The Search for Late Pleistocene pre-Clovis Archeology in Texas: Problems and Potentials

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ABSTRACT

Geoarcheological research in the North Sulphur River valley demonstrates the presence of an alluvial sequence that spans 17,000 years and provides the first radiocarbon dates for the Lower Sulphur River Formation. Stone artifacts and a single bone were discovered on the eroded surface of the Lower Sulphur River Formation and might represent a pre-Clovis occupation. Before such a claim can be made, in situ artifacts must be documented in these Late Pleistocene sediments. If pre-Clovis occupations exist anywhere in Texas, systematic geoarcheological investigations must target and identify Late Pleistocene deposits older than 11,050 B.P., then careful archeological searches must focus on these sediments.

INTRODUCTION

Clovis Paleoindian artifacts are the oldest well-dated evidence for human occupation within the Pleistocene period in Texas (Bousman et al 2004; Waters and Stafford 2007). Occasionally a claim for Late Pleistocene pre-Clovis occupation is made for a Texas site (e.g., Collins 1976); however, even as some of the original authors have come to realize, none of these claims have been substantiated with credible evidence (Collins 1994). The reasons for this situation are convoluted, complex, and somewhat unique to each site, but it is widely recognized that much of the problem lies with an absence of geological deposits that date to this highly important time span. Various geoarcheological and Quaternary geology studies have demonstrated that alluvial, colluvial, and eolian deposits dating between 18-12,000 years ago (18-12 kya) are rarely preserved in Texas (Abbott 2001; Blum and Valastro 1994; Ferring 1993; Holliday 1997). The reasons for this absence are not fully known, but Bousman (1998) argued that a cold glacial melt water spike surging down the Mississippi River into the diminutive Gulf of Mexico between 13-12 kya caused a marked drought and stimulated widespread erosion that removed these Late Pleistocene deposits across a wide region of the American South. Whatever the reason(s), the absence of Late Pleistocene sediments is common. Any evidence of ancient Native Americans that might have been contained within these sediments would also be missing. This article presents new evidence for Late Pleistocene sediments in the North Sulphur River valley and a possible, but not necessarily probable, claim for a pre-Clovis occupation in Northeast Texas.

In the spring and summer of 2005, AR Consultants surveyed a tract on the North Sulphur River that was the proposed future site for Lake Ralph Hall in Fannin County (Skinner et al. 2006). As part of this project, a preliminary geoarcheological reconnaissance of the basin was undertaken. This was an area that had not been investigated in a number of years, but previous work in the 1960s and 1970s by geologists from Southern Methodist University discovered and documented what is still the oldest in situ archeological site in Northeast Texas. For years the Sulphur River basin has been known to collectors for its abundant Cretaceous and Pleistocene fossils, and prehistoric artifacts (McKinzie et al. 2001). Plus geoarcheological studies in the South and Middle Sulphur River valleys had shown that great potential existed for buried sites and long depositional sequences (Bousman 1990; Bousman et al. 1988; Darwin et al. 1990; Fields et al. 1993a; Gadus et al. 1991). However, Pleistocene-aged archeological materials

have only been found in situ in the North Sulphur River valley (Slaughter and Hoover 1965).

QUATERNARY GEOLOGY AND PALEOINDIAN ARCHEOLOGY IN THE NORTH SULPHUR RIVER VALLEY

Frye and Leonard (1963) conducted the first study of sediments in the Sulphur River drainage. They identified the "Sulphur River Alluvial Terrace" with three depositional units that they believed dated to the Kansan and early Wisconsin glacial periods. They based their temporal assignments on the recovery of molluscan fauna. Shortly after, Slaughter and Hoover (1963) revised the Frye and Leonard study with a more detailed scheme. At many locations in the North, Middle, and South Sulphur river basins, they identified two stratigraphic units in the alluvium. Using vertebrate fauna, Slaughter and Hoover (1963) defined the oldest deposit as the Sulphur River Formation producing a characteristic Late Wisconsin fauna named the Ben Franklin Local Fauna. The Ben Franklin Local Fauna consisted of shrews, armadillos, ground squirrels, gophers, giant beavers, cotton rats, mice, wood rats, muskrats, voles, lemmings, coyotes, mammoths, mastodons, cottontail rabbits, peccaries, antelopes, deer, bison, and horses. Slaughter and Hoover (1963) also submitted materials for radiocarbon assays. From the base of the Sulphur River Formation, articulated *Amblema plicata* mussel shell produced a radiocarbon age estimate of 11,135 ± 450 B.P. (SM-533) and charcoal from a hearth was assayed at 9550 ± 375 B.P. (SM-532). This hearth was adjacent to a pond deposit 4 ft. above bedrock. Near the hearth, Slaughter and Hoover (1965) reported the discovery of a bipointed deer antler pick with a drilled hole through the middle and a few quartzite flakes. Based on an absence of extinct Pleistocene taxa, the younger deposit was suggested to date to the Holocene. Supplemental studies of mollusks, amphibians, reptiles, charophytes (freshwater green algae), and fish remains from these deposits by Cheatham and Allen (1963), Holman (1963), Schlichtling (1963), and Ueyeno (1963) supported the conclusions of Slaughter and Hoover (1963).

In 1974, Mary Rainey, under the supervision of Vance Haynes, finished a Master's Thesis on the Quaternary sediments in the North Sulphur drainage. Rainey (1974) provides descriptions for 12 profiles in the main North Sulphur River channel and Ghost Creek, a tributary on the north side of the river near Ben Franklin. Based on these descriptions, she clarified the stratigraphic relationship between the Sulphur River Formation and the overlying Holocene deposits, which she named the Ben Franklin Formation. This term causes serious confusion as Slaughter and Hoover (1963) called the fauna from the older Sulphur River Formation the Ben Franklin Local Fauna.

Rainey provided five new radiocarbon assays on charcoal, mussel shells, and clam shells from the Ben Franklin Formation. These were 660 ± 70 B.P. (SMU-70; hearth charcoal), 1123 ± 366 B.P. (SM-598; gravel charcoal), 1790 ± 50 B.P. (SMU-71; gravel charcoal), 1833 ± 144 B.P. (SM-599; clam shells), and 2840 ± 60 B.P. (SMU-62; mussel shells). The assays on mollusks are probably too old, and based on the remaining assays Rainey suggested that the Ben Franklin Formation is at least 1800 years old.

Rainey (1974) also provided a map of geomorphic terraces and presented a model of Pleistocene and Holocene depositional history for the North Sulphur drainage. She divided the Sulphur River Formation into Lower (Qsr1 and Qsr2) and Upper (Qsr3 and Qsr4) units. The top of the Upper Sulphur River Formation (Qsr4) was capped by a soil (S1). The Ben Franklin Formation was divided into multiple units (Qbf1, Qbf2, and Qbf3) and the upper surface was weathered into a soil (S2). Rainey depicted the unnamed surface sedimentary unit as Qal and it was weathered to form two soils (S3 and S4); S4 overlaid S3 within the Qal sedimentary unit.

In the 1980s, 1990s, and later, a number of archeologists and geoarcheologists visited and inspected Quaternary sediments in the North Sulphur River valley, but no substantive evidence for Paleoindian occupations dating to the Pleistocene had been found. This current study begins to redress this lack of research in one of the most promising areas in Texas for Pleistocene archeology.

CURRENT STUDY

In May and August 2005, 10 cutbank and backhoe trench profiles (Figure 1) were described on the North Sulphur River near the community of Ladonia, Texas, in eastern Fannin County. This area is upstream of the area where Slaughter and Rainey had worked, and the work was undertaken

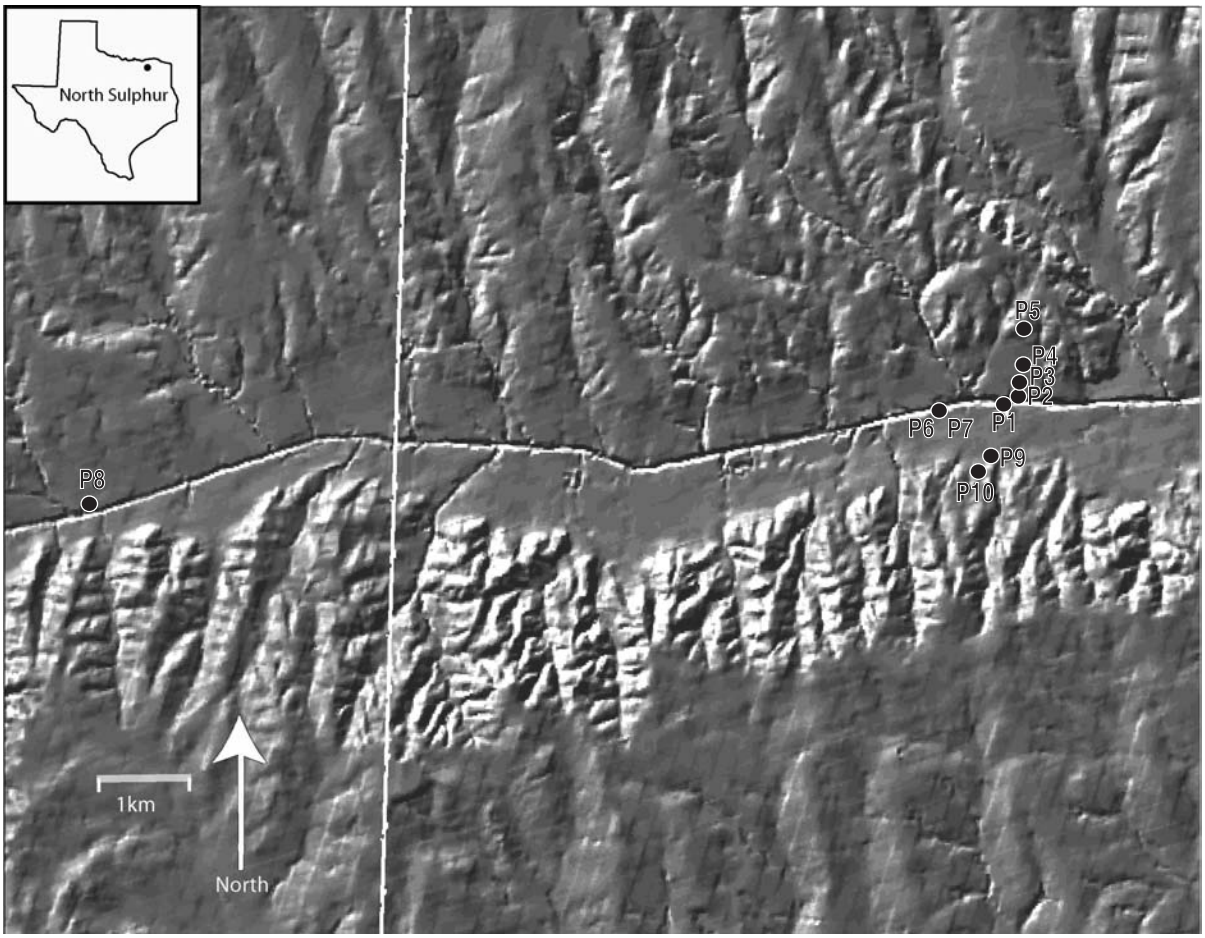

Figure 1. Three-dimensional map showing location of profiles in the North Sulphur River valley.

to evaluate the nature of Quaternary deposition, history of soil formation, and landscape evolution in the proposed Lake Ralph Hall. All the profiles except Profile 8 were placed near the dam axis on the downstream end of the reservoir, and these provide a cross-section of the valley (Figure 2). Artifacts were observed in or adjacent to three profiles (Profiles 1, 3, and 8).

During an initial field reconnaissance we identified eroded cutbank profiles and landscape features with the potential to provide geological information. In addition, we selected profiles for description that would provide a comprehensive valley topographic cross-section of alluvial deposits. We described selected cutbanks, but if selected landscape features did not have good natural exposures, then a backhoe was used to excavate small trenches on landscape surfaces in order to expose vertical profiles.

In the field, we described profiles by sediment zones. A zone is a distinctive and homogeneous sedimentary unit with a recognizable top and bottom boundary. Sediment color was estimated by comparison to a Munsell chart. For each zone texture, soil structure, mottling, calcium carbonate and manganese accumulations, natural or cultural inclusions of all sorts, evidence for disturbance, and zone boundaries were systematically described. We assigned soil horizon designations to sediment zones in the field or later in the lab. Soil horizon and depositional unit designations follow the Soil Survey Division Staff classifications (1993) and Reineck and Singh (1975). Additionally, we collected sediment and charcoal samples from selected trenches for radiocarbon dating.

GEOMORPHIC SETTING

The Sulphur River drains from west and northwest to east and southeast across the northeastern

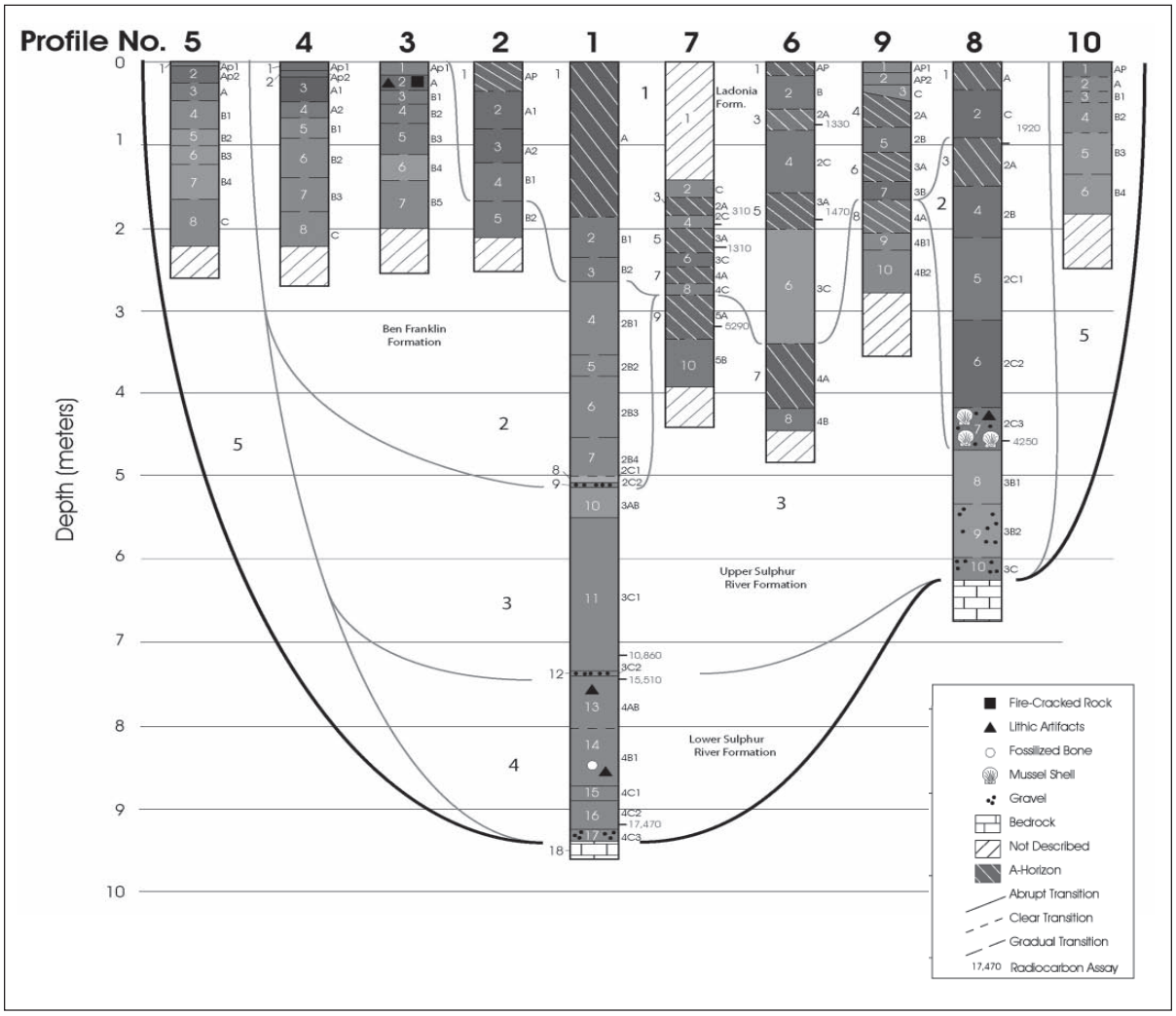

Figure 2. Cross-section of the North Sulphur River valley with geological units illustrated in Profiles 1-10.

portion of Texas south of the Red River. This is a gentle rolling hill-and-valley landscape that supports the northeastern tip of the Blackland Prairie and various woodlands. In 1929, the Texas Reclamation Department channelized the North Sulphur River in order to improve drainage for farming purposes. They straightened the original channel, which increased the speed of stream flow and stimulated rapid erosion of the river channel. The initial excavated channel was only 30 ft. wide and 12 ft. deep, but since 1929 dramatic erosion has expanded the channel to 30-40 ft. deep and 200 ft. wide (Figure 3). Today this is a remarkably straight and wide channel that is deeply eroded into bedrock, and exposes all the Quaternary deposits adjacent to the modern channel. The original stream meanders are visible on aerial photographs and topographic maps.

In Northeast Texas surface bedrock geology consists of southeast-dipping beds. This allows streams to erode laterally to form slip-off slopes and create asymmetrical valley profiles (Bousman et al. 1988: Figure 2). The surface expression of this erosional pattern results in long, gently sloping tributaries that drain into the North Sulphur from the northwest, and very short and steep tributaries that drain from the south (see Figure 1). The North Sulphur River floodplain is mapped as Quaternary alluvium (Qal) and this deposit is flanked by patches of Quaternary Terrace (Qt) deposits forming the valley walls (Shelby et al. 1966). The Ozan Formation is on both sides and underneath the Quaternary sediments. The Ozan Formation, consisting of easily eroded shales and marls, is an Upper Cretaceous deposit that dates to approximately 75-80 million years ago (McKinzie et al. 2001).

Figure 3. Photograph of North Sulphur River channel at Profile 1 looking upstream, May 2005.

These deposits have weathered to form a series of soils in the floodplain and valley walls (Goerdel 2002). On the surface of the floodplain and corresponding to the Qal deposits are dark clayey Tinn and Hopco soils. Wilson silt loam soils cap T1 and T2 terrace deposits on the north side and Benklin silt loam soils are found on T1 and T2 terraces on the south side of the channel. Normangee clay loam is found on older, more weathered, eroded terrace deposits, and can be used to identify the boundary between the T1 and T2 terraces. Upland soils on Cretaceous bedrock formations are mapped as Crockett loam and Ferris clay.

QUATERNARY SEDIMENTS AND SOIL STRATIGRAPHY

We identified five depositional units (numbered 1-5 from youngest to oldest) in the floodplain and terrace deposits on the North Sulphur River (Skinner et al. 2006). A schematic profile illustrates the stratigraphic relations between these units (see Figure 2). Correlations between profiles used the color and texture of sediment zones, the degree of soil development in the zones as indicated by structure, mottling, calcium carbonate accumulation and manganese formation, and the age of radiocarbon assays.

Unit 1

Unit 1 is mapped as the Qal deposit on the Bureau of Economic Geology Texarkana Sheet (Shelby et al. 1966) and it formed the pre-1929 T0 floodplain. Unit 1 sediments are found in Profiles 1-2, 6-8, and 9. These sediments are characterized by black to very dark grayish-brown clay loams, and a lack of evidence of advanced pedogenic development on the surface. Immediately west of Profile 1 these sediments grade into well-stratified channel fills that sit unconformably on eroded older sediments.

Two buried soils from this unit at Profile 6 (Zones 3 and 5) were dated. These produced radiocarbon assays of 1330 ± 80 B.P. (Beta-205704) in Zone 3 and 1470 ± 40 B.P. (Beta-206952) in Zone 5. The soils in Profile 6 are correlated to similar soils in Profile 9. In Profile 7, a single large piece of charcoal in the bottom of Zone 4 was dated to

310 ± 30 B.P. (Beta-205702) and a buried soil in Zone 5 was dated to 1310 ± 40 B.P. (Beta-206951). Based on the stratigraphic correlations, the assay in Zone 4 of Profile 7 is probably erroneous. It is possible that this is a root or somehow represents a too recent piece of charcoal, although no evidence of bioturbation was observed.

A comparison to previous radiocarbon dates from the Ben Franklin Formation (Rainey 1974) can be used to suggest that these current assays are contemporary in age. However, all but one of the previous samples used either mollusk shells or charcoal in gravels. These assays can be discounted because mollusk shells produce notoriously inaccurate radiocarbon assays and gravel deposits are not reliable stratigraphic contexts for radiocarbon dating. This leaves a single assay, 660 ± 70 B.P., providing an age estimate for the Ben Franklin Formation from Rainey's (1974) study, and this is younger than all but one of the assays from this current project in Depositional Unit 1.

Unit 2

Depositional Unit 2 sediments are present in Profiles 1-4, 8, and 9. These sediments reflect a series of surface soils, buried soils, overbank alluvium, pond or channel deposits, and gravel layers. The high amount of calcium carbonate in Zones 4 and 5 of Profile 1 indicates that this pedon is truncated by erosion. The bottom of this depositional unit is marked by gravel in Profile 1, Zone 9. The upper surface of Unit 2 forms the top of the T1 terrace. At Profile 3 this is only a few tens of centimeters higher than the T0 terrace surface.

Chronology is fixed by two radiocarbon assays in Profile 8. The youngest age estimate comes from a buried soil sample from Zone 3 in Profile 8. This sample produced an age estimate of 1920 ± 40 B.P. (Beta-206954). At the bottom of Unit 2, sediments in Profile 8 consist of a series of pond or channel deposits. The lowest zone contains a concentration of freshwater mussel shells and a few lithic artifacts which were recorded as site 41FN66. Organic-rich sediments from this zone were dated to 4250 ± 90 B.P. (Beta-205705). This is one of the oldest in situ sites recorded in Northeast Texas (Fields et al. 1993b; Bousman et al. 2004).

It is suggested here that the Unit 2 sediments correlate to the Ben Franklin Formation of Slaughter and Hoover (1963) and Rainey (1974). These are restricted to the T1 terrace deposits. We also suggest that our Unit 1 sediments, which comprise the T0 terrace deposits of the modern floodplain, be called the Ladonia Formation. These younger deposits date to the last 1500 years B.P. and are inset into the Unit 2 sediments.

Unit 3

These sediments are found in Profiles 1, 6-7, and 8. Buried soils cap this unit composed of overbank alluvium, and channel or pond sediments. The bottom of this unit in Profile 1, Zone 12, consists of gravel deposits. Two radiocarbon dates were obtained from this unit. A soil capping the top of Depositional Unit 3 in Zone 9 of Profile 7 was dated to 5290 ± 70 B.P. (Beta-205703), and the bottom of the deposition unit in Profile 1 was dated to 10,860 ± 140 B.P. (Beta-206953). These deposits can be correlated to the Upper Sulphur River Formation of Slaughter and Hoover (1963) and Rainey (1974). The lower radiocarbon dates reported by Slaughter and Hoover (1963) for the bottom of the Sulphur River Formation are similar to the older dates reported here. No surface exposures of this unit have been found in the valley.

Unit 4

Zones 13 through 17 in Profile 1 were the only recorded zones with sediments correlated to this unit (Figure 4). No surface exposures of this unit were discovered. These zones represent a truncated AB soil horizon with fine-grained loamy channel, pond, and gravel beds stratified below. All the deposits are well mottled and the degree of mottling helps distinguish Unit 4 from Unit 3. The top of this unit in the truncated soil was dated to 15,510 ± 120 B.P. (Beta-205701), and near the bottom this unit was dated to 17,470 ± 330 B.P. (Beta-205700). This unit can be correlated to the Lower Sulphur River Formation and these are the first radiocarbon dates for this formation.

Unit 5

Only Profile 5 and Profile 10 have sediments correlated to Unit 5. Both profiles were described from backhoe trenches excavated into the T2 terrace surfaces. Profile 5 is on the north side of the Sulphur River floodplain and Profile 10 is on the south side. Sediments in these profiles are highly weathered, very firm clays and are truncated by erosion.

Figure 4. Photo of Profile 1 showing Depositional Unit 3 and 4. Bottom of scale and trowel (910-925 cm bs) mark the location of Beta-205700, lowest radiocarbon sample, extracted from Zone 16. Gravels in Zone 17 are below the scale. Above the trowel at 733-753 cm bs is a visible rectangular radiocarbon sample location where Beta-205701 was extracted from the top of Depositional Unit 4 (Zone 11). Between 711-721 cm bs, Beta-206953 was collected from the bottom of Depositional Unit 3.

ASSOCIATED ARCHEOLOGICAL MATERIALS

Adjacent to Profile 1 and on the eroded sloping surface of Unit 4 sediments, a quartzite core/chopper was collected a few m east on the eroded profile face at 758 cm below the upper surface of the terrace deposit (bs) (Figure 5). West of the profile and on the eroded profile face of the sedimentary unit, we recovered a broken flake at 854 cm bs (Figure 6) and nearby we collected a fossilized bone with visible linear striations that we believed might be cut marks at 847 cm bs (Figure 7). The depths of artifacts were measured at the same time as the profile sedimentary/soil zone boundaries with a total station electronic transit. These materials were recorded as site 41FN73. We found no artifacts in situ, but we did not see any artifacts above Depositional Unit 4 on or adjacent to the profile.

These materials might, and we underline might, represent a Late Pleistocene pre-Clovis occupation, but recovery of in situ artifacts and features within an uncontestable geological context is necessary before an occupation of this age could be confirmed. This material does not present that type of evidence. The lithic artifacts are completely non-diagnostic in terms of technology and style, and could have been produced by any prehistoric knappers. In regards to the fossil bone, Dr. Eileen Johnson graciously inspected the fossil bone and on February 21, 2007 said: "I was able to look at the modifications using the SEM [scanning electron microscope]. The modifications are natural. The bone is very weathered and eroded. Several carnivore tooth pits occur on both sides. The distinct lines on both sides are trample marks. No cultural marks occur." Thus, no clear cultural modifications are visible on the surface of the bone. Even though this does not exclude humans as the agents of discard, it does not provide any form of viable evidence of human involvement either.

DISCUSSION AND CONCLUSIONS

Geoarcheological research has provided a better chronological scheme for Quaternary alluvial deposits in the upper reaches of the North Sulphur

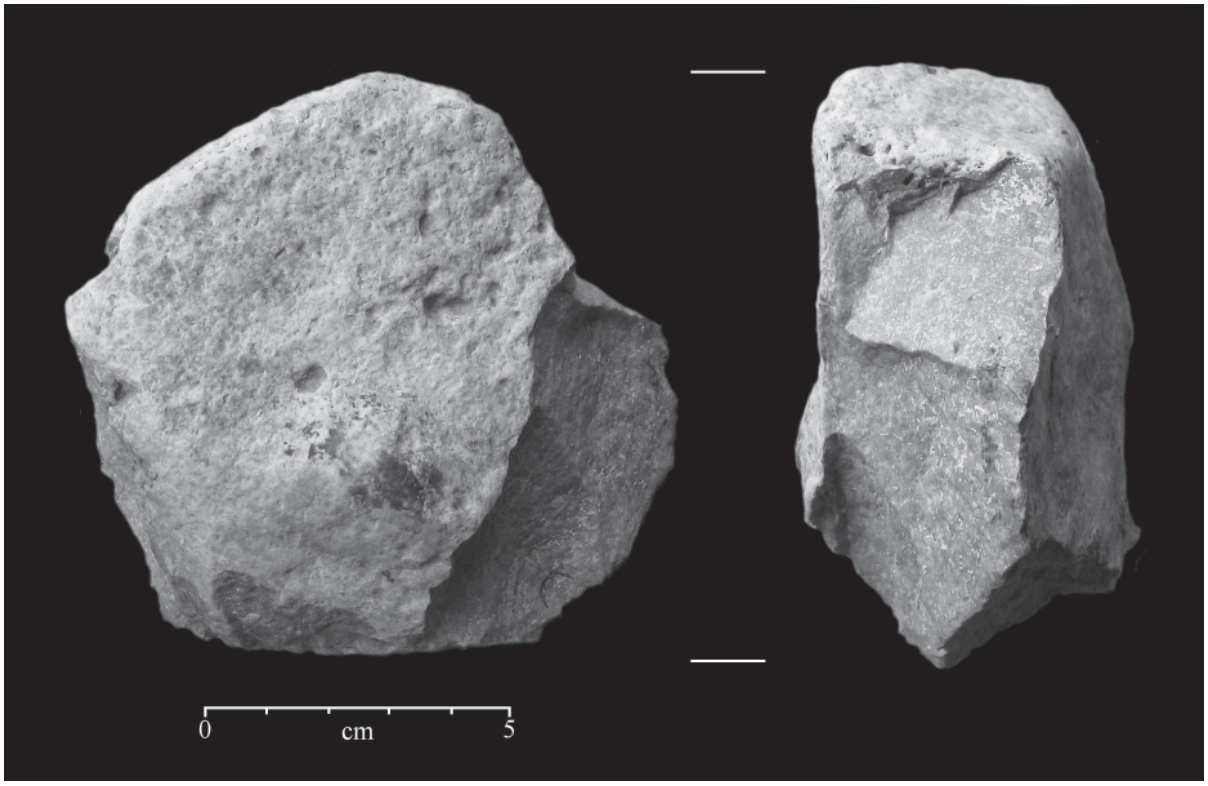

Figure 5. Quartzite core collected from the Profile 1 surface.

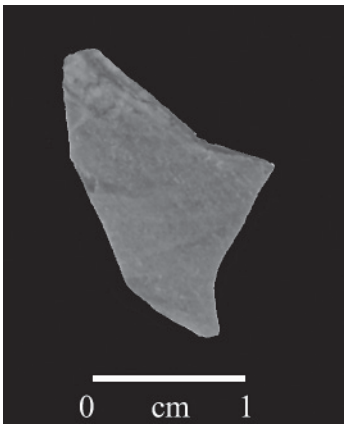

Figure 6. Small quartzite flake collected from the Profile 1 surface.

River valley. This work can be reasonably correlated to the Upper Sulphur River and Ben Franklin formations identified by earlier research down stream and can be shown to span much of the last 17,000 years. Five depositional units were defined (see Figure 2) and archeological materials were discovered in situ in mid Holocene-aged deposits and on the eroded surfaces of Late Pleistocene-aged deposits.

Depositional Unit 4 is documented only in Profile 1 and preliminary observations indicate that this unit is limited to the downstream portion of the proposed reservoir. This depositional unit is correlated to the Lower Sulphur River Formation as originally defined by Slaughter and Hoover (1963) and more fully characterized by Rainey (1974). We obtained radiocarbon dates ranging between about 17.5-15.5 kya. These are the first published radiocarbon dates for the Lower Sulphur River Formation and these assays demonstrate that these deposits date to the period immediately following the Last Glacial Maximum of the Wisconsin glacial period. Upper Sulphur River Formation sediments were dated to the time span between 10.8 kya and 5.3 kya and are mostly of Holocene age.

Lithic artifacts and a fossilized bone were found on the eroded surface of the Lower Sulphur River Formation deposits and might represent an early human occupation in the valley. Recent research at Clovis sites in Texas clearly illustrates the technological approaches of Clovis knappers (Collins 1999) and it is obvious that the very limited number of artifacts recovered on the surface of 41FN73

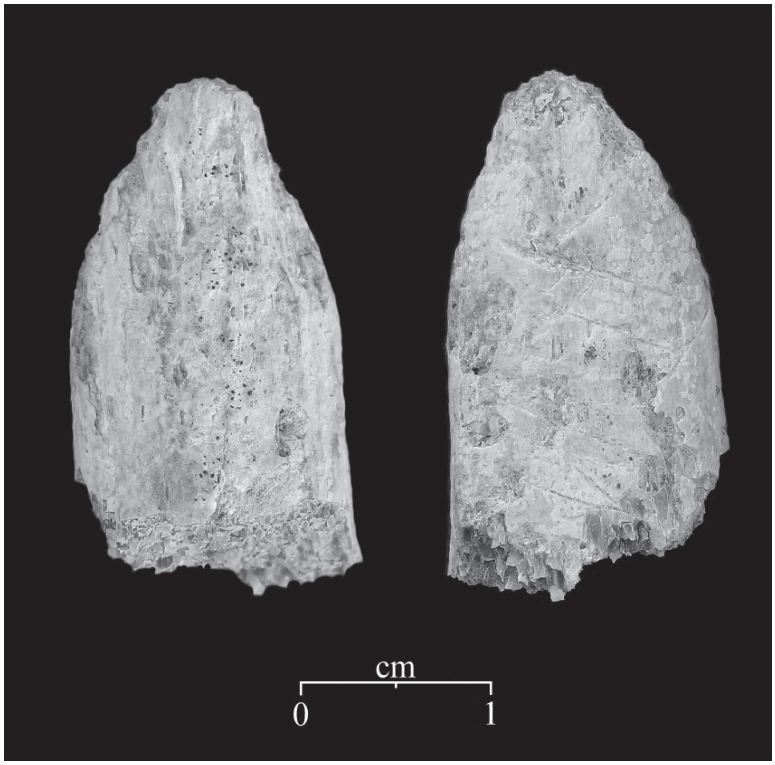

Figure 7. Fossilized bone collected from the Profile 1 surface.

are not particularly diagnostic of the Clovis method(s) of stone tool manufacture. No tools were found that would have further aided in the chronological placement of these artifacts. This lack of diagnostic evidence, in and of itself, does not indicate a pre-Clovis age for these materials, however. Artifacts recovered from uncontestable in situ and well-dated geological contexts are needed before a pre-Clovis occupation can be convincingly demonstrated. At present we do not have this evidence. More research is needed to further characterize and fully date the accumulation of sediments in the Sulphur River Valley, and search for in situ artifacts and features.

If pre-Clovis sites are present in Texas and surrounding areas then geoarcheological methods which target Late Pleistocene deposits older than 11,050 B.P. (Waters and Stafford 2007) should be integrated with archeological surveys in a systematic fashion. Careful inspection of these deposits has the potential to provide the evidence needed to confirm or reject the notion of preserved human habitations before the Clovis period in and peripheral to the Southern Plains.

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