KEYWORDS: ***Petroglyphs – 3-D Long-range laser scanner – Southern Plains – North America***

UNRAVELLING THE COWHEAD MESA PETROGLYPHS WITH 3-D LASER SCANNING AND HIGH-RESOLUTION DIGITAL PHOTOGRAPHY

Stance Hurst, Elizabeth Louden and Eileen Johnson

Abstract. The Cowhead Mesa petroglyphs hold insights into Historic Native American and Anglo-American culture for the Southern Plains region of North America. To preserve this history, a combination of 3-D long-range laser scanning and high-resolution digital photography has been used to record one large main panel 21 m long and nine smaller panels. Separating Native American motifs from the background noise of Historic and modern graffiti has revealed that the main panel is a combination of both 'Plains biographical' and 'Southwestern' symbolism. The methodology and the advantages and disadvantages of using laser scanning for recording petroglyphs are explored.

Introduction

Cowhead Mesa is located along the South Fork of the Double Mountain Fork of the Brazos River at the Southern High Plains/Rolling Plains ecotonal boundary (Fig. 1). This region is defined by the steep Southern High Plains caprock escarpment, remnant mesas, and alluvial outwash formed from erosion and the westward retreat of the Southern High Plains (Reeves and Reeves 1996). The ecotonal boundary is a unique landscape with different resource characteristics compared to the adjoining Southern High Plains and Rolling Plains. Along the escarpment edge, high-quality water sources are more abundant and predictable (Brune 1981), the caprock escarpment would have provided natural shelter, and it is likely wood occurred in higher abundance. The concentration of resources would have enticed hunter-gatherer groups to camp in the ecotonal area as they moved back and forth across the Southern Plains.

Cowhead Mesa is a geologic remnant of the westward

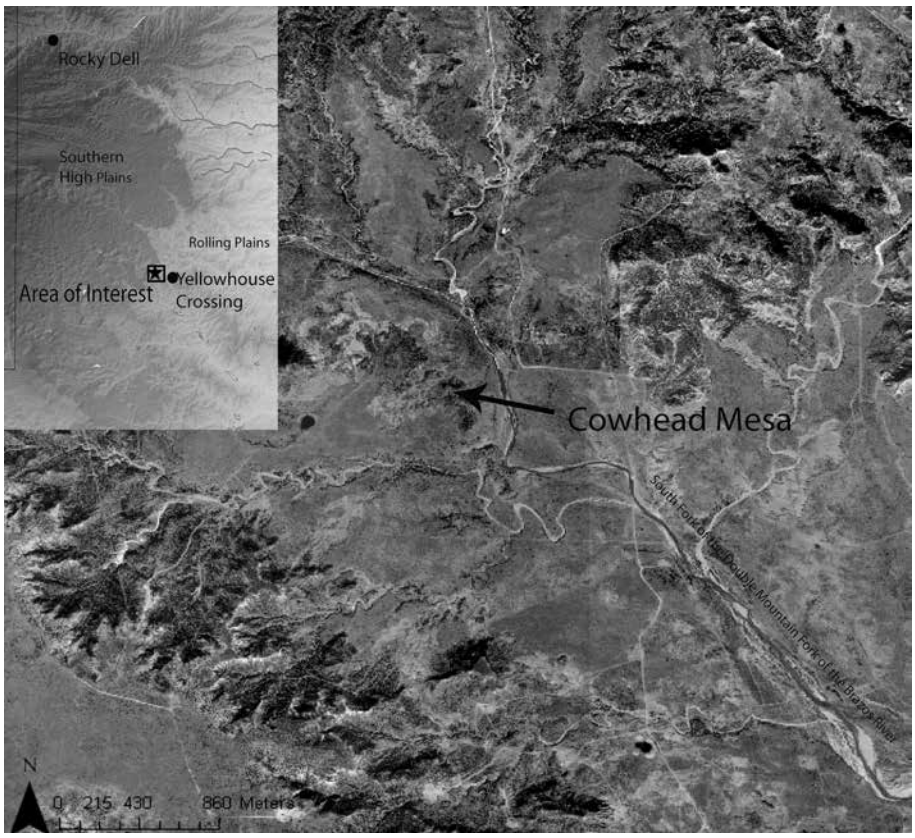

Figure 1.
Location of the Cowhead Mesa petroglyph site (41GR414) in the breaks of the Southern High Plains escarpment of western Texas in relation to other regional rock art sites.

Figure 2. *Setting up laser equipment at the main petroglyph panel at Cowhead Mesa.*

retreating Southern High Plains now located 1.2 km to the west (Gustavson and Simpkins 1989). The mesa is composed of Triassic sandstone and is capped by residual Tertiary age gravels from the Ogallala Formation. Cowhead Mesa provides a 360° vantage point for a great expanse of this upper Brazos River drainage section.

The top of Cowhead Mesa was used as a campsite from at least the Late Archaic into the Historic period (4500 BP – 1880s C.E.). Occupation evidence included hearth features, lithic débitage, projectile points and tools and ceramic shards (Hurst et al. 2007). Historic Native American and Anglo-American groups also used Cowhead Mesa to record events through rock engravings.

Eight petroglyph panels along the sides and two on top were carved into the mesa. Nine of the panels previously were undocumented and are small, 1 to 3 m in width and containing one to four elements each. The smaller panels included Historic Native American depictions of 'human' figures, 'tepees' and geometric shapes. Anglo-Americans also engraved their names with corresponding dates in three instances. One individual boasted of killing '4 CYOTES and 2 LOBO WOLFS' in 1955 while also inscribing the edict 'LONG LIVE TEXAS' with a corresponding waving Texas state flag.

The largest panel is located along the southwestern face of the mesa and is 21 m wide and varies between 50–150 cm in height (Fig. 2). The main panel petroglyphs are 1 to 3.5 m above the present ground surface. This panel has been documented previously using photographs, rubbings and drawings (Riggs 1965; Bilbo 1986; Boyd 1992).

Past investigators chronicled Native American elements demonstrating stylistic and symbolic influences on the main panel from both Southwestern and Plains cultural areas (Bilbo 1986). Noted glyphs included three multi-storied 'buildings' with crosses on top (one of them possibly on fire), geometric shapes, 'human figures in combat', two 'individuals with headdresses', a bovid, horses, and Historic Anglo-American names and dates (Bilbo 1986; Riggs 1965). A 'turtle' with distinctive four toes in front and three in the back was interpreted as a portrayal of a three-toed box turtle (*Terrapene carolina triungius)* (Lorrain and Parsons 1968), that neither prehistorically nor historically occurs in western Texas (Johnson 1987; Dixon 2000; Brown 1950). Flores (1992) suggested most of the main panel's glyphs tell the story of the 1758 Comanche attack on a Spanish mission and *presidio* located c. 124 km southeast on the San Saba River (Boyd 1992). The possible churches on fire and human figures in combat lead Flores' (1992) to his interpretation. No specific evidence, however, supported Flores' (1992) explanation; and viewing the relationship between the rock art elements was difficult due to the overprinting of modern graffiti over the entire rock panel. Additionally, an unknown portion of the lower section of the panel was missing due to deterioration of the rock face.

A comparison of photographs from 1971 to 2007 reveals approximately 10 cm of the main rock art panel from this section has weathered away (Fig. 3). Natural factors degrading the rock art include bees boring into the rock face and barn swallows seasonally nesting in crevices above the panel. Several recent names and dates inscribed into the panel obscure prior engravings and further accelerate erosion. The mesa face also has been used in the past for rappel training by the Reserve Officer Training Corps program at Texas Tech University.

As part of an ongoing study of hunter-gatherer landscape use of the ecotonal area between the Southern High Plains and Rolling Plains (Backhouse and Johnson 2007), the site was revisited to chronicle all the petroglyph panels. Anticipating further loss due to erosion, a detailed record of the petroglyphs was required to preserve the information the rock art conveys about Native and Anglo-American culture, and to discern the impact of cultural influences from both the Plains and Southwest cultural areas. None of the drawings, rubbings or photographs from previous investigations were archived in a curatorial facility, and the published drawings are either of poor quality or not to scale (Bilbo 1986; Riggs 1965). Due to

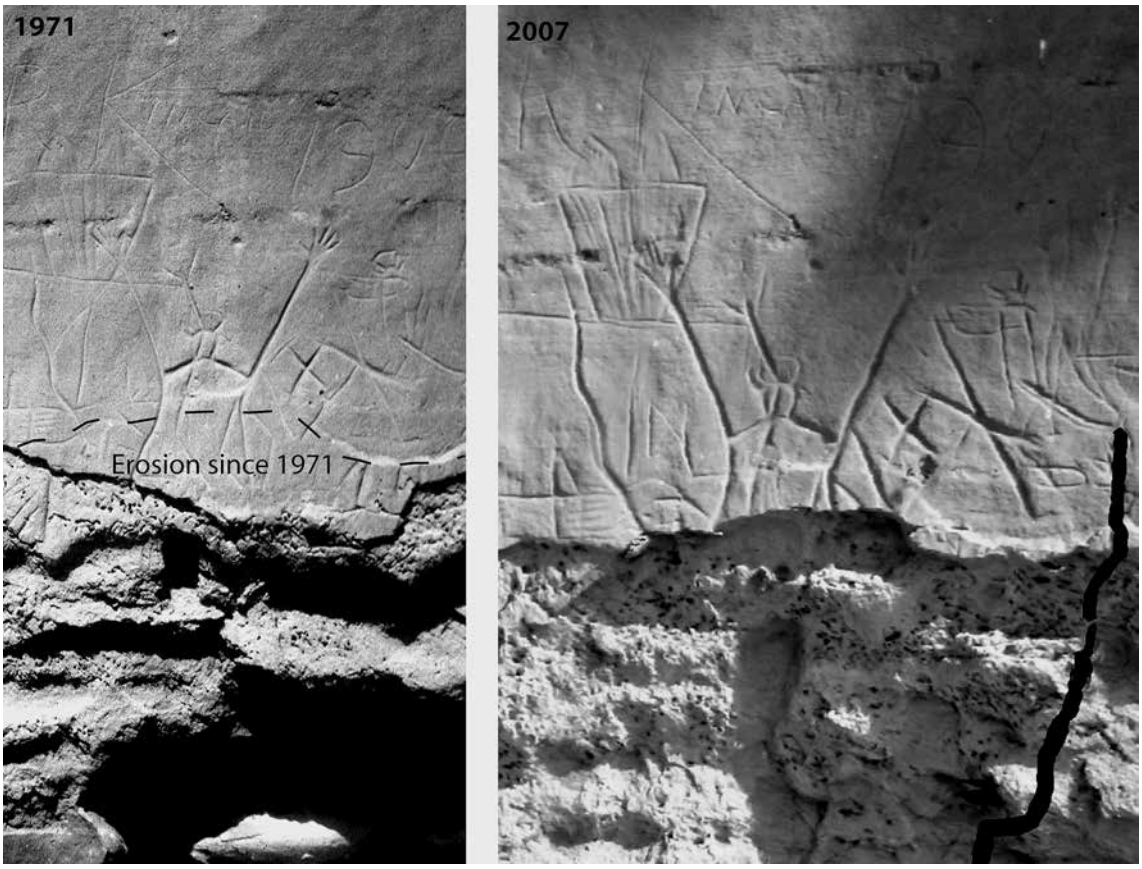

Figure 3. *Erosion of main rock art panel at Cowhead Mesa from 1971 to 2007.*

their small size and difficulty in hauling and setting up the laser scanning equipment, the nine smaller panels were recorded using digital photomosaic techniques and digital image processing (Clogg and Díaz-Andreu 2000; Ford 2005) in Adobe Photoshop and drawn in Adobe Illustrator. For the large main panel, a non-invasive technique was needed with both high accuracy and the ability to document fully the entire 21 m panel. The technique of laser scanning over traditional recording methods offered such an approach.

Laser scanning the main panel at Cowhead Mesa

Time-of-flight light detection and ranging (LIDAR) laser scanners collect between 4000–11 000 points per second (depending on the manufacturer and the specific scanner), with an accuracy range from 6 to 1 mm and below (Trinks et al. 2005). The most common application of long-range laser scanners in archaeology is recording architectural features (Lambers et al. 2007). Long-range scanners can obtain measurements from distances of up to 1000 m, and are highly versatile when working in areas difficult to reach for mapping. In contrast, short-range laser scanners can record measurements with greater accuracy and resolution, less than 1 mm, but are not as versatile for mapping larger size projects due to their limited range of around 2 m. Investigators have used high accuracy short-range laser scanners for mapping museum objects (Ahmon 2004; Grosman et al. 2008; Karasik and Smilansky 2008) and some rock art sites (Barnett et al. 2005; Díaz-Andreu et al. 2006). Short-range scanners are capable of digitising surfaces at a 0.25 mrad beam divergence (Minolta Digitiser VIVID 910 close-range scanner specifications), but are impractical to use in large context situations.

To overcome the resolution limitations of long-range laser scanners, researchers have incorporated the use of photogrammetry techniques for providing more detailed textured surface 3-D models. Mapping digital images to the 3-D data, also called a point cloud, frequently is part of the documentation process for historically important structures (Lambers et al. 2007). The technique also has worked for recording rock art sites (El-Hakim et al. 2004).

With these issues and opportunities in mind, collaboration between the Museum of Texas Tech University and College of Architecture personnel sought to determine the efficacy of using long-range laser scanning technology for recording the main petroglyph panel at Cowhead Mesa. The research objectives were to create a replicable model to preserve the entire context of the rock art panel, and to document and inventory all of the rock art elements to ascertain perceived stylistic relationships to other petroglyphs in the region.

Laser scanning technology had been used by Archi-

tecture faculty to document important structures such as the Statue of Liberty (Hughes and Louden 2005; Louden 2003) and the Spring House Pueblo at Mesa Verde National Park in New Mexico (Hill et al. 2007). The first attempt to use a 3-D laser scanner to provide accurate dimensional data as a basis of drawing documentation, as well as to create a polygonal mesh surface on which to map photographs, was at Spring House Pueblo (Hill et al. 2007). Further analysis proved that the data retained a higher degree of accuracy than hand measurements, but accurate interpretation still required trained personnel. The purpose of that project was to help redefine the process of hand measuring and recording archaeological surface information.

Expanding on that work, this research focused on capturing exposed and fragile petroglyphs in difficult and remote locations, as well as capturing the entire context for analysis and conservation planning. By adding high-resolution photographic mapping, intricate details of the petroglyphs provided a greater level of precision to archaeological interpretation. The Cowhead Mesa rock art panel was the first attempt to use laser technology in documenting petroglyphs. The University-owned Leica Geosystems HDS 3000 long-range laser scanner was employed for this research.

Long-range scanners such as the Leica HDS 3000 pulses up to 1800 points per second, depending on the scan resolution and the selected field-of-view. LIDAR equipment uses pulsed energy focused through a class 3R (IEC 60825-1) proprietary microchip, specialised mirrors, and timing devices to capture returning energy. Time-of-flight calculations result in distance and angle co-ordinates that are stored in a database within the computer software. The xyz co-ordinate data forms a digital representation and visualisation software generates a virtual three-dimensional object in space. The level of resolution is set by the operator;

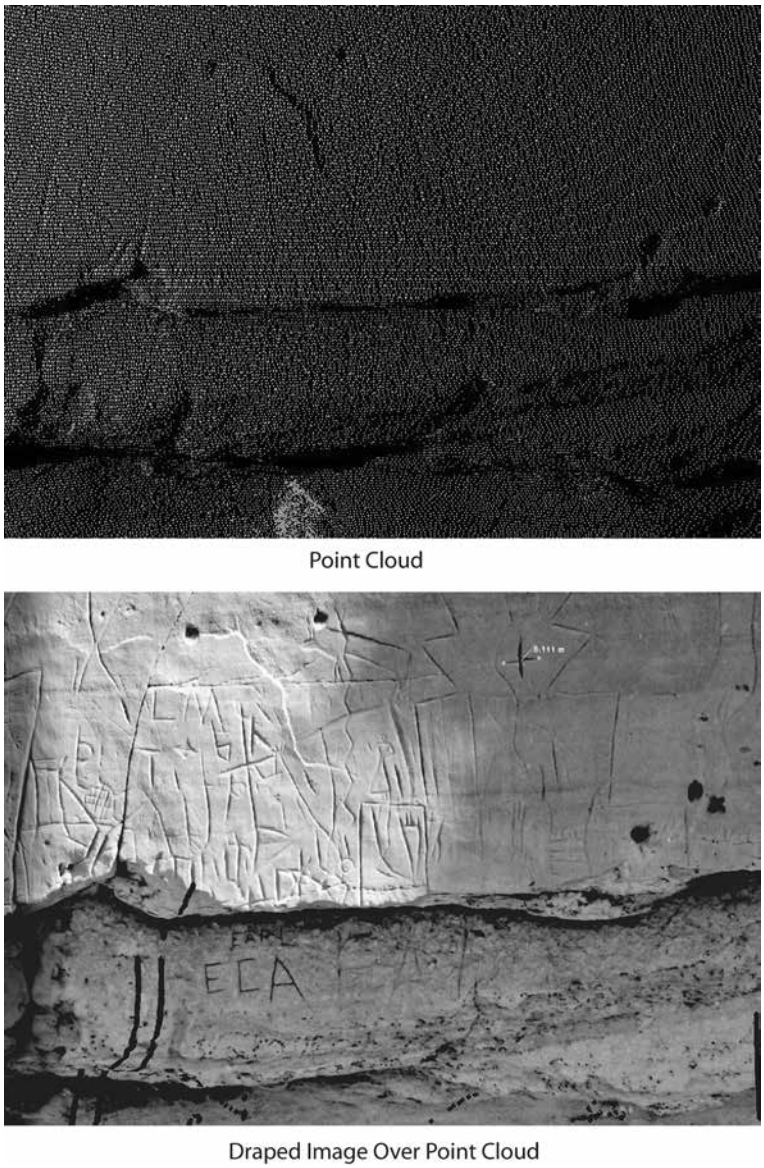

Figure 4. *Illustration of the process for converting the raw point cloud data to a surface model, and then finally draping the images over the point cloud data.*

Figure 5a. *Left part of the illustrated 155 motifs from the Cowhead Mesa main panel.*

however, the maximum sample density is 1.2 mm. Single point accuracy is 6 mm for position and 4 mm for distance. The modelled surface precision is 2 mm for the HDS 3000. The resolution of this type of long-range laser scanner, however, is not high enough for mapping all of the intricate details on the petroglyphs. High-resolution digital photographs of the entire rock panel, therefore, have been taken to be mapped on to the 3-D point cloud surface and provide a measurable and orthographically rectified representation of the panel's surface. The process of scanning and registration (combining files) occurs prior to the photography due to the physicality of the set-up process.

Two scans captured overlapping viewpoints of the rock panel to provide comprehensive coverage. Four survey targets were set up along the rock panel that provided a common set of vertex for combining or registering the point cloud data. The common survey targets had to be visible from the various scanner locations. The scans overlapped each other from opposite directions. As an alternative procedure, a minimum of 20% overlap would be necessary to register the two sets of data accurately, if the survey targets were compromised and failed to provide the common vertex locations. The scanner was placed approximately 6 m away from the rock art panel for each scan, with a distance of approximately 10 m between the two scanning locations. The mesa's narrow talus edge offered minimal surface area to locate the instrument at an acceptable distance from the rock art panel (Fig. 2). Post-processing the data used Leica's Cyclone 5.8 software to register the two scan worlds and then create a mesh with triangular irregular network (TIN) surfaces from the point cloud data by tessellating the points. Tessellation involved creation of triangles from the three closest points whereby a surface then can be filled. Digital photos could be mapped to the resulting surface.

Results

Main panel

The entire main rock panel was scanned from two different locations in one day. A total of 8.5 hours were spent in the field with six to seven of those hours devoted to just scanning and digital photography. The rest of the time was used for hauling the equipment back and forth to the petroglyph panel. A total of 1 430 628 xyz co-ordinate points with a file size of 846 MB were collected for the entire rock art panel and surrounding surfaces (Fig. 4). The petroglyphs were photographed standing approximately 2 m away, using a tripod. A total of 729 digital photographs were taken with a Nikon D200 10.2 megapixel SLR camera that resulted in 11.37 GB of data.

The photographs did not provide enough area for locating common landmarks between digital images and 3-D point data due to the insufficient distance from which the digital images were recorded. The 2 m of separation between the digital camera and rock art panel was not enough. Unlike building structures with sharp right angles and relief, the relatively smooth rock face did not yield enough points of congruence between the digital images and point cloud data. Subsequently, a Canon Rebel XT SLR digital camera with 8.3 megapixel resolution was used to photograph the rock art panel. Different digital cameras were used for photographing the petroglyphs due to their availability for use in the field. Images from the second attempt were taken 8–10 m away from the panel at a focal length of 27 mm. The resulting 75 photographs (361.7 MB) were draped successfully to the TIN mesh surfaces (Fig. 4). A total of four TIN mesh surfaces were created out of the 3 million points recorded by the laser scanner. These meshes were used as surfaces to match the digital photographs to the point cloud data.

The process of using high-resolution petroglyph images as a texture map attached to the TIN mesh was completed using the Cyclone software that operates the scanner. After unique sets of scan data within the full registration were meshed, the corresponding high-resolution images were imported into the scan files using the Texture Editor tool. Selecting closely matching anchor points paired between the TIN and the image allowed the software to fit the image to the scan data, resulting in a highly detailed and measurable surface. The rock surface posed some

Figure 5b. *Right part of the illustrated 155 motifs from the Cowhead Mesa main panel.*

Motifs	Modern	Historic Anglo-American	Plains Native American	Southwestern Native American	Unknown Native American	Total
Names and dates	100	6				106
'X' elements					5	5
Cross symbols					1	1
Zoomorphs						
Bovid			1			1
'Bird'					1	1
'Horse'			2			2
'Snake/lightning'				1		1
'Turtle'			1			1
Anthropomorphs			7		6	13
'Structures'						
'Church'				3		3
'Platform'					1	1
'Tepee'			2			2
'Abstract' elements					20	20
Other unknown elements					10	10
Total	100	6	13	4	44	167

Table 1. *Inventory of illustrated elements from the main panel at Cowhead Mesa.*

difficulty in selecting distinct matching points but was accomplished with a satisfactory result of one pixel error. Twenty-eight hours were expended to map the photographs to the point cloud data.

After producing a complete 3-D model of the entire rock panel (Fig. 5), a 2-D JPEG image was exported into ESRI's ArcGIS software to produce a scaled drawing of individually mapped elements. Other software programs (e.g. Autocad) also can import the x, y, z formatted data and create measured drawings from the Cyclone software. One individual was able to illustrate the entire rock art panel in two weeks. For two sections, new digital images were added and draped to the existing point cloud to furnish better contrast for viewing the petroglyphs and making it easier to trace the individual elements.

To quantify how much distortion occurred in producing the 2-D image for illustration, a measurement between common landmarks across the rock panel from the 2-D image was compared to a field-taped

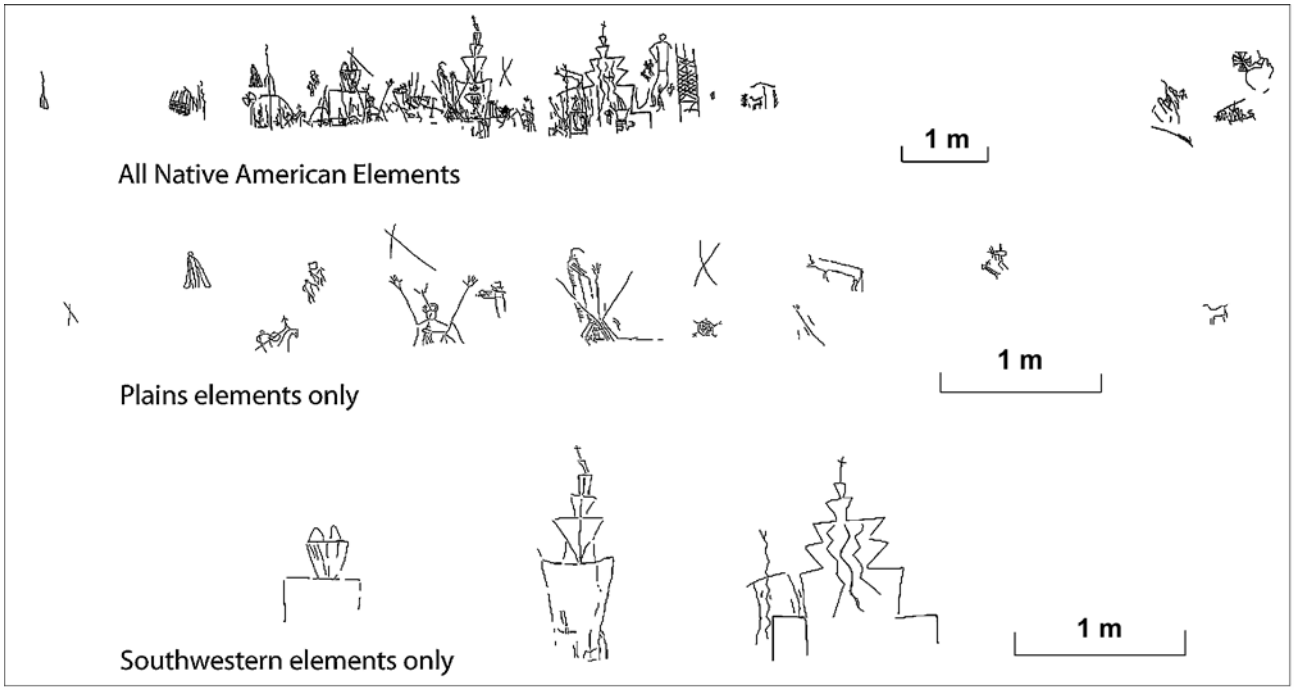

Figure 6. *Illustrated Native American elements from the main panel at Cowhead Mesa.*

measurement and the distance obtained within the 3-D model. The distance between the two common landmarks measured 7.44 m within the 3-D model, a field-taped distance of 7.27 m was obtained, and the 2-D image measured 7.09 m. The difference between the measurements illustrated that distortion occurs in producing a 2-D image from a 3-D object like rock art. The value of the laser scan data was that it is an objective and replicable measurement. In contrast, taped measurements will vary depending on how the tape is stretched across the curvature of the rock face. And the difference in the measurement between the 3-D model and 2-D image demonstrated that to obtain a 2-D drawing in the field requires some subjective determination of how to space the rock art elements in relationship to each other. Different investigators most likely would vary in how they illustrated the petroglyphs in relationship to each other.

A total of 167 individual glyphs were recorded from the main panel (Table 1; Fig. 5). The elements were grouped into separate layer files within ArcGIS into the categorical styles of Modern, Historic Anglo-American, Plains Native American, Southwestern Native American, and Unknown Native American based upon depicted themes and styles (see Keyser 1987, 2004; Keyser and Klassen 2001; Keyser and Mitchell 2001; Parsons 1987; Patterson 1992; Schaafsma 1992). The earliest Anglo-American name and date was 'Nolles 1881', composed in a distinctive cursive style. The other Historic names and dates were written in the first half of the 20th century.

The Anglo-American carvings then were removed leaving a total of 61 distinguishable Native American elements (Fig. 6). Twenty of the glyphs were abstract or their design and meaning are unclear (Table 1). Five 'X' and one cross symbols were engraved into the panel with no obvious distributional relationship to the other elements, and their Plains or 'Southwestern cultural style' affiliation is unclear. Six 'human figures', with two possibly associated with 'missions', may relate to the other Southwestern theme petroglyphs. The bottom portion of a 'bird' petroglyph was missing, and it is not evident if it is composed in a Plains or 'Southwestern style'.

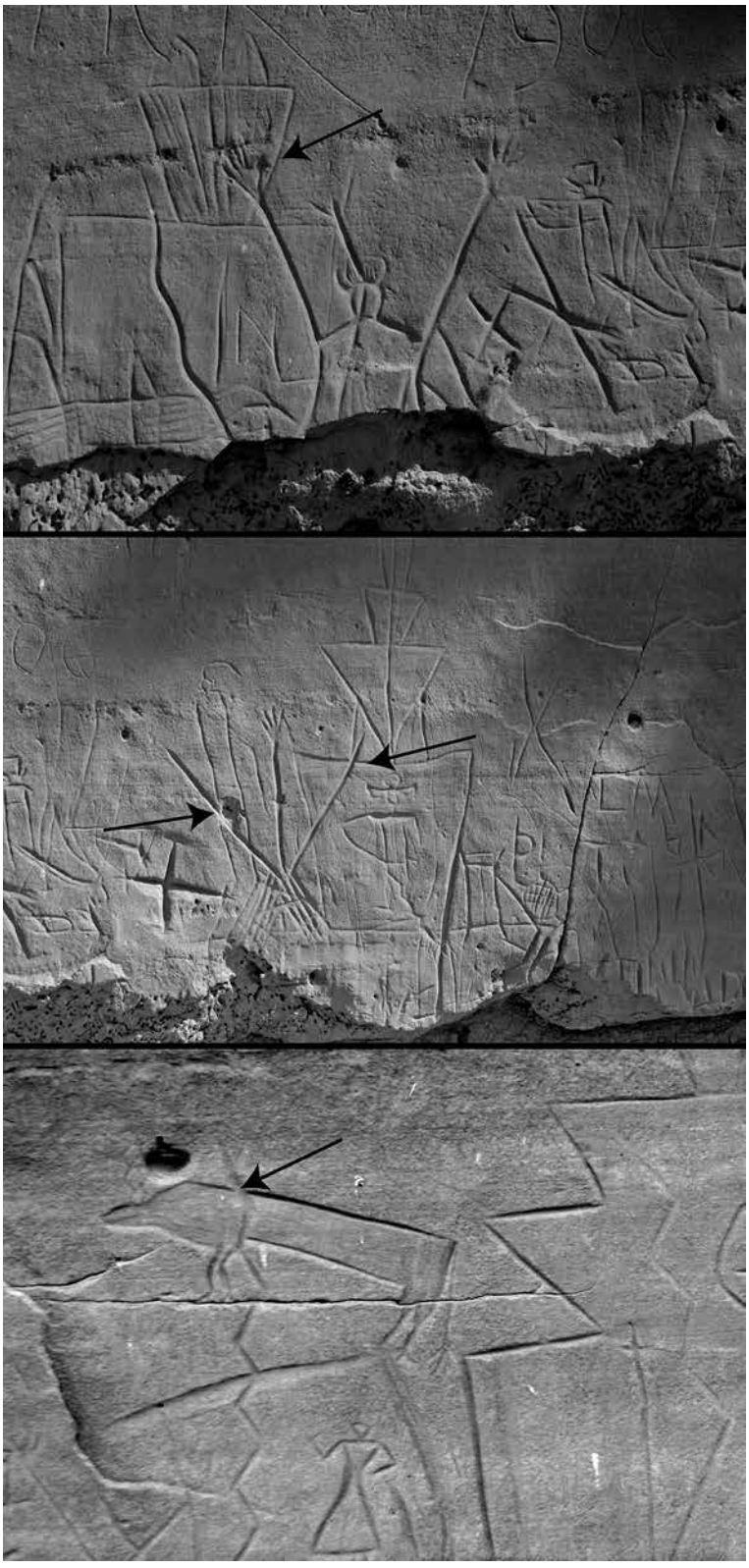

Figure 7. *Overlapping of Plains and Southwestern elements from the main panel at Cowhead Mesa; arrows denote locations of overlap: (a) Plains figure cross-cutting 'mission'; (b) 'tepee' element overlaps both Plains figure and 'mission'; (c) 'snake/lightning' symbol superimposed over bovid motif.*

Petroglyphs exhibiting elements similar to those found at other Plains rock art sites include four 'animal' figures, seven 'human' figures, and two 'tepees' (Table 1; Fig. 6). All of the Plains elements are in the 'biographic tradition' dating from the early 1700s to the late 1800s (Keyser and Klassen

Panel	Motif(s)	Modern	Historic Anglo-American	Plains Native American	Unknown	Total
Panel 1	Name and date		1			1
Panel 2	Name and date	3				3
	'Tepee'			4		4
	'Deer head outline'				1	1
Panel 3	Abstract element				1	1
Panel 4	Abstract element				1	1
	Name and date	2				2
Panel 5	'Tepee'			1		1
	Anthropomorph			1		1
	Abstract element				1	1
Panel 6	Name and date		1			1
Panel 7	Name and date		1			1
Panel 8	Abstract element				1	1
Panel 9	Name and date		1			1
Total		5	4	6	5	20

Table 2. *Inventory of illustrated elements from the nine smaller panels at Cowhead Mesa.*

2001: 224). Three 'scenes' portray a 'battle' between two individuals. In one 'scene', an individual is riding a horse carrying a shield and 'piercing another person with a lance'. The rest of the identified Plains petroglyphs appear isolated and not interacting with other elements. All of the Plains anthropomorphs are illustrated with rectilinear bodies in simple outline form. The two horses and a bovid are carved with boat-like form bodies adhering to the 'biographic style'. Artists also have outlined four 'tepees' onto the panel.

Four Southwestern theme elements also occur on the panel (Fig. 6). Three multi-storied buildings with two containing crosses on top occupy a large portion of the panel and most likely represent Spanish missions (Boyd 1992; Riggs 1965). Inside one of the 'missions', multiple zigzag lines possibly depict that the building is on fire. Another vertical zig-zag line is over 66 cm long. It is engraved over the bovid and is forked on one end. Snakes and lightning are portrayed in this fashion on Southwestern rock art panels (Patterson 1992: 180–181; Schaafsma 1992: 62).

Figure 8. *Illustration of 'tepee', 'human' figure and abstract element at the small panel 5 at Cowhead Mesa.*

The superimposition of Plains and Southwestern petroglyphs demonstrates that two or more episodes were involved in the creation of the rock art panel. In two cases, Plains elements crosscut two of the 'missions' (Fig. 7). Not only does one 'tepee' element overlie a 'mission', it also crosscuts a Plains 'human' figure element (Fig. 7). As noted, the zigzag 'snake/lightning' petroglyph is incised over the bovid element.

Smaller panels

For the smaller panels, three to four digital images per panel were taken with a Pentax digital SLR camera with 6.1 megapixels resolution. The images were shot approximately 3 m away from each of the panels with a focal length of 27 mm. Overlapping of photographs and use of a scale in each of the images minimised distortion for subsequent illustration in Adobe Illustrator.

A total of twenty elements have been recorded from the nine smaller panels (Table 2). Two of the nine panels, located on the north and northeast faces of the mesa, contain six elements depicted in the Plains 'biographical style' (Table 2). Five 'tepees' and a 'human' figure are carved on these two panels (Fig. 8). One glyph is an outline of a deer with antlers (Fig. 9). It is unclear whether this glyph is the work of a Native American or more recent Anglo-American. Names associated with Historic dates are inscribed on four of the panels. The name 'J. L. Wallace' is associated with the date of 'Dec 1914'. Three other panels have designs that are abstract with no clear indication of the artist's meaning or cultural affiliation.

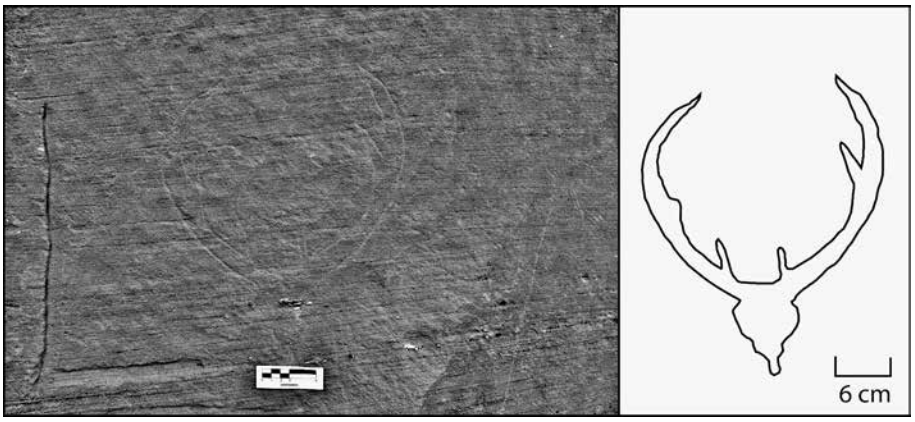

Figure 9. *Outline of 'deer' with antlers at Cowhead Mesa Panel 2.*

Discussion

Cowhead Mesa has been an important landmark to hunter-gatherer groups from at least 4500 BP to Historic times, and also held an important significance to early European settlers of the region. Laser scanning provided a non-invasive technique for recording the entire context of rock art panels for documentation and preservation. Other advantages of laser scanning are the limited amount of time spent in the field recording the petroglyphs and the measured points and illustrations mapped more accurately than traditional drawing methods (El-Hakim et al. 2004; Robson Brown et al. 2001).

The main panel has been illustrated and inventoried successfully after exporting the 3-D model from the Cyclone software as a JPEG into ArcGIS. From an examination of the style and spatial arrangements of the petroglyphs from the main panel and smaller panels, most of the Native American elements are in the Plains biographical style, dating between the early 1700s to late 1800s (Keyser and Klassen 2001). Other rock art panels in the region also are predominantly Plains biographical style (Boyd 1990). Depictions of three 'Southwestern-style' 'missions', a 'snake/lightning' design, and possibly three human figures on the main panel indicates a Southwestern influence on the rock art. Of particular interest are the Plains elements that overlie the 'Southwestern style' 'mission'. This overlay indicates the 'missions' were created and date earlier than the Plains elements. If Flores (1992) is correct that the zigzag lines within one of the 'missions' depicts the buildings on fire, then the missions may date as early as the late 16th century, corresponding with the Pueblo revolt (Silverberg 1970). On the other hand, they may represent a later event such as the destruction of the San Saba mission in 1758 (Dunn 1914). In either case, the creation of the Plains elements after the missions would fit the 1700s to 1800s date for the biographical style.

The mixture of Southwestern symbolism and Plains biographical style rock art is not surprising when considering the long history of mutual exchange between Plains hunter-gatherer groups and Puebloan peoples in central New Mexico (Spielmann 1991). A Kokopelli figure is inscribed at the Yellowhouse Crossing Mesa site, located less than 32 km to the east of Cowhead Mesa (Fig. 1). This figure is a common motif of the Jornado style rock art of south-central New Mexico (Boyd 1990). At the northern edge of the Southern High Plains, the Rocky Dell site is located in the canyon breaks of the Canadian River 276 km northwest of Cowhead Mesa. At this site, Southwestern motifs are incorporated into the rock art, including a plumed serpent almost 4 m long (Kirkland and Newcomb 1967: 203). Lieutenant Whipple, while documenting the rock art in 1853, was visited by a group of Pueblo Indians claiming responsibility for the rock art (Whipple et al. 1856: 38). The serpent and associated two human figures are slightly different stylistically from the rest of the rock art, and it is possible Puebloan peoples were responsible for these elements (Kirkland and Newcomb 1967: 205). Further stylistic study comparing Southwestern symbols to Plains elements from the Cowhead Mesa main panel and other petroglyphs in the region should clarify the influence of Southwestern and Plains peoples on the rock art of the region.

Conclusion

The combination of using a 3-D long-range laser scanner, high-resolution digital photography and photogrammetric techniques was successful in recording the ten petroglyph panels at Cowhead Mesa. The disadvantages of using laser scanners in the field are their high cost; an experienced person is required to operate the equipment; and the equipment is too bulky and heavy for use in hard to reach places (Chandler et al. 2005a). Post-processing data also consumes a considerable amount of time, and requires the appropriate software and computer equipment that adds to research cost. The advantages, however, outweigh the disadvantages. The use of photogrammetric techniques with long-range laser scanning preserves the entire context of rock art, and furnishes objective and replicable measurements for

future research.

Short-range laser scanners (Díaz-Andreu et al. 2006) and photogrammetry (Chandler et al. 2005b) offer researchers other solutions for recording rock art sites in the entire context with their own set of advantages and disadvantages over long-range laser scanning. Future advances in laser scanner technology and software will improve both field documentation and the post-processing of data, and furnish researchers with a multitude of options for recording rock art sites in their entire context. While the use of short-range scanners for a higher level of detail would improve the fine detail capture of the petroglyphs, the overall context could not be scanned. The possibility of a combination of these two types of scanning technology may offer a more precise definition for the small images in conjunction with its surroundings. The placement of permanent benchmarks on the site would provide the necessary link for future scans, thereby providing an established point for comparison with later scans. Annual scans of the images and the site context would provide a record of erosion rates and patterns. These permanent survey benchmarks also would provide precise GIS reference points for future research and analysis studies.

The advantage of using non-invasive recording techniques is clear. Not only is the rock art panel preserved in its context for preservation and fu-ture study, non-invasive techniques also are less destructive to rock art compared to traditional sketch drawing and rubbing methods. The Cowhead Mesa petroglyphs are interpreted to represent multiple episodes of Native American groups using both Plains biographical style and Southwestern symbols to impart meaning. As more is learned about rock art sites on the Southern High Plains, new and interesting questions likely are to be generated, and having preserved information allows for new insights into previously investigated rock art sites.

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Stance Hurst
Museum of Texas Tech University
Box 43191
Lubbock, TX 79409-3191
U.S.A.
E-mail: *stance.hurst@ttu.edu*

Elizabeth Louden
Texas Tech College of Architecture
Box 42091
Lubbock, TX 79409-2091
U.S.A.
E-mail: *elizabeth.louden@ttu.edu*

Eileen Johnson
Museum of Texas Tech University
Box 43191
Lubbock, TX 79409-3191
U.S.A.
E-mail: *eileen.johnson@ttu.edu*

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