RESULTS OF ARCHEOLOGICAL METAL DETECTION SAMPLE SURVEY WITHIN SAND CREEK MASSACRE NHS: IDENTIFICATION OF THE BIG HEAD SITE

Report by
Kenneth P. Cannon, Jonathan M. Peart, Charles Haecker, and Joseph Lamb

Prepared by
USU Archeological Services, Logan, Utah
Kenneth P. Cannon, PhD, RPA, Principal Investigator

Prepared for
Sand Creek Massacre National Historic Site
National Park Service
Eads, Colorado

USUAS Technical Report Number 2012-007
October 2012

RESULTS OF ARCHEOLOGICAL METAL DETECTION SAMPLE SURVEY WITHIN SAND CREEK MASSACRE NHS: IDENTIFICATION OF THE BIG HEAD SITE

By
Kenneth P. Cannon, PhD, RPA[1]
Jonathan Peart[1]
Charles Haecker[2]
Joseph Lamb[1]

[1]USU Archeological Services, Inc.
Logan, Utah

[2]National Park Service
Santa Fe, New Mexico

Submitted to

Sand Creek Massacre National Historic Site
National Park Service
Eads, Colorado

USU Archeological Services Technical Report USUAS-12-007

October 2012

Abstract

USU Archeological Services (USUAS) conducted a metal detection survey in the southwest ¼ of Section 24 and the northwest ¼ of Section 25, Township 17S, Range 46 W in an effort to locate material remains from an engagement between members of the 3rd Regiment Calvary, Colorado Volunteers and about 25 to 30 Cheyenne and Arapaho associated with Cheyenne warrior Big Head. The metal detection survey location was based upon interpretive work of primary historical sources, geomorphology, and archeological evidence by researcher Jeff Campbell of Eads, Colorado. This work was authorized and administered through the Rocky Mountains Cooperative Ecosystem Studies Unit Cooperative Agreement Number H1200-09-0004 to Utah State University and subcontracted to USUAS (Subaward #12010301).

The USUAS crew consisted of Kenneth Cannon, Jonathan Peart and Joseph Lamb, along with Charles Haecker of the National Park Services Heritage Partnerships Program. Work was conducted between 14-17 October 2011. The metal detection survey consisted of 20-m transects oriented east-west from the western park boundary to the edge of the bluff which corresponds roughly with the 4000-foot contour. A total of 133 acres were surveyed. The metal detection survey consisted of a team of 2-3 people with one person operating the detector and the others pin-flagging any 'hits'. These hits were then excavated with initial identification to discern if they were potentially associated with the massacre based upon temporal characteristics. Most of the hits identified post-date the massacre and were collected and discarded. Items of potential interest were mapped in place and collected. Mapping was conducted using a Topcon HiPER Pro RKT (Real Time Kinematic) unit.

Although hundreds of metal hits were excavated during the metal detection phase of this project, the vast majority of artifacts could be convincingly associated with modern ranching-related activities, and consequently were not recorded. These artifacts included barbed-wire, smooth-wire, metal scrap, fence staples and nails, car parts, and modern cans. Only seven artifacts were collected as a result of the 2011 metal detection survey. These artifacts include a possible whetstone, a modified railroad spike, two modern copper-jacketed bullets, a deformed piece of lead shot, a brass ring possibly from a pocket-watch or binocular, and a .40 caliber lead bullet.

No compelling evidence for the Big Head incidence was found during the metal detection survey. This area has been proposed for a hiking trail as part of the park management plan and our results indicate that no further work needs to be conducted prior to the development of this overview trail.

Table of Contents

List of Figures

Acknowledgements

We would like to express our gratitude to the National Park Service for providing us the opportunity to work on this important project. Although our efforts were minimal with respect to previous work we hope that our conclusions are useful in the larger interpretation and management of the Sand Creek Massacre National Historic Site. We would like to thank Dr. Alexa Roberts, Karl Zimmermann, James Doyle, Karen Wilde, and Rhonda Brewer for their support and hospitality. Field assistance was provided by Joe Big Medicine, Otto Braided Hair, Lela Pedro, Norma Gourneau, Tom Meier, Gary Roberts, and Andrew Masich. We would also like to extend our appreciation to Molly Boeka Cannon who serves as PI on this larger cooperative project between Utah State University and the National Park Service, of which this is just one component.

Introduction

As part of the park management, and to further provide information on the events of 29 November 1864, infamously known as the Sand Creek Massacre, Utah State University and USU Archeological Services were employed through a cooperative agreement with the National Park Service to conduct a metal detection survey in the southwest ¼ of Section 24 and the northwest ¼ of Section 25, Township 17S, Range 46 W in an effort to locate material remains from an engagement between members of the 3rd Regiment Calvary, Colorado Volunteers and about 25 to 30 Cheyenne and Arapaho associated with Cheyenne warrior Big Head. This has become known as the Big Head Incident based upon historical research by Jeff Campbell of Eads, Colorado. This project is administered through the Rocky Mountains Cooperative Ecosystem Studies Unit Cooperative Agreement Number H1200-09-0004.

The Sand Creek Massacre National Historic Site (SAND) is located in Kiowa County in southeastern Colorado about 23.5 miles northeast of Eads (Figure 1). In 1998 President Bill Clinton signed the Snad Creek Massacre National Historic Site Study Act of 1998 that directed the National Park Service to identify and locate the location and extent of the massacre are and prepare cost estimates for the development and protection of the area. In 2007, the park was opened to the public.

Today the area remains rural and sparsely populated. The predominant vegetation is the highly productive short-grass prairie of the uplands and riparian communities dominated by cottonwood stands below along Sand Creek (Figure 2). Primary grasses include blue gramma grass and buffalo grass with switchgrass and side-oats gramma common (National Park Service 2000). The vegetation of the area can be considered an important element of the cultural landscape and many plant species are reported as culturally significant to the associated tribes The bluff area of the investigations is eolian-capped with well-sorted medium-grained eolian sands (Holmes and McFaul 1999).

Figure 1. Location map of the Sand Creek Massacre National Historic Site.

The climate of the eastern Colorado plains is comparatively uniform low relative humidity, abundant sunshine, light rainfall, moderate to high wind movement, and a large daily range in temperature. Maximum summer temperatures are often above 95 F. The usual winter extremes are often below zero and can reach 10 F or 15 F below zero. The majority of precipitation on the this portion of the plains occurs during the period from April until September. Summer precipitation is typically from thunderstorm activity, which can be extremely heavy at times (www.wrcc.dri.edu/htmlfiles/co/co.avg.html).

Figure 2. Typical shortgrass prairie on the bluff. Cottonwoods along Sand Creek are visible in the distance.

Project Goal

This scope of work is designed to meet the project goal of discovering physical evidence of the Big Head incident. Recovery of redundant quantities of diagnostic artifacts reflecting this incident is not required; additionally, Sand Creek Massacre NHS (the Park) prefers not to curate additional counts of artifacts that are assignable to an artifact category already well-represented in its collection. Therefore, the project goal may be considered attained and the fieldwork phase terminated if/when sufficient numbers of diagnostic artifacts are discovered. Park officials will then make a determination as to whether or not continuation of fieldwork would be a useful means of refining its interpretation goals specific to the Big Head incident.

Background

Based on research provided by Park researcher Jeff Campbell, the site of the Big Head incident was determined to be [redacted] It also may include the eastern portions of adjacent Sections 23 and 26, which are outside the park boundary. The project search area, encompassing approximately 320 acres, is comprised of sandy loam topsoil supporting a native grasses-sage association. Shallow, natural depressions within the southwest corner of Section 24 trap water sufficient to support a relatively abundant growth of native vegetation. Ground visibility within the project area ranges between 50-80 percent. The most notable landform within the search area is the bluff escarpment, which may have held tactical significance at the time of the Big Head incident.

To date, professional archeological surveys in 1997 and 1999, and over a century of relic collector activities within the Sand Creek massacre site, focused primarily on the village locale and its immediate surroundings, probably because the greatest concentration of massacre-related objects are located here (National Park Service 2000; Greene and Scott 2004). These objects are reflective of what would have been found within a circa 1864 Plains Indian village, intermixed with Civil War era military ordnance and accouterments. If discovered, the locale of the Big Head incident may contain an artifact signature at variance from the village locale artifact signature. Physical remains of the 25-30 warriors may be limited to metallic objects worn on their clothing and bodies, e.g., cone jingles, brass wire bracelets, finger rings, ear cuffs, metal beads; and any objects that had been inside pouch bags, e.g., small tools, lead shot. Weapons or fragments of weapons may also be present, e.g., skinning knives, and metal fittings from the warriors' firearms that were destroyed by soldiers. It is also possible that metal fittings of horse tack are present, e.g., bridle buckles. Intermixed among the Indian-related artifacts may be spent military bullets similar in calibers and types found within the village area.

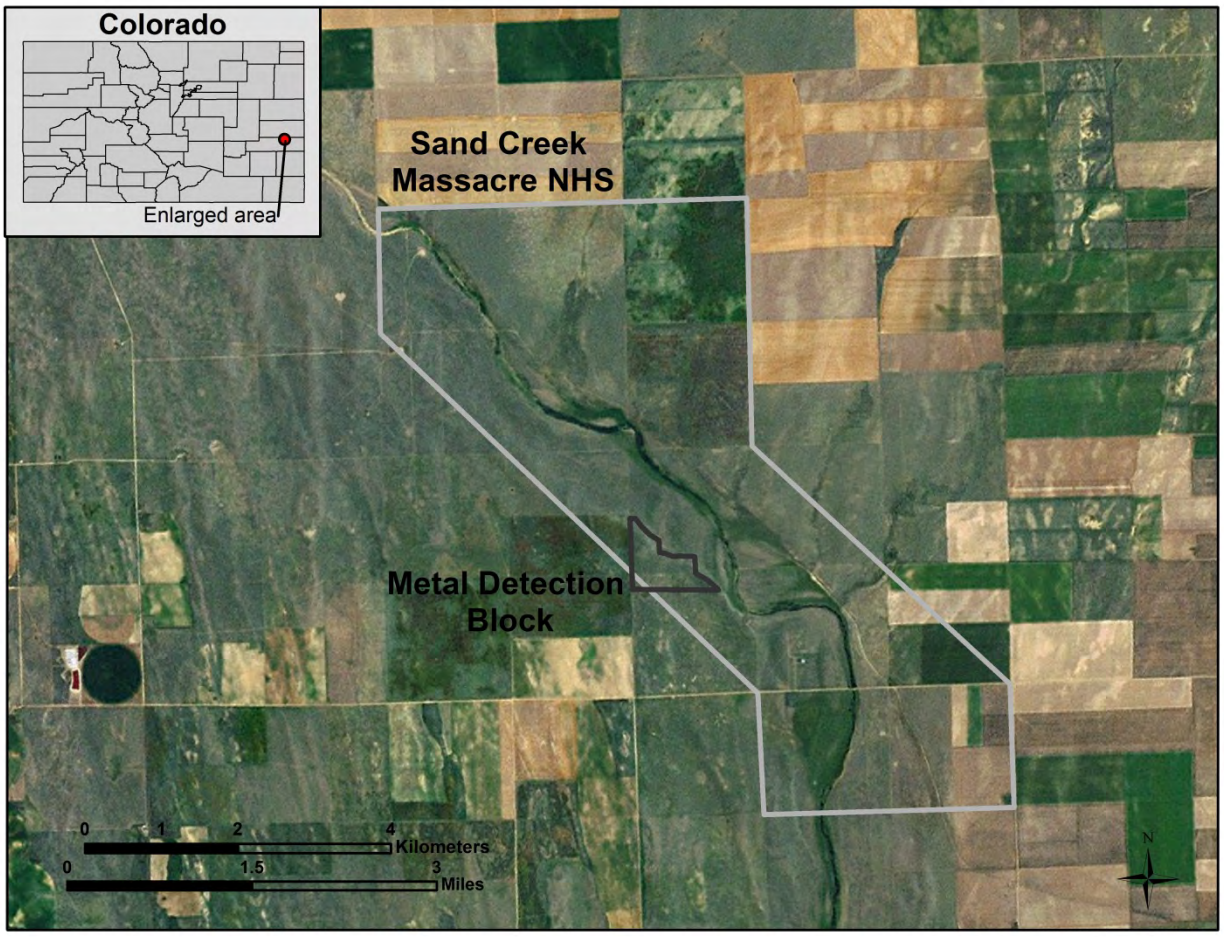

Figure 3. Location of metal detection block.

Evidence of a military formation such as a skirmish line may be identified as a roughly linear patterning of dropped/unfired bullets and percussion caps. Uniform-related items such as brass coat buttons and iron or white metal trouser buttons, and personal objects such as clasp knives and coins, might also be present. Hand-to-hand fighting locales may be reflected by a discreet deposition of intermingled Indian- and soldier-related items.

Field Methods

Approximately 133 acres were surveyed using metal detection techniques in [redacted]

The area was previously divided into 200-meter grid by the NPS. This grid will serve as the baseline for our survey. The project will survey 30 200-meter grid cells using 20-meter transects with a 2-meter swath for an approximate total of 30 acres (). The budget below details the expenditures for the metal detecting survey and in-field documentation of metal targets. Transects were oriented east-west and numbered 1-44 from north to south (Figure 4).

Metal detection field methods followed those developed for other conflict-related sites by NPS archeologists Charlie Haecker, Doug Scott, and Bill Hunt (Connor and Scott 1998; Haecker 1994; Scott et al., 1989; Scott 1994; Scott and Hunt 1998; Figure 5).

Metal detection is the appropriate remote sensing method for a site of this type. The surveyors utilized the Tesoro SuperTraq® metal detector model. This is a very low frequency-type machine capable of identifying metallic artifacts the size of a match head at a depth of 15 cm below surface. Project members who are unfamiliar with metal detection will find this model fairly simple to master and operate; it is lightweight, rugged, and dependable. Consistency in using the same model type--especially by operators unfamiliar with metal detection techniques--offers greater confidence that an apparent grouping of metal signals is due to cultural deposition. In contrast, use of a variety of model types by individuals possessing a wide range of metal detection experience may result in artifact groupings that are not culturally based.

Survey work entailed placement of a series of parallel, sequentially numbered transects that extended along an east-west axis and perpendicular to the west property boundary fence line. Vegetation mowing within demarcated transects prior to survey was conducted and removed vegetation obstructions that otherwise reduced the percentage of metal detection ground coverage within a given transect.

Each transect was two meters wide with a twenty-meter spacing between transects, resulting in a nine percent sample. Each surveyor conducted two sweeps within the assigned transect. The first sweep of a given transect was initiated from its west terminus, which is indicated by flagging tape tied to the property fence line. The surveyor swept one half of the entire length of the transect. Upon reaching the east terminus the surveyors headed back toward the west terminus, sweeping the other transect half.

Upon receiving the signal of a metallic target a surveyor a pin flag was placed at that targeted location and surveying was continued. Each target location was assigned a sequential number that is tied to the transect number; for example, the third target in Transect 1 would be labeled T1-t3. The surveyor also will also be inspecting the ground surface for non-metallic artifacts. All surface objects were pin flagged.

All exposed artifacts were analyzed in the field. If not collected, the artifacts were discarded. Collected artifacts were moved from the field, photographed, and recorded at the USUAS lab.

Mapping was conducted using a Topcon HiPER Pro RKT (Real Time Kinematic) unit (Figure 6). The value of using the RTK is that it allows for quick mapping of site boundaries, features, and individual artifacts at a resolution of 10 mm horizontally and 15 mm vertically.

Collected artifacts were labeled with field specimen numbers that indicated the transect and the artifact within the transect. For example, artifact T29-02 would be the second artifact collected in Transect 29.

Page Redacted

Figure 5. Metal detecting along bluff tansect.

Figure 6. USUAS archeologist Jon Peart setting up Topcon RTK unit.

Sand Creek Metal Detection Results

Although hundreds of metal hits were excavated during the metal detection phase of this project, the vast majority of artifacts could be convincingly associated with modern ranching-related activities, and consequently were not recorded (Figure 7). These artifacts include barbed-wire, smooth-wire, metal scrap, fence staples and nails, car parts, and modern cans. Only seven artifacts were collected as a result of the 2011 metal detection survey. These artifacts include a possible whetstone, a modified railroad spike, two modern copper-jacketed bullets (T27-02), a deformed piece of lead shot (T27-01), a brass ring possibly from a pocket-watch or binocular (T27-03), and a .40 caliber lead bullet (T29-01). Detailed descriptions of these artifacts are presented below.

The railroad spike is missing the head section, has a standard tapered chisel point, and in total measures 4 3/8 inches long with an approximately ½ inch wide square shank (Figure 8). No observable saw cut-marks are located at the end of the spike where the head was removed. Additionally, the shank of the spike is straight. These characteristics suggest that the head was removed through intentional forging and not as a result of removal by a hack-saw or due to breakage.

Soon after European contact, Native American groups traded metal objects and manufactured metal tools from scrap metal including railroad spikes (after railroads were built) (Odell 2001). Native Americans manufactured scrapers, flesher tools, tinkling cones, axe heads, knives, weapons, and arrowheads from traded or collected scrap metal and broken or worn-out metal tools (Arkush 1987; Keyser et al. 2004; Odell 2001; McGonagle et al. 1973; Pyszczyk 1999). At the same time, European-American settlers also collected and manufactured or refurbished tools from collected metal (Fontana et al. 1962). Previous archeological investigations and private collections near the Sand Creek Massacre Site have recovered hundreds of metal artifacts including scrap metal and tools commonly found at Native American village sites dating to the same period (Scott 2000). With this in mind, it is plausible that the Native Americans camped at Sand Creek could have collected the railroad spike, modified it, and subsequently deposited it near the time of the massacre. Nevertheless, both the source and historical association of the railroad spike remain a mystery.

The first railroad to pass through eastern Colorado in the vicinity of the project area was the Kansas Pacific Railroad which was completed in 1870. Construction for the Kansas Pacific Railroad began in September 1863 with the goal of establishing a main passenger line connecting across the Great Plains from Kansas City to Denver, and optimistically to the Pacific Ocean (Petrowski 1974). By 1869, the Kansas Pacific Railroad had reached the border of Colorado and by the end of 1870 the railroad had reached Denver (Bell 1870; Fleming 1876; Petrowski 1969). Fleming (1876) described the Kansas Pacific Railroad as a narrow-gauge railroad constructed with 56 pound per yard rails. The spike found during the current metal detection survey at Sand Creek has between about ½ and 9/16 inch square shank which is consistent with spikes used on narrow-gauge railroads with rail weight measuring less than 100 pound per yard (Camp 1903). If the spike is from a local source it is possibly from the Kansas Pacific Railroad post-dating 1863 (or more likely post-1870), leading to the possibility of an association with the Native American village at Sand Creek.

A possible whetstone was found on the surface in the metal detection block (Figure 9). It is made of light-gray colored medium-grained sandstone, with only one possibly worked/ground flat surface. The tool is triangular in cross-section. It measures 6.4 cm maximum length by 4.3 cm maximum width by 28.8 cm maximum thickness. Whetstones were used to sharpen metal blades including knives and axes and were a common artifact type at Native American villages on the Great Plains during the mid to late-1800s (NPS 2000:Appendix 2).

Page Redacted

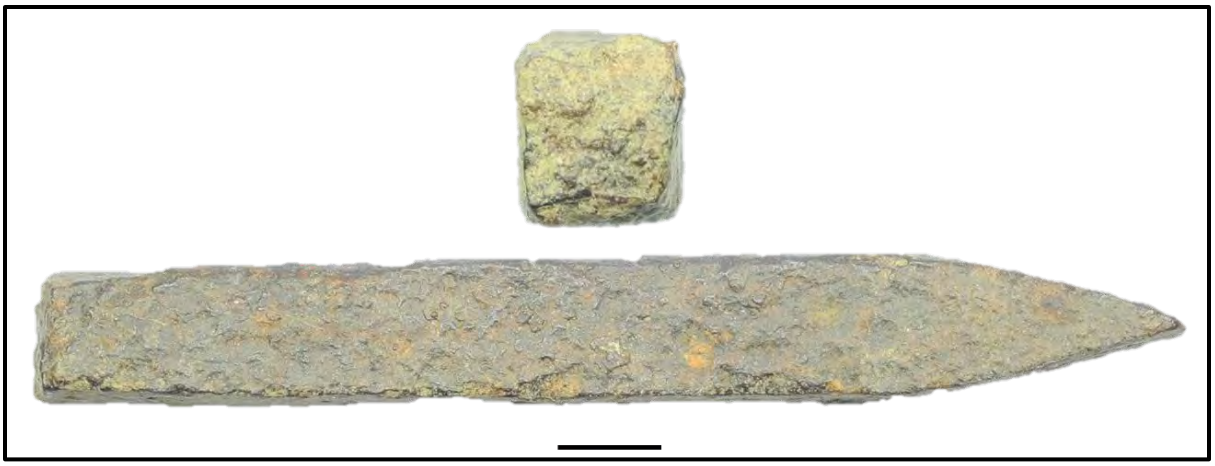

Figure 8. Close-up cut end and side profile railroad spike. Bar is one centimeter.

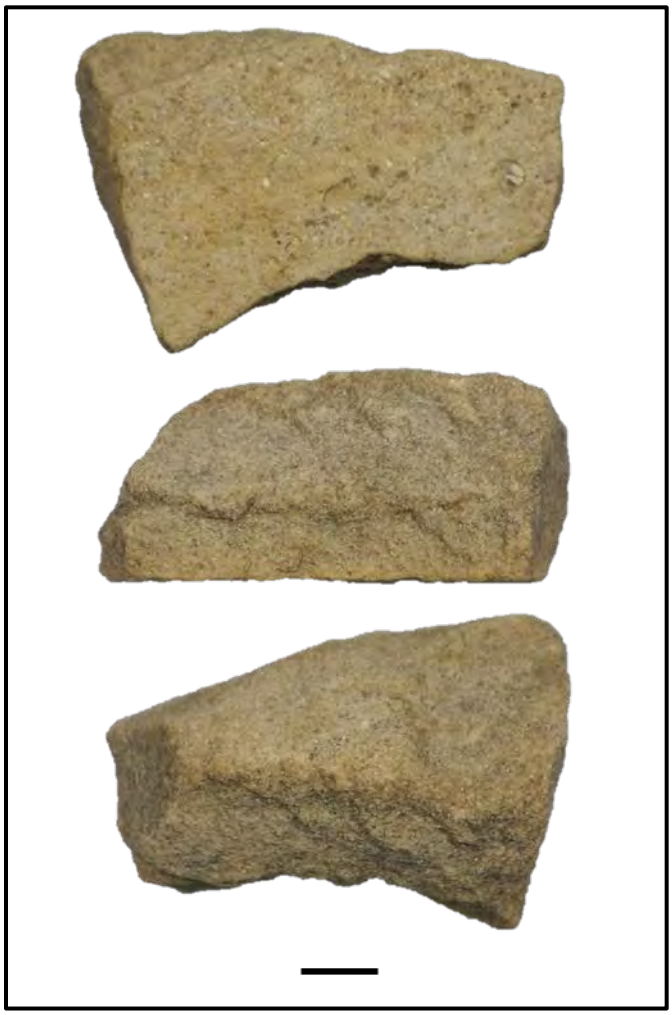

Figure 9. Close up of a possible whetstone/ground stone fragment. Bar is one centimeter.

T27-01 is a lump of deformed lead and based on its shape and weight appears to be lead shot (Figure 10). It weighs 52.5 grains which is comparable with #00 Buck Shot weighing around 53.8 grains and measures 8.38 mm in diameter (.33 inch) (Ballistic Products 2012). This size shot is very common and is commercially loaded in many modern shotgun calibers (Barnes and Simpson 2009). However, the shot is also comparable with the .30 caliber shot recovered at Sand Creek reported by Scott (2000). Scott reported finding lead shot ranging in diameter from .30 to .69 caliber. The recovered .30 caliber shot was located intermixed with a cluster of .58 caliber balls and therefore Scott argues that they date to the 1864 massacre event (Scott 2000:83). It is conceivable that T27-01 may have come from the massacre but it is much more likely that it modern.

Along the bluff overlooking Sand Creek, we located a fired and deformed copper-jacket from a modern high-power rifle bullet. Due to impact deformation the exact dimensions of the artifact were impossible to generate. The approximate diameter of the bullet is about .30 caliber and it weighs 2.5 grams (38.6 grains).

Figure 10. Close-up of recovered deformed lead shot (T27-01 in comparison with modern #00 Buck Shot (upper left). Bar is one centimeter in length.

T27-02 is a modern copper-jacketed rifle bullet measuring .308 inch diameter (7.84 mm) by .87 inch long (22.3 mm) and weighs 10.3 grams (159 grain). The bullet was fired as evidenced by rifling and deformation of the bullet (Figure 11). Edward Rubin, working at the Swiss Army Laboratory in about 1882 invented the first successful small-caliber copper-jacketed bullet (Walter 2006). This artifact does not date to the period of the massacre and likely represents either modern target practice or big game hunting.

Figure 11. Close-up of a modern copper-jacketed rifle bullet (T27-02). Bar is one centimeter in length.

T27-03 is a brass or copper ring possibly from a pocket-watch or binoculars (Figure 12). The artifact measures 1.6 inch diameter (40.7 mm) and weighs 3.5 grams. Comparing this artifact to a type collection of Civil War-era binoculars and pocket watches may be able to determine the artifacts function, manufacture date, and whether or not it is related to the 1864 massacre event.

T29-01 is a lead bullet measuring .399 inch diameter (10.1 mm) by .64 inch length (16.36 mm) and weighs 12.4 grams (191.4 grains) (Figure 13). The bullet is solid lead with a coned-shaped flat nose (Figure 14). The base of the bullet retains gun powder pellet impressions, indicating that the bullet was set hard into the powder prior to firing (Figure 15). Some possible rifling is evident along one side of the bullet; however, the bullet is weathered and was grooved by a metal trowel during excavation. The caliber of this bullet as well as other characteristics provides strong evidence that this bullet dates after the 1864 massacre. Although the bullet diameter (about .40 caliber), bullet length (about 0.65 inch), and weight (about 190 grain) are consistent with bullets fired from multiple cartridges (e.g. .401 Herter Powermag, .401 Winchester Self-Loading, .40-44 Woodswalker, .40-454 JDJ, and .41 Remington Magnum, and others) the bullet most closely fits the characteristics of the .41 Long Colt (Barnes and Simpson 2009). The .41 Long Colt is often hand-loaded with solid lead bullets around 200 grains. The cartridge was introduced by Colt in 1877 for use in the double-action or Lighting Model revolver and was later used in the New Army, New Navy, Army Special, Single Action Army and the Bisley (Barnes and Simpson 2009). Firearms firing this caliber as well as the .41 Long Colt cartridges have not been commercially produced since at least the 1930s (although Winchester produced a small quantity of loaded cartridges in the 1970s) (Barnes and Simpson 2009).

Figure 12. Brass or copper metal ring possibly from a pocket-watch or binocular (T27-03).

Figure 13. Close of T29-01 bullet, side profile.

Figure 14. Close of the top of T29-01 bullet.

Figure 15. Close-up of base of T29-01 bullet.

Recommendations

USU Archeological Services (USUAS) conducted a metal detection survey in [redacted] in an effort to locate material remains from an engagement between members of the 3rd Regiment Calvary, Colorado Volunteers and about 25 to 30 Cheyenne and Arapaho associated with Cheyenne warrior Big Head. The metal detection survey location was based upon interpretive work of primary historical sources, geomorphology, and archeological evidence by researcher Jeff Campbell of Eads, Colorado. This work was authorized and administered through the Rocky Mountains Cooperative Ecosystem Studies Unit Cooperative Agreement Number H1200-09-0004 to Utah State University and subcontracted to USUAS (Subaward #12010301).

The USUAS crew consisted of Kenneth Cannon, Jonathan Peart and Joseph Lamb, along with Charles Haecker of the National Park Services Heritage Partnerships Program. Work was conducted between 14-17 October 2011. The metal detection survey consisted of 20-m transects oriented east-west from the western park boundary to the edge of the bluff which corresponds roughly with the 4000-foot contour. A total of 133 acres were surveyed.

While [redacted] artifacts were detected during the survey they were almost exclusively from post-massacre contexts that include farming and hunting. These artifacts include barbed-wire, smooth-wire, metal scrap, fence staples and nails, car parts, and modern cans. Only seven artifacts were collected as a result of the 2011 metal detection survey. These artifacts include a possible whetstone, a modified railroad spike, two modern copper-jacketed bullets (T27-02), a deformed piece of lead shot (T27-01), a brass ring possibly from a pocket-watch or binocular (T27-03), and a .40 caliber lead bullet (T29-01). None of the collected artifacts are likely contemporary with the 29 November 1864 events.

Possible reasons why archeological evidence of the Big Head incident was not identified within the project area:

- *Ethnographic information regarding this incident is incorrect and/or misinterpreted, resulting in an incorrect placement as to its location in relation to the village site*. It may be the case that the incident occurred much further to the north and/or west of the village than what was later remembered and reported by survivors of the massacre. Memories of such traumatic events as battles and massacres can be faulty on certain details; perhaps in this case, on distance and direction. Also, what end of the village did the informants use when they indicated the site of the Big Head incident? The village was over a mile long, it makes a significant difference if one makes a distance and direction estimate from different points in the village.

- *The Big Head incident occurred within the area that was surveyed but physical evidence was not forthcoming because the sampling techniques were inadequate*. Our sampling was based on the premise that the incident would have generated varieties of metallic artifacts, e.g., cone tinklers, bracelets, finger rings, metal beads, awls, uniform buttons, metal parts to Indian firearms, horse tack, fired and unfired bullets. Given the number of individuals reportedly involved in the incident—approximately 25-30 Indians and 100 or so soldiers—and the belief that the Indians' bodies were not removed from the site, the resultant artifact concentration should be at least as strong as what was discovered within the village. The two meter-wide survey transects, spaced 20 meters apart, almost certainly would have identified such a concentration if it existed within the project area.

- *All of the artifacts are buried at a depth below the range of the metal detector readings*. The chances of such a scenario are practically nil, since 1) wind erosion, root disturbance and rodent activity continuously alters artifact deposition, especially in sandy conditions. Thus, some formerly buried artifacts will periodically appear on and/or just below the surface; 2) the metal detectors used during the survey can identify metal artifacts the size of a match head approximately 15 cm below surface; an object the size of a bullet or button, perhaps as deep as 25 cm below surface, can be discovered by these detectors; and 3) the 1999 survey discovered two spent bullets within the project area, both bullets of Civil War era vintage. It stands to reason that, if these bullets were found using essentially the same type of metal detectors used in 2011, then the artifact concentration associated with the Big head incident also would have been discovered if all indications of it are buried and within the project area.

While no artifacts were identified during this metal detection project, two bullets were discovered in 1997 during a metal detection reconnaissance they may have relevance for the continued study of the Big Head Incident location (Scott et al. 1998). These include a .45 Sharps bullet, that likely post-dates the massacre, and a .54-cal bullet that is consistent with a bullet used in the Model 1841 Mississippi Rifle. The 1841 rifle had an effective range of up to 1100 yards, with a maximum range of 2000 yards. If this bullet was an overshot, that is, it didn't hit its intended target, but continued the trajectory well beyond the site of the Big Head incident and approximately completing their maximum range. So, the site of the Big Head incident may be around 1000-2000 yards away from the survey area. If we assume the oral histories of the incident are correct insofar as direction from the village is concerned, and the bullet is associated with the incident, then a likely place to look for the site is about 1000-2000 yards to the west/northwest from where these bullets were found within the project area.

A further recommendation would be to conduct a sample survey comparable to the 2011 project. Possibly having a two or three individuals survey long-range metal detection transects that radiate out from the 2011 project area and in a westerly-northwesterly direction. If evidence of the Big Head incident is out there, then these surveyors will eventually find it.

Additional work to locate the Bighead Incident, and other events of the massacre may be enhanced by the newly collected LiDAR mapping data. Trail locations may be present in the data that were contemporary with the massacre and can be used as key landmarks. For example, the trail leading from Fort Lyon may be evident on the LiDAR and the equipment drop point may be reasonably located. Metal detection in this area may prove instructive and provide a specific point on the landscape from which to map other events.

Based upon this fieldwork, USUAS recommends that no further work be conducted in association with the establishment of the bluff line trail.

References

Arkush, Brooke S.
1987 Historic Northern Paiute Winter Houses in Mono Basin California. *Journal of California and Great Basin Anthropology* 9(2):174-187.

Ballistic Products
2012 Lead Buckshot. Electronic document, http://ballisticproducts.com/buckshot/products/65/, accessed 20 March 2012.

Barnes, Frank C. and Layne Simpson
2009 *Cartridges of the World: A Complete and Illustrated Reference for over 1500 Cartridges*. 12th Edition. Gun Digest Books. Iola, Wisconsin.

Bell, William Abraham
1870 *New Tracks in North America. A Journal of Travel and Adventure Whilst Engaged in the Survey for a Southern Railroad to the Pacific Ocean During 1867-1868*. Scribner, Welford and Company. New York.

Camp, W.M.
1903 *Notes on Track Construction and Maintenance*. Self published, Chicago.

Connor, M. and D. Scott
1998 Metal Detector Use in Archeology: An Introduction. *Historical Archeology*, 32(4): 76-85.

Fleming, Howard
1876 *Narrow Gauge Railroads in America. A Sketch of Their Rise Progress and Success: Valuable Statistics as to Grades, Curves, Weight of Rail, Locomotives, Cars, Etc. Also a Directory of Narrow Gauge Railways in North America. Second Edition*. Unknown Publisher.

Fontana, Bernard L., J. Cameron Greenleaf, Charles W. Fergusen, Robert A. Wright, and Doris Frederick
1962 Johnny Ward's Ranch: A Study in Historic Archeology. *Kiva* 28(1-2):1-115.

Haecker, C.
1994 A Thunder of Cannon: Archeology of the Mexican American War Battlefield of Palo Alto. *Southwest Cultural Resources Center Professional Papers No. 52*. Division of Anthropology and History, Southwest Regional Office, National Park Service, Santa Fe, NM.

Odell, George H.
2001 The Use of Metal at a Wichita Contact Settlement. *Southeastern Archeology* 20(2):173-186.

Keyser, James D., Russel L. Tanner, and David T. Vlcek
2004 Pictures of the Seedskadee: A Preliminary Analysis of the Biographic Rock Art of the Green River Basin, Southwestern, Wyoming. *The Plains Anthropologist* 49(190):129-151.

McGonagle, Roberta Lee
1973 Metal Projectile Points from the Deapolis Site, North Dakota. *The Plains Anthropologist* 18(61):218-227.

National Park Service
2000 Sand Creek Massacre Project. Volume One: Site Location Study. National Park Service Intermountain Region, Denver.
2000 Sand Creek Massacre Project. Volume Two: Special Resource Study. National Park Service Intermountain Region, Denver.

Petrowski, William R.
1969 The Kansas Pacific railroad in the Southwest. Arizona and the West 11(2):129-146.
1974 Kansas City to Denver to Cheyenne: Pacific Railroad Construction Costs and Profits. *The Business History Review* 48(2):206-224.

Pyszczyk, Heinz W.
1999 Historic Period Metal Projectile Points and Arrows, Alberta, Canada: A Theory for Aboriginal Arrow Design on the Great Plains. The Plains Anthropologist 44(168):163-187.

Scott, Douglas D.
2000 Chapter 4: Identifying the 1864 Sand Creek Massacre Site Through Archeological Reconnaissance. In, Sand Creek Massacre Project Volume One: Site Location Study, prepared by the National Park Service in consultation with the Cheyenne and Arapaho Tribes of Oklahoma, the Northern Cheyenne Tribe, the Northern Arapaho Tribe, and the State of Colorado. Pp. 71-136. National Park Service, intermountain Region. Denver.

Scott, Douglas D., Richard A. Fox, Jr., Melissa Connor, and Dick Harmon
1989 *Archeological Perspectives on the Battle of the Little Bighorn*. University of Oklahoma Press, Norman.

Scott, Douglas D., and William J. Hunt
1998 *The Archeology of the Monroe's Crossroads Battle, Fort Bragg, North Carolina*. Southeast Archeological Center, National Park Service, Tallahassee, FL.

Walter, John
2006 *Rifles of the World*. 3rd Edition. Krause Publications. Iola, Wisconsin.