# Odyssey Archaeological Research Fund

Report of Investigations, Summer and Fall, 2013

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## INTRODUCTION

This document summarizes investigations conducted in the summer and fall of 2013 with support from the Odyssey Archaeological Research Fund (OARF). The two OARF-supported field investigations completed during this period are as follows:

1. Test excavations at the Coffey Site (14PO1) in Pottawatomie County, northeastern Kansas.
2. Test excavations at the Scheuerman mammoth site (14SC327) in Scott County, western Kansas.

Three individuals – Dr. Jack Hofman (University of Kansas), Kale Bruner (University of Kansas) and Jack Ray (Center for Archaeological Research, Missouri State University) – played major roles in the 2013 Odyssey field investigations and provided much of the information compiled in this document. The following K.U. students provided assistance in the field: Ben Anthony, Nick Arnhold, Kale Bruner, Inga Fonder, Jessica Hagge, Julie Harbin, John Jurkovich, Helen Sangster, Blair Benson Schneider, and Jeff Shelton. Also, the following temporary Research Aids were involved in the field investigations: Adam Benfer, Chris Hord, and Karen Cunningham. Volunteers included Melonie Sullivan, Tim Meade, Sandra Moran, and Norman Dye. We are grateful to Mike and Deb Scheuerman for allowing us to conduct excavations on their property and for providing assistance. A special thanks goes to Paul Weidhaas (U.S. Army Corps of Engineers) for providing assistance at the Coffey site.

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# Investigations at the Coffey Site (14PO1), Northeastern Kansas

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## Introduction

The Coffey site (14PO1) is located in Pottawatomie County in the northern Flint Hills of northeast Kansas (Figure 1). The site is located on the convex (eroding) side of a large meander of the Big Blue River and is subject to rapid erosion during seasonal flooding and periodic fluctuations of the pool level of upper Tuttle Creek Lake (Figure 2). A diversity of aquatic and terrestrial plant and animal species, an abundance of high-quality chert resources, and the presence of a perennial source of spring water in nearby Spring Creek provided an attractive locale for human habitation at Coffey.

The Coffey site has long been the focus of investigations into little-known Archaic occupations occasionally found in the eastern Plains (O'Brien et al. 1973; Schmits 1978, 1980); however, recent investigations at the site (Mandel et al. 2010) revealed the presence of the Severance Formation, a late Pleistocene-age sediment assemblage. Mandel and Bettis (2001, 2003a) established the Severance Formation, a lithostratigraphic unit consisting of colluvium and alluvium underlying *in situ* or reworked Peoria Loess on slopes and alluvial terraces in the Central Lowlands. The type locality for the Severance Formation is in the Wolf River valley immediately west of the community of Severance in Doniphan County, northeastern Kansas (Mandel and Bettis 2003b). The upper 3-4 m of the Severance Formation are oxidized and often have two or more paleosols forming a pedocomplex developed in them. Radiocarbon ages determined on organic carbon from the paleosols range from ca. 25,000 to 15,000 yr B.P., with most clustering between 24,000 to 18,000 yr B.P., and a $^{14}C$ age of 37,100±520 yr B.P. was determined on plant macrofossils at the base of the Severance Formation (Mandel and Bettis 2001). The paleosols in the Severance have thick, well-expressed Bt horizons with brown, strong brown, yellowish brown, and/or reddish brown matrix colors; prismatic to subangular-blocky structure; iron and manganese oxide stains and concretions; discontinuous clay films and silt patches; and common macropores. The oxidized alluvium exposed in the northern half of the cutbank at the Coffey site fits all of the criteria for Severance Formation (Figure 3).

At Coffey, a light scatter of artifacts is located throughout the upper 1 m of the Severance Formation, but at least two concentrations are apparent. The first concentration of artifacts is located in the A horizon of the soil developed at the top of the Severance Formation. This concentration appears to contain a palimpsest of Paleoindian and Archaic cultural deposits. A second concentration of artifacts is located approximately 60-70 cm below the top (or surface) of the Severance Formation at multiple locations and suggests that a deeper occupation surface and discrete archaeological component also exists in the Severance (Ray and Mandel 2012). This concentration at 60-70 cm was noted in Backhoe Trench 1 excavated in 2009, in five test units excavated by Odyssey in Locality 11-2 in 2011, and in the near-vertical cutbank inspected in 2011, 2012 and 2013. Some flakes in the cutbank were found as deep as 100 cm below the top of the Severance.

The 2012 and 2013 Odyssey excavations were established on the prehistoric deposits located next to the eroding cutbank on the west side of the Coffey site. The focus of these excavations was to investigate the cultural deposits situated in the upper 100 cm of the Severance Formation with a primary goal of evaluating the apparent concentration of artifacts or component buried 60-70 cm below its surface.

In the vicinity of the cutbank, the Severance Formation is overlain by an approximately 70 cm-thick package of sediment. The upper 55 cm consists of historic-age alluvium (or post-settlement alluvium) comprising the Camp Creek Member of the DeForest Formation, most of which aggraded since the construction of Tuttle Creek Lake in the early 1970s. Underlying the Camp Creek Member and lying on top of the Severance Formation is an eolian deposit of light brown sand approximately 10-15 cm thick. Although the age of this eolian sand is uncertain, it may have been deposited during the warm, dry Altithermal climatic episode that spanned the early and middle Holocene.

**Methodology**

All excavations were in the vicinity of the North Block, which is adjacent to the present cutbank of the Big Blue River (Figures 4 and 5). In preparation for the 2013 excavations, backfill placed over the 2012 excavation area (and the top the Severance Formation) was removed with a backhoe. Afterwards, 65 cm of post-settlement alluvium (PSA) was stripped from an area to the north. This stripped area measured approximately 5-x-5-m. Excavations were conducted in 20 1-

x-1-m units (Figure 6). Sixteen of these units were contiguous and formed an extension of the North Block begun in 2012 (i.e., Test Units 12–15). Two units were located 1–3 m southwest of Test Units 12–15, whereas the final two units (outlier units) were placed 5 m and 7 m to the northeast and east of the North Block.

Test units were aligned to magnetic north, and the southwest corner of each unit was assigned northing and easting coordinates (Table 1). All but six of the 20 test units were complete (1-x-1-m) units. Test Units 27–29 and 34–36, located along the cutbank edge, were partial units that had been truncated by erosion. Nails placed in the corners of the test units were sunk to the natural contour on the top of the Severance as revealed along the cutbank exposure along the west side (Figure 5). This paleosurface dips gently to the west and north. Each unit was excavated in 5-cm levels and each level was subdivided into four 50-x-50-cm quadrants. Hand troweling and/or careful shovel skimming were used to excavate the levels in each unit. All fill excavated from each level was water screened through one-quarter-inch hardware cloth.

All tools, preforms, bone fragments, and charcoal fragments were piece plotted in three dimensions with a Topcon GTS 313 Total Station. Each piece-plotted artifact was given a piece-plot number and shot number. Pictures were also taken at the completion of each level. The only departure from the above methods was implemented for five partial units. The sediments in Test Units 27–29 and 35–36 were shovel skimmed (not screened). All encountered artifacts were recovered from Test Units 28, 29, and 35, whereas only tools and preforms were collected from Test Units 27 and 36. Ending depths for each test unit at the end of the project are presented in Table 1. Soil samples were removed in 10-cm increments from the cutbank just north of Test Unit 28, from the north wall of Test Unit 17, and from the east wall of Test Unit 25. At the end of the project, clear plastic was placed over the stripped surface and covered with 10–15 cm of overburden so that the top of the Severance Formation could be easily relocated for the 2014 excavation season.

**Stratigraphy**

The stratigraphy in the vicinity of the North Block consists of the Severance Formation overlain by 50-65 cm of Historic-age Camp Creek Member sediments. The Severance Formation overlies a ~ 1 m-thick unit of gravel, which in turn rest on limestone bedrock. The surface of the Severance Formation was stable for a long period, which permitted the development of a

palimpsest of Archaic, Woodland, and Late Prehistoric artifacts. Mandel et al. (2010:Appendix C) described the upper 1.5 m of the Severance Formation.

Artifacts collected from the upper 1 m of the Severance Formation during the 2012 excavations were divided into two broad horizons. The upper horizon included artifacts found in the upper 50 cm of the Severance Formation, whereas the lower horizon included artifacts found in sediments 50–100 cm below surface (bs). This division was based on an apparent significant decrease in the quantity of artifacts below 50 cm. No discrete cultural components were identified.

The results of the 2013 excavations isolated multiple artifact concentrations (and at least one discrete cultural component) within the upper 80 cm of the Severance Formation that appear to represent prehistoric cultural occupations. Accordingly, the upper portion of the Severance Formation was divided into seven cultural horizons (Table 2).

Cultural Horizon 1 spans the upper 10 cm of the soil developed in the Severance Formation and is within the upper two thirds of the Ab soil horizon. It contains half of the cultural material that was recorded in the Severance Formation. Based on diagnostic artifacts recovered during the 2012 and 2013 seasons and multiple diagnostic points in the Paul Reust collection (Mandel et al. 2010:Appendix A), the cultural material in Cultural Horizon 1 represents a palimpsest of Archaic, Woodland, and younger occupations. Cultural Horizon 2 (10–25 cm bs) spans the lower third of the Ab soil horizon and the entire BAb soil horizon.

Cultural Horizon 3 (25–35 cm bs) spans the upper half of the Bt1b soil horizon, whereas Cultural Horizon 4 (35–50 cm bs) spans the lower half of the Bt1b horizon. In the vicinity of the cutbank, Cultural Horizon 4 contains a concentration of artifacts that is associated with a Middle Paleoindian occupation (see below). Cultural Horizon 5 (50–60 cm bs) spans the upper half of the Bt2b soil horizon, and Cultural Horizon 6 (60–70 cm bs) spans the lower half of the Bt2b soil horizon. Cultural Horizon 7 (70–80 cm bs) spans the upper half of the Bt3b soil horizon.

**Excavation Results**

During the 2013 excavations at the Coffey site, 3,392 chipped-stone artifacts were recovered. For analytical purposes, these artifacts are divided into two general categories: (1) tools and performs, and (2) debitage.

*Tools and Preforms*

During the 2013 investigations at Coffey, 32 tools and preforms were recovered. One proximal fragment of a middle-stage preform and one distal fragment of a middle-stage preform were recovered from the eolian sand deposit on top of the Severance Formation. The other 30 tools and preforms were recovered from sediments of the Severance Formation (Table 3). Twelve specimens were found in the palimpsest located in the upper 10 cm of the Severance Formation. One (Piece Plot 12237) is a small proximal fragment of a projectile point/knife with a short square stem (Figure 7i). Although unidentified, it appears to be a Late Archaic or Woodland point. Other specimens recovered from the palimpsest include seven preforms (early-to-late stages), one side scraper, and three utilized flakes.

Ten tools and preforms were discovered between 11 cm and 35 cm bs or from Horizons 2 and 3. One is a small unidentifiable stem fragment of a projectile point/knife found in Level 2B (15–20 cm bs). Scrapers include a side scraper found at 19 cm bs and a spurred end scraper found at 29 cm bs. The latter (Piece Plot 12218) is a small exhausted end scraper with a small spur located at one end of the beveled edge (Figure 7g). Preforms include three early-stage preforms and four fragments of middle-stage preforms.

Seven tools and preforms were discovered in Horizon 4 between 36 cm and 50 cm bs. One (Piece Plot 12236) is a stem fragment of a lanceolate projectile point/knife (Figure 7a) found in the northwest quadrant of Test Unit 29 at a depth of 43 cm. This point snapped in the haft 16.2 mm from the base. The lateral edges of the stem contracts slightly toward the base which is slightly concave (approximately 2 mm deep). The base is 19.9 mm wide. The stem fragment is 5.1 mm thick at the break and 3.9 mm thick between thinning scars. The lateral edges of the stem are moderately ground, whereas the base is lightly ground. Systematic short (mean=5 mm) parallel flake scars are evident on the lateral edges of the stem. One face of the stem exhibits a minimum of six basal thinning scars. The longest thinning scar (11.8 mm) terminates just short of the transverse break. The opposite face exhibits two long thinning scars that extend beyond the transverse break (13.8 mm) and have maximum widths of 6.3 mm. This unfluted lanceolate fragment appears to be from a Middle Paleoindian Plainview/Goshen point.

Four preforms were recovered from Horizon 4. One specimen (Piece Plot 12232) was found at a depth of 45 cm in the northwest quadrant of Test Unit 28 and is a midsection fragment of a late-stage failed preform or possibly finished projectile point (Figure 7e). No thinning scars or flute scars are evident on this edge fragment, which has a maximum thickness of 7.8 mm. The distal end of a failed late-stage preform (Piece Plot 12239) was recovered at a depth of 36 cm in the northeast quadrant of Test Unit 34. This thin preform fragment (Figure 7b) has a maximum thickness of 5.1 mm. Relict ground platforms are present on both edges of the preform. Short lateral flake scars (5–10 mm), many of which terminate in step fractures, are evident along both edges of the blade. This flaking attribute and the thin cross section indicate that this is probably a failed Folsom preform (Jack Hofman, personal communication 2013). Folsom was present in the vicinity of the Coffey site based on the Paul Reust collection, which contains a Folsom point (Mandel et al. 2010:Figure A-1) that was found on the surface of the T-2 terrace approximately 500 m to the northeast. The final two preforms are edge fragments of middle-stage preforms (Figure 7c-d). Both were found at a depth of 41 cm in Test Units 20 and 34 (Piece Plots 12228 and 12240, respectively). These edge fragments represent the distal, reverse-hinge remnants of side overshot (outré passé) flaking, a thinning technique commonly practiced by Paleoindian knappers.

Two scraping tools were found in Horizon 4. One (Piece Plot 12231) is a spurred end scraper found at a depth of 36 cm in the southeast quadrant of Test Unit 28. This triangular scraper is 32.1 mm long and 27.8 mm wide across the beveled distal end. At least one spur is located on the left side of the beveled edge (Figure 4f). The other scraping tool is a utilized flake (Piece Plot 12230) found in the southwest quadrant of Test Unit 27 at a depth of 50 cm. It represents an expedient flake tool that was not intentionally modified to a certain shape to perform a specific task before it was used. This specimen exhibits extensive use wear (uniform microflake scars) along the left side of the dorsal face (Figure 7h).

Only one specimen, identified as an early-stage preform, was recovered from Horizon 6. It was found in Level 7B (65–70 cm) in the southeast quadrant of Test Unit 18. This specimen is little more than a tested alluvial cobble that exhibits only a few large flake scars removed from each face. This flattened lenticular cobble is 92 mm long, 47.2 mm wide, and 25.5 mm thick. It appears to be too large to have been displaced downward through a desiccation crack. One flake

fragment and one angular rock fragment (possible fire-cracked rock) were found in the same level and quadrant as the early-stage preform.

*Debitage*

The vast majority (98.8%) of the artifacts recovered from the North Block represent debitage from the manufacture of chipped-stone tools. Only a single piece of core debitage (a tested cobble) was recovered from Level 2A of Test Unit 33. The rest consists of flake debitage that is divided into six flake types (see Appendix 1).

Four flake types have relict platforms (i.e., platform-remnant-bearing flakes) that are generally indicative of staged core- or biface-reduction. Primary flakes and secondary flakes are decortication flakes removed during early-stage core or biface reduction. Tertiary flakes that also exhibit high-angle, non-faceted platforms were removed during early-to-middle stage reduction but lack any cortical surfaces. Biface flakes with faceted low-angle platforms, on the other hand, were removed during the reduction of early-to-late-stage bifaces or preforms. In general, the size of biface flakes decreases from early-stage bifaces to late-stage bifaces. Flake fragments are broken flakes that lack platforms and are generally nondiagnostic as to reduction stage. Small flakes (<1 $cm^2$) are typically too small to macroscopically identify a platform that can indicate reduction stage.

Flake types placed in three categories are presented in Table 4. Levels 1A-4A include artifacts from the palimpsest to the Middle Paleoindian horizon. Levels 4B-5B represent the Middle Paleoindian horizon, whereas Levels 6A-7B represent an unidentified lower component. Flake fragments dominate in each cateogory, followed by biface flakes, small flakes, and relatively few decortication flakes. Excluding nondiagnostic flake fragments and small flakes, three-quarters or more of the platform-remnant-bearing flakes from each grouping are biface flakes. The relatively small numbers of primary, secondary, and tertiary flakes and the near lack of core debitage indicates that the majority of decortication and early-stage reduction of chert cobbles and nodules occurred elsewhere, presumably at local chert sources. Most of the lithic reduction in the vicinity of the North Block appears to be related to the reduction of middle-to-late-stage bifacial preforms and the rejuvenation or resharpening of finished bifaces.

The vertical distribution of flake debitage in the upper 80 cm of the Severance Formation in the North Block is provided in Table 5. This data set is for 11 contiguous test units located next to the cutbank that were water screened and excavated to a depth of at least 70 cm. It excludes data for five partial test units along the cutbank that were not screened, two tests units dug <70 cm deep, and the two outlier units. Half of the debitage was recovered from Level 1 (upper 10 cm) of the Severance Formation. The concentration of artifacts in the upper 10 cm of the Severance formed because there was a stable (nonaggrading) surface upon which an artifact palimpsest from multiple Archaic, Woodland, and younger occupations developed. Most of the levels below this palimpsest exhibit a steady decrease in artifacts with depth.

There is at least one exception to the overall steady decline in artifacts with depth. It occurs in Level 4B (35–40 cm bs), which shows a slight increase in flake debitage. A concentration of artifacts in Level 4B and in one to two levels below (5A/5B) was most apparent in the six partial test units located along the edge of the cutbank (i.e., Test Units 27–29 and 34–36). The vertical distribution of debitage in Test Unit 34 (the only screened unit on the cutbank edge) is presented in Table 6. It shows a significant increase in flakes beginning in Level 4B, peaking in Level 5A, and decreasing in Level 5B. The concentration of artifacts at these levels, however, does not extend very far to the east of the present cutbank. Only two other test units yielded artifact concentrations at the above levels, but to lesser degrees. Test Unit 20 had relatively high numbers of flakes in Levels 4B and 5A (35–45 cm bs) and Test Unit 31 exhibited an increase in flakes in Level 4B (35–40 cm bs). Most of these flakes were located in the west half of each unit. The significant increase in flake debitage between 35 cm bs and 50 cm bs in the five truncated cutbank units and in the west halves of Test Units 20 and 31 is interpreted to represent the eastern edge of a localized knapping station or lithic workshop that does not extend very far into the adjacent units to the east. This concentration of flake debitage is associated with several tools and preforms found at the same depths (see Tools and Preforms above).

A second slight increase in artifact density may occur in Level 7B (65–70 cm bs) (Table 5), although the sample size for Level 7 during the 2013 excavations is too small for significant statistical comparisons**.** Seven flakes were also recovered from the northeast and northwest quadrants of Levels 8A (70–75 cm bs) and 8B (75–80 cm bs) in Test Unit 20. However, six of the flakes from Level 8B were <1 $cm^2$ in size and the flake from Level 8A was <2 $cm^2$, which

suggests that all of these small flakes could have been displaced into these lower levels through dessication cracks.

The horizontal distribution and density of flake debitage in the North Block is depicted in Figure 8. These data reveal that the density of artifacts (per cubic meter) is greatest in those units located along the cutbank, whereas it decreases significantly only 3–4 m east of the cutbank (in the vicinity of Test Units 21 and 22). Artifact density also decreases to the south in the vicinity of Block A that was excavated in 2012 (Ray and Mandel 2012:12). A more dramatic decrease in artifact density occurs between the east edge of the North Block and the outlier test units (25 and 26) located only 5–7 m to the east. Very few artifacts were found in these two test units (9 and 19 flakes per cubic meter, respectively).

*Features*

Three small isolated artifact concentrations were recorded in the North Block. A cluster of 10 flakes in the extreme southeast corner of Test Unit 30 was designated Feature 1. The flakes were recovered from an area of approximately 15-x-15 cm at a depth of 10–11 cm. Another flake found 12 cm to the west was included in Feature 1. Discrete knapping features typically contain multiple flakes from the same cobble or biface, some of which refit. None of the flakes in Feature 1 appear to have been knapped from a common cobble or preform. As a result, the artifact cluster identified as Feature 1 probably is not a true knapping feature.

Five flakes found in the southwest portion of the southeast quadrant of Test Unit 30 were recorded as Feature 2. The flakes were recovered from an area of approximately 10-x-10 cm at a depth of 13 cm. None of the flakes refit or appear to be from the same cobble or preform. This small cluster of flakes does not appear to be a true knapping feature. A small cluster of five flakes in Level 2 of Test Unit 31 was temporarily designated Feature 3, but it was later deleted.

A cluster of 33 flakes found in the northwest quadrant of Test Unit 30 was recorded as Feature 4. The flakes were recovered from an area of approximately 30-x-50 cm and a depth of 18–23 cm. Most of the flakes were lying flat and many were piled on top of one another. Two-to-three flakes from at least seven different cobbles and/or preforms appear to be represented in the feature debitage. This artifact cluster does appear to be a true knapping feature. Based on size, the debitage appears to represent middle- to late-stage reduction.

*Cutbank Artifacts*

Excavations at the Coffey site in 2009 and 2011 indicated the presence of a concentration of artifacts at depths of approximately 60–70 cm below the surface of the Severance Formation. These include concentrations in Backhoe Trench 1 excavated in 2009, in five test units excavated in Locality 11–2 in 2011, and in the near-vertical cutbank inspected in 2011 (Mandel 2011; Mandel et al. 2010). However, excavations in the vicinity of the North and South blocks in 2012 failed to identify a concentration of artifacts at 60–70 cm bs (Ray and Mandel 2012:25).

During the 2013 investigations, portions of the cutbank (west and north of the North Block) were rescraped with a profile shovel and 27 *in situ* artifacts were flagged and piece plotted with the total station. The depths of these buried *in situ* artifacts were compared with the top of the Severance Formation that was clearly demarcated in the cutbank profile and documented at the beginning of the 2013 investigations. The 27 *in situ* artifacts ranged in depths from 24 cm to 84 cm bs. More than half of these (52%) were found between 56 cm and 84 cm bs. At least one of these flakes, measuring between 3 $cm^2$ and 4 $cm^2$ in size, is unlikely to have been displaced downward through a desiccation crack, most of which are 1–3 cm wide (Ray and Mandel 2012:11–12). Also, a relatively large biface fragment found *in situ* in the cutbank at a depth of approximately 70 cm in 2011 (Mandel 2011) and the 9.2 cm long biface found at a depth of 65–70 cm in Test Unit 18 in 2013 are unlikely to have been displaced downward through desiccation cracks. Based on current evidence, it appears that a lower component (older than Middle Paleoindian) is represented in a highly localized area in Horizon 6. Unfortunately, most of the artifact scatter that represents this buried component appears to have been removed by lateral (eastward) cutbank migration. Remnants of the eastern edge of this component appear to be located along the present cutbank in an area perhaps only 1-m in width.

*Chert Procurement and Use*

All of the preforms and tools and all but one piece of debitage were knapped from Permian chert (i.e., Florence and Wreford cherts). This near exclusive use of local Permian cherts is similar to that found previously in the North and South blocks (Ray and Mandel 2012:22). The lone non-chert artifact is a small (<1 $cm^2$) biface flake knapped from white quartz. It was found in the palimpsest near the surface of the Severance Formation. Several flakes of chert and white quartz

were found at the Forked Tongue site (14MH184) during a reconnaissance of the summit of the ridge due east of the Coffey site. The summit of this ridge is comprised of the Wreford Formation, which contains abundant chert in the Three Mile and Schroyer members and quartz nodules in the Havensville shale member (Scott et al. 1959:126; West et al. 2010:25–26). Most of the quartz artifacts at 14MH184 represent testing and initial reduction of residual quartz cobbles.

An examination of 74 cortical flakes from 14PO1 revealed that slightly more than half (54.3%) were knapped from alluvial cobbles collected from the Big Blue River, whereas the rest were knapped from residual cobbles obtained from nearby ridgeslopes. The results of the cortical analysis from the 2013 assemblage are nearly identical to that from the 2012 assemblage (Ray and Mandel 2012:22), which underscores the observation that prehistoric knappers at Coffey procured Permian (Florence/Wreford) chert approximately equally from stream deposits and from residual deposits.

Only 10% of the chert artifacts from the North Block appear to have been intentionally heat-treated. The majority (55.6%) of these were recovered from Level 1, which contains the palimpsest of mixed Archaic, Woodland, and younger artifacts. When Levels 1 and 2 are combined, they comprise 80% of the heat-treated debitage. None of the tools and only two preforms had been intentionally heat-treated. Both heat-treated preforms were found in the upper 5 cm of the palimpsest. A relative lack of heat-treated flakes and tools indicates that the majority of the chipped-stone artifacts found in the vicinity of the North Block were made by knappers who did not heat treat chert to increase knapping quality. This would include Paleoindian and Early Archaic knappers (who lived prior to the advent of heat treatment in the midcontinent) and selected knappers from later times who opted not to heat-treat chert on a regular basis (e.g., Late Archaic Nebo Hill knappers).

*Other Lithics*

A small quantity of nonchipped-stone lithic artifacts was recovered from the test units. These include one unmodified piece of hematite, one crushed pebble, and 38 pieces of fire-crack rock. The majority of the fire-cracked rock is granite and siltstone, although some are quartz.

*Faunal Remains*

Few faunal remains have been recovered from the Coffey site due to acidic soils. An unexpected find was the recovery of a fragment of a calcined bone (Piece Plot 12242) at a depth of 59 cm bs in the southeast quadrant of Test Unit 25. This calcined bone fragment, which is 43.7 mm long, 14.5 mm wide, and 7.2 mm thick, appears to be a long bone fragment from a radius of a large mammal (probably deer). Based on the depth (Level 6B), it may be associated with the lower unidentified buried component. One flake was found in the same quadrant as the bone fragment.

*Radiocarbon Sample*

Charcoal is not well preserved in the Severance Formation. One piece of degraded wood charcoal was found during the 2013 excavations. This small piece (Piece Plot 12245) was recovered from the southwest quadrant of Test Unit 33 at a depth of 16 cm. This specimen was submitted for AMS dating and an age is pending. It should date Cultural Horizon 2.

**Summary and Conclusions**

The 2013 excavations at Coffey produced significant data that helped interpret the buried cultural deposits at the site. More than twice as many artifacts were recovered during the 2013 excavations than during the 2012 excavations. This indicates that the area surrounding the North Block was the locus of more prehistoric activity (especially stone tool production) than the adjacent area to the south. The bulk of the artifacts in the vicinity of the North Block are located in a palimpsest approximately 10 cm thick (Horizon 1) at the top of the Severance Formation. This palimpsest contains artifacts that accumulated on a stable terrace surface from multiple Archaic, Woodland, and Late Prehistoric occupations throughout most of the Holocene. The palimpsest is densest along the cutbank but thins to the east in the vicinity of Test Units 21 and 22 and essentially terminates in the vicinity of Test Units 25 and 26 (Figure 8).

Although the uppermost cultural deposits associated with the Severance Formation are mixed, cultural deposits below the upper 10 cm of the Severance appear to be stratified. No diagnostic artifacts have been recovered from Cultural Horizons 2 and 3; however, a couple of artifacts that were found in Test Unit 2 in 2012 suggest a Paleoindian affiliation for these horizons. An overshot (outré passé) fragment of a middle-stage preform was found in Level 2 (10–20 cm bs)

and a channel (flute) flake was recovered from Level 3 (20–30 cm bs). Presuming that these deposits are stratified, Horizon 2 may be Late Paleoindian in age, whereas Horizon 3 may be transitional between Middle Paleoindian and Late Paleoindian. A charcoal sample collected from a depth of 16 cm may provide a numerical age for Horizon 2.

Based on a concentration of flake debitage and several preforms and tools (including one diagnostic artifact) recovered in 2013, Horizon 4 is associated with a substantial Middle Paleoindian occupation. This Middle Paleoindian horizon appears to be primarily located between 35 cm and 45 cm bs but may extend to a depth of 50 cm. The diagnostic artifact is a stem and base fragment of an unfluted Plainview/Goshen point found at 43 cm bs. In addition to the Plainview/Goshen component, a couple of failed preforms appear to indicate the presence of a second Middle Paleoindian (Folsom) component in Horizon 4. The first artifact indicative of Folsom technology is the distal half of a very thin late-stage preform found at a depth of 36 cm bs. The second is a basal fragment of another thin late-stage preform found at a depth of 40–50 cm in Test Unit 16 in 2012 (Ray and Mandel 2012:12–15). A spurred end scraper was recovered at a depth 36 cm in 2013 and another end scraper was found at a depth of 40–50 cm bs in Test Unit 13 in 2012. Finally, in 2013 two overshot edge fragments of failed middle-stage preforms were found at a depth of 41 cm. Spatially, the scatter of Middle Paleoindian artifacts is restricted to the extant cutbank edge and 1.0–1.5 m to the east of the cutbank (Figure 8). This distribution is evident in the concentration of flake debitage in the partial (truncated) test units located along the cutbank and in Test Units 20 and 31 immediately to the east. This distribution also is evident by the recovery of all of the above Middle Paleoindian tools and preforms from only those test units situated on or adjacent to the cutbank edge in the North and South blocks.

No diagnostic artifacts, preforms, or tools have been recovered from Horizon 5; however, based on its stratigraphic position, it appears to predate the Middle Paleoindian horizon. A slight increase in artifact density appears to be present in Horizon 6 (60–70 cm bs). This increase is indicated by an apparent concentration of artifacts at this depth in the vertical cutbank along the west side of the extant portion of the Severance Formation. However, based on a relative lack of artifacts recovered from Horizon 6 in the test units excavated in the North and South blocks in 2012 and 2013, the extant artifacts in Horizon 6 do not extend very far (perhaps <1 m) beyond the present position of the cutbank. The recovery of two relatively large preform fragments at

depths of 65–70 cm bs suggest that they are unlikely to have been displaced downward through dessication cracks. The age of Horizon 6 is unknown, but its position relative to Horizon 4 suggests that it may be Early Paleoindian (Clovis). A few flakes were also found in Horizon 7 (70–80 cm bs) in 2013, and eight flakes were recovered from Levels 8–10 (70–100 cm bs) in 2012. Many of these flakes are very small (<1 $cm^2$) and could have fallen through desiccation cracks. Nevertheless, the presence of a pre-Clovis-age component in Horizon 7 cannot be ruled out.

Due to the relatively rapid lateral (eastward) migration of the Big Blue River (in the vicinity of the North Block) and the presence of concentrations of Middle Paleoindian and possibly Early Paleoindian and pre-Clovis artifacts along the cutbank edge, it is imperative that an additional season of field work be conducted at the Coffey site in 2014 before all is lost to erosion.

Recommendations for 2014 fieldwork are as follows. First, a series of excavation units should be placed along the cutbank edge and up to 1.5 m east of the cutbank edge in the vicinity of the North Block (Figure 9). Several units should be placed 6–7 m to the north of Test Units 17 and 28, and several test units should be placed 6–7 m to the south between Test Unit 27 and 2012 Test Unit 16 (Figure 8). The latter units will extend nearly to the north side of the South Block excavated in 2012. These test units located along the cutbank edge should maximize the return in the extant Paleoindian and possibly pre-Clovis-age deposits at Coffey.

Second, after modern alluvium (Camp Creek Member) and backfill deposits are removed from the north and south sides of the North Block, the 10-cm-thick palimpsest located at the top of the Severance (Levels 1A and 1B) should be shovel skimmed only (not screened) looking for tools and diagnostic artifacts. A large quantity of flake debitage has been obtained from this mixed horizon during the 2012 and 2013 excavations and any additional flake debitage would be redundant. All excavations below the palimpsest should be in 5-cm levels to a depth of 80 cm and screened through one-quarter-inch hardware cloth.

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Appendix 1

# LITHIC TYPOLOGY

## Debitage

### *Core Debitage*

*Tested Cobble:* Cobble with one or two striking platforms and a limited number of flakes (generally three or less) removed to reveal raw material flaking quality.

*Unidirectional Core:* Tabular chunk of chert reduced systematically from a single platform, or from opposing faces if two platforms.

*Amorphous Core:* Cobble or tabular chunk of chert reduced by unsystematic flaking that shifted from one working face to another to take advantage of the best platform angle for flake removal.

*Core Fragment:* Broken fragment of a core with one or more platforms or some other evidence of flake production.

### *Flake Debitage*

*Primary Flake:* Flake with more than 50% of the dorsal surface and platform covered by cortex; exhibits a high-angle striking platform.

*Secondary Flake:* Flake with less than 50% of the dorsal surface and platform covered by cortex; high-angle striking platform.

*Tertiary Flake:* Flake with no cortex on dorsal surface or platform; high-angle striking platform.

*Biface Flake:* by-product of biface manufacture; flake with a dorsal surface partially or entirely covered by negative flake scars and retains a portion of the faceted biface edge as the platform; exhibits a low-angle striking platform.

*Flake Fragment:* a broken flake that lacks a striking platform and, therefore, is unidentifiable (i.e., not diagnostic) to a specific category.

*Angular Fragments/Shatter:* an angular fragment of chert or quartzite that broke along incipient fracture plane(s) during percussion; may exhibit partial flake scars but lacks a striking platform or bulb of percussion; may include heat shatter (fire-cracked chert) and shatter from fractured chert hammerstones.

*Small Flake*: a flake that measures <1 $cm^2$ in size; unidentified as to platform and flake type.

## Tools

### *Informal Tools*

*Utilized Flake:* a flake of any class which has evidence of utilization as a tool but has not been intentionally modified (flaked) to perform a specific task; use wear may be on end, side, or side/end of tool.

### *Formal Tools*

*Side Scraper*: uniface exhibiting primary flaking on dorsal surface of flake-blank and secondary flaking primarily along the lateral edges; no apparent provision for haft element.

*End Scraper*: uniface exhibiting primary flaking on dorsal surface of flake-blank and secondary flaking primarily along the distal end; provision for haft element on proximal end.

*Primary Biface*: shaping consists only of primary percussion flaking (predominantly hard hammer) in a random or systematic pattern; biface edge is sinuous and biface cross-section is thick and irregular; usually retains a portion of cortex; usually represents an unfinished tool (e.g., early-stage preform).

*Secondary Biface*: shaping consists of primary and secondary percussion flaking (hard and soft hammer); most or all of cortex has been removed; flaking is more systematic; biface edges are less sinuous and biface cross-section is relatively thin and lenticular; usually represents an unfinished tool (e.g., middle-stage preform).

*Tertiary Biface*: shaping consists of secondary and tertiary flaking (soft hammer percussion and pressure flaking); cortex is absent and flaking is systematic; biface edges are straight and cross-section is thin; usually represents an unfinished tool or unidentifiable finished tool fragment (e.g., late-stage preform or projectile point/knife midsection/distal end fragment).

*Projectile Point/Knife*: shaping usually consists of secondary and tertiary flaking (soft hammer percussion and pressure flaking); systematic flaking and removal of cortical surfaces; generally thin lenticular cross-section; longitudinally asymmetrical with a haft element at proximal end and pointed element at distal end.

*Drill:* biface exhibiting a long, narrow bitted distal end and provision for hafting on proximal end.

*Graver*: flake exhibiting localized retouch forming a short acute projection for engraving or incising.

*Adze*: biface with primary and secondary flaking; asymmetrical trianguloid shape with bit (broad) end usually striated and polished

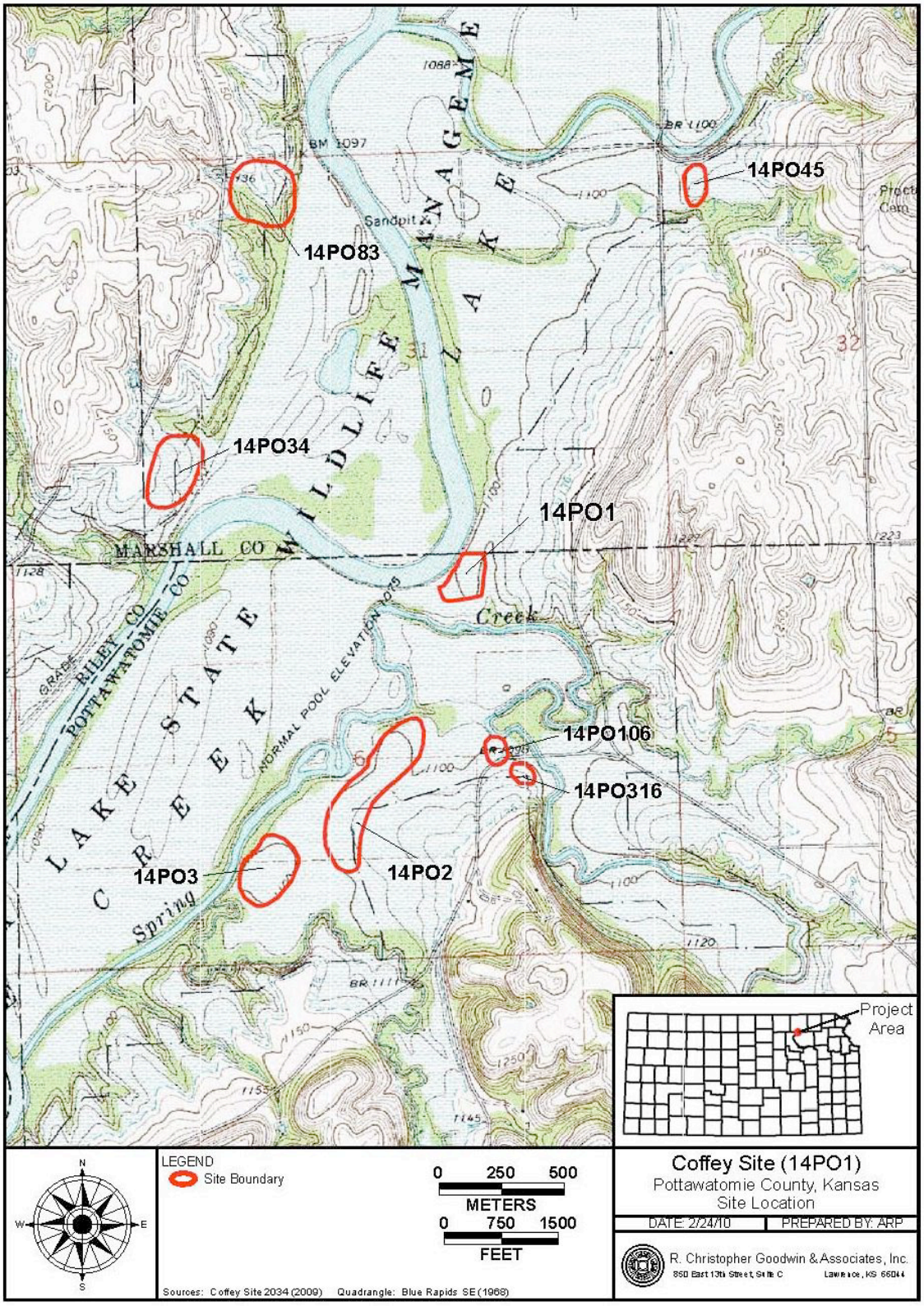


Figure 1. Topographic map showing the location of the Coffey site (14PO1).


Figure 2. A 2008 aerial photograph with the boundary of the Coffey site shown in red.

Figure 3. The reddish Severance Formation (Locality 11-7) exposed at the Coffey site (14PO1), located on the left bank of the Big Blue River and Tuttle Creek Lake.

Figure 4. Initial 2013 excavations in the North Block on the edge of the cutbank.

Figure 5. Placement of the test units at the top of the Severance Formation (inscribed line on left side of photograph).

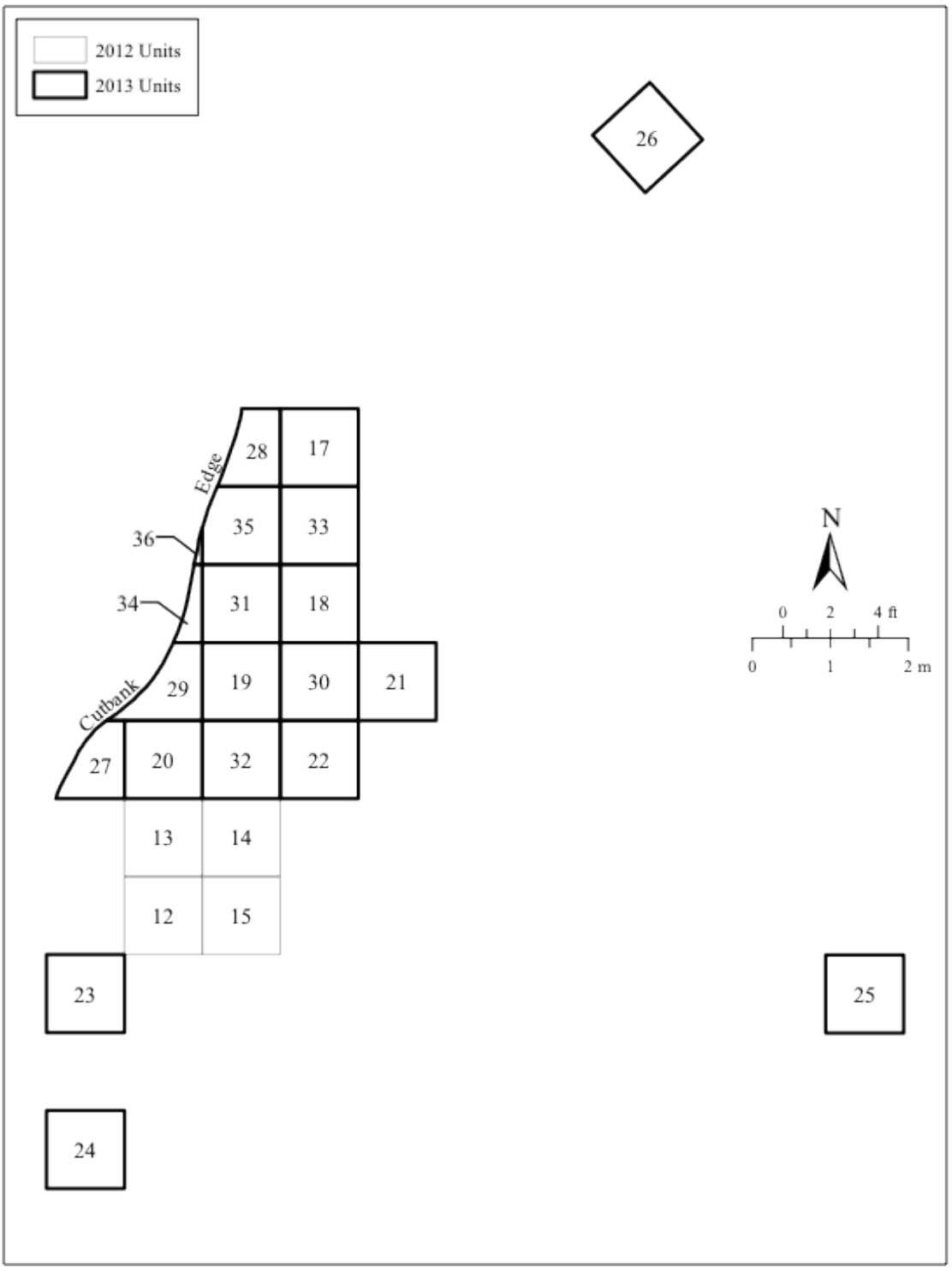


Figure 6. Location of the excavation units in the vicinity of the North Block, Locality 11-7.


Figure 7. Selected tools and preforms recovered from 2013 excavations: (a) Plainview/Goshen stem fragment, (b) failed late-stage Folsom preform fragment, (c-d) overshot edge fragments of failed middle-stage preforms, (e) midsection fragment of failed late-stage preform or projectile point, (f-g) spurred end scrapers, (h) utilized flake, and (i) unidentified Late Archaic or Woodland projectile point/knife fragment.

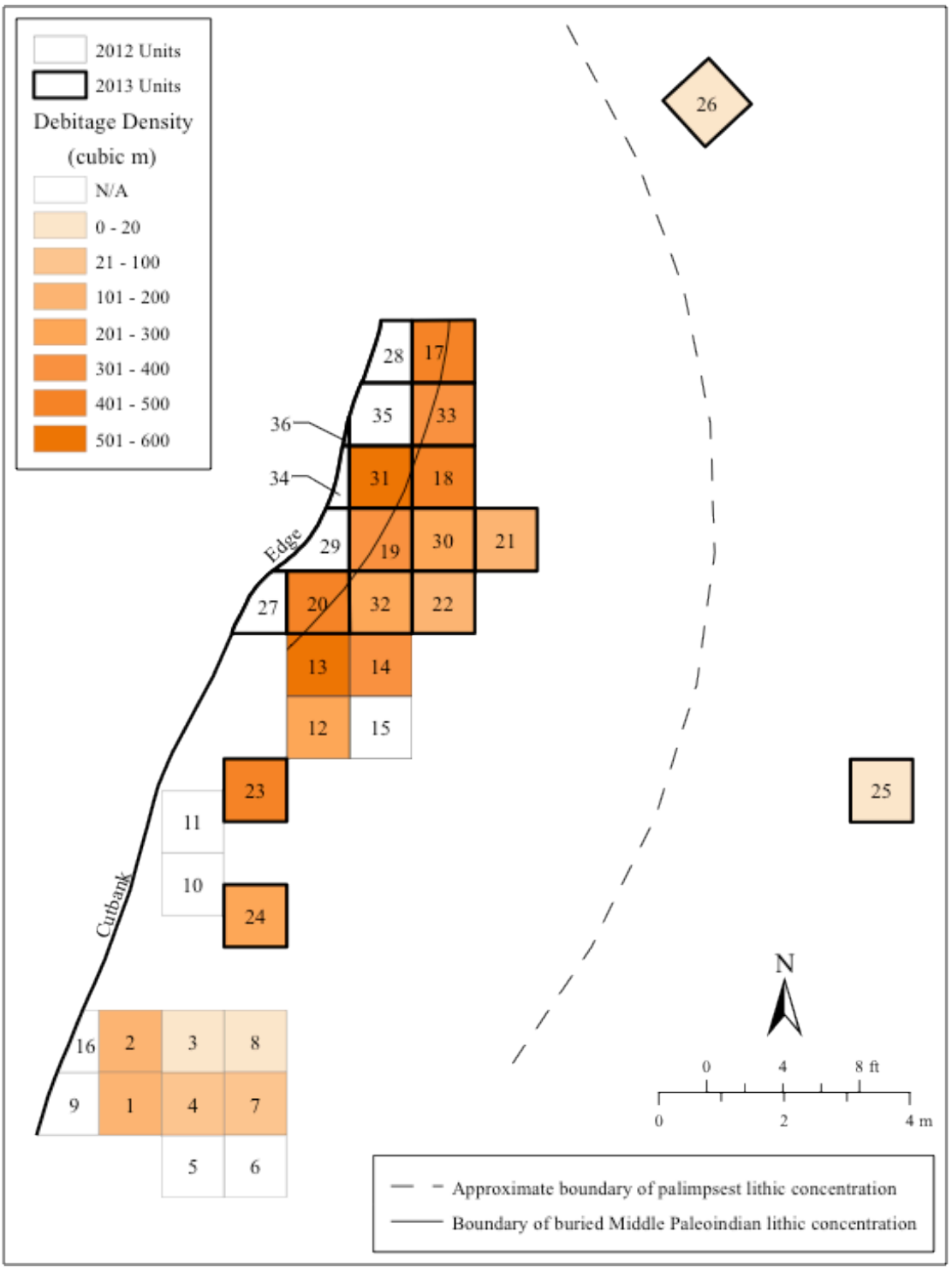


Figure 8. Debitage densities and lithic concentration boundaries in the vicinity of the North Block.

Figure 9. End of 2013 excavations in the North Block (view to the north). Excavations in 2014 should be along the cutbank to the north and south of this area.

Table 1. Grid Coordinates and Ending Depths of 2013 Units

| Unit Number | Grid Coordinates | Ending Depth |
|---|---|---|
| Unit 17 | N790, E638 | 70 |
| Unit 18 | N788, E638 | 70 |
| Unit 19 | N787, E637 | 80 |
| Unit 20 | N786, E636 | 80 |
| Unit 21 | N787, E639 | 70 |
| Unit 22 | N786, E638 | 70 |
| Unit 23 | N783, E635 | 70 |
| Unit 24 | N781, E635 | 30 |
| Unit 25 | N783, E645 | 70 |
| Unit 26 | N794.5, E642 | 70 |
| Unit 27 | N786, E635 | 80 |
| Unit 28 | N790, E637 | 80 |
| Unit 29 | N787, E636 | 70 |
| Unit 30 | N787, E638 | 70 |
| Unit 31 | N788, E637 | 70 |
| Unit 32 | N786, E637 | 70 |
| Unit 33 | N789, E638 | 50 |
| Unit 34 | N788, E636 | 70 |
| Unit 35 | N789, E637 | 70 |
| Unit 36 | N789, E636 | 70 |

Table 2. Stratigraphy in the Vicinity of the North Block.

| Level | Depth (cm bs) | Soil Horizon | Cultural Horizon | Cultural Component |
|---|---|---|---|---|
| 1A | 0–5 | Ab | Horizon 1 | Archaic-Woodland (palimpsest) |
| 1B | 5–10 | | | |
| 2A | 10–15 | | Horizon 2 | (Late Paleoindian?) |
| 2B | 15–20 | BAb | | |
| 3A | 20–25 | | | |
| 3B | 25–30 | Bt1b | Horizon 3 | |
| 4A | 30–35 | | | |
| 4B | 35–40 | | Horizon 4 | Middle Paleoindian |
| 5A | 40–45 | | | |
| 5B | 45–50 | | | |
| 6A | 50–55 | Bt2b | Horizon 5 | |
| 6B | 55–60 | | | |
| 7A | 60–65 | | Horizon 6 | (Early Paleoindian?) |
| 7B | 65–70 | | | |
| 8A | 70–75 | Bt3b | Horizon 7 | (pre-Clovis?) |
| 8B | 75–80 | | | |

Table 3. Tools Recovered from the North Block in 2013.

| Provenience | Tool Type | Piece Plot No. | Depth | Chert Type | Heat Treated | Comments |
|---|---|---|---|---|---|---|
| TU 18NE-1A | Early-Stage Preform | 12217 | 2 | Permian | No | Proximal fragment |
| TU 20NW-1A | Early-Stage Preform | 12213 | 2 | Permian | No | Midsection fragment |
| TU 20SE-1A | Utilized Flake | 12212 | 3 | Permian | No | |
| TU 17NE-1A | Middle-Stage Preform | 12214 | 4 | Permian | Yes | |
| TU 18SW-1A | Late-Stage Preform | 12215 | 5 | Permian | No | Distal fragment |
| TU 24NE-1A | Early-Stage Preform | 12229 | 0–5 | Permian | Yes | Distal fragment |
| TU 29NE-1B | Middle-Stage Preform | 12234 | 6 | Permian | No | Midsection fragment |
| TU 32SW-1B | Unidentified PPK | 12237 | 7 | Permian | No | Square stemmed fragment |
| TU 33NW-1B | Middle-Stage Preform | 12243 | 10 | Permian | No | Edge fragment |
| TU 18NW-1B | Utilized Flake | 12220 | 5–10 | Permian | No | |
| TU 18SW-1B | Side Scraper | 12221 | 5–10 | Permian | No | |
| TU 18SW-1B | Utilized Flake | 12222 | 5–10 | Permian | No | |
| TU 33SE-2A | Middle-Stage Preform | 12244 | 11 | Permian | No | Edge fragment |
| TU 19SW-2B | Side Scraper | 12225 | 19 | Permian | No | |
| TU 23SW-2B | Unidentifiable PPK | | 15–20 | Permian | No | Proximal edge fragment |
| TU 28-3A | Middle-Stage Preform | | 20–25 | Permian | No | Edge fragment |
| TU 20NE-3B | Spurred End Scraper | 12218 | 29 | Permian | No | |
| TU 23NE-3B | Middle-Stage Preform | | 25–30 | Permian | No | Midsection fragment |
| TU 29SW-4A | Early-Stage Preform | 12235 | 33 | Permian | No | Proximal fragment |
| TU 31SW-4A | Early-Stage Preform | 12241 | 35 | Permian | No | |
| TU17NW-4A | Early-Stage Preform | 12233 | 35 | Permian | No | Edge fragment |
| TU 23NE-4A | Middle-Stage Preform | | 30–35 | Permian | No | Edge fragment |
| TU 28SE-4B | Spurred End Scraper | 12231 | 36 | Permian | No | |
| TU 34NE-4B | Late-Stage Preform | 12239 | 36 | Permian | No | Distal fragment |
| TU 20NW-5A | Middle-Stage Preform | 12228 | 41 | Permian | No | Overshot fragment |
| TU 34SE-5A | Middle-Stage Preform | 12240 | 41 | Permian | No | Overshot fragment |
| TU 29NW-5A | Plainview/Goshen PPK | 12236 | 43 | Permian | No | Proximal (stem) fragment |
| TU 28NW-5A | Late-Stage Preform | 12232 | 45 | Permian | No | Midsection fragment |
| TU 27SW-5B | Utilized Flake | 12230 | 50 | Permian | No | |
| TU 18SE-7B | Early-Stage Preform | | 65–70 | Permian | No | |

Table 4. Debitage Type by Levels.

| | Levels 1A-4A | | Levels 4B-5B | | Levels 6A-7B | | Total | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| Tested cobble | 1 | 0.2 | 0 | 0.0 | 0 | 0.0 | 1 | 0.1 |
| Primary flake | 5 | 0.8 | 1 | 1.3 | 1 | 4.3 | 7 | 1.0 |
| Secondary flake | 21 | 3.3 | 6 | 8.0 | 0 | 0.0 | 27 | 3.7 |
| Tertiary flake | 4 | 0.6 | 0 | 0.0 | 0 | 0.0 | 4 | 0.5 |
| Biface flake | 147 | 23.0 | 20 | 26.7 | 8 | 34.8 | 175 | 23.8 |
| Flake fragment | 356 | 55.8 | 44 | 58.7 | 12 | 52.2 | 412 | 56.0 |
| Small flake | 104 | 16.3 | 4 | 5.3 | 2 | 8.7 | 110 | 14.9 |
| Total | 638 | 100.0 | 75 | 100.0 | 23 | 100.0 | 736 | 100.0 |

Platform-Remnant-Bearing Flakes

| | Levels 1A-4A | | Levels 4B-5B | | Levels 6A-7B | | Total | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| Primary flake | 5 | 2.8 | 1 | 3.7 | 1 | 11.1 | 7 | 3.3 |
| Secondary flake | 21 | 11.9 | 6 | 22.2 | 0 | 0.0 | 27 | 12.7 |
| Tertiary flake | 4 | 2.3 | 0 | 0.0 | 0 | 0.0 | 4 | 1.9 |
| Biface flake | 147 | 83.1 | 20 | 74.1 | 8 | 88.9 | 175 | 82.2 |
| Total | 177 | 100.0 | 27 | 100.0 | 9 | 100.0 | 213 | 100.0 |

Table 5. Flakes by Depth.

| | Number of Flakes | Percentage |
|---|---|---|
| Level 1A | 796 | 29.8 |
| Level 1B | 541 | 20.2 |
| Level 2A | 341 | 12.8 |
| Level 2B | 292 | 10.9 |
| Level 3A | 224 | 8.4 |
| Level 3B | 120 | 4.5 |
| Level 4A | 88 | 3.3 |
| Level 4B | 92 | 3.4 |
| Level 5A | 75 | 2.8 |
| Level 5B | 49 | 1.8 |
| Level 6A | 28 | 1.0 |
| Level 6B | 13 | 0.5 |
| Level 7A | 5 | 0.2 |
| Level 7B | 7 | 0.3 |
| Level 8A | 1 | 0.0 |
| Level 8B | 6 | 0.2 |
| Total | 2,671 | 100.1 |

Table 6. Flakes by Depth in Test Unit 34.

| | Number of Flakes | Percentage |
|---|---|---|
| Level 2A | 12 | 5.6 |
| Level 2B | 19 | 8.8 |
| Level 3A | 12 | 5.6 |
| Level 3B | 14 | 6.5 |
| Level 4A | 9 | 4.2 |
| Level 4B | 30 | 14.0 |
| Level 5A | 53 | 24.6 |
| Level 5B | 39 | 18.1 |
| Level 6A | 20 | 9.3 |
| Level 6B | 6 | 2.8 |
| Level 7A | 1 | 0.5 |
| Level 7B | 0 | 0.0 |
| Total | 215 | 100.0 |

# The Scheuerman Mammoth Site (14SC327), Western Kansas

Kale Bruner, Jack L. Hofman, Rolfe D. Mandel, and Blair Benson Schneider

## Introduction

The Scheueman site (14SC327) is located on the uplands near the southern margin of the Smoky Hill River valley in Scott County, Kansas (Figure 1). The skeletal remains of a mammoth were exposed in July of 2011 by heavy machinery during the construction of earth berms and ditches for agricultural contour terraces. The bones are 40-50 cm below the land surface and contained in late-Wisconsin Peoria Loess. The Scheuerman mammoth is dated by AMS to 13,468 +/-40 years BP and, therefore, is pre-Clovis in age. Odyssey–supported work at Scheuerman began in 2011 and work continued in 2012. Twenty-six additional mammoth bones or bone fragments were documented in 2013 bringing the total count of bones or bone fragments from the site to 44.

## History of Research

Two mammoth bones (scapula and ulna) were initially exposed during the construction of the earthen berms and ditches for agricultural contour terraces on the Scheuerman property in July 2011. Natural Resources Conservation Service (NRCS) workers immediately notified the Kansas State Historical Society (KSHS) of the discovery, and the KSHS fielded a small crew for two days to expose additional associated bones. Odyssey crew joined these efforts and worked for four days to expose, map, cast, and remove ten mammoth bones, including a scapula, ulna, and eight rib bones. Two permanent site datums were established along the fence line approximately 80 m north of the excavation area. Mike Scheuerman (landowner) agreed to take the mammoth locality and a 50-m buffer around the mammoth out of cultivation for at least two years. In the summer of 2012 more extensive excavations were supported by Odyssey. The grid was expanded and eight new bones were identified and recovered.

In 2011 a dense concentration of lithic artifacts was documented (Feature 1) 50 meters north of the mammoth bone excavations. The top of this feature was clipped by heavy machinery (pan scraper) during contour terracing. The bulk of the artifacts (>1000) represents early-to-late-stage reduction flake debitage and angular fragments, but several fragments of early- and middle-stage

failed preform fragments were also recovered from the feature. At least four biface fragments were refitted (representing two refit cases). All lithic artifacts were Smoky Hill Jasper. This discrete knapping feature measured approximately 30-x-40 cm wide and approximately 5-7 cm thick. Although Feature 1 cannot be directly associated with the mammoth remains, the base of the knapping feature was only 1 cm above the base of Bone 6 of the mammoth. This suggests that the knapping feature was deposited on the same surface as the mammoth remains. In addition to this lithic concentration, two artifacts were mapped in the area that had been disturbed by terracing operations: a basal (corner) fragment of a possible Folsom point or a late-stage failed Folsom preform, also Smoky Hill Jasper, and a fragment of an early-stage preform knapped from trachyte.

A sample of mammoth long bone from Bone 4 (sample 4.1) was submitted for AMS radiocarbon dating and yielded an age of 13,468±40 (NZA 39694), or 16,782 to 16,550 calibrated years B.P. This date indicates a pre-Clovis age for the mammoth and is within the age spectrum of other potential pre-Clovis cultural sites in the region (Waters et al. 2011; Holen 2007). Although a definitive association of prehistoric artifacts with the Scheuerman mammoth cannot be determined based on current information, the nearby presence of lithic artifacts is intriguing. Archaeological fieldwork continued at the Scheuerman mammoth site in 2013 in order to further investigate the possibility of cultural association with the mammoth bones.

**Methodology**

Investigations at the Scheuerman site in 2013 followed the same field methodologies established in 2011 and 2012. Fieldwork consisted of two sessions of excavation and a third session employing GPR. The main focus of the 2013 excavations was a cluster of bone present north and west of the 2012 excavation block. Overburden (2-5 cm) was removed from the area immediately north of the 2012 excavation and the area was shovel skimmed in order to determine the location of additional bones (Figure 2) and placement of test units for excavation. In total, an area approximately 24 $m^2$ was shovel skimmed to the top of the bone level or below.

A Topcon GTS 313 Total Station was used to put in grid pins, datums, and to piece-plot artifacts and mammoth bone. The two permanent site datums established in 2011 were located along the fence line north of the excavation area. From these two sub-datums (Datum 2-2013 and Datum

3-2013) were placed in the vicinity of the excavation area and a 1 x 1 meter grid was put in around the area of exposed bone. These sub-datums were the primary control points from which all spatial data were collected in 2013.

Eight 1 x 1 meter test units and two 1 x .5 meter test units were excavated with a combination of shovel-skimming and hand excavation using trowels, bamboo tools, or brushes. Seven full test units and 2 half test units were contiguous and adjacent to the 2012 excavation block (Figure 3). Six test units were placed on the 105N between 111E and 105E. One test unit and the two half test units were placed on the 106N line between 108E and 105E. One test unit (108N-109E) was placed north and east of the main excavation block in an area that had previously been scraped by heavy machinery to the base of the A horizon of the surface soil (Figure 3). This test unit was placed over a tertiary flake fragment discovered on the surface. This test unit was excavated in arbitrary 10 cm levels to 50 cm below surface. All sediments were dry-screened through one-quarter inch hardware mesh. Aside from a surface flake, no other cultural materials were recorded in this test unit.

For the test units in the excavation block depth of excavation varied between and within test units as it was largely determined by the depth required to expose and sufficiently pedestal the bones for casting and removal. All sediments at the bone layer and below were dry-screened through one-quarter inch hardware mesh. Exposed bones were uncovered and pedestaled, then measured and drawn on unit level forms (Figure 4). The location of the bones within the site grid was recorded in three coordinates using the Total Station. Orientation and dip were determined using a hand-held compass and recorded on the level form along with notation of the bone's general condition and taphonomy. After documentation was completed the bones were casted for removal (Figure 5).

**Excavation Results**

A total of 26 bones were encountered during the 2013 field season and 23 of these were casted and removed from the site. Three bones (Bone #29, Bone #42, and Bone #44) were only partially uncovered and were left in place for future excavation. The bones clustered in the north and west portion of the excavation block, particularly in test units 105N-105E; 105N-106E, and 106N-106E, whereas test units 105N- 108E, 105N-109E, and 105N-110E produced isolated bones. The

bones were positioned nearly horizontal and at a consistent elevation to that noted during previous excavation. The base level of the bones dips slightly to the north and west at a slope of 2 to 11 degrees following the contours of the modern surface.

Fragments of the vertebral column were found in near-anatomical position in groups of four (Bones *#34-37*) and three (Bones *#38-40*) vertebrae (Figure 6). One, isolated vertebrae (Bone #28) also was collected. Six rib or rib fragments (Bones *#21, #23, #24, #29, #30, and #31)* were recovered, bringing the total rib count from the site to 14 (Figure 7). A distal tusk fragment (Figure 8) measuring 1.5 m (Bone #20) is the second tusk fragment from the site. Preservation of the mammoth bone was variable and improved with depth. Taphonomic evidence of root acid etching and dry breaks were common. One rib bone exhibited a transverse break likely caused by sediment loading (Figure 9).

Cultural materials were not found among the mammoth bones. A single tertiary flake of unidentified quartzite came from the surface of test unit 108N-109E. No other lithics were found in this unit and it is most likely that the surface find was transported to the location by machinery when the area was initially cleared.

A lithic concentration (Feature 1) identified in 2011 produced over 1,000 flakes and biface fragments of Smoky Hill Jasper (Hofman et al. 2012). The cluster was in an area 30 x 40 centimeters and was 5-7 centimeters thick, situated at the top of the Peoria Loess. The feature had been disturbed and scattered during terracing operations. This area was surveyed regularly in 2013 and a total of nine flake fragments or angular shatter, all of Smoky Hill Jasper, were found in the general vicinity of the original cluster. These finds were piece-plotted using the Total Station. None exhibit attributes diagnostic of either tools or reduction strategies. Decortication flakes and debris are present alongside debris and flakes indicative of later stage reduction.

*Upper Terrace Finds*

A total of 31 lithic artifacts were collected from the plowed terrace west of the excavation area. These are composed predominately of Smoky Hill Jasper (N=20). Other lithic materials present include gray quartzite and five unidentified siliceous materials. Three of these were likely procured from the Ogallala gravels available locally. The remaining two are high quality cherts

of unknown origins. In addition, two unworked cobbles, also likely deriving from the Ogallala gravels, were among the lithics collected. Three pieces of rock were also collected, one of which is fire-cracked. The lithic artifacts consist of primary and secondary decortication flakes, tertiary flakes, angular shatter, three edge-modified flakes, one tested cobble, and one endscraper.

**Ground Penetrating Radar**

Ground penetrating radar (GPR) is an active method that transmits a short pulse of high frequency electromagnetic energy, usually in the range of 10-1000 MHz, into the ground by an antenna. Changes in the electrical properties of the ground create interfaces that reflect back part of the transmitted signal, which is detected by the receiving antenna and stored for data processing and display (Davis and Annan, 1989). The electrical properties of the material in the ground (i.e. the dielectric constant and the electrical conductivity) determine the radar signal velocity, the attenuation, and the power that is reflected back from interfaces to the receiving antenna (Davis and Annan 1989). With GPR, frequency is a primary control on the depth and resolution of the data acquired. Higher frequencies will provide better resolution but do not get deep penetration, whereas lower frequencies will penetrate further below the surface but will have reduced resolution.

GPR data were collected at the Scheuerman mammoth site on November 2, 2013. Four areas of interest were targeted after the summer 2013 excavations (GPR grids 6, 7, 8, and 9), but due to time constraints and an excessive overgrowth of weeds, data were only collected over grid areas 6, 7, and 9. For grid 6, data were collected using the 500 MHz frequency antennas in both the North-South and East-West directions to account for both polarizations. For grid 7, data were collected in the North-South direction using both the 500 MHz and 1000 MHz frequency antennas. A small representative sample of data was collected in the East-West direction using the 1000 MHz frequency antennas as well. Finally, for grid 9, data were collected in both the North-South and East-West directions using the 1000 MHz frequency antennas.

Future work will include processing of the new datasets to compare with the 2012 GPR datasets. The 2012 datasets also will be compared to the 2013 excavation summaries to look for any anomalies that may correspond to bones that were identified and collected.

## Summary and Conclusion

Twenty-three bones and bone fragments of what appears to be a single mammoth were uncovered, documented and removed during the 2013 field season. Three bones were partially exposed but due to time constraints were left in place for future excavation. The majority of the bones documented in 2013 were concentrated in an area approximately 4 $m^2$. The discovery this season of two clusters of vertebrae in rough anatomically position is intriguing and suggest that more of the carcass will be found north and west of the currently excavation blocks. If humans were involved in the death or butchering of this mammoth the axial portions of the carcass may be expected to be located nearer the location of butchery. Discarded or lost tools are more likely to be discovered within such an area of concentrated activity. The total count on bone recovered from the site is 41, representing only a fraction of the mammoth skeleton. The possibility remains that people were in the Great Plains contemporary with the Scheuerman mammoth and may have contributed to its demise or utilized bone material from the skeleton. Continued excavation in the area north and west of the 2013 excavation block is recommended in order to enhance our understanding of site formation and the taphonomic history of this animal, and whether people may have killed the animal or modified its carcass in any way.

**References Cited**

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Figure 1. Location of the Scheuerman mammoth site (14SC327) on Google Earth image.

Figure 2. Shovel Skimming and removing overburden. View is to the northwest.

Figure 3. Location of 2013 Excavation Block. Test Unit 108N-109E is to the left of the photo. View is to the southeast.

Figure 4. Recording the position of mammoth bone in test unit 106N-106E.

Figure 5. Casting bones for removal in test units 105N-106E and 106N-106E.

Figure 6. Base of test unit 105N-105E showing three vertebrae (Bones #38-40) in near anatomical position. Also in the photo are two ribs (Bones # 30 and #31).

Figure 7. Rib (Bone #21) in Test Units 105N-107E and 105N-108E.

Figure 8. Distal tusk fragment in test unit 105N-107E.


Figure 9. A transverse break on a rib (Bone #30).