Odyssey Archaeological Research Fund

Report of Investigations, Summer and Fall, 2017

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INTRODUCTION

This document summarizes investigations conducted in the summer and fall of 2017 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 Spring Valley site (23CT389), southeastern Missouri.
2. Exploration at the Classen Mastodon locality and adjacent areas of the Classen Ranch in Meade County, southwestern Kansas.

The excavation crew at the Spring Valley site (23CT389) consisted of three students from the University of Kansas: Josh Collins, Paige Englert, and R. Mason Niquette. Also, Jacque Griffith-Esala, Matthew Nowak, and Jack Ray (Project Supervisor), all from Missouri State University, participated in the excavation. In addition, Dr. Laura Murphy and Alyssa Sparks from the Washburn University archaeology field school were involved with the excavation during the second field session, and Allison Young (National Park Service), David Cain (U.S. Forest Service) and Jake Pluim (U.S. Forest Service) served as volunteers at the site. Dr. Rolfe Mandel conducted the geomorphological investigation at site 23CT389.

The following K.U. students were involved with the Odyssey investigation at the Classen mastodon locality and adjacent areas of the Classen Ranch: Paige Englert, Jeff Ross, and Blair Benson Schneider. Dr. Laura Murphy (Washburn University) served as Project Supervisor, and three Washburn students – Adrianna Hendricks, Lori Holstrom, and Daniel Hougland – served as volunteers. Two volunteers from Meade County also served as volunteers: Norman Dye and Aidan Miller. Dr. Rolfe Mandel conducted the geomorphological investigation at the Classen mastodon locality.

We are especially grateful to Ralph and Randall Classen for allowing the Odyssey research team to conduct research on their property and for assisting us in the field.

Excavations at the Spring Valley Site (23CT389), Southeast Missouri

Jack H. Ray and Rolfe D. Mandel

Introduction

The Spring Valley site (23CT389) is located on a remnant of a colluvial/alluvial (co-alluvial) fan at the mouth of Spring Valley, approximately 400 m southeast of Big Spring in Carter County, southeast Missouri (Figure 1). Big Spring is the largest single-outlet spring in the Western Hemisphere, and its average flow of 470 cubic feet (13,000 L) of water per second feeds an outlet channel that constitutes the second largest tributary of the Current River. The site's proximity to Big Spring made it an attractive place for human habitation. Big Spring and large portions of the Current River valley are part of Ozark National Scenic Riverways (National Park Service), the first national park in the United States that was designed to protect a river system.

Site 23CT389 was discovered in 1993 after a trench for a water line was excavated to a depth of approximately 1.8–2.1 m (Jim Price, personal communication 2016). Archaeologists from the Midwest Archaeological Center, who were excavating at the nearby Gnat Alley site (Price et al. 2003), inspected backdirt piles of the water line trench on July 28-29, 1993 and found many artifacts, including projectile points/knives, failed and aborted preforms, flake tools, flake debitage, and shatter (Jack Ray, personal observation of collection at Midwest Archaeological Center 2017). Selected artifacts from this collection include one Late Paleoindian Dalton point (Figure 2a), one aborted late-stage Dalton preform (Figure 2b), two Searcy point fragments (Figure 2c-d), one failed late-stage preform (Figure 2e), a distal (bit) fragment of a Dalton adze (Figure 2f), and one distal fragment of a drill with a left bevel.

In 1994, Jim Price, Jeff Kroke, and M. J. Hastings formally recorded the site as 23CT389. During the 1930s, Leo Anderson reportedly found a fluted Clovis point (see Chapman 1975:Figure 4.4b) at 23CT389 when a park road was being constructed across the east end of the co-alluvial fan. However, the point has a flute scar on only one face and exhibits prominent shoulders above the stem; hence, it probably represents a fluted Dalton point (Figure 2g). The recovery of the fluted point and several Dalton points, the location of the site in the vicinity of

Big Spring, and the apparent removal of much of the Holocene fill from the co-alluvial fan made 23CT389 an attractive location for an Odyssey investigation with a focus on deeply buried Clovis and pre-Clovis-age deposits.

The co-alluvial fan was truncated by the construction of a CCC stone masonry shower house into the base of the adjacent footslope of the valley wall (Figure 3), but the extent of the truncation is impossible to determine. Nevertheless, judging from a level surface at the base of the valley wall, up to 2 m of sediment may have been removed. In addition to the truncation of the co-alluvial fan during the construction of the CCC shower house, the emplacement of a deep sewerline, the construction of trenches for at least two buried electrical cable lines, and the excavation of the 1993 water line extensively disturbed some of the cultural deposits at the site. CCC workers also may have widened the channel of Spring Valley Branch, which is located adjacent to the site. Next to the site, the channel is approximately 15 m wide and 4 m deep. By contrast, approximately 400-500 m upstream from the site the channel is only about 5 m wide and 1 m deep. Hence, if the CCC workers modified the channel of Spring Valley Branch, they may have removed a large portion of the co-alluvial fan at 23CT389.

In June of 2016, Dr. Jack Hofman (KU) placed a four-inch-diameter auger test on the site. The auger test went to a depth of 125 cm and revealed that approximately 40 cm of the upper fill consisted of disturbed backfill deposits. However, below a depth of 40 cm, the sediment appeared to be undisturbed. Also, a light scatter of chert and quartzite flakes was recorded in the undisturbed sediment.

The goals of the 2017 Odyssey investigation at the Spring Valley site were to penetrate overburden deposits and excavate undisturbed sediments to a depth of 3 m or more to determine the integrity of the Paleoindian components and potentially discover deeply buried Early Paleoindian and pre-Clovis deposits.

Geomorphological Setting and General Site Stratigraphy

Spring Valley Branch is a small 3rd-order tributary of the Current River. The headwaters of Spring Valley Branch are located approximately 6.8 km to the west of the site. The truncated co-alluvial fan at 23CT389 was probably about 2 m higher than it is now. The surface of the nearby T-1 terrace of the Current River is 13 cm higher than the truncated surface at 23CT389. The occurrence of fine-grained alluvium with angular pebbles, cobbles and boulders scattered through the matrix indicate that the fan was formed by a combination of overbank sedimentation during episodic flooding of Spring Valley Branch and the nearby Current River and by the accumulation of colluvium derived from the adjacent valley wall.

A brief summary of the stratigraphy as evident in the north wall of Block A is as follows. Due to the truncation of the co-alluvial fan by CCC construction, there is no undisturbed A horizon. The disturbed overburden is divided into two horizons (Figure 4a). The Ap1 horizon is a very dark gray (10YR 3/1) silt loam with occasional large rocks, historic artifacts, and fragments of concrete. The Ap2 horizon is a pale brown (10YR 6/3) sand matrix with few to common subrounded to rounded alluvial pebbles and cobbles (approximately 85%) with a distinct undulating boundary. The Ap2 horizon represents an emplaced layer of river gravel and sand for a temporary road during the construction of the masonry shower house. The combined two layers of overburden range from approximately 55 to 75 cm thick with a slight dip to the east.

Directly below the disturbed overburden is a series of brown (7.5YR 4/3) to dark brown (7.5YR3/4) silty clay loam Bt horizons (Figure 4a and 4b) containing angular pebbles and cobbles of chert, quartzite, and dolostone. This series of Bt horizons extend from the base of the Ap2 horizon to the base of excavations at 330 cm bd (below datum). Colluvium in the Bt horizons is mostly small angular pebbles and was especially common in test units (2, 4, 6, 8, and 17) located along the north bench closest to the adjacent valley wall. The colluvium increased slightly with depth, comprising up to about 10-15% of the matrix between Levels 18 and 30. The size of the colluvial clasts increased significantly in the lowest two levels, where four large dolostone boulders measuring up to 50-x-50 cm wide were exposed (Figure 5). Small subrounded alluvial pebbles were relatively rare (one per level) in the middle-to-lower deposits (Levels 18-30) but increased to 5-10 pebbles per level in Levels 31-33).

A dark brown (7.5YR 3/3) silty clay loam that represents a weak (or light) midden deposit was recorded at a depth of approximately 85-101 cm bd within the uppermost Bt horizon. An increase in the frequency of charcoal fragments and chert flakes was noted in Levels 9 and 10 in Test Units 2, 4, 6, and 8. However, charcoal and chert flakes were less concentrated in adjacent Test Units 1, 3, 5, and 7 across the middle of Block A, and the concentration was absent in Test Units 11-14 along the south side of Block A. The midden dips to the east, where it occurs at a depth of approximately 114-132 cm bd in the east wall of Test Unit 16. Although evident in the north and east walls of Block A, the weak midden was not present in the south or west walls. No other midden deposits were noted between 130 and 330 cm bd.

The stratigraphy of the co-alluvial landform at 23CT389 appears to be complicated by two cut-and-fill episodes produced by Spring Valley Branch. These cut-and-fill episodes are described in the "Summary and Conclusions" section below.

Methodology

The 2017 field investigations at the Spring Valley site were conducted between June 12 and July 29. The excavation crew consisted of Josh Collins, Paige Englert, Jacque Griffith-Esala, Matthew Nowak, R. Mason Niquette, and Jack Ray (project supervisor). Dr. Laura Murphy and Alyssa Sparks from the Washburn University archaeology field school were involved with the excavation during the second field session, and Allison Young (National Park Service), David Cain (U.S. Forest Servoice) and Jake Pluim (U.S. Forest Service) served as volunteers at the site.

A site datum (100N, 100E) designated Station 1 was established 1 m west of the southwest corner of the deck located at the southeast corner of the CCC shower house (Figure 6). Seventeen contiguous 1-x-1-m test units were excavated in a block (designated Block A) located approximately 15 m east-southeast of Station 1 (Figure 6). The northwest corner of Test Unit 2 served as local datum for Block A. This local datum is located 2.7 m south and 12 m east of Station 1 and has an elevation of 99.350. The depths of all piece-plotted tools and charcoal samples were calculated in cm below this local datum (i.e., cm bd).

Initial work consisted of removing disturbed backfill deposits from Block A. After overburden removal, 15 of the 17 test units in Block A were excavated in 10-cm levels into undisturbed deposits. Ending depths of these 15 test units are presented in Table 1. Excavations in Test Units

9 and 10 were terminated in disturbed overburden when it became apparent that these units were disturbed by the construction of the 1993 water line to a depth of more than 1 m.

To obtain a depth of 3 m or more in Block A, the excavations in Block A were stepped. Test Units 2, 4, 6, and 8 were terminated at a depth of 150 cm bd and formed a north bench. Test Units 11-14 were also terminated at a depth of 150 cm bd and formed a south bench. Test Units 1, 3, 5, and 7 formed the central trench, which was excavated to depths of 210-330 cm bd (Figure 7). At a depth of 100 cm bd (just below the base of the disturbed overburden), Test Units 3 and 7 were designated as control units. The north one half of each of these units was dry screened through one-quarter-inch mesh, whereas the south halves were carefully shovel skimmed. The sediments in all other test units were carefully shovel skimmed.

All artifacts and charcoal fragments that were encountered in shovel-skimmed levels were collected. All tools, preforms, 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. Five 10-liter flotation samples were removed from the northeast wall of Test Unit 7 between 110-120 and 220-230 cm bd. Fifty liters of sediment were also collected from two hearth-like features.

The area where Block A was placed was examined by a utility locator for buried electrical lines prior to our excavation. Two lines were located and marked. One was located approximately 1 m south of the south side of Block A, and one was located approximately 3 m north of the north side of Block A. Our 3-x-5 m block was positioned between these marked lines. However, soon after overburden removal began, it became evident that additional electrical lines were located within Block A (Figure 8). One old excavation trench, designated Trench 1, was located trending east-west across the middle of Test Units 1, 3, 5, 7, and 9. Trench 1 measured approximately 30 cm wide and contained three electrical lines. Another old excavation trench, designated Trench 2, was located trending east-west across the south halves of Test Units 2, 4, 6, 8, and 10. Trench 2 measured 60 cm wide and contained a 20-cm wide red tile sewer line pipe emplaced by CCC workers in the middle 1930s. A third old excavation trench, designated Trench 3, was located trending east-west across the middle of Test Units 11-14. Trench 3 measured 36 cm wide and contained six electrical lines. Trench 3 was dug ca. 1977 when the electrical lines in Trench 1 (probably installed in the 1960s) stopped working (Lindle Sanders, personal communication 2017). Once the Odyssey excavation exposed electrical lines in Trenches 1 and 3, they were encased in 7-inch plastic tubing and supported throughout the excavation period (Figure 9). The sewer line pipe, which rested on the top of the north bench at 150 cm bd, needed no support.

When the excavations were completed, mesh ground cloth was placed on the north and south benches and at the bottom of the central trench. Six 2017 copper Lincoln pennies in ziplock plastic bags were also placed at the ends of each bench and in Test Units 5 and 7 in the deepest portion of the central trench.

Excavation Results

As noted above, Test Units 2, 4, 6, 8, and 11-14 were excavated to a depth of only 150 cm bd, whereas Test Units (1, 3, 5, and 7) in the central trench were excavated much deeper, with Test Units 5 and 7 extending to a maximum depth of 330 cm bd. At that depth, a six-inch diameter auger was placed in the southwest quadrant of Test Unit 5 and dug to a depth of 388 cm bd before a dolostone boulder was encountered. The fill from the 58 cm deep auger hole was screened, but no artifacts were found.

The base of the cultural deposits in Block A is located at approximately 250 cm bd. Only one flake was found (in Level 27) below this depth. Based on numerous krotovina and root casts in the co-alluvium below 230 cm bd, this lone flake could easily have been displaced from sediments above. For example, at the base of Level 26 of Test Unit 5, approximately 15-20% of the unit's walls consited of krotovina and/or root casts measuring between 2 and 4 cm in diameter. Below 250 cm bd, five levels (50 cm) of sterile sediment were excavated in Test Unit 3 and eight levels (80 cm) of sterile sediment were excavated in Test Units 5 and 7.

A limited analysis was conducted on the artifacts collected from 23CT389. All recovered artifacts were washed and processed, but only a sample was analyzed in detail. These include all bifacial and unifacial piece-plotted chipped-stone tools and a small sample of debitage from Test Unit 7.

Projectile Points/Knives

Thirty-one diagnostic projectile points/knives (PPKs) were recovered from Block A. More than half (51.6%) of the PPKs are Late Paleoindian Dalton points, but one Middle Archaic point, several Early Archaic points, one Late Paleoindian San Patrice point, and one Middle Paleoindian point were also recovered during the Odyssey excavation.

Middle Archaic

One White River point (Figure 10b) was recovered from disturbed overburden deposits. This specimen exhibits relatively wide rounded side notches and a concave base. It was manufactured from Roubidoux quartzite. Side-notched White River points date to the Middle Archaic period ca. 6300-5500 rcybp (Ray 2016:82).

Early-Middle Archaic

One Jakie point was found in overburden deposits. This specimen exhibits an extensively resharpened blade. The stem expands slightly and the base is slightly concave (Figure 10a). Although the stem of the Jakie archetype is expanding and the base is concave, a minority exhibits stems that are only slightly expanding and bases that are only slightly concave (Ray 2016:98). Jakie points date to the terminal portion of the Early Archaic period and the early portion of the Middle Archaic period (Ray 2016:100).

Early Archaic

Ten PPKs are Early Archaic types. Four of these Early Archaic PPKs were recovered from disturbed overburden deposits. Six Early Archaic points that were recovered below the overburden were all found in the southeast portion of Block A between 124 and 239 cm bd. Five Early Archaic PPKs are Searcy points. Three are complete (Figures 10c and e and 12a) and exhibit blades that are steeply beveled on the left side, whereas two are stem fragments (Figure 10d). Three Searcy points were recovered from the disturbed overburden, whereas one Searcy point was found in situ at a depth of 140 cm, and the other was found in situ at a depth of 194 cm bd. The latter specimen appears to have been displaced from deposits above 194 cm. It was found in a diagonal position in the middle of a krotovina that was first noted more than 20 cm above. Two additional contracting-stemmed Searcy points were recovered from backdirt deposits in 1993 (Figure 2c-d).

One Taney point (Ray 2016:126-129) was recovered from a depth of 124 cm bd in Test Unit 15. This specimen (Figure 10f) exhibits a straight stem, slightly concave base, and a blade that is beveled on the left side.

Two Graham Cave points were recovered from Block A. One was found in Test Unit 7 at a depth of 134 cm bd (Figure 12a). However, this point was found at the intersection of two krotovina stains and appears to have been displaced vertically and/or horizontally. The second Graham Cave point (Figure 12c) was found in Test Unit 7 at a depth of 142 cm bd.

One Hardin point was found at a depth of 177 cm bd in Test Unit 5 (Figure 12b). The age of Hardin points is not well known since they have not been recovered from discrete single-component contexts that have been radiocarbon dated (Ray 2016:93). Although an overly long duration range of ca. 10,000-7000 rcybp has been suggested for Hardin (Chapman 1975:249; Justice 1987:51-53), others have suggested shorter ranges of ca. 9800-9000 rcybp (O'Brien and Wood 1998:128) and 8700-8300 rcybp (Ray 2016:94).

One PPK was identified as a Breckenridge point. It was found at a depth of 239 cm bd in Test Unit 14. It exhibits a steep left bevel and has a form nearly identical to that of a Breckenridge point found at the Big Eddy site (Figure 12d) (Ray and Lopinot 2005:274-277). Breckenridge was presented as a poorly defined point type having some Dalton-like attributes (Wood 1963:80). Since then, the Breckenridge type has typically been used as a variant (and presumably descendant) of Dalton (Dickson 1991:46; Morrow 1984:29; Perino 1971:12; Ray and Lopinot 2005:274-277). Primary attributes that appear to distinguish Breckenridge points from classic Dalton points include (1) faint shallow side notches, (2) a wider stem with tangs or ears that are more rounded or squared, (3) a base that is only slightly concave, (4) absence of flutes and limited basal thinning, and (5) blades that are beveled on the left side (Ray 2016:50). Breckenridge appears to be the first large Early Archaic point type that was consistently resharpened on alternate right sides of the blade producing left bevels. Based on radiocarbon ages from above and below a Breckenridge point found at the Big Eddy site (18 cm above the top of a Dalton and San Patrice horizon), Breckenridge was estimated to date to ca. 9700 rcybp (Ray and Lopinot 2005:274-277).

One PPK from disturbed overburden is unidentified as to type. It exhibits broad corner notches, an expanding stem, a straight base, and was heat treated. Two PPKs are unidentifiable fragments of PPKs. However, one distal fragment (from a depth of 107 cm bd) that exhibits serrations and a bevel on the right side of the blade is probably a fragment of a Dalton point.

Late Paleoindian

Two Late Paleoindian point types were recovered from Block A. The bulk of these (n=15) were Dalton points. Dalton artifacts were found in every excavated test unit in Block A except Test Units 11 and 13-15. Six Dalton points were recovered from disturbed overburden (50-99 cm bd) that was redeposited during the construction of the CCC shower house and the excavation and backfilling of three trenches. However, nine Dalton points were recovered from undisturbed in situ deposits below the overburden. Eight of these were found in the northwest part of Block A between 108 and 140 cm bd, whereas one was found in the southeast portion of Block A at 209 cm bd. Five Dalton adzes were also recovered from undisturbed deposits (see below). Four of these were found in the northwest part of Block A between 96 and 147 cm bd, whereas one was found in the southeast portion of Block A at 200 cm bd. The discrepancy between those Dalton artifacts found in a 51-cm thick horizon between 96 and 147 cm in the northwest portion of Block A and the two found at deeper depths (200 and 209 cm) in the southeast portion of Block A may be associated with a cut-and-fill sequence and associated scarp oriented southwest-northeast through Test Units 5, 7, and 8 (see Summary and Conclusions below for interpretations). The concentration of Dalton artifacts between 96 and 147 cm in the northwest portion of Block A is referred to as the Dalton horizon. The weak midden deposit identified in the north wall of Block A at approximately 85-101 cm bd appears to be located at the top of the Dalton horizon.

Dalton points from any large assemblage typically exhibit a wide range of variation in form and physical attributes (Ray 2016:136-139). A Dalton assemblage from the Little Black River area in nearby Butler and Ripley counties demonstates this variability (Price and Krakker 1975:Figures 3-6). A considerable amount of variation is likewise evident in the sample of Dalton points from

Spring Valley. Some are relatively large (wide and long) (Figure 13), whereas others are smaller (Figure 14). Maximum thickness ranges between 6.4 and 9.3 mm. The edges of the stem vary from broad shallow side notches (Figure 14a-d) to lanceolate with little differentiation between the stem and blade other than grinding along the stem (Figure 13a-c and Figure 14e). Bases vary from only slightly concave (Figure 14a-d) to deeply concave or bifurcated (Figure 13a-g). The tangs or corners of the stem may be essentially straight and pointed or flare outward. All of the Dalton points are ground along the sides of the stem and base but to varying degrees. Thirteen exhibit moderate grinding, two exhibit heavy grinding, and one exhibits light grinding. Grinding was concentrated along the sides of the stem and ends of the tangs with less grinding in the concavities. All of the points exhibit basal thinning scars, but only seven specimens exhibit flute scars on one or both faces (e.g., Figure 13c and Figure 14e). The flute scars on the seven Dalton points range between 11.2 and 32.5 mm.

The blades of eight Dalton points exhibit slightly to steeply beveled edges on the right side. The right bevels (as viewed in planview) were produced by multiple resharpenings on alternate left sides of the blade. Five Dalton points exhibit no beveling and were either resharpening bifacially or received limited resharpening before they were broken. The blades of six specimens are serrated, whereas eight are not serrated. None of the Dalton points have burin scars on the stem or blade edges, an attribute commonly found on Dalton points from northeast Arkansas (Goodyear 1974). Two extensively resharpened Dalton points with narrow blades appear to represent Dalton drills and/or awls (Figure 13f-g). Chert was the preferred raw material from which to make Dalton points, although one specimen was made from Roubidoux quartzite (Figure 14e). All of the chert was obtained from local resources (i.e., Gasconade and Roubidoux cherts). None of the Dalton points were intentionally heat treated, although the ears of two specimens appear to have been burned.

Two artifacts attributable to Dalton were recovered from the site when the water line was dug in 1993. One of these is a classic Dalton point (Figure 2a). This specimen, which has a missing tang, exhibits flutes and right bevels on both faces. It was made from the Ellipsoidal variety of Gasconade chert. The other specimen appears to be an aborted late-stage Dalton preform (Figure

2b). It exhibits stacked hinge fractures on one face, and it is not ground along the edges of the stem or the base. It was manufactured from the Dead variety of Roubidoux chert.

A second Late Paleoindian point type was also recovered from 23CT389. Although this specimen resembles a small Dalton point, it is a San Patrice (Hope variety) point (Figure 12d). It was recovered from disturbed overburden deposits. Maximum length is 39.2 mm, maximum blade width is 21.7 mm, and maximum thickness is 6.5 mm. The stem and base are moderately ground, and the sides of the stem are slightly beveled on opposite edges. The blade is not beveled, serrated, or burinated. One face exhibits a long flute scar (22.2 mm), whereas the other exhibits a shallow (7.4 mm) flute scar. One ear or tang is reddened or burned, which is not an uncommon attribute on San Patrice points (Lopinot and Ray 2017). It was made from local Roubidoux chert. A San Patrice (Hope variety) point made from exotic Arkansas novaculite was recovered from the Alley Mill site (23SH83/159) in nearby Shannon County (Ray and Mandel 2015:17-18), and more than 15 San Patrice points were recovered from the Big Eddy site in southwest Missouri (Lopinot and Ray 2010). San Patrice points occur primarily in the Gulf Coastal region of northern Louisiana, eastern Texas, and southern Arkansas; however, they are found occasionally in northern Arkansas and southern Missouri (Ray 2016:108).

Middle Paleoindian

One Middle Paleoindian point identified as Gainey (PP-109) was recovered from Block A. It was found in Test Unit 5 at a depth of 234 cm bd. This specimen is a proximal fragment that appears to have broken in the haft. It exhibits a diagonal snap fracture (Figure 12e). The stem is relatively wide (37.4 mm), and the edges of the stem are slightly excurvate. The base is concave. The stem and basal margins are lightly ground. One face exhibits a wide (19.6 mm) flute scar that extends to the diagonal break but was undoubtedly much longer. The opposite face exhibits a less well-defined flute scar, the proximal portion of which is overridden by three basal thinning scars. The Gainey point was manufactured from local high-quality Gasconade chert (Ellipsoidal variety). One face and one edge are reddened and appear to have been burned unintentionally.

Non-PPK Tools

Fifteen non-PPK tools were recovered from the Dalton horizon. Five of the tools are Dalton adzes (Figure 15) that were recovered from the top, middle, and bottom portions of the Dalton horizon. Two adzes are complete (Figure 15a-b), whereas three are fragments that broke at or near the haft-blade juncture. Two fragments are distal (bit end) halves (Figure c-d), and one fragment is a proximal (poll end) half (Figure 15e). One of the complete adzes (Figure 15b) was recovered near Feature 1. Maximum thickness of the complete adzes ranges between 15.8 and 20.9 mm. The poll (hafted) end or the haft-blade juncture of each adze exhibits moderate to heavy grinding. Four of the adzes appear to have been resharpened frequently since only one specimen exhibits use polish near the blade-haft junction. Two of the adzes were made from local Roubidoux chert, whereas the other three were manufactured from nonlocal Lafayette chert from Crowleys Ridge in southeast Missouri and northeast Arkansas. None of the adzes were heat treated, although one was burned. Dalton chipped-stone adzes were likely used for heavy-duty woodworking, including the construction of dugout wooden canoes (Morse and Goodyear 1973:320). Canoes would have provided a reliable means of transportation in the rugged Current River valley.

Two non-PPK tools are drills. One is a T-drill (Figure 16a) found at a depth of 117 cm bd. This specimen appears to be a post-Dalton (displaced Graham Cave?) drill since Dalton drills have Dalton stems and bases (i.e., expended Dalton points). The other drill is a distal fragment found at a depth of 154 cm bd. Although only a fragment, the bit exhibits a steep right bevel and, therefore, may be a Dalton drill.

Nine end scrapers were recovered from 23CT389 (Figure 17). Five were found in undisturbed deposits. One is a broken point that was reworked into a hafted end scraper (Figure 16d). It was found at a depth of 173 cm bd. The beveled bit edge is moderately polished. The stem of this specimen expands slightly to the base that is concave. The edges of the blade immediately above the stem are broken and battered, making a positive identification difficult. Nevertheless, it is possible that it represents a Breckenridge hafted end scraper.

Two end scrapers were made from exotic Penters chert (Figure 17a-b). One was recovered just above Feature 1 in the Dalton horizon at a depth of 148 cm bd. Two end scrapers were found at depths of 128 and 141 cm bd in Test Unit 15. The remaining four scrapers were found in disturbed (overburden) contexts. Four of the end scrapers retain the platform at the proximal (hafted) end. Of these, three were made from biface flakes (produced via biface thinning) and one was made from a secondary flake (removed from a core).

The final non-PPK tool that was recovered from the Dalton horizon is a denticulate made from a large (70 mm wide) primary flake of Ellipsoidal Gasconade chert. One side of the expanding flake is serrated with seven prominent spurs (Figure 16c). The tips of all seven spurs exhibit modern polish from use. The presumed function of a denticulate was for sawing and cutting soft tissues and/or hard substances such as bone, wood, or antler. Another denticulate and three utilized flakes were recovered from backhoe backdirt piles in 1993 (Jack Ray, personal observation 2017). Although not common at any site, several denticulates were recovered from the Dalton horizon at the Olive Branch site (Gramly 2002:Plate 68).

Preforms

Fifty-one preforms (unfinished tools) were recovered from Block A. These preforms are comprised of two early-stage preforms, 35 middle-stage preforms, eight late-stage preforms, and six late-stage preforms/PPK fragments.

Early-stage preforms were shaped primarily by random percussion flaking. Cortical surfaces may be present on one or both faces. Edges are generally sinuous and cross section is thick (approximately 20+ mm) and irregular. Both early-stage preforms were broken during manufacture.

Middle-stage preforms were produced after successful decortication and moderate thinning of cobble blanks or flake blanks by soft-hammer percussion (Figure 18). Flaking is relatively systematic, biface edges may be sinuous (but less so than early-stage preforms), and cross sections are relatively thin (approximately 8-20 mm). Middle-stage preforms were frequently broken during biface reduction due to flaws in the raw material or manufacturer error. Those that were not broken were aborted for some reason or were lost in the process of reduction. Of the 35 middle-stage preforms that were recovered from 23CT389, 31 (88.6%) failed during preform thinning and consist of proximal, midsection, or distal fragments.

Late-stage preforms represent the final stage of biface thinning and shaping just before the preform becomes a completed tool (Figure 19). Flaking on these preforms is systematic, edges are straight, and cross section is thin (approximately 5-10 mm). Of the eight late-stage preforms recovered from 23CT389, four failed during manufacture and four were aborted. One aborted late-stage preform with a concave base (PP-22) is almost certainly a Dalton preform (Figure 19a). Three other aborted late-stage preforms (Figure 19b-d) and the proximal half of a failed late-stage preform (PP-21) (Figure 19e) also are likely Dalton preforms.

The midsection and distal portions of thin and well-flaked late-stage preforms are often difficult to distinguish from midsection and distal fragments of finished PPKs and have been identified as late-stage preforms/PPK fragments here. Four specimens from 23CT389 that have been identified as late-stage preforms/PPK fragments are depicted in Figure 19f-i). Based on differences in patina, the edges of one specimen (Figure 19f) appear to have been resharpened long after it was originally produced and broken.

Of the above preforms, 32 (58.2%) were recovered from undisturbed deposits in Block A. Twenty-two are middle-stage preforms, seven are late-stage preforms, and three are late-stage preforms/PPK fragments. The presence of these preforms indicates that the manufacture of Dalton and other points was an important activity at 23CT389. An absence of thick early-stage preforms (as well as a relatively small quantity of early-stage reduction flake debitage) indicates that the bulk of raw material testing, initial reduction of cobbles, and early-stage reduction of preforms was conducted at procurement sources such as local gravel bars. Successfully thinned middle-stage preforms, however, were subsequently transported to the Spring Valley site for further reduction and eventual manufacture of Dalton points.

Artifact Refits

All broken bifacial artifacts (i.e., PPKs and preforms) were examined to see if any fit together, and three refits were discovered (Figure 20). The first refit conjoins the proximal and distal halves of a broken Dalton PPK (Figure 20a). The proximal half (PP-54) was recovered from the northwest quadrant of Test Unit 3 at a depth of 131 cm bd, whereas the distal half (PP-30) was recovered from the northeast quadrant of Test Unit 6 at a depth of 113 cm bd (Figure 21). They were separated 2.3 m horizontally and 18 cm vertically. Some or all of the vertical separation may be due to the southward sloping surface of the coalluvial fan.

The second refit conjoins the proximal and distal halves of a broken middle-stage preform (Figure 20b). The proximal half (PP-8) was recovered from the northwest quadrant of Test Unit 1 at a depth of 85 cm bd, whereas the distal half (PP-56) was recovered from the southwest quadrant of Test Unit 13 at a depth of 128 cm bd (Figure 21). They were separated 2.3 m horizontally and 43 cm vertically. The relatively large vertical discrepancy is probably related to deposition on separate landforms with unequal surfaces (i.e., the proximal half was deposited on a higher surface to the north and the distal half was tossed onto a lower surface to the south).

The third refit conjoins proximal and midsection portions of a broken late-stage preform (Figure 20c). The proximal portion (PP-93) was recovered from the southwest quadrant of Test Unit 7 at a depth of 200 cm bd, whereas the midsection portion (PP-91) was recovered from the southwest quadrant of Test Unit 7 at a depth of 199 cm bd (Figure 21). They were separated 40 cm horizontally and 1 cm vertically. Both specimens appear to have been dropped in close proximity on the same living surface. Based on the recovery of a Dalton adze (PP-92) and a Dalton point (PP-93) in the southwest quadrant of Test Unit 7 at approximately the same depths (200 and 209 cm, respectively), this late-stage preform refit may represent a failed Dalton preform.

Debitage

Although no formal analysis was conducted on the debitage from 23CT389, a cursory examination of the collection as it was recovered from the test units and close examination of a sample of 300 flakes from Test Unit 7 revealed that the majority (approximately 75%) of platform-bearing flakes consist of biface flakes indicative of middle-to-late-stage biface reduction. The large number of biface flakes indicates that the thinning of bifacial preforms and the rejuvenation (resharpening) of dulled bifacial tools were the primary flintknapping activities that were conducted at the Spring Valley site. Like the near absence of early-stage performs, the relative small number of primary, secondary, and tertiary flakes and a general lack of core debitage indicates that the majority of decortication and early-stage reduction of chert cobbles and nodules occurred elsewhere, presumably on local gravel bars of the Current River and its tributaries.

Features

Two features were identified during the excavation of Block A; however, neither feature was distinct in appearance or discrete in outline.

Feature 1

This feature consisted of a slight concentration of charcoal, burned sediment, and flakes surrounding a large unmodified quartzite rock in the northcentral portion of Test Unit 5 (Figure 22). This part of Test Unit 5 appears to be in the Dalton horizon. The top of the feature was first noticed at a depth of approximately 143 cm bd and the base was found at a depth of 159 cm bd. The excavation of Trench 2 that contains the sewer line pipe truncated the north edge of this feature. The truncated north-south dimension of Feature 1 is 75 cm, whereas the maximum east-west dimension is 97 cm. However, the darkest (7.5YR 3/4) central (or core) portion of the feature that surrounded the rock was approximately 60 cm in diameter, whereas a lighter (7.5YR 4/3) halo area surrounded the core area. A Dalton adze (PP-67) and an end scraper (PP-69) found near the top of the feature at depths of 147 and 148 cm bd, respectively, may or may not be associated with Feature 1.

Fifty liters of sediments were collected for flotation and the rest was dry screened. Animal and plant materials identified in the flotation samples included several small unidentified calcined bone fragments, deer teeth fragments, and charred fragments of hickory nutshell, walnut shell, acorn shell, grape seeds, and persimmon seeds (Neal Lopinot: personal communication 2017). In addition to the plant and animal remains, the extreme distal end or tip of a PPK was identified in the flotation sample. Under magnification, a bevel is evident on the right side of the blade, indicating that it is most likely a small distal fragment of a Dalton point. This fragment and the possibly associated Dalton adze and end scraper suggest that this feature is probably affiliated with a Dalton occupation.

The function of this scatter of burned sediment and charcoal is uncertain. It may have been a cultural feature such as a hearth or hearth dump. On the other hand, the diffuse nature of the burned sediment and charcoal is similar to deposits made by natural burn features that may have been subsequently altered and dispersed by bioturbation processes. Therefore, the possibility that Feature 1 represents a tree root burn through a light Dalton midden deposit cannot be ruled out.
A sample of charred nutshell from Feature 1 was submitted for radiocarbon assay. This sample yielded a radiocarbon age of 8992±44 B.P. (D-AMS 024886). This radiocarbon age is generally considered to be Early Archaic, although its stratigraphic position in the Dalton horizon suggests that it is associated with a Dalton occupation. Unless the Dalton manifestation lasted an extraordinarily long period of time in the Ozarks, this age appears to be at least 1,000 years too young to be associated with Dalton. It appears more likely that the charred nutshell that was dated was displaced into Feature 1 from younger deposits above via bioturbation processes.

Feature 2
This feature was less evident than Feature 1, but it also consisted of a slight concentration of charcoal and burned sediment that surrounded a pitted stone and a smaller nearby unmodified rock. The feature was located in the northeast quadrant of Test Unit 7 (extended into the east wall of that unit) in the southeast portion of Block A. Maximum width of Feature 2 is unknown since the northern edge also extended into the north bench and unexcavated portions of Test Units 8 and 10. The top of this feature was noted at a depth of 162 cm bd, and the base extended to a depth of 170 cm bd. The base of the feature dipped to the south at approximately 2 degrees, which may represent a relatively gentle slope of the co-alluvial fan surface.

Fifty liters of sediments were collected from Feature 2 for flotation. Animal and plant materials identified in the flotation samples included several small unidentified calcined bone fragments, deer teeth fragments, and charred fragments of hickory nutshell, acorn shell, grape seeds, and persimmon seeds.

The function of this feature is unclear. It may have been a hearth and nut processing station. However, like Feature 1, the possibility that it may be a natural burn feature cannot be ruled out. A sample of charred nutshell from Feature 2 was submitted for radiocarbon assay. This sample yielded a radiocarbon age of 8916±41 B.P. (D-AMS 024887) and may be associated with an Early Archaic occupation (see below).

Raw Material Analysis

Two chert- and quartzite-bearing rock formations (Gasconade and Roubidoux) crop out in the vicinity of Big Spring and nearby Spring Valley Branch. As a result, large quantities of redeposited alluvial cobbles of Gasconade chert, Roubidoux chert, and Roubidoux quartzite are found on gravel bars along the Current River and residual cobbles are present on local ridgeslopes.

Gasconade chert is a rugged chert that occurs in thin and thick beds, in nodules of various sizes and shapes, and in irregular stromatolite masses (Ray 2007:77–79). Much of the chert is of poor knapping quality due to the presence of vugs, quartz druse, and abundant incipient fracture planes. Nevertheless, a small percentage of Gasconade chert (especially chert that occurs in ellipsoidal nodules) exhibits fair to good knapping quality.

Roubidoux chert also is a rugged chert that occurs in the same forms as Gasconade chert. The knapping quality of the vast majority of Roubidoux chert is compromised by the presence of vugs, quartz druse, sand grains, and many incipient fracture planes (Ray 2007:81–83). It is often very difficult to distinguish between Gasconade and Roubidoux cherts due to considerable overlap in the physical characteristics of each. Both Ordovician cherts are essentially nonfossiliferous (with the exception of rare gastropods), and they occur in a variety of colors. Because of these physical similarities, it is often necessary to combine cherts from the Gasconade and Roubidoux formations into a generic Undifferentiated Ordovician chert type (Ray 2007:116).

Roubidoux quartzite is composed of sand grains so tightly cemented by silica that fractures pass through individual sand grains rather than around them. It occurs in bedded deposits, and the matrix is usually white, light gray, or gray (Ray 2007:83). The quartzite is generally homogeneous with relatively few flaws and if strongly cemented approximates the knapping quality of some cherts.

A sample of 300 flakes from Levels 16 and 17 of Test Unit 7 were analyzed as to raw material type. This sample is from the vicinity of Feature 2. All of the flakes were knapped from local chert, quartzite, and rhyolite resources found in the Current River valley (Ray 2007). The vast majority (98.3%) of the flakes were knapped from chert resources. Of these flakes, Gasconade chert comprises 45.3%, Roubidoux chert comprises 35.3%, and the remainder (17.7%) could only be identified as Undifferentiated Ordovician chert (i.e., either Gasconade chert or Roubidoux chert). Local non-chert resources such as Roubidoux quartzite (1.3%) and Aphanitic rhyolite (0.3%) appear to have been utilized only rarely by Dalton and Early Archaic knappers and are considered incidental resources.

A small subsample of Gasconade chert flakes revealed that more than three-quarters are comprised of the Ellipsoidal variety of Gasconade chert. The Ellipsoidal variety occurs in lenticular nodules that have relatively fewer flaws than other varieties, and as a result, it typically exhibits the highest knapping quality (Ray 2007:79). Although generally of high quality, nodules of Ellipsoidal Gasconade chert are relatively scarce in gravel bars of the Current River. Nevertheless, a concerted effort must have been made to procure these scarce nodules by Dalton and Early Archaic knappers.

Of 67 preforms and tools that were collected from Block A, the vast majority (86.6%) were made from either Roubidoux chert or Gasconade chert. Only two were made from Roubidoux quartzite. Although no extralocal resources were identified in the sample of flake debitage referred to above, six tools were manufactured from extralocal resources. Two end scrapers (Figure 17a-b) and one Searcy projectile point/knife (Figure 12a) were made from exotic Penters chert (Variegated variety) found along the Ozarks Escarpment in Independence County, northeast Arkansas (Ray 2007:122-131), approximately 125-150 km to the south-southwest of

23CT389. Three Dalton adzes (Figure 15b-c and e) were manufactured from nonlocal Lafayette chert found on Crowleys Ridge in southeast Missouri and northeast Arkansas more than 70 km to the east and southeast. Elongated and slightly flattened chert cobbles found in the redeposited gravels of the Lafayette Formation on Crowleys Ridge (Ray 2007:311-315) provided ready-made preforms for the manufacture of adzes. An adze was easily made by simply removing all or most of the cortical surface.

In addition to the above resources, two artifacts (one failed middle-stage perform fragment and the distal fragment of a probable projectile point/knife) were made from unidentified cherts. Although not confirmed, the white and light gray raw material of the distal PPK fragment (Figure 19g) might be fine-grained novaculite from southwest-central Arkansas.

Radiocarbon Assays

Five charcoal samples from Block A were submitted for AMS radiometric dating (Table 2). Also, a sample of what initially appeared to be wood, the deepest sample collected from Block A at 289 cm bd, was determined to be mostly sediment and was not dated. The two radiocarbon ages determined on charcoal samples collected from Features 1 and 2 (8992±44 and 8916±41 B.P.) were described above.

The fourth radiocarbon sample was collected from Test Unit 2 at a depth of 99 cm bd, which is in the lower portion of the light midden deposit at the top of the Dalton horizon. A small piece of charred nutshell from this area yielded a radiocarbon age of 9214±43 B.P. (D-AMS 024890). Although collected from the highest elevation in Block A, this sample yielded the oldest of four radiocarbon ages.

The fifth radiocarbon sample (D-AMS 024888) of charred nutshell was collected from a depth of 236 cm bd in close proximity to the fluted Gainey point and not far above the base of the cultural deposits. This sample yielded an Early Archaic age of 8283±38 B.P. (D-AMS-024888). Although collected from the lowest elevation in Block A, it yielded the youngest of the four radiocarbon ages. This small sample of charred nutshell apparently was displaced from much younger sediments far above 236 cm bd.

Summary and Conclusions

Significant portions of the Spring Valley site have been disturbed by historic activities since the 1930s. Although the exact amount of disturbance is unknown, it appears that the upper 2 m of the pre-CCC era co-alluvial fan at the mouth of Spring Valley were removed during the construction of the CCC shower house. This truncation is supported by the absence of any diagnostic Late Prehistoric, Woodland, or Late Archaic artifacts from the remaining portion of the co-alluvial fan. The construction of an access road to the shower house by CCC workers in the 1930s and subsequent excavation of two trenches for electrical lines resulted in the accumulation of overburden that is 55 and 75 cm thick across all of Block A (Figures 23-25). The excavation of a deep sewer line trench in the 1930s and a deep water line trench in 1993 also created localized disturbances to depths of 140-150 cm and 180 cm, respectively. These disturbances apparently mixed all of the Middle Archaic and Early Archaic deposits and possibly portions of the uppermost Late Paleoindian deposits across the northwest portion of Block A.

Despite these disturbances, the Odyssey excavations at the Spring Valley site revealed the presence of buried Late Paleoindian deposits (below the disturbed overburden) in the northwest portion of Block A and deeply buried Early Archaic and Late Paleoindian deposits in the southeast portion of Block A. Directly below the disturbed overburden in the northwest portion of Block A are intact deposits that comprise an approximately 50-cm-thick Dalton horizon. Dalton occupations appear to have been frequent and extended over a long period of time. Dalton points comprise more than half of all PPKs that were recovered from Block A (disturbed and undisturbed contexts). Dalton points and Dalton adzes also comprise 81.3% of the 16 diagnostic artifacts that were recovered from undisturbed contexts. The Spring Valley site appears to have functioned primarily as a seasonal or short-term field camp during Dalton times. Several small, localized concentrations of chipped-stone artifacts generally measuring only 1.0-1.5 m in diameter were noted along the north bench (Test Units 2, 4, 6, and 8) between 80 and 150 cm bd and in the central trench (Test Units 1, 3, 5, and 7) between 100 and 200 cm bd. However, no discrete artifact concentrations were noted along the south bench (Test Units 11-14).

In addition to the Dalton component at Spring Valley, a contemporaneous Late Paleoindian San Patrice component is represented by a Hope variety of San Patrice dart point. Although not common, San Patrice points are found at sites across southern Missouri (Lopinot and Ray 2010; Ray 2016:108). One Hope variety of San Patrice PPK was recovered from the Alley Mill site on the Jacks Fork River (Ray and Mandel 2015:17-18). The presence of San Patrice in Ozark National Scenic Riverways appears to be related to occasional forays into a northern frontier area and interaction (e.g., trade) between nonlocal (San Patrice) and local (Dalton) contemporaneous groups.

Based on the recovery of one fluted Gainey point fragment from a depth of 234 cm bd and a light scatter of flakes to 250 cm, it appears that a Middle Paleoindian component is the oldest occupation that is represented in the vicinity of Block A. Unfortunately, there is no evidence from Block A for Clovis or pre-Clovis occupations between 250 and 330 cm bd (sterile deposits).

Although intact deposits across the northwest portion of Block A yielded only Dalton artifacts between 96 and 147 cm bd, several Early Archaic points were found in the southeast portion of Block A between 124 and 239 cm bd. The presence of multiple Early Archaic point types (including Breckenridge, Hardin, Graham Cave, Searcy, and Taney) at deeper depths in the southeast portion may be due to at least two factors. Significant bioturbation appears to be responsible for the displacement of some artifacts and charcoal samples. Bioturbation processes such as rodent burrows and tree throws can displace artifacts more than a meter. Specifically, (1) at least one Graham Cave point and one Searcy point were found in obvious krotovina, (2) an Early Archaic Breckenridge point was found 5 cm below the Middle Paleoindian Gainey point in the deepest cultural deposits, and (3) the four AMS radiocarbon ages are in reverse stratigraphic order.

As previously noted, four radiocarbon ages are in reverse chronostratigraphic order and, therefore, are problematic. The deepest sample (236 cm bd), collected between the Gainey point and the Breckenridge point, produced the youngest (middle Early Archaic) of the four samples.

This small piece of nutshell was clearly out of context and displaced from a much higher location.

Two radiocarbon samples from Features 1 and 2 at slightly different depths and possibly on separate landforms produced overlapping radiocarbon ages slightly younger than 9000 ^{14}C yr B.P. Several explanations may account for these problematic ages. First, both samples of charred nutshell could have been displaced from younger Early Archaic sediments from above and, therefore, the ages do not reflect the actual age of the surrounding sediments and associated artifacts. Second, the nutshell sample from Feature 1 (located on the west side of the proposed southwest-northeast oriented scarp) could have been displaced from upper sediments, whereas the nutshell sample from Feature 2 (located on the east side of the proposed southwest-northeast oriented scarp) could have been recovered from an in situ context. If so, the radiocarbon age of 8916±41 B.P. from Feature 2 would match expected ages of the *in situ* Early Archaic points found in the southeast portion of Block A, i.e., successively younger Graham Cave and Taney points above Feature 2 and successively older Hardin and Dalton points below Feature 2.

Third, samples of charred nutshell from both Features 1 and 2 could have been recovered from in situ contexts. If so, the radiocarbon age of 8992±44 B.P. from Feature 1 would indicate that the sample that yielded an older radiocarbon age of 9214±43 B.P. from a much higher stratigraphic context (i.e., within the light midden deposit at 99 cm bd) was displaced upward perhaps 75 cm or more. If the charcoal sample from Feature 1 was in situ, its stratigraphic position at the base of the Dalton horizon would also suggest that the bulk of the Dalton occupations were considerably younger than 8992±44 ^{14}C yr B.P. Dalton occupations in the Ozarks have generally been placed at 10,500-9800 ^{14}C yr B.P. (Goodyear 1982; Lopinot and Ray 2010; O'Brien and Wood 1998; Ray 2016:139). Unless the Dalton manifestation lasted an extraordinarily long period of time in the Ozarks (approximately 2,500 years considering the radiocarbon plateau), this age appears to be at least 1,000 years too young to be associated with Dalton.

On the other hand, some (e.g., Wyckoff 1985; Kay and Hilliard 2017) believe that the Dalton manifestation lasted to approximately 9200 ^{14}C yr B.P. However, the stratigraphy at the Packard site and especially at the Breckenridge site, also appear to be problematic (Ray and Lopinot

2005:281). In any event, if the sample from Feature 1 was in situ, Dalton occupations would be even younger than 9200 ^{14}C yr B.P. This would also imply that Dalton points are coeval with Early Archaic point types such as Scottsbluff, Thebes, St. Charles, Hardin, Cache River, and perhaps even Graham Cave and Rice Lobed. If so, then Dalton points should be found in association with these point types. However, at most sites that contain discrete Dalton deposits (e.g., Sloan, Brand, and Leopold), only Dalton points have been recovered (Goodyear 1974; Morse 1997; Price and Krakker 1975). At the Big Eddy site, Late Paleoindian San Patrice points were found in the same horizon as Dalton points (Lopinot and Ray 2010).

The radiocarbon age of 9214±43 B.P. determined on charred nutshell from the top of the Dalton horizon also could have been displaced from a higher stratigraphic context. On the other hand, it could have been recovered from an in situ context. If the latter is true, it would indicate that (1) the charcoal sample from Feature 1 was displaced from sediments located above the Dalton horizon, and (2) the radiocarbon age of 9214±43 B.P. dates the end of a very long Dalton manifestation in the Ozarks.

Based on available data and associated stratigraphic contexts, it appears likely that the dated sample from Feature 1 and the sample from near the base of the cultural deposits (i.e., 236 cm bd) were displaced from sediments above via bioturbation. Although also suspect, it could be argued that the remaining two dated samples (from the top of the Dalton horizon and from Feature 2) were collected from undisturbed in situ contexts.

In sum, it is clear that extensive bioturbation has compromised the integrity of some of the cultural deposits, especially very small fragments of charcoal. Hence, it is uncertain if the radiocarbon ages from 23CT389 are associated with the Dalton component or with younger Early Archaic components, such as Breckenridge, Hardin, or Graham Cave. Additional excavations and an additional suite of radiocarbon samples might help clarify the ages of the cultural deposits at the Spring Valley site. However, additional excavations appear unlikely given the narrow remnant of the co-alluvial fan at the site and the logistical complications created by the presence of live electrical cables.

Regardless of the problematic radiocarbon ages obtained from Block A, it is clear that the co-alluvial fan at 23CT389 was a favorable area to inhabit during Paleoindian and Early Archaic times. It is the closest relatively high and stable landforms to one of the largest freshwater springs in the world: Big Spring. Many activities were conducted at the site, such as flintknapping, hunting, gathering, processing plant and animal resources, heavy duty woodworking (including the construction of canoes), drilling, and hide processing. Food resources consumed include deer, nut resources such as hickory, walnut, and acorn, and wild grape and persimmon seeds. Chipped-stone tools were made primarily from locally available Gasconade and Roubidoux chert cobbles selected primarily from nearby gravel bars. Finally, most of the flint knapping that was conducted on site consisted of the reduction of middle-to-late-stage preforms and the resharpening/rejuvenation of dulled edges of projectile points, knives, and other finished bifacial tools.

Based on previous investigations in Ozark National Scenic Riverways and elsewhere, large springs may have been a focal point for the Dalton culture in the Ozarks. In addition to Spring Valley just below Big Spring, a substantial Dalton component was documented at the Alley Mill site next to Alley Spring (Lynott et al. 2006; Ray and Mandel 2015), and a Dalton component may have been present at Round Spring (Haslag 1959:8). A Dalton component was also likely to have been present at Boney Spring in southwest Missouri (Bruce McMillan, personal communication 2017).

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Table 1. Coordinates and Ending Depths of Test Units 1-17.

Test Unit Number	Grid Coordinates	Ending Depth (cm bd)
1	96.3N, 112E	210
2	97.3N, 112E	150
3	96.3N, 113E	300
4	97.3N, 113E	150
5	96.3N, 114E	330
6	97.3N, 114E	150
7	96.3N, 115E	330
8	97.3N, 115E	150
9W1/2	96.3N, 116E	50
10	97.3N, 116E	100
11	95.3N, 112E	150
12	95.3N, 113E	150
13	95.3N, 114E	150
14S/12	95.3N, 115E	150
14NE	95.3N, 115E	200
14NW	95.3N, 115E	250
15	94.6N, 116E	150
16	94.6N, 117E	150
17N1/2	97.3N, 111E	130
17S1/2	97.3N, 111E	70

Table 2. Radiocarbon Ages Determined on Samples from Block A.

Lab No.	Provenience	Depth	Sample Type	Radiocarbon Age
D-AMS 24886	Feature 1, TU-5NE	138-150 cm bd	Nutshell	8992 ± 44
D-AMS 24887	Feature 2, TU-7NE	150-170 cm bd	Nutshell	8916 ± 41
D-AMS 24888	TU-5SE	236 cm bd	Nutshell	8283 ± 38
D-AMS 24890	TU-2NE	99 cm bd	Nutshell	9214 ± 43

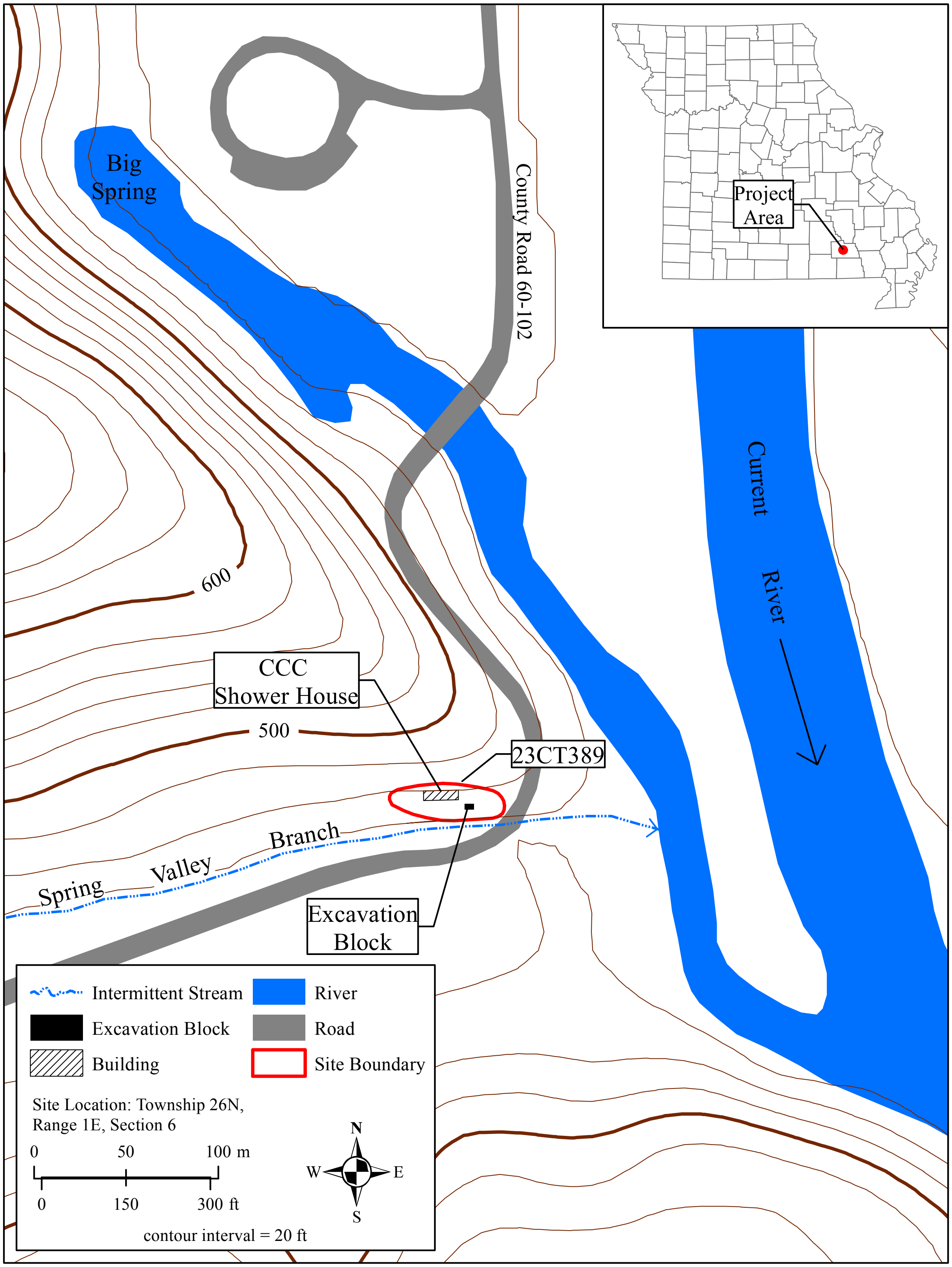

Figure 1. Location of the Spring Valley site in relation to Spring Valley Branch, Big Spring, and the Current River.

Figure 2. Selected artifacts collected from Spring Valley site in 1993: (a) Dalton point, (b) late-stage Dalton preform, (c-d) Searcy points, (e) late-stage preform, and (f) distal fragment of Dalton adze.

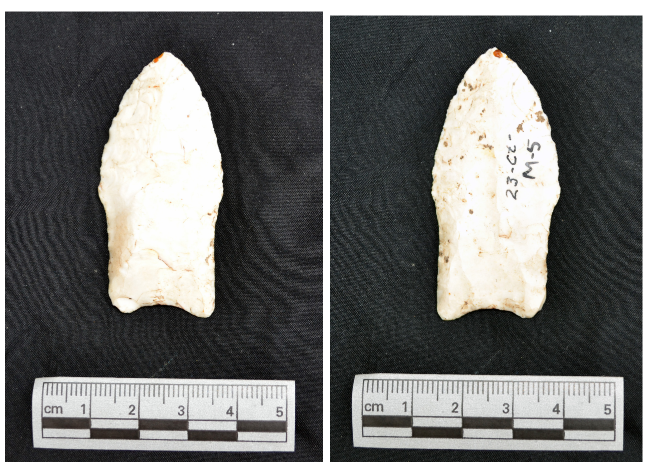

Figure 2g. Obverse and reverse sides of reported fluted "Clovis" point recovered by Leo Anderson from 23CT389 in the 1930s. Appears to be a fluted Dalton point.

Figure 3. CCC shower house/restroom (above) (view to northwest) and narrow coalluvial fan truncated by CCC construction (below) (view to east).

Figure 4. Disturbed overburden (55-60 cm thick) overlying Bt horizons (including a light midden deposit 24-40 cm below base of overburden) in north wall of Block A (above), and multiple Bt horizons in north wall of central trench (below).

Figure 5. Residual dolostone boulders (from adjacent ridgeslope) in Test Units 5 and 7 at 330 cm bd.

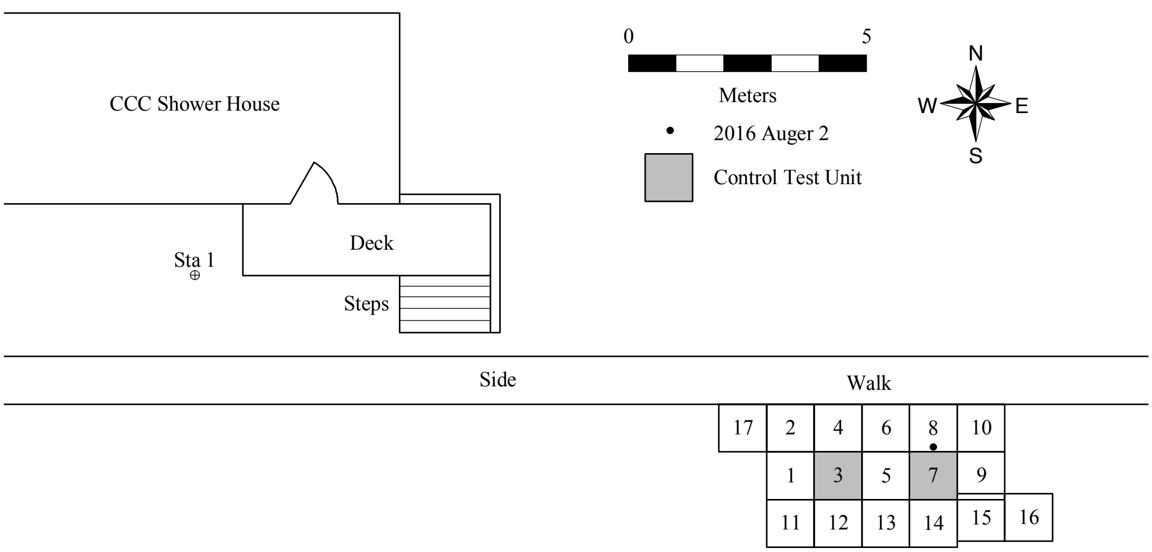

Figure 6. Location of Block A (Test Units 1-17) in relation to CCC shower house and side walk.

Figure 7. Central trench (Test Units 1, 3, 5, and 7) in Block A at 320 cm bd (view to west).

Figure 8. Electrical cable lines in Trenches 1 and 3 in central and southern portions of Block A (view to west).

Figure 9. Electrical cable lines (right), sewer line (left), and water line (upper left) in Block A (view to east).

Figure 10. Diagnostic projectile points/knives: (a) Jakie, (b) White River, (c-e) Searcy, and (f) Taney.

Figure 11. Diagnostic projectile points/knives: (a and c) Graham Cave, (b) Hardin, and (d) Breckenridge.

Figure 12. Diagnostic projectile points/knives: (a) Searcy, (b-c) Dalton, (d) San Patrice (Hope variety), and (e) Gainey.

Figure 13. Dalton points with deeply concave (bifurcated) bases.

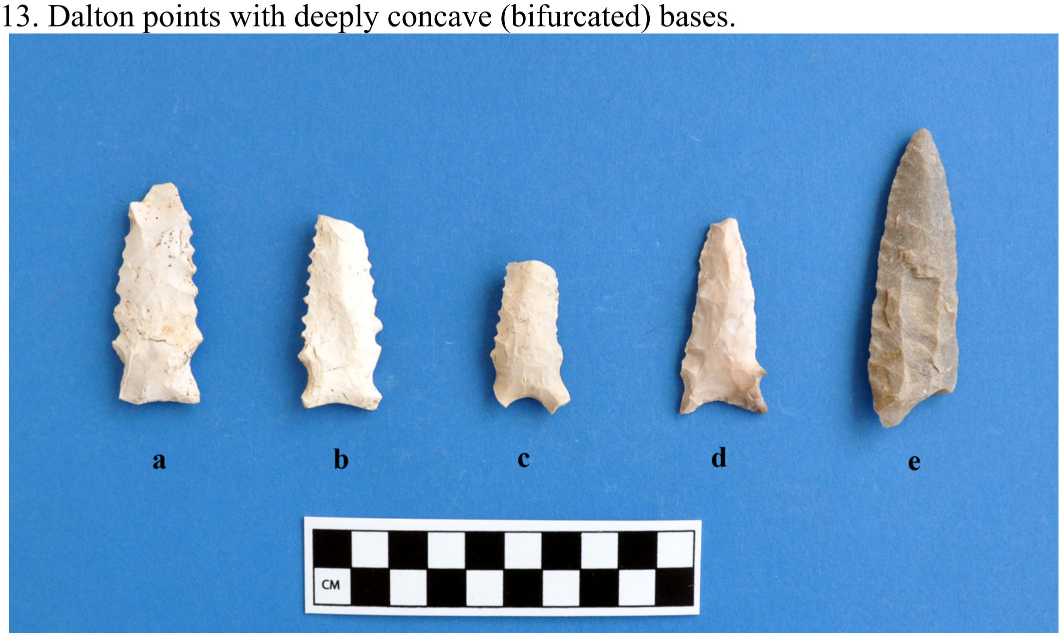

Figure 14. Dalton points with slight-to-moderate concave bases.

Figure 15. Dalton adzes: (a-b) complete adzes, (c-d) distal (bit) fragments, and (e) proximal fragment.

Figure 16. Chipped-stone tools: (a-b) drills, (c) denticulate, and (d) hafted end scraper.

Figure 17. End scrapers.

Figure 18. Failed middle-stage preforms: (a) distal fragments, (d, f-g) proximal fragments, and (e) refit.

Figure 19. Late-stage preforms (a-e) and distal fragments of projectile points/knives (f-i).

Figure 20. Refit specimens: (a) Dalton point, (c) failed middle-stage preform, and (d) failed late-stage preform.

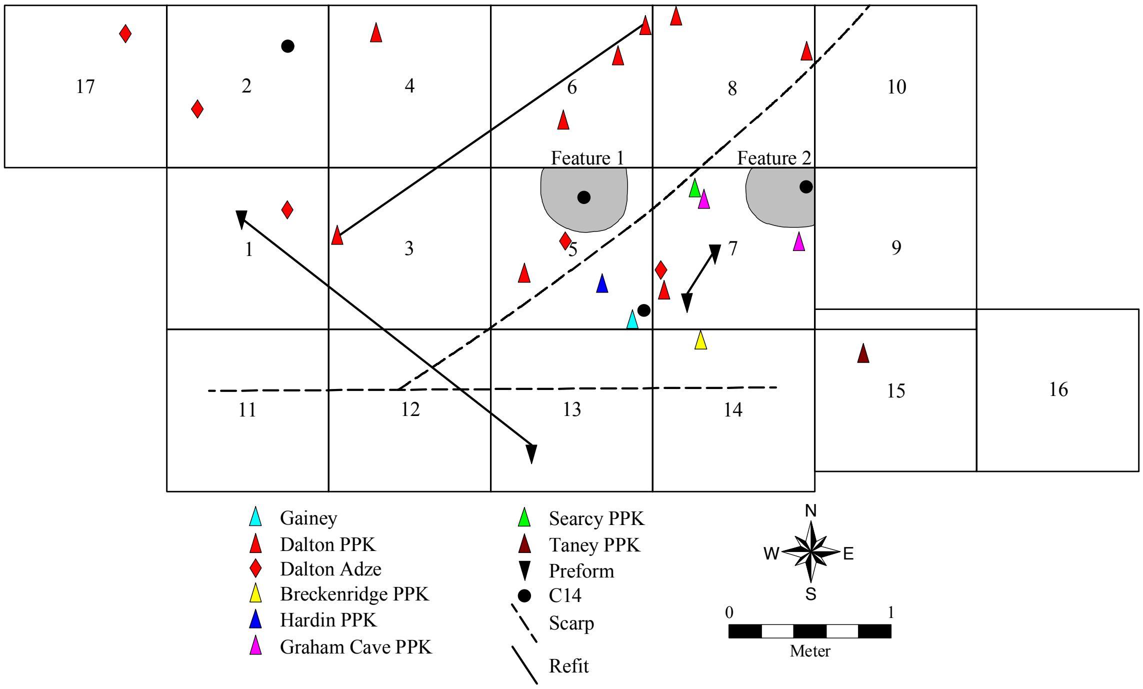

Figure 21. Locations of diagnostic projectile points/knives, radiocarbon samples, Features 1 and 2, refit specimens, and possible cut-and-fill scarps.

Figure 22. Feature 1 in Test Unit 5 at 150 cm bd.

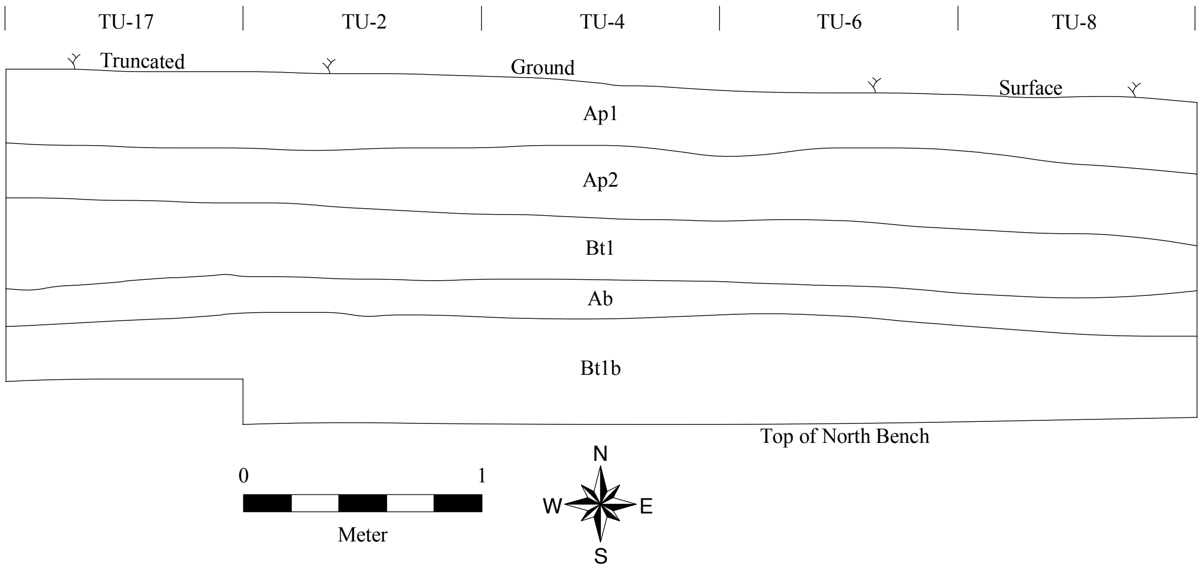

Figure 23. North wall profile of Block A.

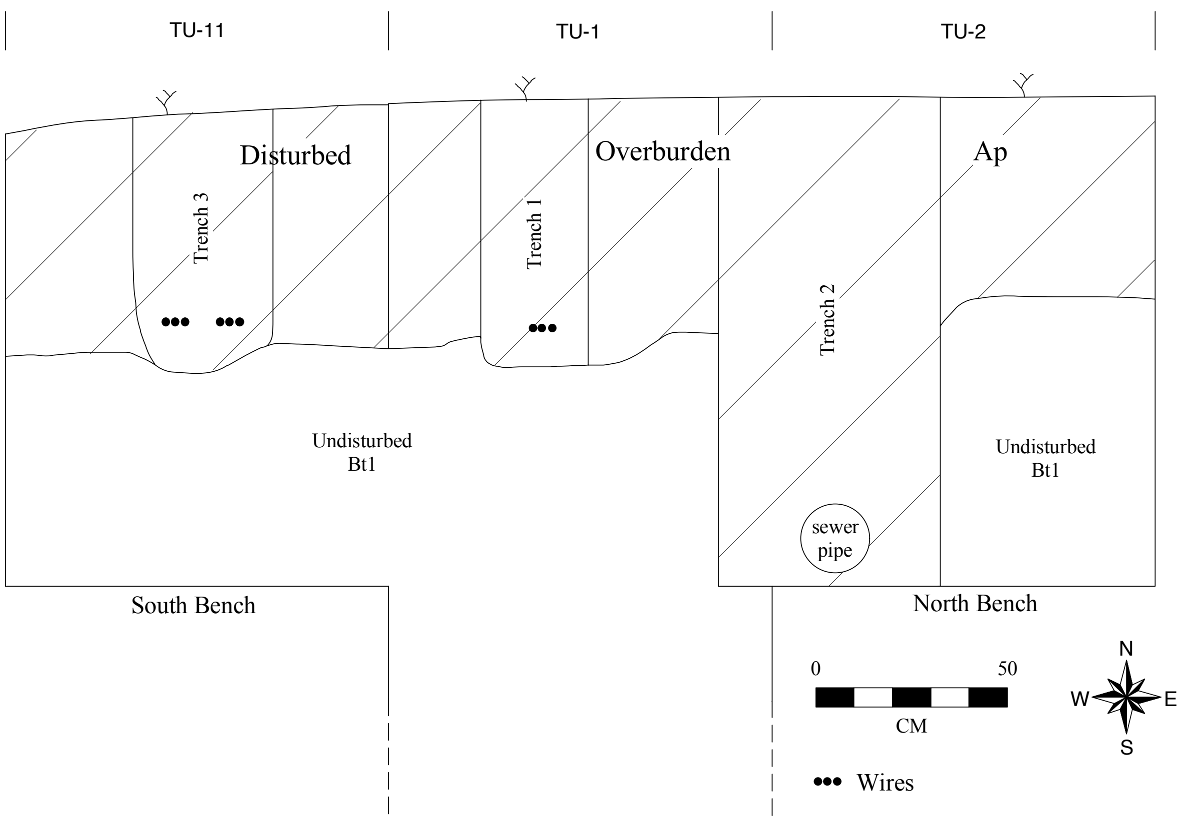

Figure 24. West wall profile of Block A.

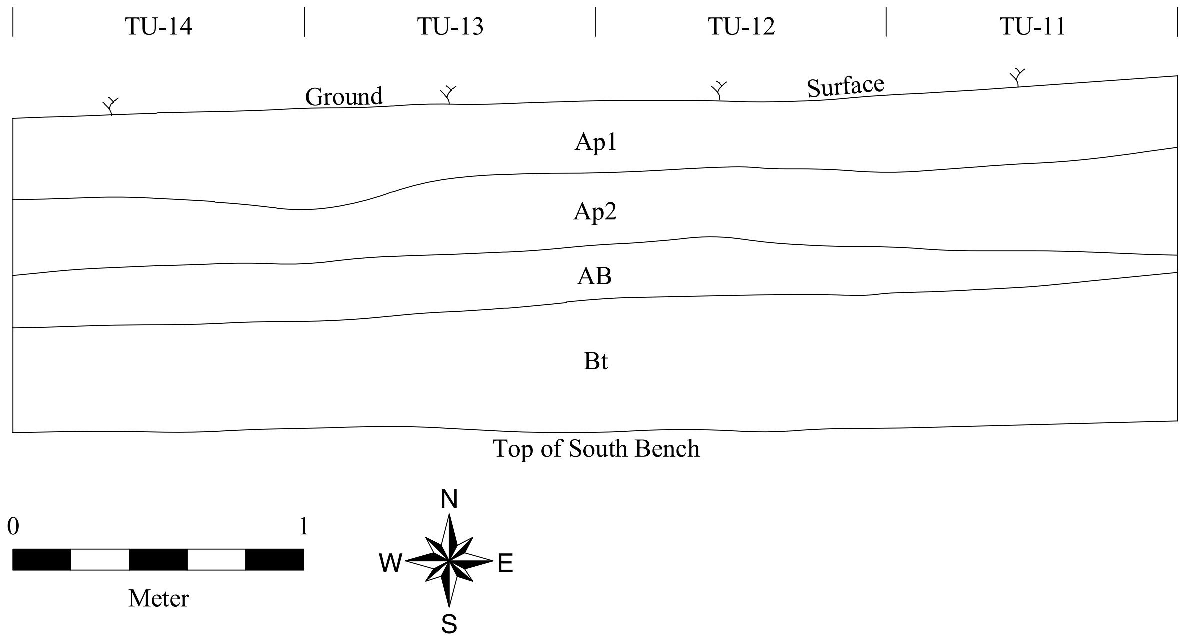

Figure 25. South wall profile of Block A.

Test Excavations at the Classen Ranch, Meade County, Kansas

Laura R. Murphy

Introduction

The Classen Ranch is located in Meade County, Kansas, approximately 15 miles south of the town of Meade in the High Plains physiographic region (Figure 1). Sand Creek, a low-order tributary of the Cimmaron River meanders through the Classen Ranch exposing thick late-Pleistocene and Holocene sediments and soils. While dry most of the year, portions of Sand Creek remain perennially wet from Ogallala aquifer spring outflow (Figure 2). The modern land cover consists mostly of short grasses, but near the springs, shrubby vegetation and trees grow. Currently, the ranch is used for cattle grazing, with several oil pump jacks in operation. Both cattle trails and oil access roads have exposed fragments of paleontological remains over the years.

Meade County has a rich history of Pliocene-Pleistocene paleontological investigations since the early 20th century, including many years of investigation by Claude Hibbard, a former paleontologist at the University of Kansas Museum of Natural History. In the early 1970s, Hibbard, then a faculty member at the University of Michigan, along with his students, were involved in paleontological work on the Classen Ranch. Hibbard documented a mastodon skull as having been potentially altered by humans based on its orientation. At that time, landowner Ralph Classen and a local high school science club placed the skull in plaster and surrounded it with burlap. Odyssey conducted ten days (July 24-August 2, 2017) of survey and test excavations in an attempt to relocate this particular mastodon skull. Moreover, the Odyssey team used this opportunity to assess the potential for Early Paleoindian and Pre-Clovis archaeological sites along Sand Creek.

Methodology

Prior to archaeological testing at the Classen locality, ground-penetrating radar was used to locate the buried mastodon skull. However, the soils were too silty for this geophysical method to be effective.

During Odyssey's 10-day session at the Classen Ranch, the crew used a combination of pedestrian surface survey, bucket augering, shovel tests, and test units, and described and sampled two Sand Creek cutbank exposures. First, Laura Murphy and Paige Englert conducted pedestrian surface survey across a portion of the ranch to look for any surface evidence of megafauna or cultural remains, and to locate areas for potential testing (Figure 3). Based on the initial survey as well as and guidance by Ralph Classen, three areas of greatest potential for relocation of the mastodon skull were selected: A, B, and C. Transects of 3¼-inch bucket auger tests (ATs) were placed 1 or 2 m apart for a total of 107 auger tests excavated in the three areas, each dug to its maximum depth of 2 m unless it was certain sterile soil was encountered first (Figure 4). In addition to the auger tests, one 1x2 meter test unit (TU-1) was placed in Area A (excavated in 10 cm levels), and four shovel tests (STs), three 30x30 cm STs, and one 50x50 cm ST, were placed in Area B (Figure 5).

During survey, Murphy located cultural material, including chipped stone, fire-cracked rock (FCR), and bone in a cutbank exposure of Sand Creek (Soil Profile 2, Figure 6). These materials were mapped and collected within a buried soil (Ab horizon) 34-56 cm below the land surface. A 1x2 m test unit (TU-2) was placed directly east of the cutbank on the land surface to test for additional cultural material (Figure 7). TU-2 was excavated in 10 cm levels to 80 cm below surface (8 levels). In addition, Murphy described the cutbank soil profile (Soil Profile 2) at this location and one additional location (Soil Profile 1), and sampled the soils by horizon for potential radiocarbon dating and paleoenvironmental analyses.

All auger and shovel tests, test units, soil profiles, and cultural features and artifacts were mapped by hand and with a Real Time Kinematic (RTK) TopCon HiPer V Global Navigation Satellite System (GNSS) with 2 cm accuracy. Soils and sediments were removed from the bucket auger and checked for bone fragments and cultural materials; notes were taken on general soil color, texture, and depths. All soils and sediments excavated from shovel tests and test units were dry-screened on site with a ¼-inch mesh. All bone fragments and cultural materials recovered from the screen were collected and bagged for future analysis. In addition, 2 bulk samples were collected from TU-2 for flotation.

Results

In Areas A-C, all 107 auger tests, shovel tests, and TU-1 were negative for megafauna remains and cultural material. Most auger tests exhibited a package of fine-grained silt loam loess overlying lacustrine (clay-rich) deposits. The exposed lacustrine deposits in the north wall of TU-1 were sampled for potential paleoenvironmental analysis. The crew was not able to relocate the mastodon skull.

Surface survey did not yield any additional cultural materials or faunal remains on the ground surface, covered primarily by short grasses (80%) with approximately 20% visibility in exposed cattle trails. During survey, the areas at Soil Profiles 1 and 2 both contained buried bone fragments; bone fragments, one biface, and FCR were collected from Soil Profile 2 (Figure 8).

At TU-2, near Soil Profile 2, the crew uncovered one diffuse feature (Feature 1) of bone fragments, shell, and charcoal at level 7 (61 cm below test unit surface). The items expanded across the 1x2 m unit; a krotovina (~ 4 cm diameter) bordered the feature on the north and west sides. Feature 1 concentrated into a discrete feature (Feature 2) in level 8 that contained a chert flake, fire-cracked rock, charcoal, hackberry seeds, mussel shell fragments, numerous burned bone fragments, a small herbivore tooth, and a small pronghorn-sized mandible (Figure 9). The feature was mapped by hand and with the Topcon HiPer V. This feature corresponds in elevation to the cultural materials exposed within the buried soil at Soil Profile 2. Analyses of the spatial data, cultural remains, and soils recovered from this feature are ongoing.

Summary and Conclusions

Based on the history of paleontological investigations, Pliocene-Pleistocene remains are abundant on the Classen Ranch, including mastodon remains from unknown or disturbed contexts. Lack of precise location data of the reported mastodon skull by Claude Hibbard hindered rediscovery – no testing in the probable areas yielded any evidence of megafauna remains. However, the Classen Ranch has potential to contain *in situ* archaeology as demonstrated by the buried feature in Test Unit 2 in a soil likely contemporaneous with the mid-Holocene Beaver Creek paleosol documented elsewhere throughout the High Plains of western

Kansas. Future radiocarbon dating on the soil organic matter and paleoenvironmental analysis could bear out similarities to other transitional Pleistocene-Holocene environments of western Kansas. At this time, pending Carbon-14 ages and the exposure of additional cultural material associated with older late-Pleistocene remains, no further Odyssey work is planned for the Classen Ranch at this time.

Figures

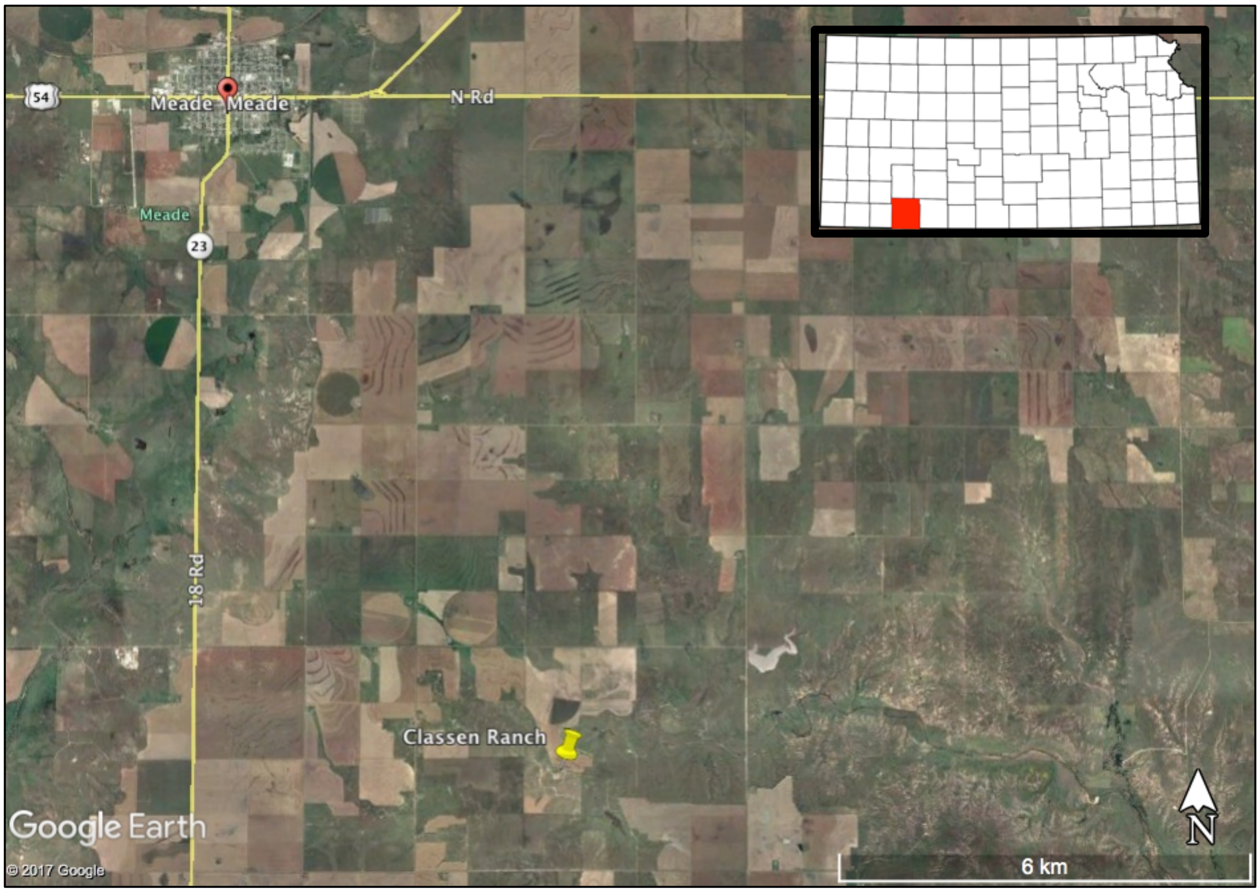

Figure 1. Map of the Classen Ranch in Meade County, Kansas, in relation to the town of Meade, Kansas.

Figure 2. View to the west of Classen Ranch landscape within the survey area and the Sand Creek draw with spring-fed water. Soil Profile 1 is in the foreground, and tested areas A-C are in the background.

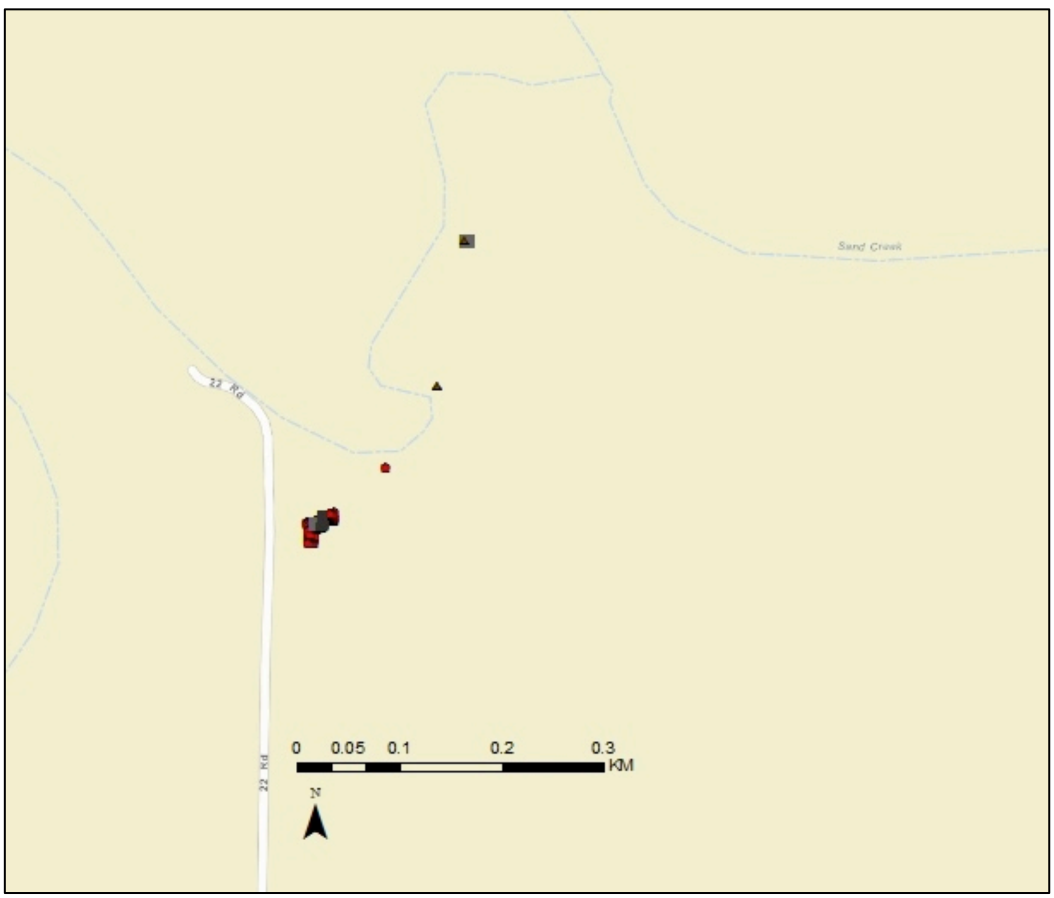

Figure 3. Portion of the Classen Ranch along Sand Creek. Map extent covers the pedestrian survey area.

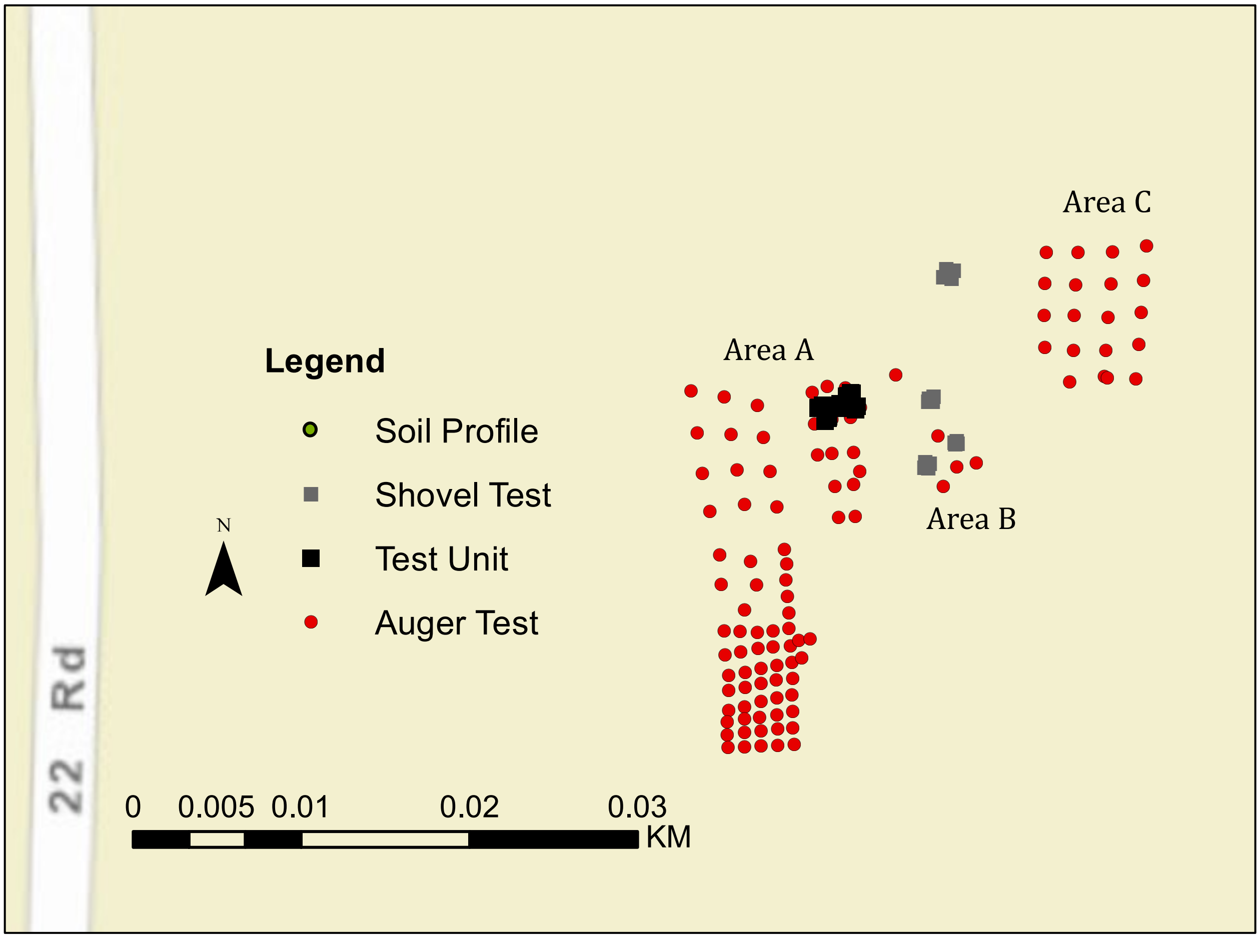

Figure 4. Testing areas for the mastodon skull: A, B, and C with auger tests depicted in red, Test Unit (TU-1) in black, and four shovel tests in gray.

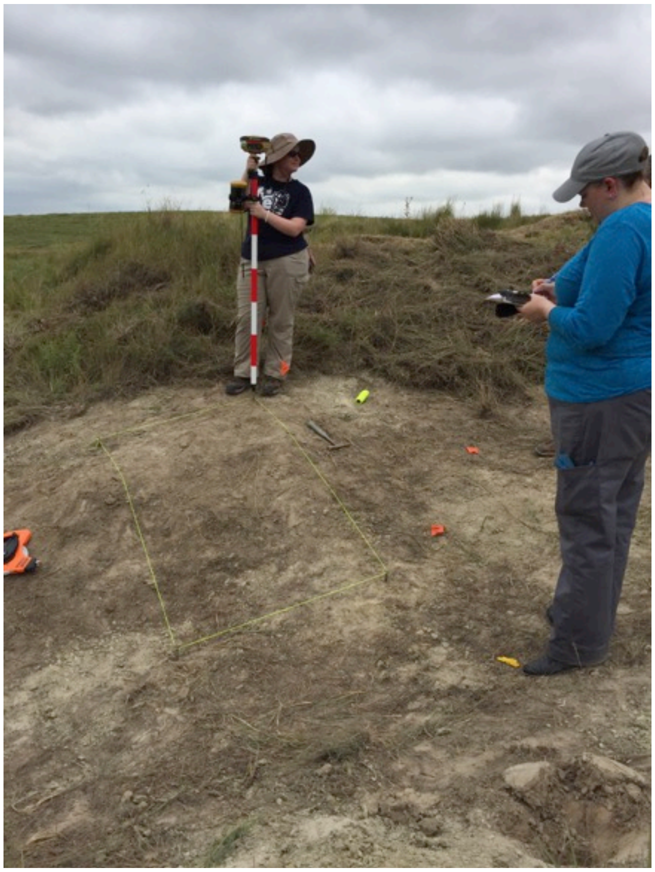

Figure 5. Washburn University volunteers Adrianna Hendricks and Lori Holstrom digitally map the location of TU-1, a 1x2 meter test unit in Area A. View to the east.

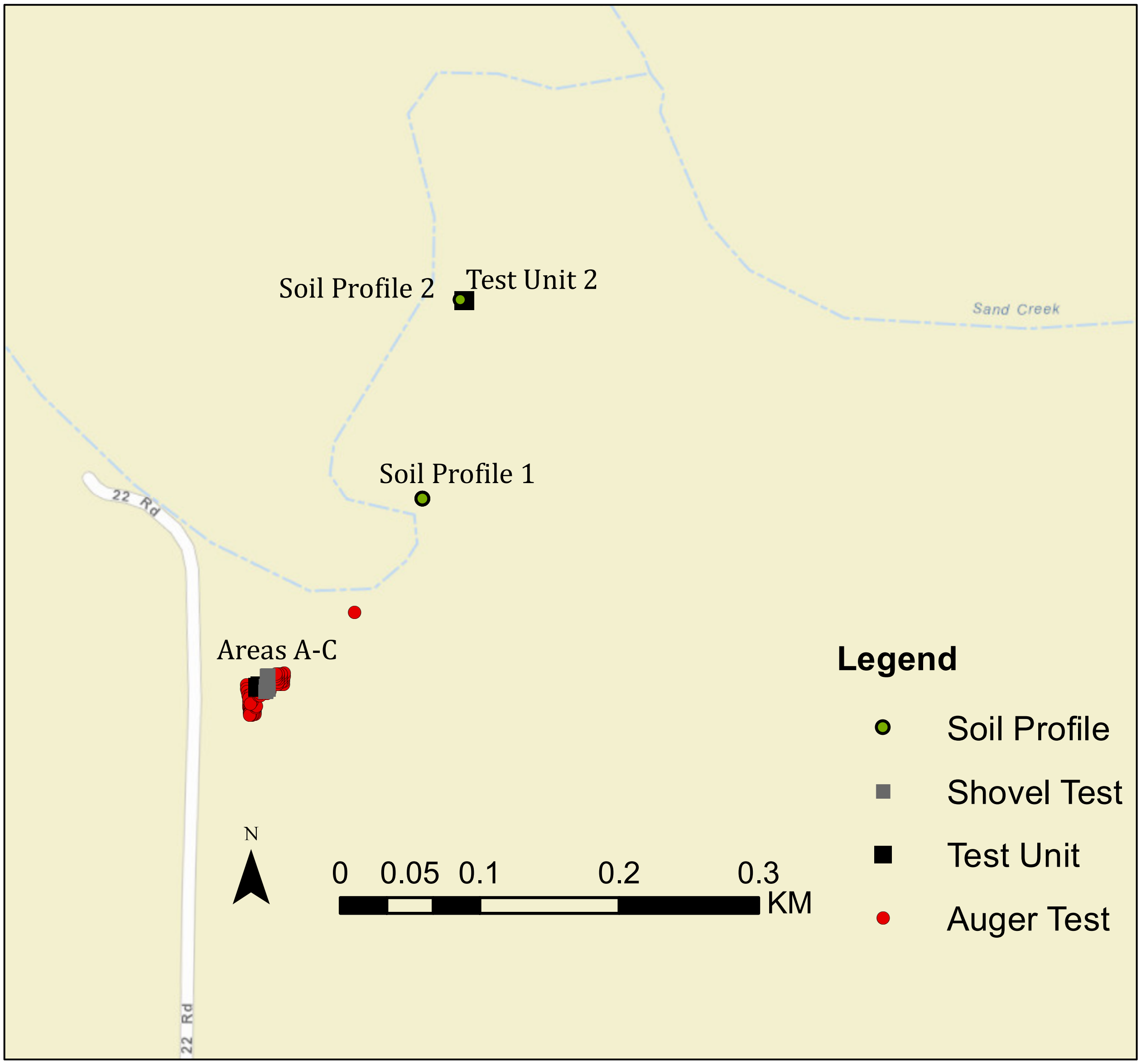

Figure 6. Soil Profiles 1 and 2 and Test Unit 2 (TU-2) in relation to Areas A, B, and C.

Figure 7. Washburn University volunteer Daniel Hougland excavates TU-2, a 1x2 meter test unit adjacent to Sand Creek, with help from local Meade, Kansas, volunteers Norman Dye and Aidan Miller. View to the northwest.

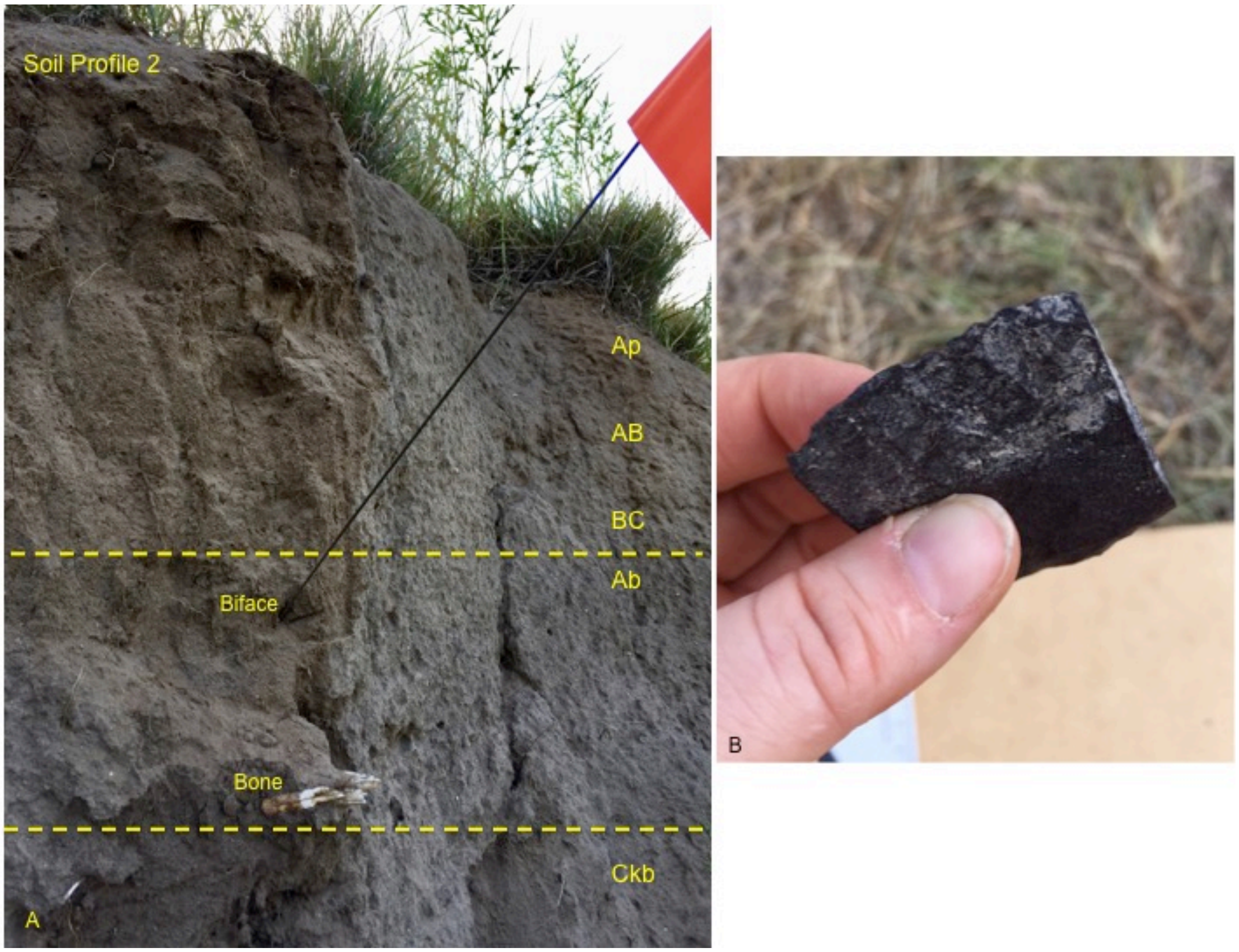

Figure 8. A. Soil Profile 2 showing soil horizons, and the location of a biface fragment and bone within a buried soil (Ab) 34-56 cm below the cutbank land surface. B. The recovered biface fragment.

Figure 9. Feature 2, top of Level 8 within the buried (Ab horizon) soil. Note bone fragments, darkened soil with charcoal flecks. Inset photo: FRC and mandible recovered from Feature 2.