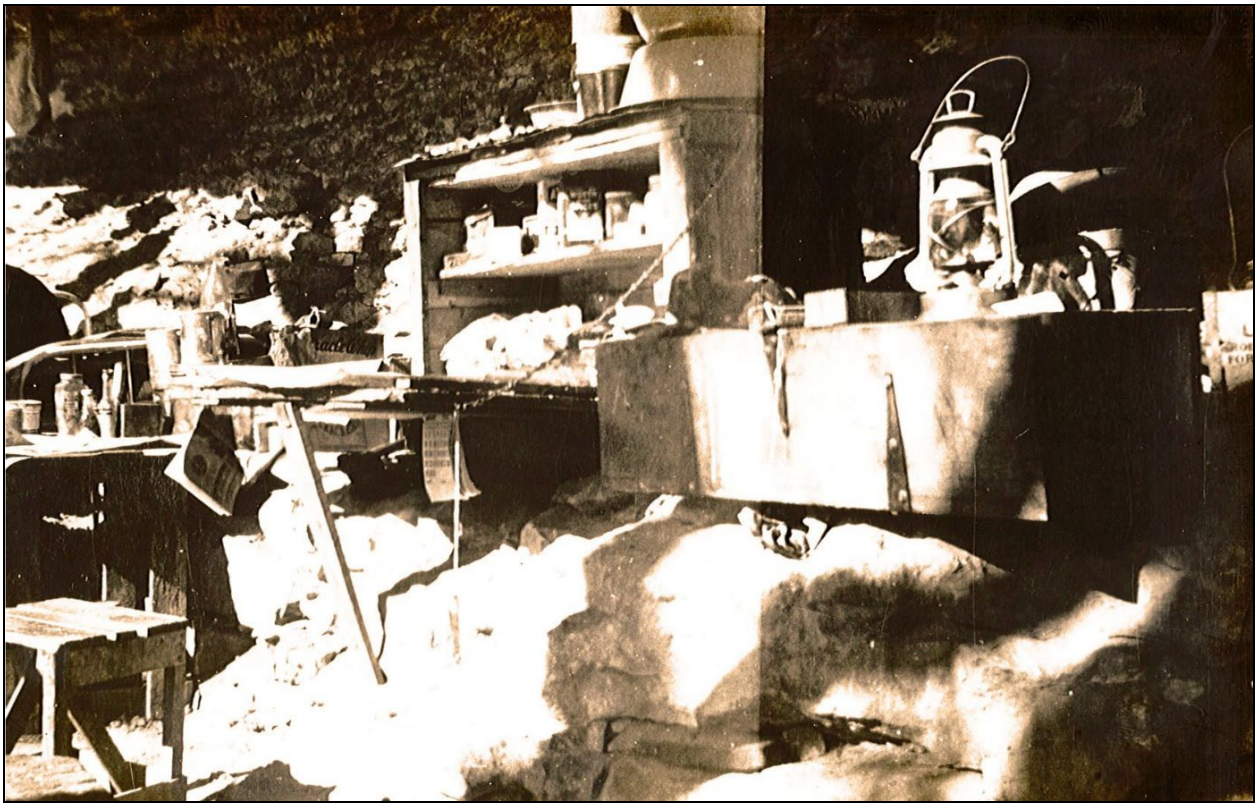

Figure 24. Tabletop and storage area located behind the cooking area at 41PP172 rockshelter.

Figure 25. Photograph of the sleeping area at the west end of 41PP172 rockshelter.

CONCLUSIONS

The archaeological material from the Franty Watson site presented an interesting study for both a better understanding of prehistoric archaeology in Palo Pinto County, as well as the historic Great Depression era occupation of the rockshelter. Cultural material and radiocarbon dates identify occupation of the site during the Late Prehistoric and the Late Archaic periods. While a vast majority of the Late Prehistoric material comes from under the overhang in the rockshelter, most of the Late Archaic material came from the depths of Unit 9 on the talus slope and must predate the earliest radiocarbon date described above. Until further investigation of the talus slope outside the shelter is conducted, a better understanding of the Late Archaic or even earlier occupation at the site remains speculative. Archaeological evidence indicates the site was last occupied by Native Americans during the Late Prehistoric but not in the historic period.

Based on the prehistoric cultural material recovered, Franty Watson can be described as an intermittently occupied campsite. Its location and site characteristics fit into the known prehistoric regional settlement pattern of central Texas wherein small groups of semi-nomadic mobile hunter-gatherers took advantage of a wide breadth of locally available plants and animals along streams.

The site's historic occupation during the Great Depression coincides with a known occupation of a second rockshelter, the Twin Cave site (41PP172), just downstream. A few photographs taken from this period at Twin Cave present a possible glimpse into what the historic occupation of the Franty Watson site would have looked like.

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Mineral Wells and throughout Palo Pinto County and to Thelma Doss, Butch Ernst of Palo Pinto, Allen Ramsey of Santo, and dozens of landowners, artifact collectors, volunteer diggers, historians, and business leaders, all of whom gave their time and donations to support the study. My first memorable experience with the Buzbee brothers was at their office of the Omega Corporation in the Fort Wolters Business Park sometime in January of 1979. I was in town to give a lecture to the FAA club at the high school but when I got there, we realized that the FAA talk was the following week but that I was supposed to be at the Optimists Club in Hillsboro that night. Jim had just earned his pilot's license and Chuck talked him into flying me down there. Jim had never seen the landing strip at Hillsboro and the landing lights were those of an Optimists club member's car. We flew in, gave my talk, and then Jim and I returned to Mineral Wells that same night. It was an interesting experience and we both made it safely.

Thelma was very supportive of our study and wrote enthusiastically about it in the paper. This allowed for many folks to know that we were doing archaeological fieldwork and could be trusted. Butch Ernst spent much of the time while we were in Palo Pinto County recovering from back surgery but provided information about site locations and his perspective on Palo Pinto County archaeology. Allen Ramsey lived in a house in Santo where he had been raised since 1912 and he was particularly familiar with historic Native American sites in the county. His handwritten letters contain all sorts of information about the county's history.

Tilley's Café on the west side of Palo Pinto served up a wonderful breakfast for our field crews and whenever possible we tried to drop in there for lunch which frequently included homemade pie if we got there in a timely manner. It was a warm place to be a stranger in and allowed the field crew to interact with local workers and ranchers who were curious about just what we were doing.

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The site forms are curated at the Texas Archeological Research Laboratory (TARL). The survey and excavation records, and the artifact assemblage will be curated at the Archaeology Research Collections at SMU.

In closing, I want to thank the many students and staff at the Department of Anthropology at SMU and at AR Consultants for assisting in the analysis and write up of the various aspects of the Palo Pinto County Archaeological Survey including testing at the Franty Watson site. These folks included Katie Cross, Jacob Harris, Joannah Robertson, Toni Turner, C. Britt Bousman, Jessie Jiminez, and Rachel Hearn.

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ARTIFACT ANALYSIS OF THE DON ROSICK COLLECTION, TARRANT AND JOHNSON COUNTIES, TEXAS

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1 North Texas Archaeological Society

This article began as a 'simple project,' analyzing a "small collection of mainly stone artifacts collected from Tarrant and Johnson Counties during the 1950s." At least, that is how it was presented to me. As often happens, this 'small project' has grown and taken on a life of its own.

In late January of 2023, the North Texas Archeological Society (NTAS) received a message from Ms. Patricia Mason that she had "Indian artifacts" collected by her late husband, Mr. Donald (Don) Rosick. Rosick grew up in Fort Worth and, as a teenager very interested in archeology, he collected points and other items over a span of years. A member of the former Tarrant County Archeological Society (TCAS, now NTAS), Rosick participated in TCAS excavations and surveys, at least one of which sheds light on our understanding of artifacts in this report. (Dawson and Johnson 1956). Ms. Mason contacted NTAS President Allen Rutherford, stating, "I would very much like to return (his collection of arrowheads) close to where they belong. I am certain that is what Don would have wanted." President Rutherford asked for assistance in responding to Ms. Mason's inquiry. THC Archeological Steward James Everett spoke with Ms. Mason, explaining that NTAS could use the collection in public displays and educational outreach, and Ms. Mason sent him the collection the next day. James had intended to analyze the collection himself, but with several other time- sensitive commitments to both NTAS and TAS, delaying his analysis of the collection, he asked for a volunteer to take over this responsibility. I accepted and in December 2023, I received the collection and began the analysis.

A short note on the back of a postcard from Ms. Mason and included with this collection is seen in Figure 1.

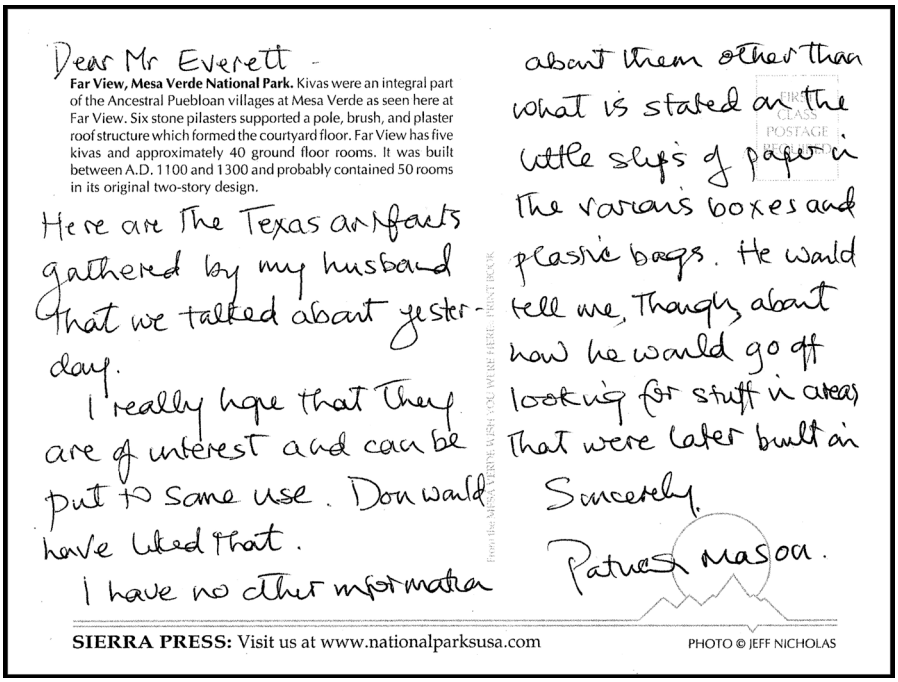

Figure 1. Ms. Patricia Mason's note, on the back of a postcard, was included with her late husband, Don Rosick's, artifact collection.

COLLECTION OVERVIEW

The collection contains slightly more than 70 different items all collected from Tarrant and Johnson Counties, Texas. There is little more than broad provenience or any other information provided for any items, except some small tags inside boxes and/or bags, with a general location and, in some cases, the date (month/year) when these were collected. The specimens were all contained in plastic bags with twist ties and/or in boxes. In most cases, a label or paper tag was inside the bags or boxes. James Everett had taken the effort to decipher some of the faded writing on these small slips of paper, and I used a magnifying glass to confirm his excellent detective work. In some cases, a notation in light pencil was added such as "T-5," "T- 10," etc. In others, the name of a landform, such as "Indian Creek" or "Eagle Mt/ Mountain," or "Hamm[1] [sic] Creek," would appear. Occasionally a reference, such as "T-5", and it was quickly determined that "T" was used by TCAS members to indicate Tarrant County, followed by a sequential site number. Less apparent, was the meaning of what appeared as either "DR" or "AR" penciled on some boxes and/or tags. It took a while to determine this was in fact DR - Don Rosick's own initials. In another instance, effort to read a faded pencil inscription on a box from *The Fair* (a jewelry store in Fort Worth), took some time and the use of a magnified view with a cell-phone camera to decipher the word, "Bought." (Figure 2) This note suggests that at least some of the items in this box were not collected but purchased, raising questions regarding the original location. Fortunately, an additional penciled note, on the upper left corner of the same box (Figure 2), was determined as "JC," likely indicating items were from Johnson County. This, at least. places the items in the correct vicinity for work carried out on Ham Creek, matching dated tags contained within. Connected with news items and records from TCAS and Dallas Archeological Society (DAS) members, along with a short monograph report on TCAS investigations on Ham Creek permits a reasonable conclusion these artifacts were from, or near, those TCAS investigations on Ham Creek, near its confluence with the Brazos River.

Figure 2. This enlarged view of the penciled inscription on a box from "The Fair," indicates some of the items were purchased from an unknown seller.

Further research, with assistance from others, allowed for combining site reports enabled some tentative connections between some of the collection's items to possible sites, or at least general locations. These included reports from the THC Atlas, as well as some editions of *The Catalogue* (TCAS newsletter) and *The Record*, (DAS newsletter) from the 1950s, 60s, and in some cases later. Independent maps recorded by TCAS and DAS members from this era added enough information to aid formulating limited interpretations and suggestions for further research, offered in the conclusion of this report.

[1] The spelling "Hamm Creek" is what Rosick used on his bags and boxes. The archeological literature, geographic maps, and other sources most frequently use "Ham Creek," though occasionally "Hamm Creek "is used. Throughout this article the "Hamm" spelling will only be used when quoting Rosick's records and collection. The preferred "Ham Creek" is otherwise used.

ANALYSIS METHODS

All measurements are in millimeters. A digital caliper was used for accuracy and consistency. In some situations, a hand-held magnifying glass was used to identify flake scars on edges, and/or patterning on sides of projectile points, flakes, or bifaces. Small indications of wear on edges were also identified using a magnifying glass. Some of this retouch and wear stands out in the photos.

What's in a Type?

While I have been involved in archeological research over several years, much of it has been in Historical Archeology and I have not spent a lot of time learning to identify various projectile point types. I have documented the sources consulted for these identifications. All readers are invited to add their own thoughts where they disagree. Often a matter of subjective discernment, some items can be classified using key stylistic attributes such as blade edges (straight/incurvate/excurvate), stem (expanding/contracting), base (flat/straight, concave/convex), etc. In addition, key metric parameters such as ''Total Length," "Stem Length," "Width," "Thickness," as well as "Shoulder" and/or "Stem Width" can be used. Great pains were taken to sort through different sources and use all these attributes for assigning "Types."

"Arrow Points," "Bird Points," or "Dart Points"?

Long-term debate exists over whether to identify a projectile point as a dart or arrow (extremely small variants of which are sometimes referred to as 'bird point'). Commonly, distinctions between the two employ the following line of reasoning: "dart points were used for killing large game, usually hafted onto spears for stabbing, throwing, or using an atlatl; arrow/bird points were attached to arrows used for smaller game (usually *not* birds). Thus, the former are larger and heavier; the latter smaller and lighter." While this sounds reasonable, in practice this approach often leads to confusion at best, ambivalence at least, and total frustration at worst. Consequently, I decided to use a method initially devised by Hildebrand and King (2012) to resolve this dilemma; namely a dart-arrow index (DAI). Simply stated, this index uses the sum of maximum point thickness and neck width to differentiate between darts and arrows. Any point with a total DAI >11.7mm. is a dart; any below that are arrows.

A Word on Groups and Tables

As stated previously, the collection arrived separated into bags and/or boxes. Items in each bag were kept together and analyzed as unique units to keep the collection in its original form and, potentially, to allow for more specificity of location. A table containing measurements, descriptions, and identifications of all specimens was constructed for each bag or box. As no within-site collection provenience was provided, these tables are not intended to indicate any necessary contextual association between artifacts within the bags. However, since bag labels did include general information (e.g., county and city names, geographic data such as "Cleburne, Farm South of Arlington," "Eagle Mountain Creek," etc.), these tables are a convenient way to present the material, keeping original groups intact, as well as to provide some general information about locations of origin. Each table is accompanied by photos of all the items in the correlating bag/box.[2]

All measurements are in millimeters, taken by hand-held calipers, although photos are presented with a centimeter reference scale. The following measurements were taken, when those elements were present: total length, width, thickness, stem length and width.

[2] High-resolution images of all of the artifacts are available at: http://doi.org/10.5281/zenodo.17450217.

In the tables and figures that follow, each item is indicated by a letter. In cases where reference sources are used, they are listed in the description.

For presentation, tables have been arranged and presented as follows:

SECTION A: FORT WORTH, TARRANT COUNTY

A paper bag labeled "Texas: Tarrant County." This bag contained several small, plastic bags sealed with plastic ties (such as those used in some grocery stores). These bags had paper labels or tags as follows:

Tarrant County Unlabeled Bag 1

13 dart points, 4 bits of gravel, 1 triangular shaped interior flake, and one small ceramic sherd (Table 1, Figure 3, and Figure 4)

Tarrant County Unlabeled Bag 2

10 stone tools (9 broken, incomplete projectile points; 1 cobble with indentations, probably from being stream rolled). The tools/retouched pieces are presented in Table 2 and Figure 5, the projectile points in Table 3 and Figure 6.

Eagle Mtn. Lake, 1957, T-10

8 items (Table 4 and Figure 7)

Texas Eagle Mountain/Eagle Mt. Lake, 1957, T-10 Bag 2

A separate plastic bag, also labeled "Eagle Mt. Lake, 1957, T-10," was tucked in a box for "Hamm [sic] Creek, Cleburne, Tx." This bag was removed, combined with the Eagle Mountain Lake material, and subsequently labeled as "Eagle Mt. Lake, 1957, T-10, Bag 2" (Table 5 and Figure 8).

Eagle Mountain Lake near Indian Creek

Two items were in a small, square box, within the larger box marked with "The Fair" referenced earlier (Table 6 and Figure 9). While other artifacts in the larger box were in a bag containing artifacts from Ham Creek in Johnson County, this small, square box, had a faint label lightly penciled in as "Eagle Mt Lake Near Indian Creek." Inside this box were two artifacts and a label reading: "DR- T-14." It appears that, while his own initials appear as "DR," T-14 was likely a TCAS site number indicating, Tarrant County, Site AR 14. There is a significant drainage with that name associated with the West Fork of the Trinity River, on the east side of Eagle Mountain Lake. James Everett offered a very old map given to him "many years ago, by a former member of TCAS" that has red strings glued to points indicating locations where site excavations occurred. Figure 10 shows at least five sites near Eagle Mountain Lake, three of which are located in Indian Creek drainage.

Bird Points, Texas Fort Worth

There are four artifacts in this bag (Table 7 and Figure 11). Using the Hildebrand and King DAI (2012), all of these are likely dart points.

Farm South of Arlington, Tex. March 1958 Surface

This bag contained 2 Items (Table 8 and Figure 12).

SECTION B: CLEBURNE, JOHNSON COUNTY

"The Fair" Box, Texas, Cleburne

A small, square box with a name printed as "The Fair, Fort Worth." Inside were some artifacts and bones, containing a label that read: "'The Fair' box, Texas, Cleburne." ("The Fair" was a company in Fort Worth that was part of chain of stores in the late 19th, and early 20th centuries.) It appears that some artifacts in this box were purchased from an unknown person, but are likely from Cleburne, and/or Ham Creek. Three items, two bones and tooth, were kept as part of the Cleburne collection, while others were

separated and included with those appearing in Table 11.

This box contained 10 artifacts, 3 ecofacts, and one "Rusted Arrowhead," a piece of scrap metal which might have been repurposed for an arrow, but is very questionable, so it was not included in the table, or photos (Table 9 , Figure 13, and Figure 14). The three ecofacts, two deer bones and a canine tooth (Table 9 and Figure 14), were part of this group, but in a separate bag.

Box A-2, Hamm Creek, 8-57, Cleburne

A small, rectangular box with a penciled label: "Box A-2." This box contained a single dart point (Table 10 and Figure 15), and a label inside that read: "Box A-2, Hamm [sic] Creek, 8-57, Cleburne."

Hamm Creek, 8-57, Cleburne

A bag with several artifacts appearing in Table 11 and Figure 16, and a long, slender box containing: a single specimen with a tag, "Hamm [sic] Creek, 8-57, Cleburne." This contained a large preform, made of Gabbro and possibly reworked into a end scraper (Table 11 and Figure 17).

ANALYSIS RESULTS

Tarrant County

Table 1. Tarrant County: Unlabeled Bag 1 (Figure 3 and Figure 4).

Item Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
a. Uvalde (Suhm and Jelks 2009 [1962]; Turner et al. 2011). Random transverse flaking, slightly contracting stem with concave base, and slightly upward-pointing shoulders. Blade is slightly excurvate. Moderate to heavy patina.	71	38.1	11	Length: 19.18
b. Almagre (Suhm and Jelks 2009 [1962]; Suhm and Krieger 1954). Triangular, with one side slightly straighter than the other, contracting, slightly convex base; tip broken (from impact?) and one shoulder slightly broken.	58.4	42.22	10.15	Length: 15.61
c. Almagre (Suhm and Jelks 2009 [1962]; Suhm and Krieger 1954). Triangular, with asymmetrical stem and straight, beveled base.	65.53	35.02	8.21	Length: 16.01
d. Carrollton (Suhm and Jelks, 2009 [1962]). Triangular blade, missing the tip (from impact?), upward pointing shoulders, shallow side notched with straight, asymmetrical stem with convex, beveled base. Quartzite.	48.38	27.09	9.97	Length: 13.24
e. Preform, possibly Carrollton. This item is broken at the base. Excurvate blade, with what remains as the base on diagonal, looks like it has been ground smooth. One shoulder broken. Quartzite, irregular flaking.	37.39 (tip snapped)	9.69	9.65	Undetermined

f. Kent (Suhm and Krierger, 1954). Dark gray flint. Slightly expanding and straight to slightly convex base. One shoulder is slightly higher and angled upward more than the other. This appears to be a deliberate flake removal. (See Item g below)	46.84	21.23	6.80	Length: 11.90
g. Kent (Suhm and Krieger 1954). Appears to be broken on impact (both tip and neck), but initial form intact and similar to Item f.	35.24	18.61	11.43	Undetermined
h. Angostura variant (projectilepoints.net 2008; Turner et al. 2011). Asymmetrical triangle with one side of blade slightly longer than the opposite. No stem. The base is straight and beveled. White quartzite.	39.36	18.60	11.424	Undetermined
i. Angostura variant (projectilepoints.net 2008; Turner et al. 2011). Asymmetrical triangle with one side of blade slightly longer than the opposite. The base is convex with no discernable stem. White quartzite.	46.67	36.60	11.11	Undetermined
j. Angostura variant (projectilepoints.net 2008; Turner et al. 2011). White quartzite, this has a triangular contracting stem point, that appears to have been broken. One blade edge is slightly incurvate (concave), and the opposite edge straight, and decidedly longer. Stem is broken just below the shoulders. Base appears to be ground.	45.87	27.90	10.02	N/A
k. Angostura (projectilepoints.net 2008; Turner et al. 2011). Asymmetrical with one blade edge longer than opposite. Both shoulders turn slightly upward, and stem is contracting with a straight, beveled base.	45.33	28.20	10.17	Length: 9.37
l. Gower (projectilepoints.net 2008) or possibly Edgewood (Suhm and Jelks, 2009 [1962]). Although relatively small and light in weight, using DAI it is a dart point. Blade is triangular, excurvate, with side notches defining the neck. The stem is expanding with a bifurcate base	33.14	20.64	7.94	Length: 15.9
m. Meserve (projectilepoints.net 2008; Suhm and Jelks, 2009 [1962]) or possibly reworked Plainview (Suhm and Jelks, 2009 [1962]). Virtually no stem, straight to slightly convergent toward tip. Elliptical cross section and the base is straight and beveled.	51.30	16.33	9.13	N/A
n. Flake. Appears to be an interior flake of white chert, with scars on dorsal surface.	N/A	N/A	N/A	N/A
o. Ceramic sherd. Likely utility ware, with some red ochre paint remaining, and grog tempering.	33.04	18.15	10.01	N/A

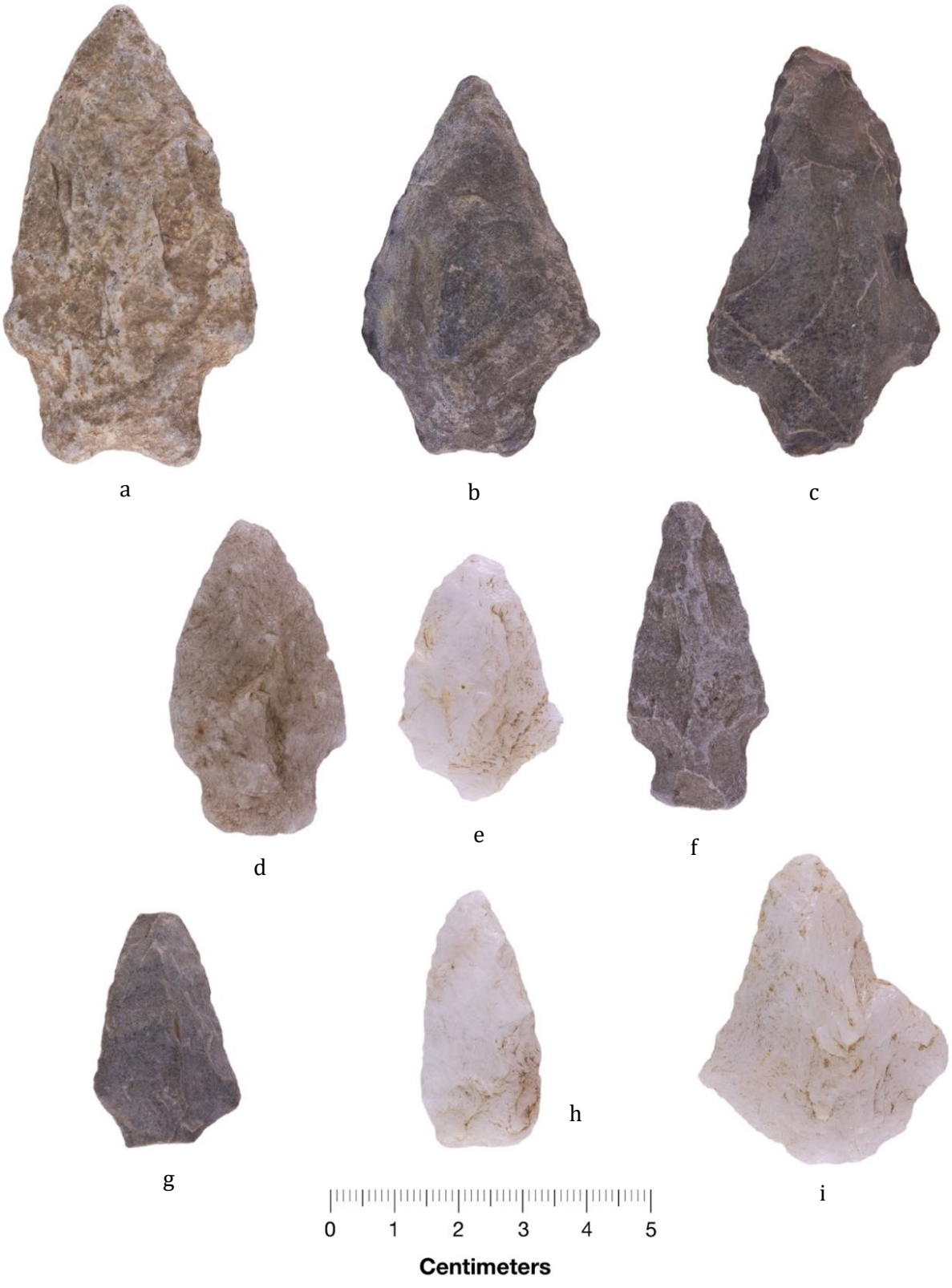

Figure 3. Tarrant County: Unlabeled Bag 1 – Items a-i (Table 1).

Figure 4. Tarrant County Unlabeled Bag 1 – Items j-o (Table 1).

Table 2. Tarrant County: Unlabeled Bag 2 – Tools/Retouched Pieces (Figure 5).

Item Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
a. Cody knife (projectilepoints.net 2008). Asymmetrical blade with one weak shoulder on one edge, none on the other. The blade is somewhat excurvate with a straight, beveled base.	50.39	16.12	8.99	Length: 18.94
b. Toyah phase drill (projectilepoints.net 2008; Turner et al. 2011). Horizontal, barbs and broken bit. Bifacial flaking with beveled, convex base. One side appears to have a flute, with polished surface.	36.08	20.25 (neck) 14.28 (blade)	9.70	Length: 15.64
c. Appears to be an Eden or Scottsbluff point (projectilepoints.net 2008; Suhm and Jelks, 2009 [1962]; Suhm and Krieger 1954). Elongated, tapering bit, slightly convex sides, with elliptical, diamond shape cross-section, broken about mid-section. Base is missing.	41.87	11.2	6.90	N/A
d. Biface (Turner and Hester 1985). May have been a projectile point, broken during manufacture and then retouched. Some small flake scars on one edge.	N/A	N/A	N/A	N/A
e. Multi-edged scraper. A retouched interior flake, (or core fragment) with small retouch and edge wear along two edges of one side. Edwards chert.	N/A	N/A	N/A	N/A
f. Biface. Possible snapped preform, with alternating retouch along one edge, but no discernable edge wear.	N/A	N/A	N/A	N/A
g. This appears to be a core fragment, with some remaining cortex, and multiple flake scars.	N/A	N/A	N/A	N/A
h. End Scraper. Possibly the end of a broken preform or projectile point, has two edges forming a converging point, with distal end broken. Each of the two triangular edges has some retouch and/or edge wear.				
i. Red River Knife (projectilepoints.net 2008). Small-medium sized knife with an elliptical cross section. Asymmetrical blades are excurvate on one side and incurvate on the opposite side. Shoulder is missing one side, and weak on the other. Stem is straight with a straight, beveled base. Pink chert.	36.7	22.0	7.73	Length: 9.0
j. Side scraper. A large, interior flake, with a “clean” break on one edge, and two edges converging to a striking platform opposite to the break. Each edge has retouch flake scars and/or evidence of wear.	N/A	N/A	N/A	N/A

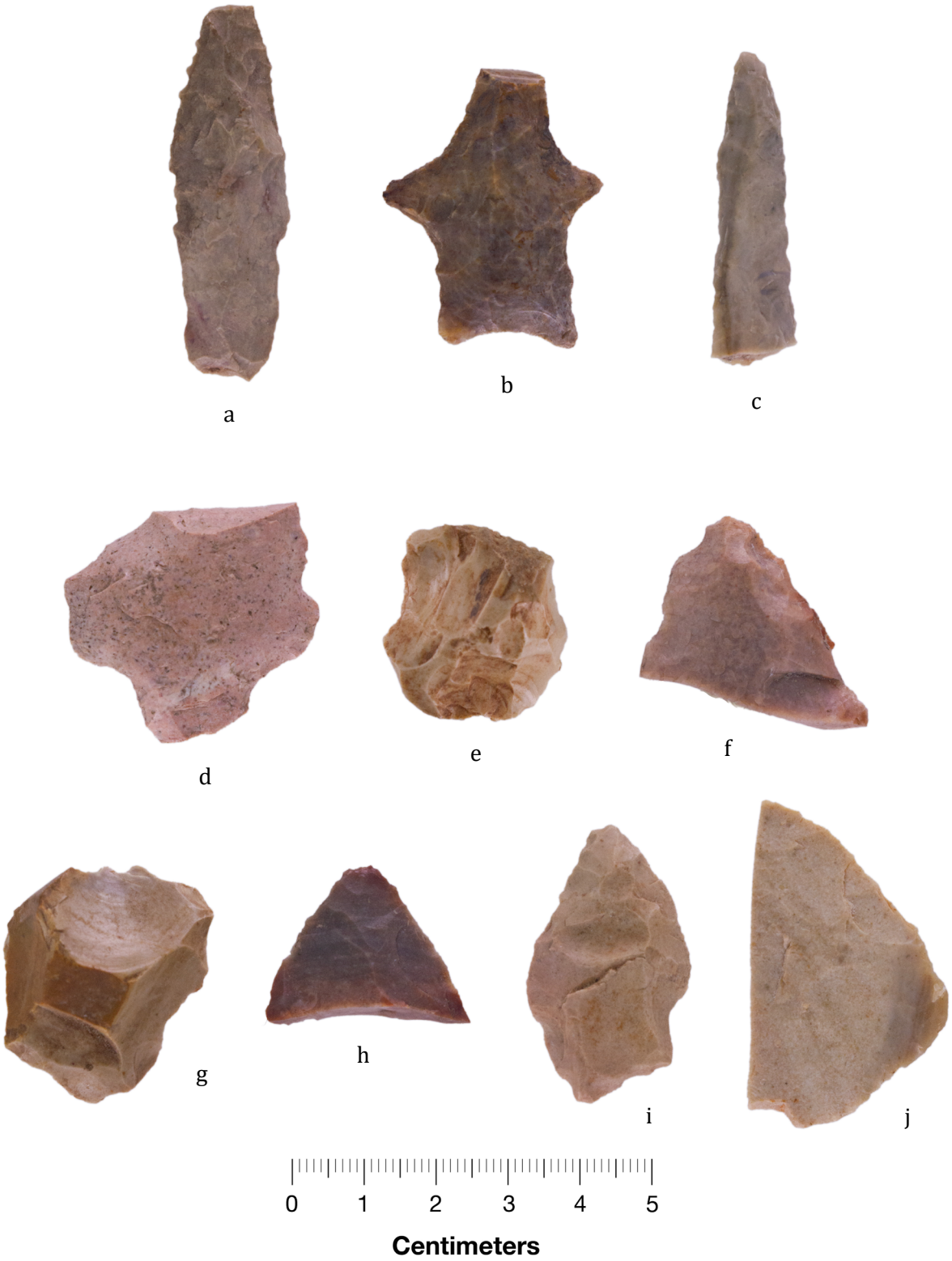

Figure 5. Tarrant County: Unlabeled Bag 2 – Tools/Retouched Pieces (Table 2).

Table 3. Tarrant County: Unlabeled Bag 2 – Incomplete/Broken Projectile Points (Figure 6).

Item Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
a. Triangular blade, broken across middle, and snapped at tip. Bifacial flaking on alternate sides of alternate edges, at oblique angles. Elliptical, median ridged.	23.78	15.40	7.16	N/A
b. Small, possible arrow (aka 'Bird Point') snapped just above shoulders, with one barb missing. Appears to have notched shoulders, straight stem, and straight, beveled base. Light grey, Edwards chert.	NA	NA	NA	Length: 11.84
c. Broken point; possibly Basset Pointed Stem, associated Perdiz Preform cluster (Suhm and Krieger1954). One partial edge is worked (serrated?). By extrapolation, that edge and opposite edge appear to be slightly excurvate, pointing inward to form a pointed tip. The stem is very small, barely a projection from base. Material is similar to Item d.	6.61	NA	3.64	Length: 5.77
d. Bonham. Broken so difficult to determine. However, the shape – thin, triangular, flat, slightly elliptical cross section, downward, slightly barbed shoulders and slightly serrated, recurvate (concave) sides - and dimensions suggest Bonham or Basset Type (Suhm and Krieger 1954). Material is similar to Item c.	NA	19.65	3.84	Length: 7.81 Width: 4.61
e. Dallas Stemmed and Elam Types (Suhm and Jelks 2009 [1962]). Key features include, prominent, upward facing shoulders, expanding stem, straight or slightly convex base, and dimensions within the parameters (or within a standard deviation).	NA	NA	NA	Length: 8.7 Width: 16.15
f. This is probably a Morhiss Type, but difficult to tell due to absence of barbs. Less likely, it is the basal end of a Scottsbluff Type II, due to a relatively large, straight to concave base. (Suhm and Jelks 2009[1962]; Suhm and Krieger 1954).	NA	NA	5.59	Length: 12.74 Width: 13.93
g. Meserve (projectilepoints.net 2008; Suhm and Jelks, 2009 [1962]). Oblique flake scars distinguish it from Plainview. This appears to be a triangulate, similar in material and manufacture to Item a.	NA	NA	6.21	N/A
h. Possibly a Cuney point fragment. Stem appears to be expanded and base concave with a U shape. (Suhm and Jelks 2009 [1962]).	Undetermined	13.33	3.19	Undetermined

i. Alba Point Cluster (projectilepoints.net 2008; Suhm and Jelks 2009 [1962]). Single broken barb. Similar in material and form to Item h, this item has a pronounced incurvate (concave), outward pointing barb, serrated edges, straight stem with straight base.	15.83	12.36	2.35	Length: 6.0 Width: 5.29

Figure 6. Tarrant County: Unlabeled Bag 2 – Incomplete/Broken Projectile Points (Table 3).

Table 4. Eagle Mt. Lake, 1957, T-10 (Figure 7).

Item Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
a. Biface, possibly preform (Shafer 2006). Flat, ovoid shape, with point on one end, convex curvilinear sides and convex, rounded base. Light color, speckled granite or rhyolite material.	44.17	29.63	8.45	N/A
b. Preform, of undetermined point type. Possibly re-utilized as a scraper. Light brown chert (Edwards?).	29.23	20.51	7.22	N/A
c. Biface, projectile point bifurcate base. Reddish-brown Edwards chert, side notched, expanding stem, with concave base. Broken just above shoulders, with one side broken.	N/A	12.43	8.94	Length: 14.58
d. Gary Stemmed Point (projectilepoints.net 2008; Suhm and Jelks 2009 [1962]) Triangular blade, contracting stem, cross-section Plano-Convex. Grainy, pink quartzite material (Trexler 2020).	32.7	14.66	6.16	Length: 15.01
e. Biface preform. Possibly re-used as a perforator. Very light gray chert, with a contracting, possible stem. Appears to have broken in middle, with some retouch on one side.	29.76	20.92	7.89	N/A
f. Possible Eden, broken (Suhm and Krieger 1954). Straight stem with diagonal snap at top (point missing), possibly due to impact. The slight concave base may suggest a St. Mary's Hall cluster (projectilepoints.net 2008).Tan chert material. Median ridged cross-section.	41.67	13.01	6.56	Undetermined
g. Side Scraper. Large interior flake, unifacial scars on dorsal side. Triangular point shape, with considerable retouch and evidence of use on both sides. Fine grained, light brown chert, with slight tinge of red mix coloration.	49.92	22.32	9.51	N/A
h. Preform. Interior flake with bifacial flake scars, and a large 'hump' on the dorsal side (likely unable to remove, possibly causing the piece to be discarded).	39.07	22.38	13.20	N/A

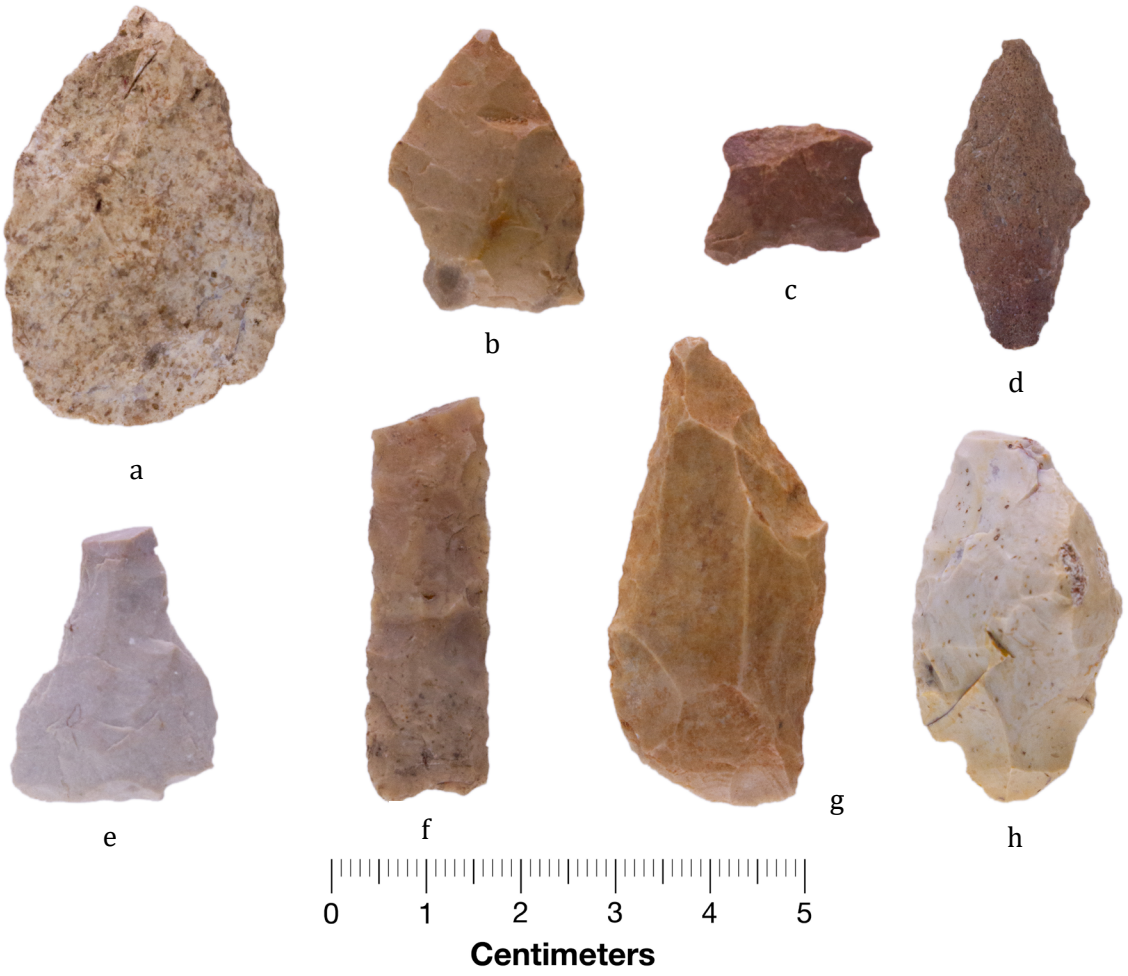

Figure 7. Eagle Mt. Lake, 1957, T-10 (Table 4).

Table 5. Texas Eagle Mt (Figure 8).

Item Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
a. Mabin Stemmed-Gary Variant (projectilepoints.net 2008). Incomplete, snapped blade. Sides of blade are triangulate, but slightly concave; shoulders are notched, outward, horizontal to slightly pointing upward. Stem is short, broad, slightly expanding, with a flat base. Material is fine grained, dark gray chert. Cross section is "Plano-Convex" shape.	14.44	6.91	N/A	N/A
b. Carrollton Stemmed (projectilepoints.net 2008; Turner et al. 2011). Very tip is missing. Blade is triangulate, shoulders are small, slightly turned up, and stem is straight, with a flat, beveled base. Stem is long (1/3 of length, described by key sources). Material is slightly pink chert.	44.22	18.71	7.94	Length: 15.6
c. Carrollton Stemmed, (projectilepoints.net 2008). Edwards chert. Stem is straight, but asymmetrical, nearly half the total length of point. Base is slightly convex and beveled. Blade is excurvate (convex).	36.50	16.05	5.95	Length: 15.83

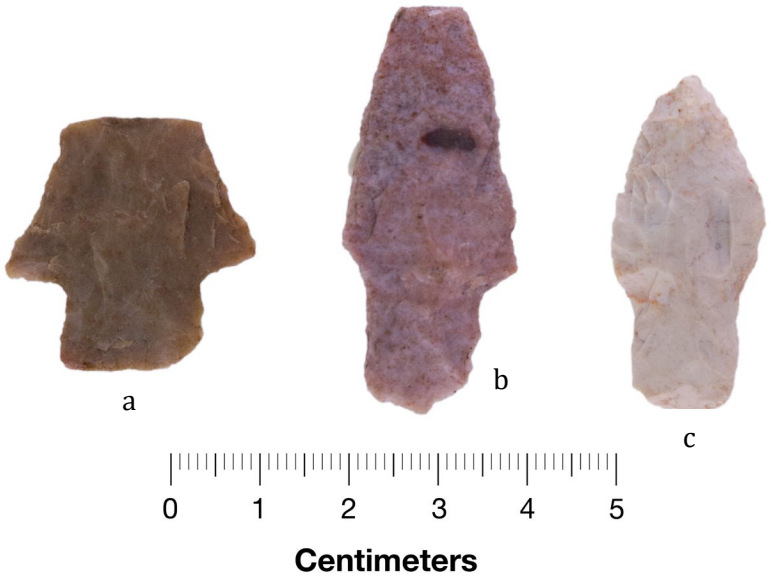

Figure 8. Texas Eagle Mt (Table 5).

Table 6. DR/AR T-14 Eagle Mountain Lake, near Indian Creek (Figure 9).

Item Description	Length (mm)	Width (mm)	Thickness (mm)
a. Biface/preform. Lanceolate shape, with retouching on alternate edges. The edges are slightly convex, coming to a point; there is a split just above the base. This may have been a blank.	53.43	30.20	15.82
b. Blade. This is a long, thin blade made of cream and speckled color (Alibates) flint. No apparent retouch on edges.	63.46	19.13	4.57

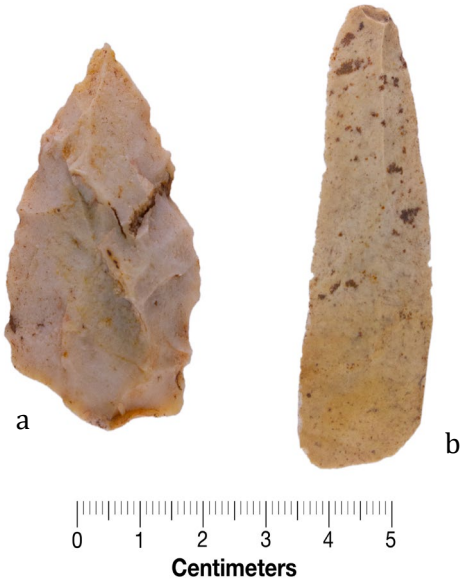

Figure 9. Two Artifacts from DR/AR T-14 Eagle Mountain Lake, near Indian Creek (Table 6).

Figure 10. This old map shows six different sites along the east side of Eagle Mountain Lake, and three along Indian Creek near where it drains into Eagle Mountain Lake, near Dido. Unfortunately, no site numbers exist, but one can see the penciled notes indicating "Archaic," "Pottery," and "Burial" sites.

Table 7. Bird Points, Texas Fort Worth (Figure 11).

Item Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
a. Elam (Suhm and Krieger 1954) or Ellis (projectilepoints.net 2008, Suhm and Jelks 2009. Light gray chert. Short, stubby, with elliptical/biconvex cross section. Triangular blade, with mildly contracting stem and straight, beveled, base. Possibly reworked.	24.48	11.44	5.55	Length: 8.48
b. Elam (projectilepoints.net 2008; Suhm and Krieger 1954), or Ellis (projectilepoints.net 2008; Suhm and Jelks 2009 [1962]). Light gray chert. Stem is straight, with flat, beveled, base. Shoulders are horizontal.	28.95	17.9	7.93	Length: 8.45 Width: 7.2
c. Fresno (Turner et al. 2011). Early Unstemmed. Thin, triangular, with serrated, straight sides. No stem.	23.04	15.31	3.41	N/A
d. Fresno(?)/Early Unstemmed (Turner et al. 2011). Small, unstemmed, with a median ridge on one side of cross section. Crudely made on dark, reddish brown chert. Possibly reworked.	21.82	12.48	5.71	N/A

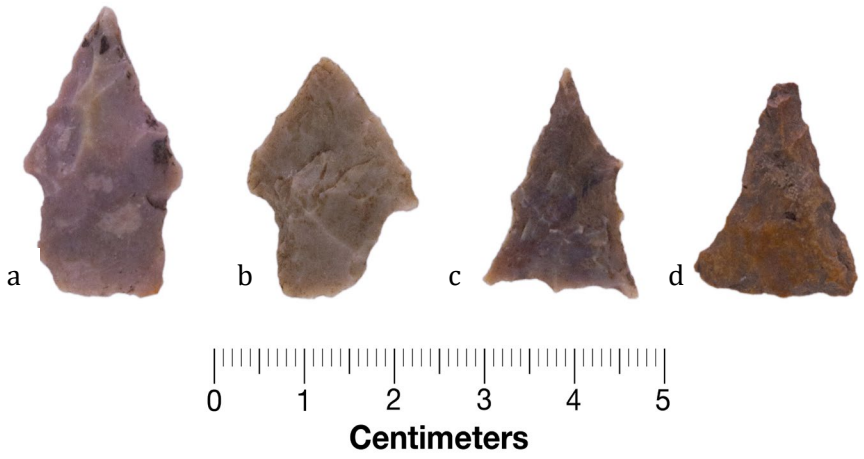

Figure 11. Bird Points, Texas Fort Worth (Table 7).

Table 8. Farm South of Arlington, Tex. March 1958 Surface (Figure 12).

Item Description	Length (mm)	Width (mm)	Thickness (mm)
a. Biface; possible broken preform. Bifacially worked, chert, similar to perforator (item b). Elongated, with horizontal flaking across this piece, which appears to have been in the process of becoming a dart point before ending with a sharp, break in the wider (base?) proximal end.	35.46	17.61	8.78
b. Perforator/ Primary flake. Brown,('root beer') colored, fine grained, chert. Narrow, elongated section with retouch and use wear sheen. This may have doubled as a side scraper.	34.23	21.28	8.21

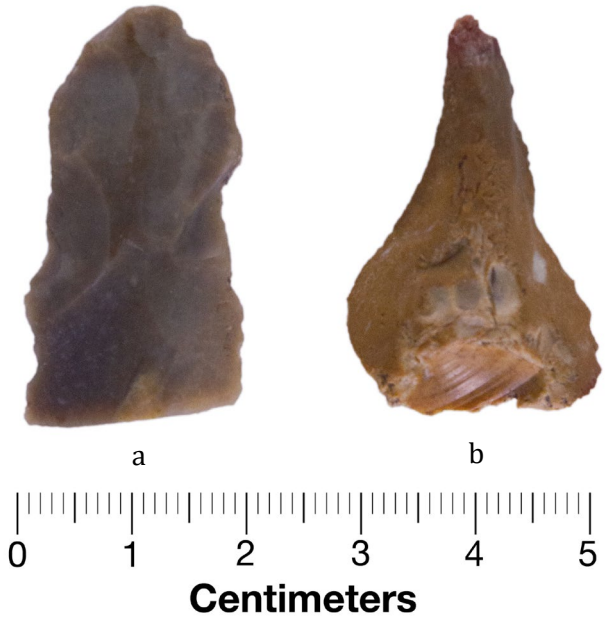

Figure 12. Two items: Biface (left) and Perforator (right) Farm South of Arlington, TX. March, 1958 Surface (Table 8).

TARRANT COUNTY DISCUSSION

In summers from 1994-1999, Jeff Hanson of UT Arlington, led surveys and excavations of two sites within the Village Creek watershed: the Riley site (41TR134) and the Fountain site (41TR136). Research revealed that the Riley site (41TR134) was a multi-component campsite that was occupied during the Late Archaic and Late Prehistoric periods; the Fountain site (41TR136) also exhibited Archaic and Late Prehistoric components but, based on the artifact and faunal assemblages, it appears that this site functioned as a hunting and processing site (Hanson 2013:105). Since Mountain Creek is of similar geographic proximity, approximately 10-15 miles apart on the west side of the West Fork of the Trinity River, and two sites there (Bagget Branch [41DL149] and Cobb-Pool [41DL148]) have comparable artifact assemblages, and are roughly contemporaneous, these four sites may have been part of the same settlement system.

"A common approach used by archeologists to make inferences about site types particularly among hunting-gatherers and small scale agriculturalists," argues Hanson (2013:106), is to differentiate to what degree activities were specialized or generalized. He took a somewhat different approach: by measuring these two extreme types in terms of tool class assemblages' "richness" and "breadth." Hunting-processing was demonstrated by a relatively narrow, specialized assemblage, and small agricultural camps a relatively larger, generalized one.

If we hypothesize these four sites were within the same settlement system, Baggett Branch, with the most specialized assemblage, was most likely a site where the inhabitants hunted and processed game and aquatic sources and gathered and processed walnuts. "The tool class assemblages are dominated by projectile points (including fragments), scrapers, and bifaces. Walnuts accounted for 66% of wild plant remains, and tubers accounted for 27%" (Hanson 2013:109). Lying intermediate between them was the Fountain site, with projectile points and scrapers somewhat dominating the assemblage, but less so than the Baggett site, and as a hunting camp, in the Cross Timbers, the focus was deer. The data indicate that the Riley and Cobb-Pool sites are very close, suggesting that these two sites exhibit more generalized activities, indicating a base or residential habitation (Hanson 2013:111). Alternatively, the Fountain site shows a relatively higher number of cores, hammerstones, drills/scrapers, and gravers and lower numbers of points, indicating that it was closer to the Bagget Site in terms of function. The Fountain Site, falling intermediate between the two, possibly reflects a temporary hunting camp, connected to the Riley Site.

The finds from the Rosick collection, while selective, offer some tantalizing possibilities. The two artifacts from the site south of Arlington may represent a somewhat sedentary way of life. Combined with the "Old Map," there is a suggestion (burial, ceramics) that Village Creek may have offered a semi-settled way of life. Again, the constraints of a small, scattered collection only offers possibilities of future research.

Johnson County: Cleburne, TX

Table 9. "The Fair" Box, Texas Cleburne (Figure 13 and Figure 14).

Item Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
a. Ovoid scraper, made from a white, chalky colored chert. This appears to be an interior core fragment of a cobble with an identifiable ridge on one side, and possible sharpening on one edge. This edge also has a small point which may have served as a burin.	42.12	36.35	17.19	N/A
b. Biface. Thin interior flake with retouch on edges of both sides. Possibly a preform or gouge. Light gray chert.	36.50	18.87	5.43	N/A
c. Interior flake. Does not appear to have any retouch or clear signs of use.	N/A	N/A	N/A	N/A
d. Gar Scale Point (Costa and Fox 2016). Lanceolate blade, thin straight stem. This is NOT lithic; rather it is smooth, sturdy and, evidently, a gar scale.	28.43	13.80	2.67	Length: 8.03
e. Carrollton Point (projectilepoints.net 2008; Suhm and Krieger 1954) Slightly convex, triangular blade, side notched shoulders, which point slightly upward, expanding stem with straight (flat) base. DAI: 17.34	29.48	14.34	2.67	Width: 9.45
f. Kent Projectile Point (projectilepoints.net 2008; Turner et al. 2011) Point has a triangulate, asymmetrical blade; elliptical/ median ridged cross-section; deep, asymmetrical, upward facing corner notches, with a short, straight stem and slightly convex base.	72.72	42.89	7.92	Length: 15.56
g. Cache biface. Possibly a blank (Shafer 2006). Made of dark Edwards chert. The edges are symmetrical, convex, narrowing at proximal and distal ends. The proximal end forms a convex "base". Using Shafer's analysis (2006), this item appears to be a blank preform.	63.89	34.65	13.31	N/A
h. Core fragment; possibly end scraper. Light gray, Edwards chert. Appears to be part of a blade core, snapped at proximal end, with possible retouch and use on opposite (distal) end.	46.10	26.03	17.03	N/A
i. This appears to be part of a point, split down the middle with one side and one notched corner remaining. It may have been (or intended to be) a Carrollton point (Suhm and Krieger 1954).	22.91	11.26	4.69	Undetermined
j. Carrollton point (Suhm and Krieger 1954). Small, thin flake, fashioned with slightly excurvate (convex) sides to a point, with a clear basal notch at distal end. Suhm and Krieger (1954) argue these are often isolated finds and may be reworked and used from earlier versions.	24.75	14.75	2.90	N/A
k. Dog Tooth	N/A	N/A	N/A	N/A
l. Bone: Probable metapodial of white-tailed deer (Abigail Fisher, personal communication 2024)	78.02	15.07 (diameter)		N/A

m. Bone: Probable phalanx of white-tailed deer (Abigail Fisher, personal communication 2024)	49.70	17.72 (diameter)	15.81 (proximal end)	N/A

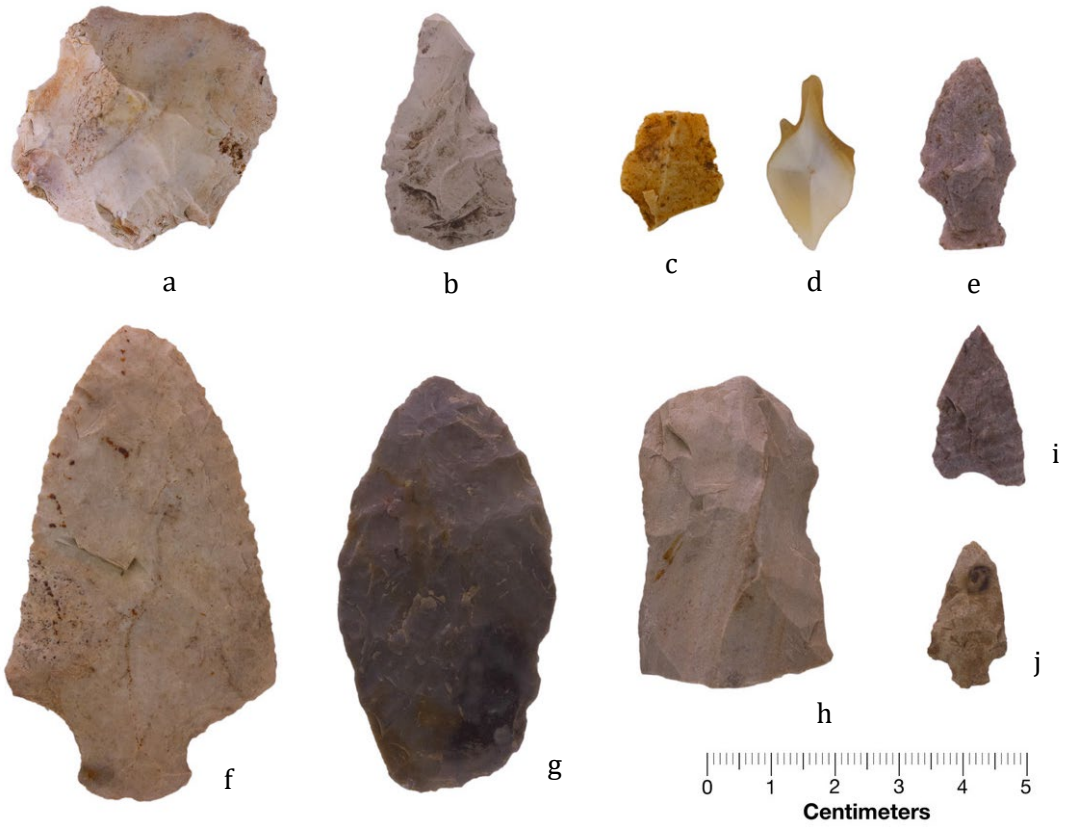

Figure 13. "The Fair" Box, Texas Cleburne – Items a-j (Table 9).

Figure 14. "The Fair" Box, Texas Cleburne – Items k-m (Table 9).

Table 10. Box A-2, Hamm Creek, 8-57, Cleburne (Figure 15).

Item Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
Folsom Point. Material is yellowish, grainy chert. Triangular, lanceolate shape, with slightly concave base. It has been suggested this point was ground, resharpened, and later, once again resharpened. This point has flake scars perpendicular to the base. The point was examined by numerous experts, including Prof. David Meltzer.	49.61	27.4	7.02	N/A

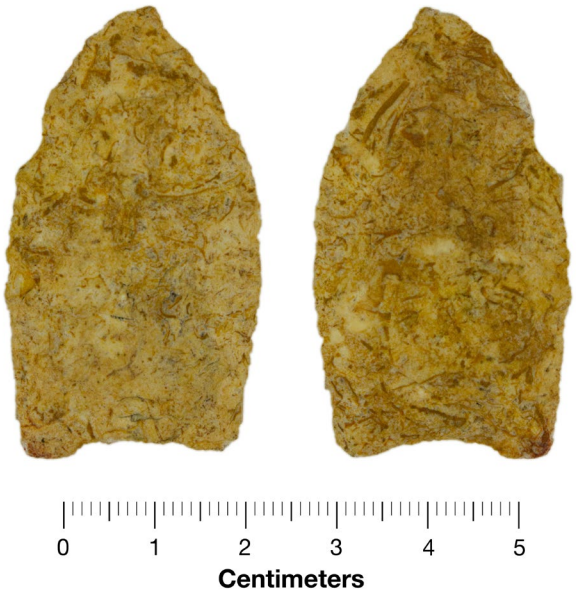

Figure 15. Folsom Point. Box A-2, Hamm Creek, 8-57, Cleburne (Table 10).

Table 11. Hamm Creek, 8-57, Cleburne (Figure 16 and Figure 17).

Item ID, Description	Length (mm)	Width (mm)	Thickness (mm)	Stem (mm)
a. Side scraper. Possibly intended as a preform blank for a projectile point, this biface has iron inclusions, that may have rendered it inefficient for that purpose. There is evidence of wear and retouch on one edge.	51.80	39.89	17.52	N/A
b. Scraper. Ovoid in shape, this large secondary flake retains a small patch of cortex on a prominent 'hump' on dorsal side. There is considerable flaking on all sides, including on ventral side producing a biface. Small flake scars and some possible wear around one side. Material is light grey Edwards chert.	47.44	46.31	20.29	N/A
c. Jay Stemmed/Angostura/Thrall (projectilepoints.net 2008; Turner et al. 2011). This dart point has a longer stem than blade. Stem is straight, with small, upturned shoulders, and slightly convex blade. The base is straight. The cross-section shape is median ridged . The ridge very noticeable on one side. Material is dark gray and red chert, possibly Dakota Quartzite (projectilepoints.net 2008).	38.97	17.34	6.46	Length: 20.83

d. Partial Projectile Point. Excurvate blade, with oblique, parallel flake scars, and alternate retouch on edges. The specimen is broken at what appears to be widest point (this is uncertain.) Due to breakage, no identification can be made.	N/A	N/A	N/A	N/A
e. Burin. Manufactured on a large interior flake, this biface has a point on one end, which shows alternating pressure flakes and some limited evidence of wear/ use. Material is grainy, reddish brown, producing irregular flaking, possibly Dakota Quartzite (projectilepoints.net 2008).	53.59	36.40	20.47	N/A
f. Possible Preform, reworked into an end scraper. Material is a dark Gabbro, with some cortex remaining on dorsal side.	70.00	39.0	24.10	N/A

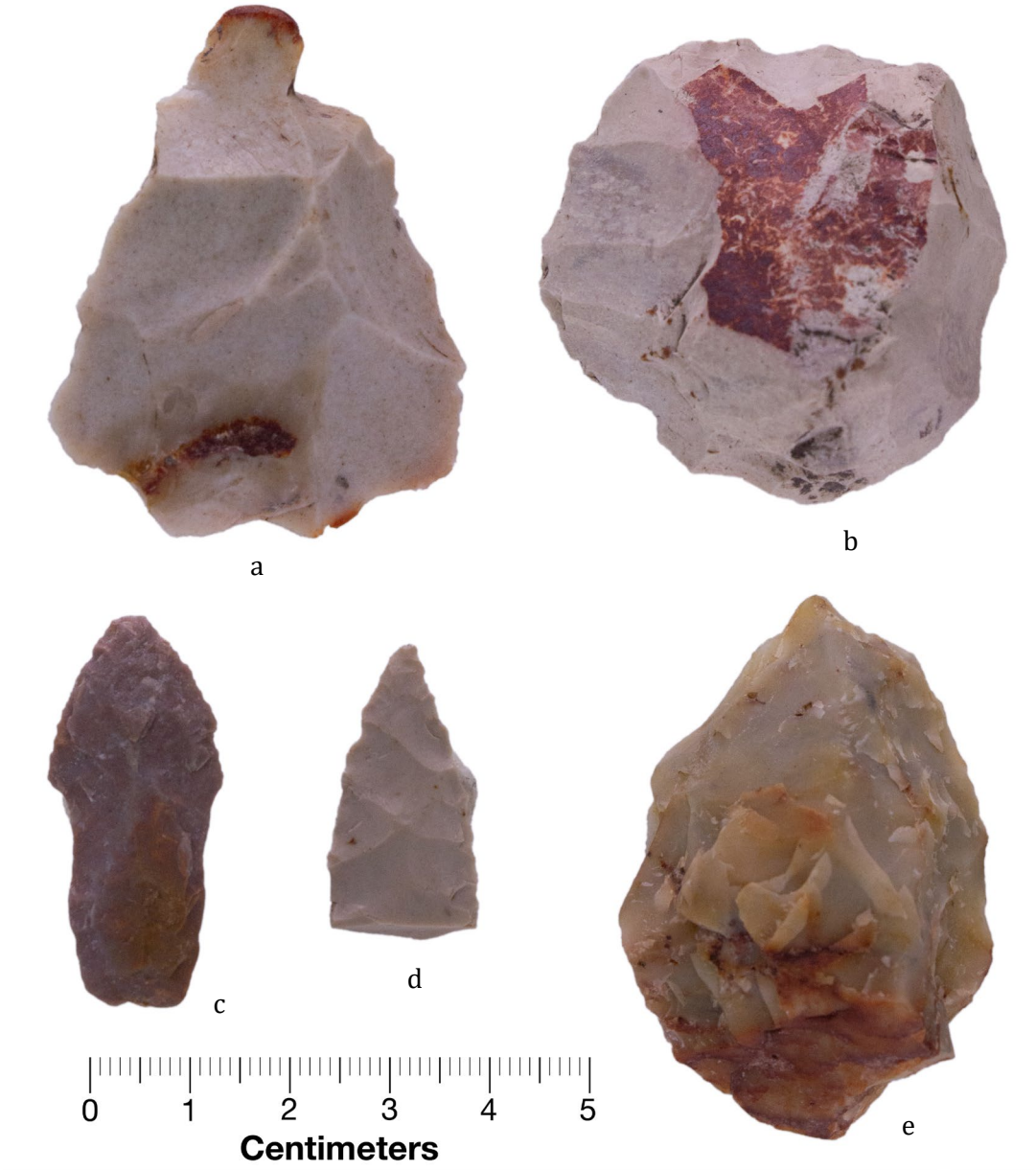

Figure 16. Hamm Creek, 8-57, Cleburne – items a-e (Table 11).

Figure 17. Hamm Creek, 8-57, Cleburne - item f (Table 11).

Johnson County Discussion

During 1946 and 1947, several members of the DAS cooperated with Robert Stephenson of the River Bason Surveys – Smithsonian Institution. They used the homes of Mr. and Mrs. R.K. Harris and Lester Wilson as a temporary laboratory and headquarters in the surveys of several reservoirs including Lake Whitney on the Brazos River, and on the East Fork of the Trinity River. Many members of the DAS who had participated in these surveys furnished the River Basin Surveys – Smithsonian Institution with valuable notes as well as documented artifacts and references. These can be found in *The Record* and proved to be of great value to surveys (Harris 1964).

This work was followed by investigations of Robert Forrester in a publication in 1964. Forrester, who worked for General Dynamics Corporation, and was a chemist by trade, put his skills as scientist to work carrying out investigations at the Ham Creek site, first in 1951, when he was first shown the site, then again in 1955. In 1956-1957, when the Tarrant County Archeological Society was formed, he was joined by members of that group to excavate the site as "speed became important, as the site was easily accessible by road, and was constantly being despoiled by relic hunters, who kept few records" (Forrester 1964:4).We know from records that young Rosick was a member of the Tarrant County Archeological Society at that time.

Forrester also carefully explains that a burial was found, and lots of fire-cracked rock. He found no evidence of shelters, no post molds, no evidence of packed earth, and concluded that the area was not used as a permanent residence. In addition, Clear Fork gouges were in evidence. Even at that time, however, it was realized that they had been reported from Oklahoma, the Texas panhandle, and a wide range from Brownsville and in Alaska. In addition, Forrester noted that the intermingling of materials from the Edwards Plateau Aspect with material from the La Harpe Aspect was important: "It is fairly obvious that the site was occupied by members from both aspects either concurrently or alternately…" as these were determined be "layered" at points. (Forrester 1964:19). Further, he observed a mixing from east to west:

> "The east Texas Archaic begins with a dart having an expanded stem and ends with a dart possessing a contracted stem (Gary). Conversely, the central Texas Archaic begins with a rectangular stem (Bulverde, Travis) and progresses to an extremely expanded stem (Ensor, Frio). This reversal in tradition changes between the two areas probably has considerable significance, but this significance is unknown to the writer" [Forrester 1964:15].

Three things jump out at the reader: (1) The lack of occupation; (2) the percentage of La Harpe Aspect is markedly less than from the Edwards Plateau Aspect, and (3) there is a remarkable range from all over Texas represented (although some less than others). Angostura and Jay may have been variants of the same group, dispersed over time. Forrester shows remarkable foresight in his comments, seeming to echo the thoughts of Aarn demonstrating the work of amateurs, by sharing their collections, can make a significant impact.

SUMMARY AND CONCLUSIONS

What conclusions, if any, can we draw from this collection? As Shafer reminds us, the reason for recording collections is:

> "…to preserve information that might be lost. Archaeology is multidimensional in that information or data can be used to investigate any number of research questions and issues and at different scales or levels of inquiry and different approaches. *The key factor is knowing where the artifact is from.* Excavated data from an archaeological site is complex and incorporates artifact and feature context, provenience, and association. Archaeologists use the contextual information as a basis for establishing facts used in formulating interpretations" [Shafer 2006:66-67; emphasis added].

The present collection, lacking specific provenience or context, other than the most general, may offer little support for "formulating interpretations." However, in a very general, regional way, we might ask some interesting questions.

In the process of identifying some of the projectile points in this collection, I was influenced by not only styles and metrics, but by the regions in which "Types" had been originally discovered, described, assigned names, and most likely associated, per the experts who assembled the classifications, which I consulted as sources. For example, I was reluctant to identify a particular point, which was likely to be associated with Tarrant and/or Johnson counties (e.g., Angostura, supposedly in the northeast; and Mabin/Carrollton, predominant in east Texas; Gar scales which are associated with coastal, southeast Texas). In some cases, where regions were large, or overlapped with the areas explored by the youthful Rosick, I would 'bend a bit' when assigning a classification. One cannot help but wonder, at times, if the distinctions between projectile

types were more a function of the observer, rather than the observed or were the same, but smaller, due to being reworked, and then ground down. Then again, perhaps they were a function of trade or actual movement of social groups was wider than given credit. If the latter were the case, more questions followed:

1. To what extent does an individual artifact, discovered in an avocational collection such as this, reflect how much professional archaeology has been carried out in specific locations rather than other locations where not as much work has been carried out? While this collection is limited in both information and scope, it provides *some* data and reminds us that other collections, from all regions (both professional and avocational), should be sought out and combined into a larger, regional database for further investigation and comparison. This was anticipated as long ago as 1954, by Suhm and Krieger:

> We should like to see amateur archeologists throughout the state make a compilation of their artifacts in their own collections, starting with types of pottery and projectile points described herein. The notes which we have given on distribution are very general, barely suggesting the main areas in which each type has so far been found. This has been done *because we really do not know the full distribution of a single type* [Suhm and Kreiger 1954].

2. The questions raised by Forrester are yet to be answered entirely. Whether there was an "intermingling" of groups from Central Texas, East Texas and the Oklahoma/Panhandle Plains areas or a pattern of occupation by one group and then followed by another, remains to be seen. The abundance of high-quality sources in some areas may have led to an accumulation of discarded material and, later visiting groups, using poor material might have used these, rather than rely on their own. Nor, in a material-rich area, does it mean they were intensively using that material as much. "This does not mean…that these raw material-rich zones of Central Texas were unimportant to Clovis groups, or that they were used differently than other areas. It simply highlights the difficulty in using point distributional data to address questions of prehistoric land use" (Bever and Meltzer 2007:75).

3. If migration patterns are a factor in artifact types turning up in locations other than our expectations, how big of an area might a band, or other social group, have relocated in, and for what reasons?

4. How often was trade not simply a matter of actual artifacts, or a matter of *exchange of technological practice?* Using widespread historic Jumano social networks as an example, John W. Arnn, III references Robert Kelly's suggestion that such social networks were a source of "stimulus diffusion." That is, "individuals not only personally transmitted or diffused news or 'gossip,' but also 'technical information regarding such things as ceramic technology, artifact styles, and specific behaviors" (Arnn 2012: 245).

5. What are we to make of Dr. Hanson's analysis? If he is correct, and the Riley, Fountain, Baggett Branch, and Cobb-Pool sites are different functioning sites, within the same "ecological" system, then we ought to

be able to test them with other sites in this range. Or, if they are a general pattern of adaptation, then we can test that as well.

A Final Note: This collection adds to our general knowledge of North Texas prehistory, as well as providing useful artifacts to present to NTAS public and educational outreach programs. We hope this brief overview of Mr. Rosick's collection will encourage others to share personal collections.

ACKNOWLEDGEMENTS.

This project would not have been completed without the assistance of others.

James Everett reached out to Patricia Mason who donated the collection. Upon receipt, James delivered the collection to my house and took time to explain the background. He also read the results and offered thoughtful editorial comments.

Dr. Catrina Whitley helped by giving her own advice on the bones and directed me to Dr. Abby Fisher. A specialist in zooarcheology, Dr. Fisher offered her preliminary identification and directed me to the website http://www.boneid.net, which proved very useful for determining final identifications.

Mr. Jason Sullivan, of the Arlington Historical Society, was helpful in providing a number of articles from old Tarrant County Archeology Society, as was Ms. Priscilla Escobar and Ms. Elizabeth Bittner.

Ms. Jean Hughes, for helping with cross checking and sharing information from the Texas Archeological Research Labs.

NTAS very much appreciates Ms. Patricia Mason for contacting the North Texas Archeological Society and donating her late husband's collection.

Artifact photographs were prepared by Dr. Matt Boulanger, Director of Archaeological Research Collections at Southern Methodist University.

Finally, a final note of gratitude goes to the memory of Mr. Don Rosick, whose enthusiasm for archeology helped to preserve and provide us with this part of Texas' past.

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ARCHIVAL NOTES AND BRIEF HISTORY OF A RARE EARLY-18TH-CENTURY (CA. 1705) BRITISH ESTATE HUNTING GUN

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British flintlock quality sporting long guns of the early 18th Century are very rare today. This is especially true regarding those surviving firearms manufactured by well-known British gunmakers famous for their quality work and high social status associations. One of these rare surviving flintlock long guns was recently acquired manufactured by Louis (Lewis) Barbar (Barber) of London, a British gunmaker of the circa late 17th and early 18th Century very familiar to today's antique gun collector.

Louis Barbar was originally from Essendon, Poitou, France and migrated to London around 1685 to 1690. He was the son of James Barbar who emigrated to France with Lord Byron after the English Civil War. Louis came to London ca. 1688, probably due to the French King's Edict of Nantes of 1688 which was strongly anti-Protestant, the faith of Barbar, and was instrumental in the migration of many French refugee Huguenot craftsmen from France to London and other parts of Britain and many other European countries. Barbar was in the King's Service ca. 1690-1697. It is known that he appeared before the Gunmakers Company of London Court in 1698 because he had unproved firearms in his possession (Neal and Back 1984:288). Barbar was naturalized in 1700 which enabled him to apply for admission to the Gunmakers Company of London and in July of 1704 the Court recorded:

"Mr. Lewis Barbar being naturalized and having purchased his freedom of this company of the Court of Aldermen and desiring his admission accordingly The Court think fit that he should pay a fine before he be admitted and thereupon put it to the vote whether he should pay 15, 12, or 10 (pounds) and it was carried that he pay 12 (pounds) before his admission and he being called in submitted to the payment of twelve pounds and paid down the same accordingly and was sworn which said 12 (pounds) the company took in full of all charges of admittance. Mr. Lewis Barbar now also presented his proof piece (which was a very fine piece) and the same was allowed and he paid 13/4d." (Neal and Back 1984:289).

Louis was free of the London Gunmakers Company by redemption and a proof piece passed ("a very fine piece") in 1704. In 1710, his son John was apprenticed to Louis, and in 1714 his son James (to also become a well-known quality gunmaker) was apprenticed to him. James was to later succeed Louis in the gunmaking profession. Louis Barbar became a warden of the Gunmakers Company of London in 1716 and 1717 and he was elected Master in 1718. Barbar was appointed Gentleman's Armorer to King George I by warrant in April 1717 and was re-appointed in 1727 by King George II.

Royal patronage appears to have been to a good degree monopolized by Louis Barbar with excellent quality examples of his work including guns for George Ludwig of Hesse-Darmstadt (1668-1705), John 2nd Duke of Montague (1710-1741), Lord Hugh Constable of England at the coronation of King George I, and George I of England. He was gunsmith to the Master of Horse, in charge of the private armory at Kensington Palace in 1718, gunmaker at Pall Mall 1712, Portugal St. 1726-1739, and Rupert St. 1739-1741. Louis made pattern muskets for the Ordnance for George 1 (1722), contractor to Ordnance 1723-1740, and died in 1741 (Blackmore 1986). Barbar's production besides muskets includes turn-off (screw-barrel) pistols, turn-

over two-barrel holster pistols, and belt and horse pistols.

Another significant aspect of the history associated with the Barbar hunting gun is that it predates and foreshadows the development of the British "Brown Bess" musket which roughly appears a decade or so later. This is predominantly in the lock and sideplate features which includes the shape and design of the lock, hammer, and trigger which anticipates some of the features of the "Brown Bess". The differences however, are equally evident with the Barbar gun having a higher quality upscale hexagonal barrel rather than round, a rare folding rear sight at the breech, more "artistic" trigger guard, buttplate, the "leaf shaped" end of the sideplate, root wood stock, and far more decorative features of the metalwork and wood. Of course, as a military longarm the "Brown Bess" is designed and produced for optimal economy and ease of mass manufacture precluding the employment of many "high quality" gun features. Lord Cadogan, Master of General Ordnance, commissioned Barbar to manufacture a number of "pattern" as well as some common muskets (Table 1, after Neal and Back 1984:288-290).

Around 1726, the plan of obtaining limited quantities of guns and their repair from a relatively large number of gunmakers was changed. From 1726, component firearms parts obtained in large quantities were sent out for manufacturing into complete firearms on a huge scale and this work was given almost exclusively to contractors Louis Barbar and Charles Pickfatt for the next decade. The annual production of Barbar for finishing rough-stocked King's Pattern Land Service muskets with brass furniture is shown in Table 2.

Table 1. Quantities and Types of Patterns by Year.

Year	Quantity and Type(s)
1722	12 long ironwork muskets
	6 brasswork muskets
	2 short ironwork muskets
1723	480 Land Service muskets
	507 pairs of Land Service pistols
	27 carbines
	480 bayonets
	480 cartouche boxes
	24 drums
1725	9 carbines
	9 pairs of pistols
1726	setting up 500 Land Service musket barrels with ramrods
1728	832 Land Service muskets
	856 pairs of pistols for Major General Grove's, Brigadier Kerr's, Colonel James Campbell's, and Lord Carpenter's Regiments of Dragoons
1729	128,000 French flints
1738	600,000 French flints:
	299,480 for muskets
	192,720 for carbines
	107,800 for pistols

Table 2. Barbar Annual Production.

Year	King's Pattern	Sea Service	Other Firearms
1730	1,250	-	-
1731	2,450	-	-
1732	750	-	-
1733	300	-	-
1734	1,500	-	-
1735	500	-	-
1736	750	-	1,000 pistol pairs
1737	560	-	550 pistol pairs
1738	-	970	168 musketoons (brass furniture)
			300 Dutch muskets (brass furniture)
1740	2,000	-	300 pistol pairs
			229 muskets with bayonets for Lord Crawford's Regiment of Foot
1741	1,200	-	-

The 1741 King's Pattern production was by Louis Barbar's son James, as Louis died in 1741. In addition, when relatively consistent records for gun production submittals began in 1721 by the Gunmakers Company of London, it can be seen that Barbar submitted for proof (Table 3, after Neal and Back 1984: 289-290).

Table 3. Number of muskets Government paid Barbar for by Year.

Year	Muskets	Pistols	Blunderbusses	Musketoons
1721	136	6	2	6
1722	164	160	2	-
1723	56	23	12	-
1724	109	51	-	-
1725	179	14	-	4
1726	143	36	-	20
1727	179	16	-	-
1728	114	39	-	-
1729	50	-	-	-
1730	15	2	-	18

By 1739, Louis' son James probably took over most if not all the gunmaking business when he is recorded on Rupert Street, White Chapel near Christopher Court. After his death in May 1741, Louis left no will with the rest of his estates handled by his two other sons John and Peter (Neal and Back 1984:290).

The Louis Barbar flintlock sporting gun was originally obtained by Norman Blank in a 1967 auction from Lord Leigh of Stoneleigh Abbey, Warwickshire, U.K. The Norman Blank collection was auctioned by the Rock Island Auction Company and was a unique collection of fine European sporting arms and included such fine arms as made by Nock, the Mantons, Rigby, Westley Richards, Keiser, Boutet, and Gastinne-Rennette. Blank died in 2004. One of the little known great collections, it exhibited often unique extravagant guns from 17th Century through to modern nitro breech loaders. Many were decorated by the greatest engravers, inlayers, and woodworkers in history. Stoneleigh Abbey is a country house estate south of Coventry. Henry II granted land in 1154 to some Cistercians from Staffordshire with the 14th Century gatehouse remaining today. With the dissolution of the monasteries, Sir Thomas Leigh, Lordmayor of London, obtained the estate in 1558. Thomas Leigh was given a barony by Charles I for giving the king sanctuary when the Coventry gates were closed to him during the English Civil War. Stoneleigh Abbey was the estate of the Leigh family from 1561 to 1990 and were the largest land owners in Warwickshire. From 1714 to 1726, the estate had the palatial West Wing built. Reverend Thomas Leigh inherited the estate in 1806 and accompanying him was his cousin Cassandra Austen and her two daughters, Cassandra and the now famous authoress Jane Austen. Jane Austen (1775-1817) was the famous English novelist that has scant detailed biographical information as only 160 letters of hers remain for reading. She was born in Steventon Hampshire, U.K. in December 1775. Father George Austen married Cassandra Leigh (1739-1827) in 1764. Thomas Leigh was a cousin and Stoneleigh was home to Jane's maternal relatives for 400 years. In 1806, Stoneleigh Abbey was visited by Queen Victoria. Charles I also visited the Abbey much earlier. When Jane Austen writes of estate changes to Sotherton Court (fictional) in her "Mansfield Court" she probably takes work at Stoneleigh Abbey as her example (Wikipedia 2024).

The archaeological significance of the Barbar hunting gun is that it exhibits and exemplifies the morphology and design common to the

very early U.S. colonial firearms which either came from or were copied by colonial gunmakers. As such, the Barbar gun provides a surviving example of the many rusted and corroded archaeological gun parts recovered in New England and other colonial settlements predominantly along the eastern US and eastern regions. Further, the archaeological significance of the Barbar gun is that it exhibits the features and morphology (although with some relatively minor stylistic changes that developed over the ca. 70 years or so in the future) that would characterize the British civilian guns that were at the initial (and later) Revolutionary War battles of Concord and Lexington. So, for any rusted gun components recovered in historic archaeological contexts here is an example of how these gun parts originally fitted and appeared.

THE CA. 1700 BARBAR SPORTING GUN

The Barbar flintlock sporting gun exhibits many late-17th and early-18th century features. The lock plate exhibits the classic early "banana" shape with "BARBAR" marked along the bottom edge to the right of the hammer (Figure 1). The frizzen spring screw attaching the frizzen spring is from inside the lock with the early "feathered" or fleur-de-lis termination. The frizzen itself exhibits the early "double curl" where there is a curl midway along the frizzen arm as well as at its terminus (the mid-curl commonly disappeared about 1720 and the end curl went out of fashion about 1770 to 1780 or so). There is a decorative "bump" on the front face of the frizzen (early feature on quality guns of this period) as well as a decorative line pattern to the edges of the pan and edge of the frizzen flat. The hammer screw has a linear type of design with most of the metal components exhibiting double line engraving around their perimeters. The hammer top ends in a pronounced curl with the jaw screw exhibiting a globular or lobe terminus following the high-quality design of the overall firearm. The trigger also has a nice backward curl with the sideplate in an "S" shape but with a floral termination. The 11 gauge 36 and 3/4 inch swamped full-length octagonal barrel exhibits Louis Barbar's London Gunmakers Company mark of a dot (which is actually a poorly formed heart) over "LB" and the Gunmakers Company of London proofs (1690-1720 style) of a crude crown over "GP" and a crude crown over "V" (Figure 2). The Barbar sideplate (Figure 3 and Figure 4) also follows the very early 18th century hunting gun patterns. The breech sight has a fleur-de-lis terminus and has three tip-up sight accommodations. The barrel also exhibits a front dovetailed rounded inset blade front sight with turned ramrod ferrules. The trigger guard has both ends with a fleur-de-lis and has the double line engraving on its edges like most metallic features of the gun. The buttplate has the double line edge engraving as well as a flower (rose?) engraved on its top end with the top arm of the buttplate almost extending to the blank leaf-shaped escutcheon (Figure 5 and Figure 6).

Figure 1. BARBAR lock plate with BARBAR in front of hammer.

Figure 2. Barbar mark & Gunmakers of London proofs.

Figure 3. BARBAR sideplate.

Figure 4. BARBAR lock plate side view.

Figure 5. BARBAR escutcheon and wrist area.

Figure 6. BARBAR buttplate.

The stock is of "root wood" with a red/orange and black mottled appearance which is early and usually reserved for only the highest quality firearms of this time period (root wood use seems to disappear around 1740-1750 or so). The stock is elegantly carved and molded following many of the contours of the metal components often ending in artistic "teardrop" termini. Overall, the specimen is a very fine and very rare early production sporting firearm from the early production period of one of Britain's finest gunmakers.

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OBSIDIAN BLADES AND OCCAM'S RAZOR

A REPLY TO ERWIN AND BOULANGER

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1 Arkansas Archeological Survey

Erwin and Boulanger (2023) describe a rhyolitic obsidian blade from the collection of Mr. Lloyd R. Erwin. The blade's chemical composition was analyzed using XRF and shown to come from the well-known source of Sierra de Pachuca near latter-day Mexico City, and they argue it must have been carried by one of the Nahua-speaking *indios amigos* who accompanied the Coronado expedition during its 1541 expedition through the region. Their article represents a significant contribution and comes to some intriguing conclusions; here I wish to briefly reexamine three portions of their argument that I think particularly warrant further discussion.

First concerns a rhetorical (and logical) leap. The authors propose three possible explanations for the presence of an obsidian blade from Sierra de Pachuca found so far from its source: "(1) Erwin obtained this blade through trade/exchange of artifacts with other collectors or during a trip to Mexico City; (2) the blade was intended as a hoax to garner attention to Erwin and his collection; or, (3) the blade was genuinely collected in Texas by Erwin and is a genuine archeological find" (2023:5).

All well and good, as these are reasonable alternatives. But they are subsequently discussed somewhat differently, as 1) "modern trade/travel/exchange" (2003:5); 2) "hoax" (2003:5-6); and 3) "The Coronado Expedition" (2003:6-8). The first two match the original possibilities and are addressed with admirable clarity. The third, however, seems to substitute a conclusion for a possibility. There is a logical gap between "genuine archeological find" and "Coronado expedition," and yet it is crossed in a single bound. The substitution of terms may prove correct, but the logic warranting such a substitution is not explained.

In part that introduces my second hesitation regarding the logical necessity of the argument, and how sharply Occam's razor cuts with an obsidian blade. Occam's razor holds that the simplest explanation is generally the most likely. Given that formally similar obsidian blades demonstrably from the same Sierra de Pachuca source have been found in more archeologically secure contexts within the region, should we necessarily assume that this blade requires a completely different origin associated with a single European-led expedition? A Pachuca obsidian blade is already known from precontact Spiro IVB contexts at Craig Mound at Spiro (34LF40), Oklahoma (Barker et al. 2002). Moreover, five artifacts of Pachuca obsidian are already known from Kansas (Dolan and Shackley 2021:782). Two are from the Sharps Creek site (14MP408), but are from undated surface contexts; two late-stage polyhedral blades are from the Paint Creek site (14MP1); and one large core fragment is from the Murray Creek site (14SN4), described by Hoard et al. (2008:224) as representing "unknown prehistoric" contexts. This last site is in far northwestern Kansas, well outside the range of Coronado's presumed travels. It is entirely possible that Pachuca obsidian in south-central Kansas reflects the Coronado entrada, but this has not been demonstrated, and the Murray Creek site both predates the expedition and is far from its presumed route. Known Coronado campsites in the region (e.g., the Jimmy Owens site [41FL81]) have not, to date, produced Pachuca obsidian.

Other Mesoamerican materials are known from demonstrably precontact contexts in the region, most notably shell beads. Shortly after

publication of the Spiroan obsidian, Laura Kozuch published a taxonomic reassessment of dwarf olive (Olivella) marine shell beads from Spiro, showing that they represented a taxon (*Olivella dama*) found only in the Gulf of California (2002). Some 13,948 Olivella beads from a single burial at Spiro (B145, from Spiro IVB precontact contexts) were from this same source. In subsequent analyses of Olivella beads from Kansas sites Hoard and Chaney similarly found that "all Olivella specimens from Middle and Late Ceramic sites that have been identified by professional malacologists are from *Olivella dama*" (Hoard and Chaney 2010:295); these results offer further evidence that materials from Mesoamerica or Baja California were circulating in the region well before the Coronado incursion.

My final hesitation concerns Erwin and Boulanger's logic in dismissing these other possible origins. They acknowledge the existence of the Spiro blade but argue the Erwin blade "does not appear to be heavily reworked as may be expected for an artifact passed down through expansive trade networks, such as the single blade on Pachuca obsidian recovered from Spiro Mounds in Oklahoma" (2023:6). This is actually a rather complex assertion involving several assumptions or inferences which require greater explanation or elaboration to be compelling. It is not altogether clear, for example, that goods being carried 1,000 km as items for trade at their destination are more likely to be retouched while in transit than are the tools carried by an individual for their own use traveling over the same distance; one might just as plausibly argue that the reverse is more likely. In a related vein, since there are numerous objects from greater Mesoamerica at Spiro, not just the single blade, one might argue that use-wear and retouching is more likely at an object's destination than at points along the way. Whether that is actually the case here is not certain, of course, but dismissing an arguably more parsimonious explanation simply because one blade has more retouching than the other requires more fully developed warranting arguments than have been presented.

Surprisingly, few pieces of Pachuca obsidian have been found at sites in the American Southwest. Dolan and Shackley (2021) argue that most Sierra de Pachuca obsidian in the Southwest is associated with Spanish occupations, yet all but one example (LA54147 in Bernalillo, New Mexico) are either undated or postdate Coronado. That is not to say there is no Mesoamerican obsidian from Coronado sites, simply that the Mesoamerican obsidian is not from Pachuca. At Piedras Marcadas (LA290, besieged by Coronado and forces including some 1,300 *indios amigos* during the winter of 1540-1541) several fragments of Mesoamerican obsidian have been identified and sourced, but all are from the Zinapécuaro source in Michoacán (Shackley 2023), and none are from Pachuca. Conversely, no fragments of Zinapécuaro obsidian have been identified thus far from the Plains, whether from putative Coronado sites or not. Despite Coronado and his forces having spent more time in the Southwest than on the Plains, and having far more Southwestern than Plains sites securely associated with Coronado and his forces, we are currently in the rather curious position of having more Pachuca obsidian from sites in Kansas and Oklahoma than from all known and documented Coronado-era sites in the Southwest combined.

Dolan and Shackley (2021:786) explain the relative paucity of Pachuca in the Southwest through several entirely reasonable arguments (few *indios amigos* would have been the skilled *navajeros* able to make such blades, few would have brought the specialized equipment needed for their manufacture, the expedition was not expected to last anywhere near as long as it did, and the native allies would have used up their own obsidian supplies early in the trip and begun using local obsidian sources instead). But if those arguments are correct,

then it is unlikely that Coronado-era Pachuca obsidian would be found in Kansas and North Texas, and certainly not in greater quantities than in the Southwest. If, on the other hand, we assume Pachuca obsidian at some Plains sites is proof of Coronado's route (which in any event does not fit all observed instances), then we would seem to need to reject Dolan and Shackley's arguments and account for how native allies had more Pachuca obsidian when they got to the Plains than they did along their way. Current data are perplexing, and only additional analyses can solve the apparent conundrum.

Erwin and Boulanger's conclusion—that the Pachuca blade in the Erwin collection must be evidence of Coronado's route—is plausible, of course. But in the absence of other lines of evidence it is equally possible that the Erwin blade represents another example of the precontact movement of goods from greater Mesoamerica across the southern High Plains or up the major river valleys of the American midcontinent. At least one site (Spiro) has previously produced the same class of object made from the same material from contexts predating European entradas, and on the basis of extant evidence another (Murray Creek 14SN4) predates the Coronado expedition and lies well outside its supposed range.

To be clear, I am not arguing that Erwin and Boulanger's conclusion that the blade represents evidence of the Coronado expedition and the presence of *indios amigos* is mistaken. Instead, I suggest that on the basis of current evidence the conclusion is premature, and other possibilities should be considered. I am confident that further work will reveal additional examples of obsidian objects from secure contexts within the region, allowing us to choose between these alternatives.

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BARKER'S BARK MISSES THE MARK

RESPONSE AND DISCUSSION OF OBSIDIAN ON THE SOUTHERN PLAINS

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We thank Barker for his comments regarding our hypotheses on the origins of Central Mexican–obsidian prismatic blades found in the US Southwest and Southern Great Plains and our proposed association of these artifacts with the Coronado Expedition of AD 1541. We also thank NTAS, for providing an opportunity to respond and to elaborate upon our previous statements.

Barker's arguments against our hypotheses amount to three main points:

(1) The presence of Olivella shells from the Gulf of California at Spiro Mounds (34LF46) proves exchange of raw materials and finished objects between Mesoamerica and the Southern Plains prior to European contact;

(2) That definitively identified Coronado campsites in Texas have not yielded Central Mexican obsidian, and therefore the identification of Central Mexican obsidian cannot be used to identify Coronado sites in Texas; and,

(3) There are unspecified other mechanisms that could explain the Erwin blade in a more parsimonious manner. We address each of these contentions in turn. We close by presenting a synthesis of obsidian data from the Southern Plains to illustrate that Barker is missing the forest for the trees when it comes to his cited examples of Sierra de Pachuca obsidian at Spiro Mounds, Oklahoma and at Murray Creek, Kansas.

OLIVELLA SHELLS

Barker discusses the presence of Pacific Ocean species of *Olivella* shell beads at Spiro Mounds and at sites on the Central Great Plains (Hoard and Chaney 2010). We do not dispute the findings of Hoard and Chaney, nor do we disagree with their conclusion that the presence of these shells is likely evidence of "direct or indirect connections between the Central Plains and the *American Southwest,* also indicated by the distribution of other trade items such as pottery, turquoise, and obsidian" (Hoard and Chaney 2010: 295, emphasis added). But, the Gulf of California is not the Basin of Mexico, and *Olivella* shell beads are not obsidian blades.

The coastline of the Gulf of California is, minimally, 750 miles distant from the likely location at which the Erwin blade was recovered. And, the Pachuca obsidian source is minimally, over 1,000 miles distant from the Gulf of California. We can think of no reason why the use, trade, or transportation of *Olivella* shell should necessarily resemble—or even inform upon—the use, trade, or transportation of obsidian from volcanos 1,000 miles away. Moreover, there are numerous sources of rhyolitic glass and obsidian around the northern edges of the Gulf of California, such as Los Vidrios and Los Sitios del Agua (Martynec et al. 2011; Shackley 2005a), and artifacts made on these obsidians *are* found at archaeological sites in the Southwest in the absence of material from Central Mexico. The fact that obsidian from these sources has yet to be found in secure archaeological contexts in the Southern Plains is *prima facia* evidence that the trade and exchange of *Olivella* shells does not—and should not—be assumed to mirror the trade and exchange of obsidian.

JIMMY OWENS AND THE ABSENCE OF OBSIDIAN

Barker is correct that no Pachuca obsidian has been recovered from the single likely Coronado campsite in West Texas: Jimmy Owens (41FL81). However, the absence of obsidian artifacts from 41FL81 likely has much to do with the manner in which the site was both identified and investigated.

This site was originally discovered by a metal-detector enthusiast. Later professional investigations used metal detectors to identify subsurface metallic targets, and these targets were mapped and excavated using minimally invasive methods. Not surprisingly, nearly all of the Coronado-related material from this site consists of metal artifacts (copper crossbow bolts, iron nails, chainmail, etc.). Indeed, Blakeslee and Blaine (2003) note the absence of obsidian from Central Mexico in their collection and conclude either that they have not yet located the Mexican Indian portion of the camp or that supplies of obsidian had been depleted by the time the expedition set up camp at 41FL81. Absence of evidence in this case is not evidence of absence; rather, it is evidence of bias in how the site was investigated.

As Seymour (2025) has shown in her investigations at Coronado sites in southern Arizona, obsidian artifacts, especially small flakes and blades, are often missed unless systematic surface collection and excavation are employed. At Suya (San Geronimo III), for example, she found obsidian flakes and blades in battlefield contexts alongside diagnostic Coronado metal artifacts, underscoring the complementary nature of these material classes. This suggests that sites like Jimmy Owens may indeed contain obsidian tools or debris associated with Coronado's Mexican Indian allies, but that such materials remain undocumented due to the limited recovery strategy focused almost exclusively on metal items.

MESOAMERICAN OBSIDIAN

Barker seems to be arguing that we have ignored other mechanisms by which Central Mexican obsidian could arrive in the northern Texas Panhandle; however, he provides no alternative ideas and no new data to challenge our hypothesis that Central Mexican obsidian can be used as a tentative proxy for Colonial-era events including but not limited to the Coronado expedition.

His sole argument seems to rest on the premise that the presence of an obsidian scraper in pre-Colonial contexts at Spiro Mounds (34LF46) and a single core reportedly collected from the surface of a site in northwest Kansas demonstrate the potential for pre-Colonial exchange and interaction between the Southern Plains and Central Mexico. We find his argument lacking.

While a tool made from Pachuca obsidian was found at Spiro, as Dolan and Shackley (2021) discuss, there is no comparable evidence of Mesoamerican obsidian in Prehispanic contexts at major excavated sites in the Southwest, such as Pueblo Bonito, Snaketown, and Paquime. Each of these sites has been the focus of extensive archaeological research on interregional exchange and sociopolitical complexity, yet none have yielded obsidian sourced to Central Mexico, despite those sites having copper bells, marine shell, cacao, and scarlet macaws from West Mexico and Mesoamerica. This absence is significant, as it indicates that peoples in the Southwest did not engage in direct or sustained Prehispanic trade with groups connected to Central Mexican obsidian sources.

In contrast, Mesoamerican obsidian appears in secure Coronado-era contexts, highlighting the temporal specificity of these materials. The presence of Pachuca and Zinapécuaro obsidian in 16th century assemblages, and their absence in earlier ones, supports our position that these artifacts are more appropriately interpreted as products of Spanish-led expeditions involving Mexican

Indian allies, rather than as remnants of Prehispanic trade networks.

Recent research by Seymour (2025) offers strong archaeological support for our position regarding the diagnostic value of Central Mexican obsidian in identifying Coronado-related contexts. As we note here, the absence of obsidian at sites like Jimmy Owens likely reflects a methodological bias toward metal detecting rather than a true absence of Indigenous weaponry. Seymour's fieldwork in southern Arizona addressed this issue. At the site of Suya (San Geronimo III), she recovered a green obsidian blade fragment from a battlefield context, along with other small green obsidian flakes and a banded mahogany flake—potentially from the Zinapécuaro source—within a burned structure. At the site of Chichilticale, Seymour documented a prismatic core fragment.

While the number of obsidian artifacts is small, their spatial association with definitive Coronado materials—such as crossbow boltheads, copper bells, and gable-headed nails—demonstrates that obsidian was present and used during battle, most likely by Coronado's Mexican Indian allies. Seymour (2025: 9) also references "a prismatic blade collection recovered from a junk shop in Duncan, AZ," which, while lacking precise provenience, suggests the wider dispersal of Central Mexican obsidian in southern Arizona and may reflect undocumented or secondary movement of Coronado-era materials. Though not recovered through formal excavation, such finds underscore the potential for unrecognized Coronado-related artifacts to circulate in private or informal contexts, further complicating the archaeological visibility of the expedition and the movement of the Indios Amigos.

We do not dispute or challenge the presence of a Pachuca obsidian blade at Spiro Mounds. We do however recognize that the social and cultural mechanisms leading to its presence at a pre-Colonial Caddoan village and burial mound site in southeastern Oklahoma are very well distinct from those leading to the presence of obsidian blades in New Mexico and the Texas Panhandle.

We do not currently have sufficient evidence to assess the significance of the obsidian core supposedly collected from the surface of the Murray Creek (14SN4) site in northwestern Kansas. The artifact was analyzed by Shackley (2005b), and it is listed in the data table of Hoard and colleagues' publication reporting these data (2008: Table 1). However, Hoard and colleagues say nothing whatsoever about this artifact—despite specifically discussing surface finds of Sierra de Pachuca obsidian from Sharps Creek (14MP408) which is located within the presumed path of Coronado's entrada. Should Hoard or some other researcher choose to publish additional information on the Murray Creek artifact and its context, we would be better able to evaluate its potential significance. However, if the reporting authors have had nothing more to say about this artifact over the past 20 years, we are not sure why Barker imbues it with such significance while ignoring other possible mechanisms for the supposed recovery of Sierra de Pachuca obsidian far from its source (e.g., Boulanger 2020; Boulanger et al. 2007).

Barker provides no competing hypothesis to explain the recovery of the blades in question—either in the Texas Panhandle or at sites in New Mexico. Nor does he attempt to explain how his examples from Murray Creek and Spiro are relevant both to our reported finds and to each other.

Multiple studies now (Dolan and Shackley 2021; Seymour 2025; Shackley 2023) demonstrate that while unconventional ferrous and copper weapon points are the most abundant diagnostic artifacts of the Coronado expedition, green obsidian artifacts, as well as some black obsidian blades, although uncommon, serve as definitive markers of Coronado's Mexican Indian allies.

Table 1. Table of sourced obsidian recovered from archaeological sites on the Southern and Central Plains, summarized by geographical region of source.

Note: No attempt has been made to summarize these data by chronological position.

State	Texas	Oklahoma	Kansas	Nebraska	Σ
Southwest	628	200	332	18	1178
Northern Plains	51	64	35	21	171
Great Basin	3	2	4	3	12
Mesoamerica	34	1	7	-	43
Other/Unknown	49	7	5	1	62
Southwest	82.1%	73.0%	86.7%	41.9%	80.4%
Northern Plains	6.7%	23.4%	9.1%	48.8%	11.7%
Great Basin	0.4%	0.7%	1.0%	7.0%	0.8%
Mesoamerica	4.4%	0.4%	1.8%	0.0%	2.9%
Other/Unknown	6.4%	2.6%	1.3%	2.3%	4.2%

Table 2. Table of Mesoamerican obsidian finds on the Southern Plains summarized by regions[1]. Central Mexico includes sources in the states of Hidalgo and Querétaro; West Mexico includes the states of Jalisco, Michoacan, and Zacatecas; North Mexico includes the state of Chihuahua.

	Texas	Oklahoma	Kansas	Nebraska	Σ
Central Mexico	21	1	7	-	30
West Mexico	12	-	-	-	12
North Mexico	1	-	-	-	1
Central Mexico	61.8%	100.0%	100.0%	0.0%	69.8%
West Mexico	35.3%	0.0%	0.0%	0.0%	27.9%
North Mexico	2.9%	0.0%	0.0%	0.0%	2.3%

[1] Central Mexico includes sources in Hidalgo (Sierra de Pachuca, Tulancingo, Otumba, and Zacualtipan), and Queretaro (Ojo Zarcos/Penjamo, and El Paraiso). West Mexico includes sources in Jalisco (San Isidro and Teuchitlan/La Mora), Michoacán (Ucareo and Cerro Varal), and Zacatecas (Huitzila). North Mexico includes sources in Chihuahua (Largo Barreal, Sierra Fresnal, Los Jagüeyes, Sierra la Brena) and Sonora (Agua Fria, Selene).

SOUTHERN PLAINS OBSIDIAN

Rather than attempting to draw connections between two disparate artifacts—one in southeastern Oklahoma and one in northwestern Kansas—to discuss the significance of Central Mexican obsidian finds on the Southern Plains, we close with a presentation of what we believe to be a more fruitful comparative venture: Assessing a large sample of obsidian finds from across the entirety of the Southern Plains to better contextualize the rarity and possible significance of Mesoamerican obsidian in this region.

Although no singular published database exists for finds of obsidian on the Southern Plains (but see Jones et al. 2019 for the Northern Plains), each of us has in our own ways been engaged in compiling such data for at least the past 20 years. We also have benefitted greatly from the sharing of data with and from our colleagues. The compiled results of these efforts (Table 1) make it clear that at minimum 765 pieces of obsidian have been found at archaeological sites in Texas. In Oklahoma, at least 274 obsidian finds have been reported. In Kansas, the number is 383; and, in Nebraska, the number is 43. By far the most common source of obsidian on the Southern Plains is the American Southwest—almost entirely from sources in northern New Mexico, specifically sources within the Jemez Mountains (Shackley 2005a:64-75, 2013).

In our sample of 1,466 finds of obsidian on the Southern Plains, only 43 (2.9%) derive from Mesoamerican sources (Table 2), and most of these (n = 34) are Sierra de Pachuca obsidian from known Colonial contexts in South Texas[1]. This is to say: Mesoamerican obsidian is extraordinarily rare north of the current U.S.–Mexico border, except within Colonial-era archaeological contexts. If, as Barker appears to be proposing, there existed some Prehispanic obsidian-exchange network between the Southern Plains and Central Mexico, we see no evidence of it with the exception of the single tool he has documented from Spiro Mounds (Barker et al. 2002)—which is not even located on the Southern Plains proper. Rather, nearly all (n = 1,423, 97.1%) of the obsidian from bona-fide Colonial and pre-Colonial contexts across the Southern Plains comes from New Mexico, the Northern Plains, and other localities in the western United States (Figure 1).

Pointing out that some of the obsidian associated with Coronado's entrada derives from the Zinapécuaro source in northeast Michoacan (Shackley 2023), Barker argues that "it's unlikely that Coronado-era Pachuca obsidian would be found in Kansas and North Texas." It is folly to presume that Coronado's indios amigos carried exclusively Sierra de Pachuca obsidian. The entrada itself embarked from Compostela in West Mexico, and as such likely brought with it obsidian from numerous sources south of the Chihuahuan and Sonoran Deserts. We have previously identified Sierra de Pachuca blades from known Coronado sites in northern New Mexico—sites which would have been occupied immediately prior to the entrada's entrance onto the Southern Plains (Dolan and Shackley 2021). And the cluster of documented Sierra de Pachuca finds in central Kansas—though not necessarily from Coronado-associated contexts—are from Protohistoric contexts along the path of the Coronado entrada. Regardless of the origins of the Erwin blade, the entrada appears to still have had Sierra de Pachuca obsidian in its possession by the time it arrived in northern New Mexico.

Barker also claims that "we are currently in the rather curious position of having more Pachuca obsidian from sites in Kansas and

[1] We note that Blakeslee has made numerous claims of finding significant numbers of Central Mexican obsidian artifacts in southern Kansas (e.g., https://www.wichita.edu/about/wsunews/news/2023/03-march/quivira_3.php), but these claims have not been published in peer-reviewed literature and will not be considered here. We encourage Blakeslee to formally document these finds in the professional literature.

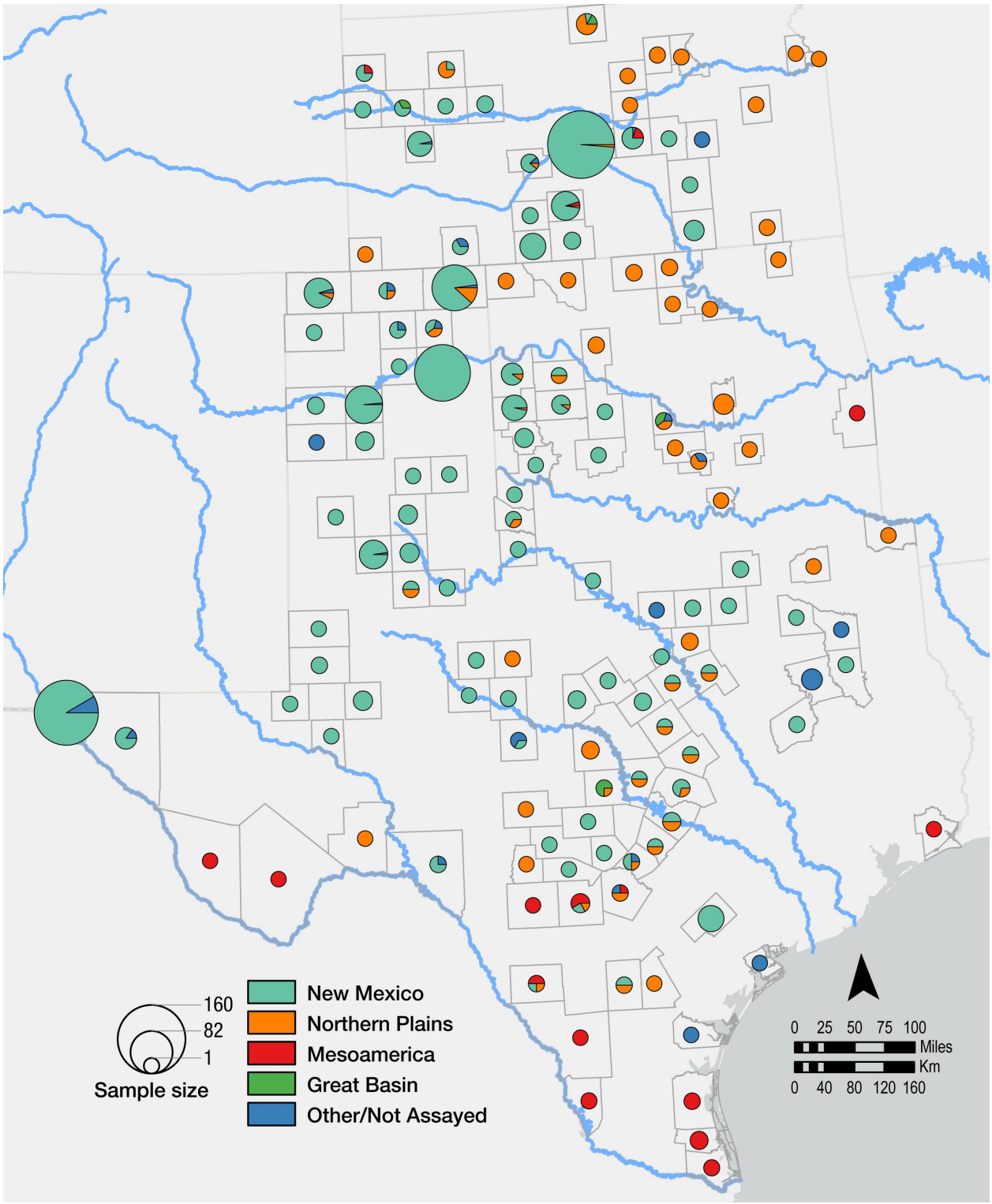

Figure 1. Map of published obsidian finds on the southern Great Plains grouped by general region of source location.

Oklahoma than from all known and documented Coronado-era sites in the Southwest combined." While technically true, at least until such time as Seymour sources the obsidian from Suya (San Geronimo III), Barker is leaving out information required to contextualize this claim. First, there is only one piece of Sierra de Pachuca obsidian reported from Oklahoma, and it was found associated with a prominent pre-Colonial Caddoan mound site nowhere near the current reconstructed route of the Coronado entrada. Second, all but one of the other reported finds of Sierra de Pachuca obsidian in Kansas fall directly within the reconstructed route of the entrada. The single exception in this case being the aforementioned minimally reported blade core attributed to the Murray Creek site in northwestern Kansas. Setting aside these two pieces, the archaeological literature contains mention of a total of six pieces of Mesoamerican obsidian found in Kansas (all from Sierra de Pachuca; see Hoard et al. 2008 and Macaluso 2012). In New Mexico, we have documented a total of six Mesoamerican blades (Dolan and Shackley 2021; Shackley 2023), four of which are from the Sierra de Pachuca source.

Mesoamerican obsidian found in South Texas is strongly associated with Spanish shipwrecks and early Mission sites, and the geographic distribution of these finds highlights early Colonial ventures into the state. Similarly, the geographic distribution of Mesoamerican obsidian blades we have documented in the Northern Rio Grande and the Texas Panhandle overlaps with the projected route of the Coronado entrada (Figure 2). One possible explanation for this is mere coincidence. Another, and we think more reasonable explanation, is that these two phenomena are causally related.

SUMMARY

The Erwin blade is the furthest north of known Mesoamerican obsidian finds in Texas, and it is clearly distinct geographically from finds at sites on the Gulf of Mexico, along the Rio Grande, and in eastern Oklahoma. It is much closer geographically to the New Mexico finds of Central Mexican obsidian—all of which derive from Spanish colonial sites known to have been visited during the Coronado expedition. This artifact, and others documented from northern New Mexico, are prismatic blades—a technological description that distinguishes them from pre-Colonial lithic technologies used in the Southern Plains and Southwest generally, and in the Texas Panhandle and Northern Rio Grande specifically. Moreover, all these items come from localities clearly located within the known and reconstructed paths of the Coronado expedition. The totality of obsidian evidence from the Southern Plains fails to show any significant evidence of Central Mexican obsidian outside of those areas that saw early Colonial ventures.

In closing, the senior author would like to restate something from the original article that Barker—and other archaeologists commenting in other venues—seemingly passed over: "only the recovery of in situ archeological evidence that can definitively be associated with the Coronado expedition will establish beyond a reasonable doubt" that the Erwin blade is in fact evidence of this event (Erwin and Boulanger 2023: 9). We recognize the tenuousness of giving undue importance to a single surface-collected artifact held in a private collection for nearly a century. However, we have yet to come up with a competing hypothesis that equally explains the form, material, location, and historical pedigree of the Erwin blade, while also being consistent with the rest of the evidence—both positive and negative—from across the Southern Plains. If Barker, or anyone else, can articulate a hypothesis pertaining to the blade's origins that conforms to all available evidence, we would happily entertain it.

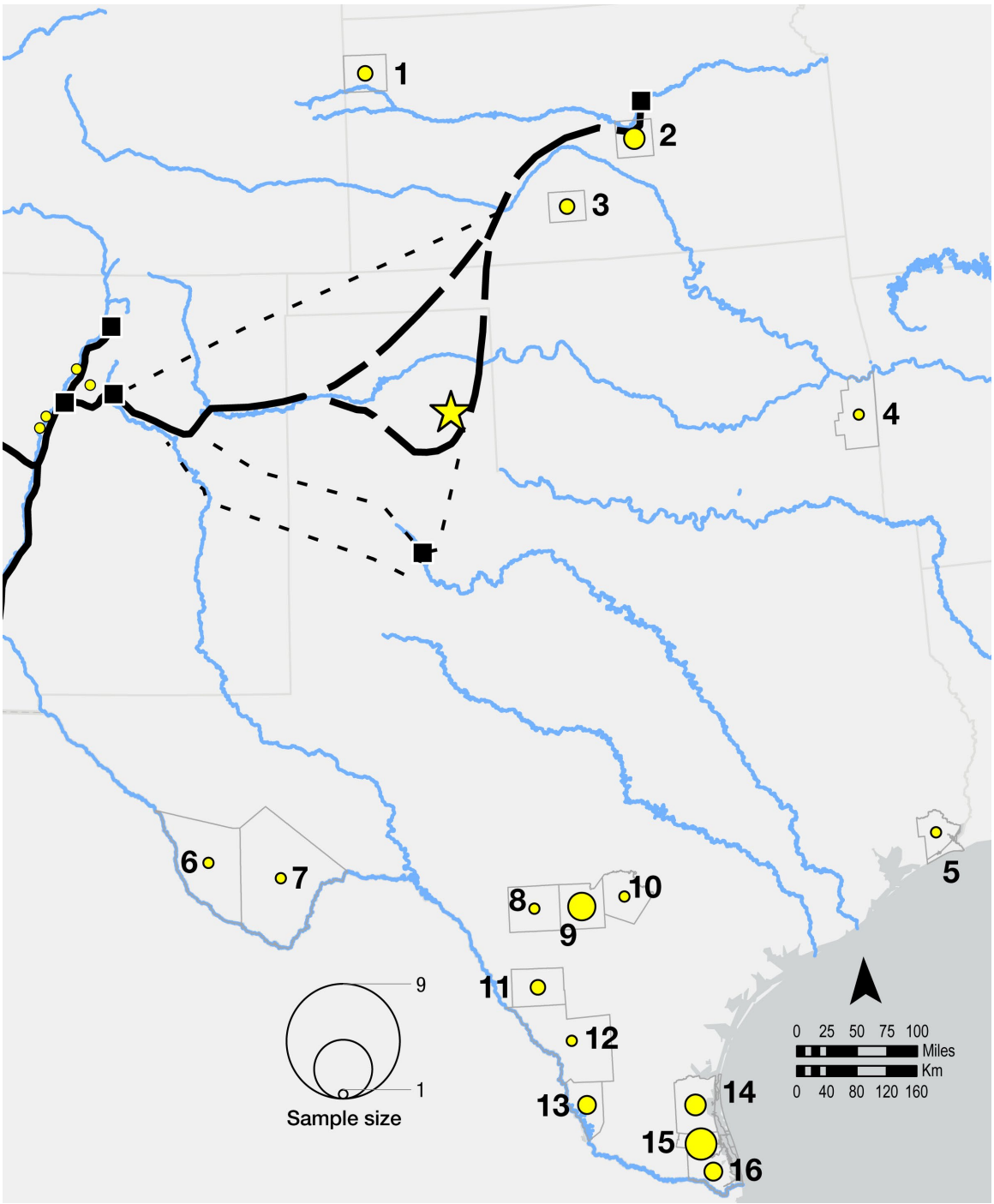

Figure 2. Map of Mesoamerican obsidian finds from the southern Great Plains showing their distribution in relation to the reconstructed route of the Coronado entrada. Star indicates the location of the Erwin blade in the Texas Panhandle. Thick dashed line represents the Coronado route suggested by the National Park Service; thin dashed lines represent the route suggested by Blakeslee and Blaine (2003). Find localities are 1: Sherman Co., KS; 2: McPherson Co., KS; 3: Pratt Co., KS; 4: LeFlore Co., OK; 5: Jefferson Co., TX; 6: Presidio Co., TX; 7: Brewster Co., TX; 8: Uvalde Co., TX; 9: Medina Co., TX; 10: Bexar Co., TX; 11: Dimmit Co., TX; 12: Webb Co., TX; 13: Zapata Co., TX; 14: Kenedy Co., TX; 15: Willacy Co., TX; 16: Cameron Co., TX. New Mexico sites discussed by Dolan and Shackley (2021) and Shackley (2023) are unlabeled.

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