Around the Lower Pecos in 1,095 Days: The Alexandria Project

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In 2017 Shumla Archaeological Research & Education Center launched The Alexandria Project, with the goal of digitally documenting and preserving the 4,000 year record of hunter-gatherer rock art in the Lower Pecos Canyonlands of southwest Texas. The majority of identified Lower Pecos rock art is in Val Verde County, Texas, and the objective of the Alexandria Project is to conduct baseline documentation at the over 300 known Val Verde County rock art sites. Shumla has implemented intensive rock art documentation and digital preservation methods using a combination of low and high-tech approaches, including Structure from Motion (SfM) 3D modeling and high-resolution gigapanoramas. This project will create an unparalleled visual and spatial inventory of Lower Pecos rock art to inform current and future research. This paper summarizes Shumla's documentation methods used during the Alexandria Project.

The Lower Pecos Canyonlands of southwest Texas and northern Coahuila, Mexico, is home to some of the world's most complex prehistoric rock art (Boyd 2003, 2016; Shafer 2013; Turpin 2010). The majority of known Lower Pecos rock art sites north of the U.S.-Mexico border are in Val Verde County, Texas, where there are over 300 rock art sites recorded. However, many are being lost due to age and natural weathering, and few have received the detailed documentation and iconographic description crucial for studying and protecting these endangered sites. To digitally document and preserve the rock art of the Lower Pecos, Shumla Archaeological Research & Education Center launched The Alexandria Project in 2017 with the goal of conducting baseline documentation at all of the known rock art sites within Val Verde County. Through a combination of low and high-tech methods, including Structure from Motion (SfM) 3D modeling and gigapanoramas, the Alexandria Project will result in an incredible spatial and visual inventory of Lower Pecos rock art. This paper describes Shumla's documentation methods used during the Alexandria Project, and demonstrates how new technologies can be utilized by rock art researchers during an intensive survey-level project.

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The Lower Pecos Canyonlands

Centered on the confluences of the Rio Grande, Pecos, and Devils Rivers, the Lower Pecos Canyonlands was home to hunter-gatherers for over 10-millennia prior to European contact (e.g., Turpin 2004). The visual and material culture characterizing the region and its prehistoric inhabitants has been described in widely available resources (e.g., Black and Dering 2001; Boyd 2016; Shafer 2013; Turpin 2004), and extends approximately 110 km north and 150 km south of the United States-Mexico border (Figure 1). Around

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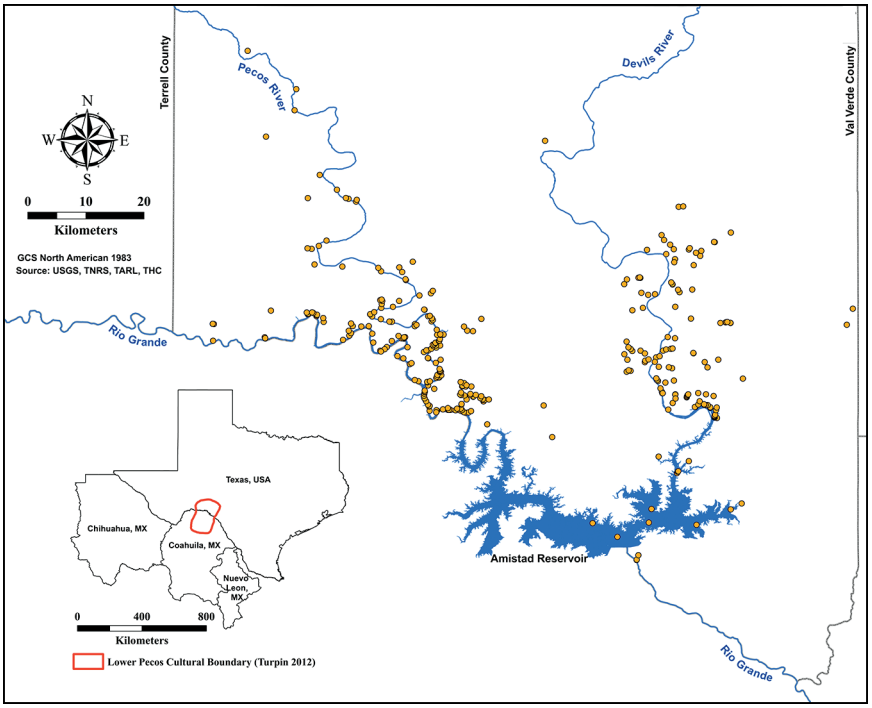

Figure 1. Map of the Lower Pecos Canyonlands archaeological region showing the known rock art sites as of January 2017. The regional boundary is based on Turpin (2012:Figure 1).

four thousand years ago, hunter-gatherer artists began transforming this arid region into a painted landscape, and today the rock art of the Lower Pecos is known to be some of the oldest pictographic rock art in North America (e.g. Bates et al. 2015; Rowe 2009).

Within the region there are currently five defined rock art styles (Figures 2–6), ranging in age between 2200 B.C. and A.D. 1800: Pecos River, Red Linear, Bold Line Geometric, Red Monochrome, and Historic Era (Boyd 2016; Boyd et al. 2013; Kirkland and Newcomb 1967; Turpin 1986a, 1986b, 2004). Although each of the region's defined rock art styles are pictographs, there are also less-studied petroglyphs (Figure 7) known from a small number of sites (e.g., Turpin 2005; Turpin and Bass 1997).

The most common, and best-studied, rock art in the region is Pecos River Style, famous for the large, polychromatic murals that adorn numerous Lower Pecos rockshelters and caves (Figure 8). According to Boyd's (2003, 2016) work, many of the Pecos River Style murals were planned, complex compositions that were created to communicate the Lower Pecos hunter-gatherer's beliefs, understanding of the natural and supernatural world, and their place within the cosmos. Although Shumla and other researchers (e.g., Greco 2011; Harrison 2009, 2011; Kirkland and Newcomb 1967; Turpin

Figure 2. Pecos River Style pictographs at Rattlesnake Canyon (41VV180). Pecos River Style (PRS) has been radiocarbon dated between 4200 and 1465 RCYBP (Bates et al. 2015:45–46), and is characterized by polychromatic depictions of anthropomorphs, zoomorphs, and enigmatics (neither human nor animal figures). All photographs are from Shumla.

Figure 3. Red Linear Style pictographs at the Kirby Site (41VV1480). Red Linear figures are much smaller than Pecos River Style, and are often referred to as stick figures. Images include anthropomorphs, zoomorphs, nets, snares, and other enigmatic images. Contrary to the name, Red Linear figures are also painted in yellow, black, and possibly white (Boyd et al. 2013). There are currently no radiocarbon dates on Red Linear, but based on 38 examples where Red Linear and Pecos River Style are in stratigraphic relationship, Red Linear is painted beneath Pecos River, indicating Red Linear is older—or at least contemporaneous—with Pecos River Style (Boyd et al. 2013).

Figure 4. Red Monochrome Style pictographs at Painted Shelter (41VV78). Based on the presence of bows, Red Monochrome Style dates to the Late Prehistoric period in the Lower Pecos (Turpin 1986b, 2004), and include anthropomorphs, zoomorphs, and a wide range of enigmatic figures. Red Monochrome figures are often painted in a more realistic manner than Pecos River Style images.

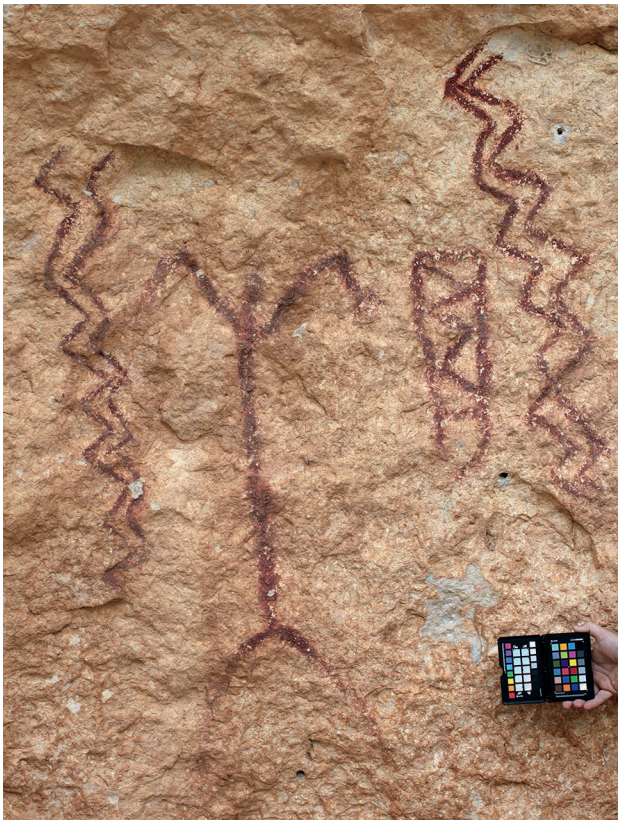

Figure 5. Bold Line Geometric Style pictographs at Curly Tail Panther Alcove D (41VV1438). There are no radiocarbon dates on Bold Line Geometric figures, but the style is argued to be Archaic (>A.D. 1000) in age (Turpin 1986a, 2004). Figures include geometric patterns, especially zigzag images and "blanket" designs of woven geometrics, as well as expedient anthropomorphic figures.

Figure 6. Historic era pictographs at Meyers Springs (41TE9). Historic era imagery includes horses, riders on horseback, firearms, churches or missions, Spaniards, and cattle.

Figure 7. Lower Pecos petroglyphs at Lewis Canyon (41VV236). Although much less common than pictographs, there are several sites across the Lower Pecos that contain petroglyphs. The most famous site is Lewis Canyon, where several acres of exposed bedrock are covered with thousands of incised designs (Manaugh 2013; Turpin 2005).

1994, 2010) have intensively studied Pecos River Style, Lower Pecos hunter-gatherers produced a diversity of other images that have been less studied, but are no less important for understanding Lower Pecos foraging peoples. These images and sites together create a large, complex, and enduring library of information that provide clues into the prehistory of the region.

Shumla and the Alexandria Project

Shumla Archaeological Research & Education Center is a 501(c)(3) non-profit located in Comstock, Texas, and Shumla's mission is to preserve the oldest known "books" in North America—the rock art of

Figure 8. The Pecos River Style mural at Red Beene Shelter (41VV951). The central anthropomorphic figure at Red Beene is nearly two meters tall, and is painted two meters above the current floor of the shelter. Many Pecos River Style murals are large and elaborate, spanning dozens of meters across the rear-walls of rockshelters or caves. See also https://sketchfab.com/models/a48332d9630a49f6b95e00c4b41d5b48 and http://gigapan.com/gigapans/203329 for additional images of Red Beene.

the Lower Pecos—through documentation, research, stewardship, and education. Since 2007, Shumla's data collection has focused on intensively documenting individual sites like The Rock Art Foundation White Shaman Preserve of the Witte Museum (Boyd 2016), Panther Cave (Johnson et al. 2011), and Texas Tech University's Rattlesnake Canyon (Lindsay 2015). This approach is invaluable for learning about the iconography present at a single site, but the entire data collection process is very time-consuming because of the meticulous, labor-intensive methods we employ. For instance, full documentation of a large site can take upwards of three years due to the sheer volume of data collected. While this level of documentation is incredibly important, we recognize it would take decades, or even centuries, for Shumla to fully record each Val Verde County rock art site. In response, Shumla launched the Alexandria Project to conduct baseline documentation of all known and extant rock art sites (some sites have been inundated by Amistad Reservoir) in Val Verde County.

The Alexandria Project name harks back to the Library of Alexandria in Egypt, which burned in 48 B.C. A staggering amount of knowledge about ancient philosophy, astronomy, and mythology was destroyed in that fire. As though we had discovered a room of the lost library of Alexandria, we have built a three-year research and data management plan to fully catalog and digitize this treasure of knowledge and ensure that every image is available to researchers for years to come.

Over the course of The Alexandria Project, Shumla will be pursuing the following overarching goals via baseline documentation of Lower Pecos rock art sites:

1. To collect data that can be used to address a variety of research questions and inform Lower Pecos rock art research/scholarship for years to come.
2. To determine the threatened status of rock art sites and to prioritize future documentation efforts accordingly.
3. To build stronger relationships with local landowners, land managers, and site stewards.
4. To share what we learn and increase public awareness in the importance of preserving and protecting rock art sites for future generations.

Alexandria Project Data Collection

One of the greatest challenges we had to confront during the planning and implementation of the Alexandria Project was the limited amount of time spent on-site. Unlike with previous documentation efforts when Shumla would spend several weeks (cumulatively) at a single site, we had to scale back our data collection methods to collect as much data as possible over a few hours. To accommodate the time restrictions, we split our documentation methods into two levels of data collection: 1) Core Data and 2) High-Resolution Panel Data. There are many tasks in each level, and the number of tasks completed at each site is dependent on the preservation of the rock imagery and the complexity of the iconography.

Core Data

Core Data is collected for every site documented during the Alexandria Project, regardless of rock art preservation. Core Data include a state standardized archaeological site form (TexSite), site maps, daily recording notes, GPS point, site feature photos, and site context photos. More detailed information about the rock art is collected on the Shumla Rock Art Site Form (RASF) as part of Core Data. The RASF was developed for Lower Pecos rock art, and allows us to collect data such as rock art styles, application methods, agents of deterioration (natural and cultural), preservation, and information about the iconography.

Distilling the iconographic data collected during the project to a manageable amount was a difficult task. During previous documentation efforts iconographic attributes were collected for every identified figure (e.g., Boyd 2016; Boyd et al. 2012; Johnson et al. 2011; Lindsay 2015), but due to time constraints this amount of iconographic data could not be feasibly collected during the Alexandria Project. We ended up choosing 36 attributes that are relatively common

throughout Lower Pecos rock art (Table 1). Some of the attributes we document include the paraphernalia and adornments present on anthropomorphs (Figure 9), the types of zoomorphs (Figure 10), and a series of Lower Pecos-specific enigmatic elements (figures that are neither anthropomorphic nor zoomorphic; Figure 11). In addition, we also record the presence of two complex motifs that are comprised of several symbols in association with each other (Figures 12 and 13).

The data collected on the RASF is entered into the Shumla Database, where researchers are able to search for specific styles and look for agents of rock art deterioration, as well as specific iconographic symbols and motifs. The iconographic data collected during the Alexandria Project affords a unique opportunity to create a detailed catalog of symbols across a large area. The RASF, along with the rest of the Core Data, documents the current condition of the entire archaeological site, and provides future researchers more information about the rock art than currently exists for most Lower Pecos rock art sites.

Table 1. The iconographic attributes documented during the Alexandria Project, and entered into the Shumla Rock Art Site Form (RASF).

Motif Type	Iconographic Element
Anthropomorphic Attributes	Antlered Anthropomorph Antlers with Dots Rabbit-Eared Anthropomorph Left-Handed Anthropomorph Impaled Anthropomorph Half-bodied Anthropomorph Winged Anthropomorph Hip-Cluster Simple Atlatl Stylized Atlatl Other Noteworthy Paraphernalia Powerbundle
Enigmatic Attributes	Box with Legs Arch with Portal Crenulated Shape Comb Shape Impaled Dots Single Pole Lader Impaled Single Pole Ladder Handprints Grid Zigzag Line Spiral Serpentine Line U-Shape with Serpentine Line Snare Net Cluster of Single Motif
Zoomorphic Attributes	Deer Impaled Deer Feline Avian Snake Othr Noteworthy Zoomorph
General Attributes	Speech/Breath Dismembered/Disarticulated
Complex Motifs	Otherworld Journey Peyotism

High-Resolution Panel Data

Depending on the density and preservation of the rock art imagery, we employ three different types of photographic methods to collect High-Resolution Panel Data: Structure from Motion (SfM) 3D modeling, gigapanoramas, and General Panel Photography. Each of these methods requires taking quality digital photographs, and subsequent processing of the images allows for more intensive analysis of the rock art at each site. It should be noted that the three digital photography methods are not mutually exclusive; we often use all three methods at a single site. In addition, we take supplementary photographs, including macro and microscopic photos (e.g., Boyd 2016) on a case-by-case basis.

Structure from Motion

Structure from Motion (SfM) 3D modeling is becoming more commonplace within rock art research (e.g., Jalandoni et al. 2018; Miller et al. 2012; Robin 2015; Willis et al. 2016). The basic principle by which a 3D surface is created using SfM is fairly simple: take dozens—or sometimes thousands—of overlapping photographs of the object/area being mapped. For best results these photographs need to overlap between 30 to 80 percent, and should be taken in a logical manner while moving across the subject (see Koenig et al. 2017; Willis et al. 2016). For documenting rockshelters we are taking these photographs with a hand-held camera (referred to as ground-based SfM), but archaeologists working around the world are taking SfM photographs from airplanes, UAVs, blimps, and kites, or by suspending the camera from a pole (see Willis et al. 2016 for more detailed instructions and examples of different SfM applications). These photographs are then put into a specialized software such as Agisoft Metashape (Agisoft 2018), but other software programs are available (e.g., Green et al. 2014) that also tie the photographs together to build a 3D surface.

Perhaps the most important step in the SfM process is referencing each 3D model to real-world coordinates using ground control points (GCPs). GCPs are simply

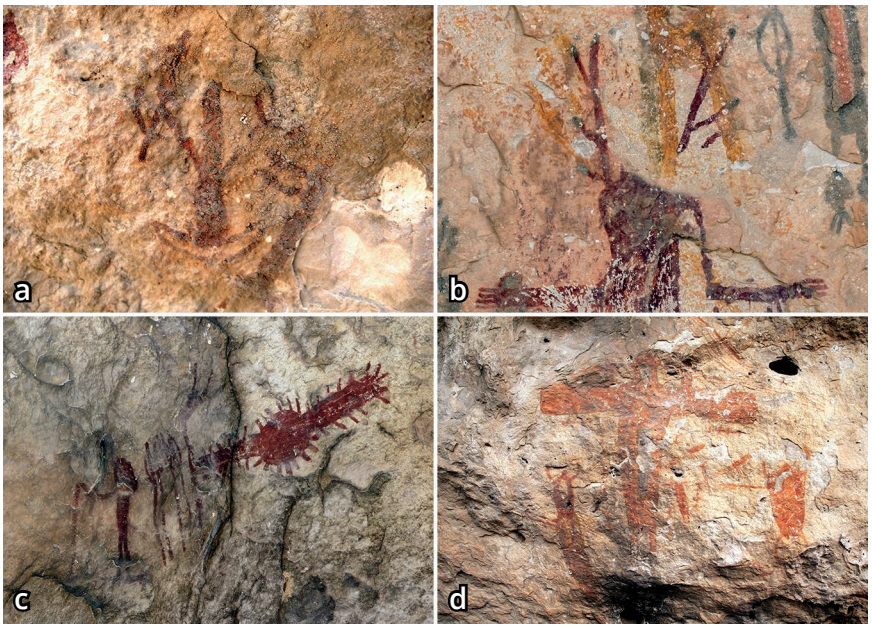

Figure 9. We record several different anthropomorph adornments and paraphernalia types during the Alexandria Project, including (a) atlatls, (b) antler-rack headdresses, (c) "power-bundles" (also called dart-headed figures [Harrison 2011; Turpin 1986c] or Datura seed-pods [Boyd and Dering 1996:Figure 10]), and (d) wings. Images are from 41VV612 (a), 41VV1230 (b), 41VV73 (c), and 41VV286 (d).

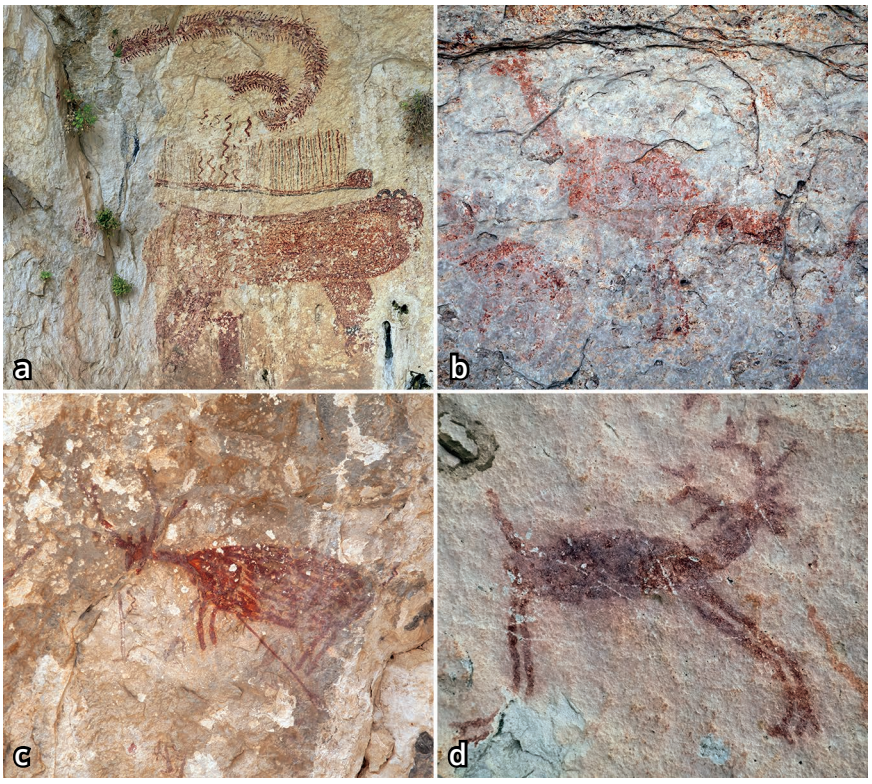

Figure 10. We record several different zoomorph types during the Alexandria Project, including (a) felines, (b) avians, and (c and d) deer. Zoomorphs are common in Pecos River (a and c), Red Monochrome (b), and Red Linear (d) styles. Images are from 41VV18 (a), 41VV78 (b), 41VV612 (c), and 41VV1480 (d).

known points (or objects with known dimensions) within your model that allow you to apply scale (e.g., meters or feet) and orientation (e.g., up-down; north-south). GCPs can be created using points shot in with a total data station (TDS) or high-precision GPS unit, or simply a meter tape stretched out across a surface. Regardless of what is used for establishing GCPs, the important thing is that GCPs allow researchers to measure (in real-world coordinates) directly on the 3D surface.

Rather than using TDS or GPS for creating GCPs during the Alexandria Project, we are using a different methodology: a builder's square (Castañeda 2015, 2017; Willis et al. 2016). At each site we orient a standard builder's square to North, level it using line levels, and then photograph the builder's square in the model (Figure 14). This method does not allow us to reference each model to real-world UTMs or Latitude/Longitude, but still allows us to apply scale and proper orientation to the models. In addition to being a less expensive solution, the builder's square is lighter and easier to carry than a TDS, and is a very efficient method for referencing 3D models on a survey-level project.

Once the SfM 3D models are referenced, we can export fully-textured 3D models of the subjects (Figure 15), as well as orthographic photos and digital

Figure 11. Several different enigmatic figures are documented during the Alexandria Project, including (a) spirals, (b) handprints, (c) box-with-legs, and (d) single-pole ladders. Images are from 41VV236 (a), 41VV320 (b), 41VV76 (c), and 41VV1340 (d).

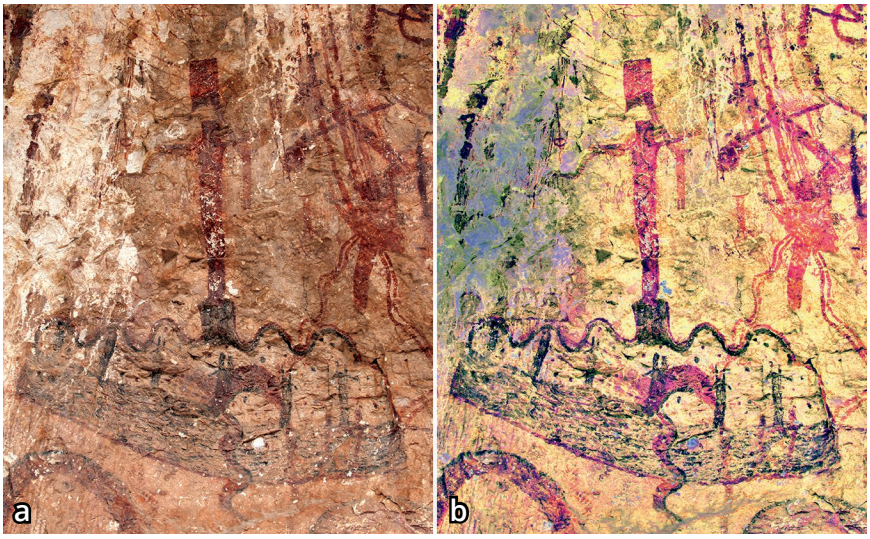

Figure 12. The first complex motif we document within Pecos River Style has been referred to as a hole-in-the-universe symbol (Turpin 1992:278, 1994:Figure14), and is what Boyd (1996, 2003) describes as an Otherworld Journey. This example of an Otherworld Journey is from Mystic Shelter (41VV612), and consists of a red anthropomorph passing through a black portal, with a red portal above the figure's head. The left image is in real-color, and the right image has been enhanced with DStretch YBK *color channel.*

elevation models (DEMs) for the surfaces (Figure 16). Because the exported files have scale, we are able to collect measurements on individual figures using the digital data (see Jalandoni et al. 2018; Mackie 2015). Having the ability to measure figures on the 3D models and 2D exports (e.g., DEMs and orthographic photos) is invaluable for future analyses, and provides a different dataset than the gigapanoramas.

Gigapanoramas

Panoramas are frequently used by rock art researchers (e.g., Diaz-Granados et al. 2015; Mark and Billo 1999, 2012), and provide an excellent platform for documenting entire rock art panels. A standard photographic panorama is taken from one location, and consists of a series of photographs in an arc across the subject. Gigapanoramas are similar in concept, except that they must be taken on a stable tripod (this is unlike capturing a SfM 3D model, where the camera is physically moved around the subject), and typically are made up of hundreds (or even thousands) of individual images (Mark and Billo 2012). The main difference between a standard panoramic image and a gigapanoramic image is the size. A gigapanoramic image, or GigaPan, is a panorama containing at least one billion ($1X10^9$) pixels (a large digital photograph is between 20 and 50 million [$2X10^7$–$5X10^7$] pixels).

For our GigaPan system, a DSLR camera with a 50.6 Megapixel sensor and a 100–400mm telephoto lens is set up on a tripod with a pan-head (Figure 17). Our pan-head is a Gigapan Epic Pro with an electric motor which allows for mechanical, incremental movements to capture images with at least 50 percent overlap. Having the camera and pan-head on a tripod allows us to take images at higher focal lengths, lower ISOs, and slower shutter speeds, meaning finer details of a smaller area. The combination of DSLR, telephoto lens, pan-head, and tripod helps us create incredibly high-resolution images that can be zoomed in to see the smallest of details (Mark and Billo 2012).

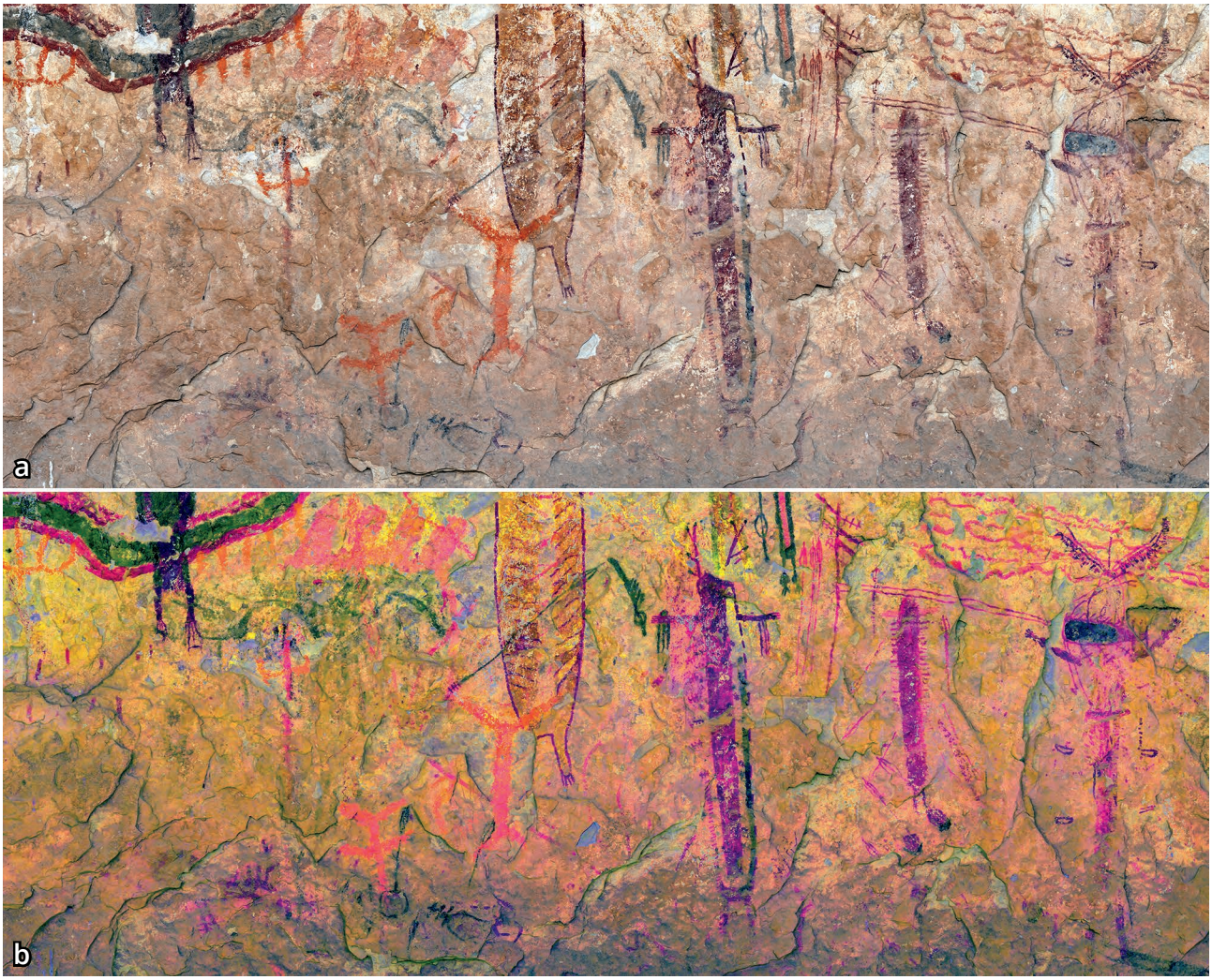

Figure 13. The second complex motif we document within Pecos River Style is what Boyd (2003, 2012) refers to as the Peyotism Motif. This example from Halo Shelter (41VV1230) consists of an anthropomorph with an antler headdress, impaled dots, single-pole ladders, and deer beneath the figure, shown in real-color (a) and DStretch YBK *enhancement (b).*

Once the GigaPan photographs are collected, the images are then imported into specialized software such as Autopano Giga (Kolor 2018) which then stitches the photographs together into one large image (Figure 18). This large image can then be transformed into multiple projections to minimize distortion as much as possible. Once we find the projection with the least amount of distortion, it is exported as a large Photoshop document (.PSB). GigaPan images are generally higher resolution than SfM 3D models, but the GigaPans themselves do not have internal scale, reference, or orientation. When possible we add a 2-meter tape to each GigaPan section in order to provide scale, but it is always beneficial to have both GigaPan and SfM models of well-preserved rock imagery so we have both high-resolution images and detailed 3D surfaces of each panel.

General Panel Photography

The final, and most straightforward, photography method we use during the Alexandria Project is General Panel Photography (GPP). GPP consists of taking high-resolution, quality photographs of rock art panels with and without scale (Figure 19). GPP is often the only digital documentation method we employ at sites with only remnant pigment because the lack of preservation does not warrant more intensive photography. In addition to areas of poor preservation, we use GPP in cases where it is not physically possible to produce a 3D model or gigapanorama of a rock art panel (e.g., very low ceilings, poor lighting, undulating rock surfaces), or as supplemental documentation to areas already photographed with gigapanoramas and/or SfM.

Figure 14. Jerod Roberts leveling and orienting a builder's square in preparation for referencing a 3D model. See also Castañeda (2015:45–47) and Willis et al. (2016:23–25).

Figure 15. Screenshot of a 3D model from 41VV1190, the Little Monkey Site. The original model has 1,614,840 faces. The 3D model can be viewed at this link: https://sketchfab.com/models/46b42589dcfd4ee38ef3d87b1f7dfc5f.

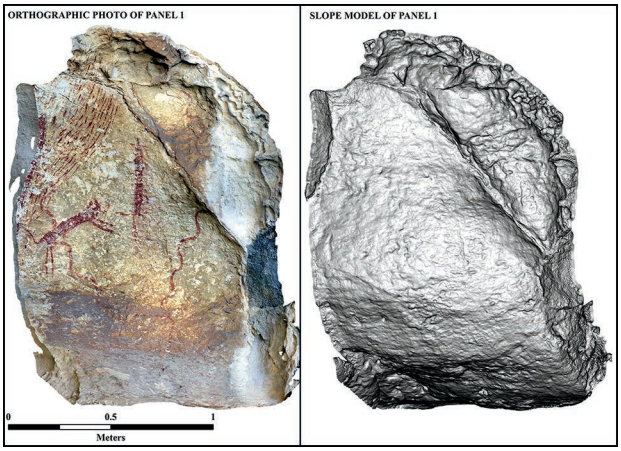

Figure 16. Orthographic photo and digital elevation model (DEM) with interpolated slope of the pictograph panel at the Little Monkey Site (41VV1190) exported from Agisoft Metashape. The orthographic photo has a pixel resolution of 0.1 mm, and the DEM has a pixel resolution of 0.4 mm.

Figure 17. Shumla's gigapanorama setup at Black Cave Annex (41VV76a).

Enhancement of High-Resolution Panel Data

Once High-Resolution Panel Data have been collected at a rock art site, the first task is to process the images and run the final versions through DStretch (Harman 2005). As with much rock art research, DStretch has revolutionized our ability to identify rock art. No matter what type of High-Resolution Panel Data we collect (SfM, gigapanorama, or GPP), we use DStretch intensively in the lab (and in the field) to assist in identifying specific rock art images and motifs. One of the greatest advantages of creating SfM 3D models and gigapanoramas is the ability to DStretch entire rock art panels (Figures 20 and 21). This not only aids in identifying individual figures, but is also invaluable to understanding the relationship between figures across the panel. These high-resolution images are intended to be a resource for future researchers if sites are no lon-

Figure 18. The gigapanorama from Sunburst Shelter (41VV840). The Photoshop Large Document Format (.PSB) file is 81 GB, and is 204,100x104,077 pixels. The large file size allows the user to zoom to very fine details within the document, as illustrated here with details from left center of this panel. This gigapanorama can be viewed at this link: http://www.gigapan.com/gigapans/203141.

Figure 19. General Panel Photography of a single anthropomorphic figure with scale from Sonic Cicada (41VV419).

ger accessible, have since degraded, or if the researcher cannot physically visit the region. In fact, many of these GigaPans and SfMs are already accessible on the SketchFab and the GigaPan websites (see Figures 8, 15, 18, and 21). These sites give us a platform to share the rock art not only with other researchers, but interested landowners and the public as well.

Alexandria Research Questions and Ongoing Data Analysis

Depending on the scale and preservation of the rock art, baseline documentation of a single site can take anywhere from a few hours to several days (e.g., LaRock and Houle 2018); however, most sites are finished within one day of field work. The first step in data analysis is processing the SfM 3D models and gigapanoramas, and entering all our Rock Art Site Form data into our Shumla Rock Art Database. These data allow us to begin searching for patterns in the rock art. Our data analysis is guided by several broad research questions and objectives that we have developed while planning for the Alexandria Project. These questions/objectives are:

1. Are there patterns in rock art site location?
2. Are there patterns in the spatial distribution of rock art styles and motifs?
3. What is the range of variation of well-known motifs (e.g., Otherworld Journey, Peyotism, etc.)?
4. Are there sub-styles within the Pecos River Style?

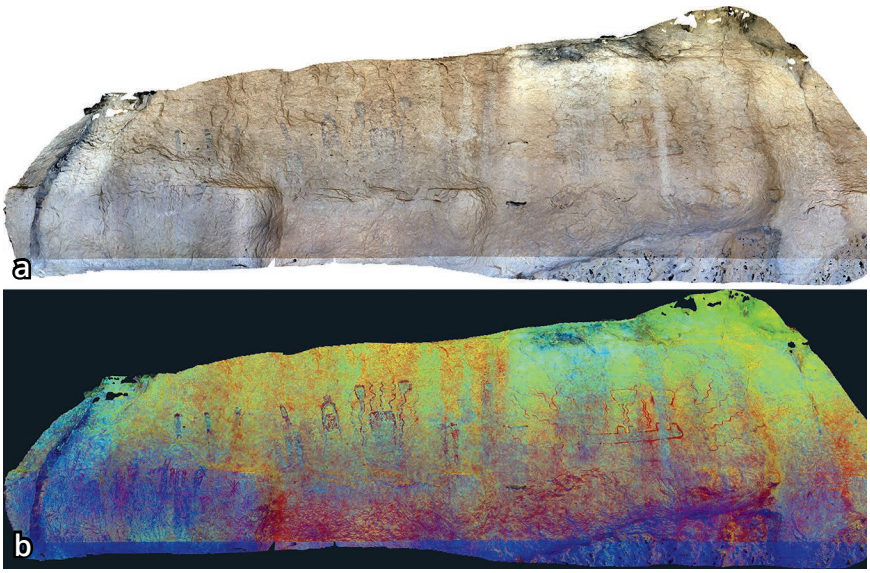

Figure 20. Panel 1 orthographic photo of Skiles Shelter (41VV165) in real-color (a) and DStretch LDS enhancement (b). Original file was exported from Agisoft Metashape, and has a pixel resolution of 0.2 mm.

5. What is the spatial distribution and variation of Red Linear Style in the Lower Pecos?
6. Are there any currently unknown rock art styles that exist in the region?

All these questions can be addressed using the visual, iconographic, and spatial information we collect as part of the project. Inevitably there will be additional questions that arise as we and future researchers continue to study this complex visual culture.

Although the current focus of the Alexandria Project is on data collection, we are slowly beginning the process of data analysis. One of the biggest surprises thus far is that we are encountering many rock art images that do not fit into any of the existing rock art styles (Figure 22). At the moment we consider these images to be in unknown or unclassified rock art styles, and we are continuously building a database of these unknown images. Further, we are seeing variation and diversity in the way certain attributes are portrayed within existing styles. For instance, there is a great deal of variety in how antler headdresses are portrayed within Pecos River Style (Figure 23).

The more sites we document will increase the data available for addressing all of our broad research questions, and will greatly assist future researchers. If a future researcher wants to conduct an iconographic

Figure 21. The gigapanorama of the main pictograph panel at Halo Shelter (41VV1230) in real-color (a) and DStretch LDS enhancement (b). The .PSB file is 11 GB, and is 103,547x35,575 pixels. The gigapanorama for Halo Shelter can be viewed at this link: http://www.gigapan.com/gigapans/206231.

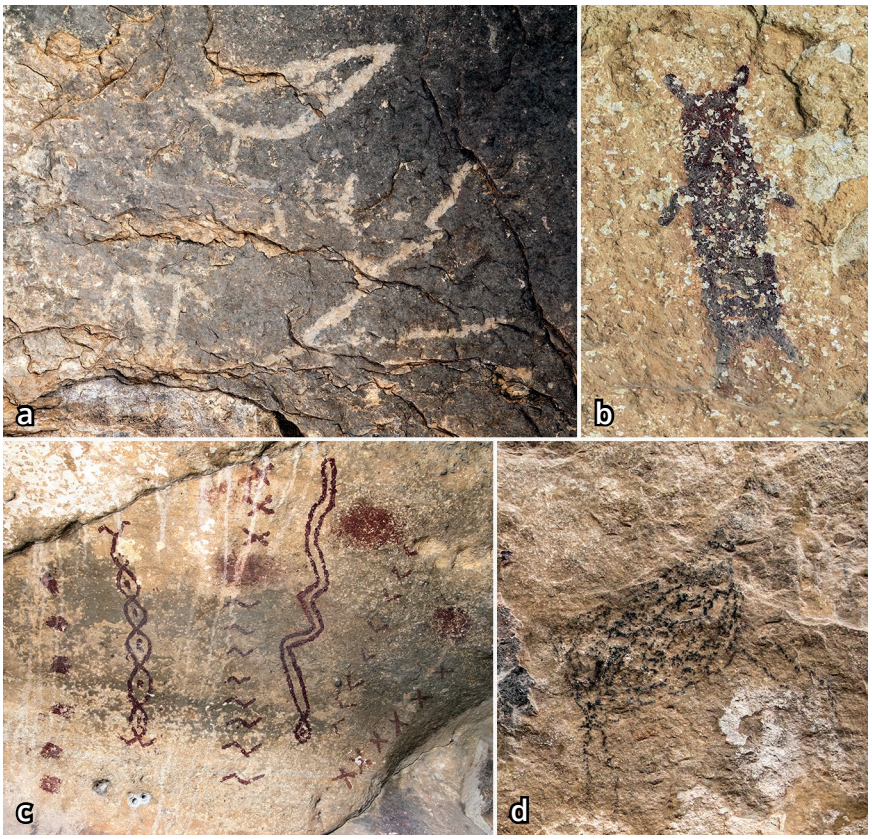

Figure 22. We have encountered several pictographs that do not fit into any previously defined Lower Pecos rock art styles: (a) thickly applied white pigment from 41VV1441; (b) maroon "horned" anthropomorph from 41VV73; (c) red geometrics from 41VV1310 (see also Turpin 1992); and (d) a dry-applied black deer from 41VV73 (see also Boyd et al. 2014).

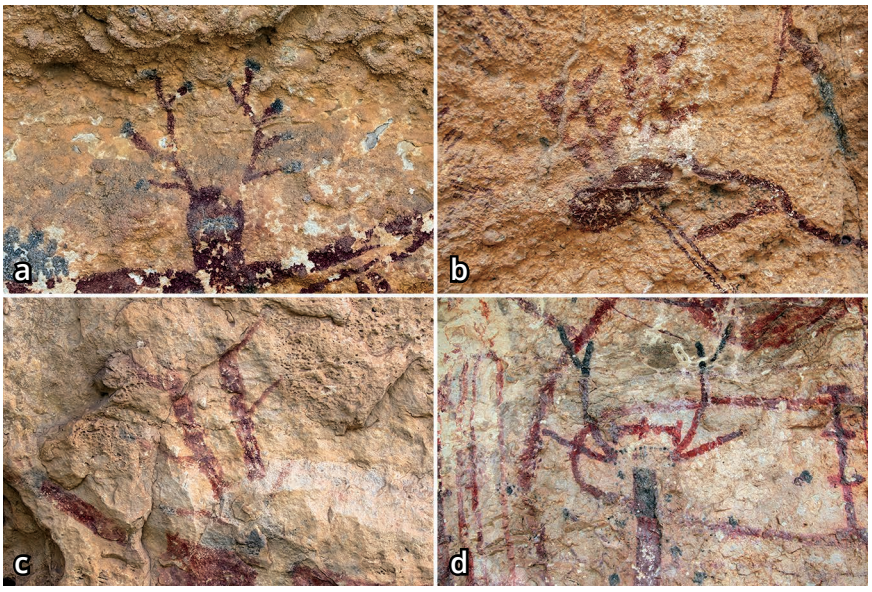

Figure 23. There is variation of antler headdresses within Pecos River Style pictographs: (a) curved antlers with black dots from 41VV124 (see also Boyd 2016); (b) a double set of antlers from 41VV124 (see also Boyd 2016); (c) straight antlers with black dots from 41VV961; and (d) curved antlers with black tips from 41VV612. See also Koenig and Castaneda (2018) for more examples of antler headdresses within Pecos River Style.

analysis of all antler headdresses or unknown images in Lower Pecos rock art, the first step would be to conduct a simple search of the Alexandria Database to identify which sites contain antler headdresses or unknown rock art styles. Once the sites are identified, the researcher can proceed to look at high resolution images of this symbol across the region, and then determine if more field work is necessary. Analyses such as these will be important for furthering our understanding of the pictographic lexicon of Lower Pecos hunter-gatherers.

Conclusion

At the time of article submission we have documented 94 sites, and we can already see the research value of the Alexandria Project coming to fruition. The Alexandria Project represents a rare opportunity to collect survey-level, baseline data from a large sample of sites within a single archaeological region. Data collected during the Alexandria Project will inform current and future research in Lower Pecos rock art, and provide data for comparisons to other regional rock art traditions. In addition, we are prioritizing rock art sites for full documentation based on preservation, research potential, and threatened status of the rock art. By applying documentation methods such as the Shumla Rock Art Site Form, SfM 3D modeling, and gigapanoramas at each site we can not only provide an unparalleled visual and spatial inventory of Lower Pecos rock art, but also digitally preserve the rock art imagery for future generations.

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