## 1. NAME AND LOCATION OF PROPERTY

**Historic Name:** Hueco Tanks

**Other Name/Site Number:** Hueco Tanks State Park and Historic Site, 41EP2

**Street and Number** (if applicable)**:** 6900 Hueco Tanks Road No. 1

**City/Town:** El Paso **County:** El Paso **State:** Texas

## 2. SIGNIFICANCE DATA

**NHL Criteria:** 6

**NHL Criteria Exceptions:** N/A

**NHL Theme(s):** I. Peopling Places
3. migration from outside and within
4. community and neighborhood
III. Expressing Cultural Values
2. visual and performing arts

**Period(s) of Significance:** Formative Period (1,800–550 BP)

**Significant Person(s)** (only Criterion 2)**:** N/A

**Cultural Affiliation** (only Criterion 6)**:** Jornada Mogollon

**Designer/Creator/Architect/Builder:** N/A

**Historic Contexts:** Aboriginal Precontact (Prehistoric) Archeology

**Paperwork Reduction Act Statement.** We are collecting this information under the authority of the Historic Sites Act of 1935 (16 U.S.C. 461-467) and 36 CFR part 65. Your response is required to obtain or retain a benefit. We will use the information you provide to evaluate properties nominated as National Historic Landmarks. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number. OMB has approved this collection of information and assigned Control No. 1024-0276.

**Estimated Burden Statement.** Public reporting burden is 2 hours for an initial inquiry letter and 344 hours for NPS Form 10-934 (per response), including the time it takes to read, gather and maintain data, review instructions and complete the letter/form. Direct comments regarding this burden estimate, or any aspects of this form, to the Information Collection Clearance Officer, National Park Service, 12201 Sunrise Valley Drive, Mail Stop 242, Reston, VA 20192. Please do not send your form to this address.

## 3. WITHHOLDING SENSITIVE INFORMATION

**Does this nomination contain sensitive information that should be withheld under Section 304 of the National Historic Preservation Act?**

_X_ Yes

___ No

## 4. GEOGRAPHICAL DATA

**1. Acreage of Property:** 860.3 acres

**2. Use either Latitude/Longitude Coordinates or the UTM system:**

**Latitude/Longitude Coordinates** (enter coordinates to 6 decimal places)**:**

Datum if other than WGS84: NAD83

**Latitude:** **Longitude:**

**OR**

**UTM References:**

| **Zone** 13N | | **Easting** | **Northing** |
|---|---|---|---|
| | A | 400568 | 3532917 |
| | B | 402086 | 3532749 |
| | C | 402076 | 3530575 |
| | D | 400558 | 3530599 |

**3. Verbal Boundary Description**: The boundaries of Hueco Tanks correspond entirely to the current boundaries of Hueco Tanks State Park and Historic Site, as indicated on the accompanying map 'Hueco Tanks SP & HS'.

Deeds further describe the original property as portions of Sections 9, 10, 15 and 16, Block 77, Township 1, Texas & Pacific Railway Surveys, El Paso County, Texas, described as follows:

Tract #1
BEGINNING at the SW corner of Section 10, Block 77, Township 1, of Texas & Pacific Railway Surveys, El Paso County, Texas and THENCE North 0°34' West 4800 feet along the West line of said Section 10 to a point and THENCE East 0°34' North 4000 feet to a point and THENCE South 0°34'

East 4800 feet to a point on the South line of said Section 10 and THENCE West 0°34' South 4000 feet along said South Section line to the point of beginning and containing 440.77 acres, more or less.

Tract #2
BEGINNING at the NW corner of Section 15, Block 77, Township 1, of Texas & Pacific Railway Surveys, El Paso County, Texas, and THENCE East 0°34' North 4000 feet along the North line of said Section 15 to a point and THENCE South 0°34' East 2350 feet to a point and THENCE West 0°34' South 4000 feet to a point in the West line of said Section 15 and THENCE North 0°34' West 2350 feet along said Section line to the point of beginning and containing 215.79 acres, more or less.

Tract #3
BEGINNING at the NE corner of Section 16, Block 77, Township 1, of Texas & Pacific Railway Surveys, El Paso County, Texas, and THENCE South 0°34' East 2350 feet along the East line of said Section 16 to a point and THENCE West 0°34' South 500 feet to a point and THENCE North 0°34' West 2350 feet to a point in the North line of said Section 16 and THENCE East 0°34' North 500 feet along the North line of said Section 16 to the point of beginning and containing 26.97 acres, more or less.

Tract #4
BEGINNING at the SE corner of Section 9, Block 77, Township 1, of Texas & Pacific Railway Surveys, El Paso County, Texas, and THENCE West 0°34' South 500 feet along the South line of said Section 9 to a point and THENCE North 0°34' West 4800 feet to a point and THENCE East 0°34' North 500 feet to a point in the East line of said Section 9 and thence South 0°34' East 4800 feet along the East line of said Section 9 to the point of beginning and containing 55.10 acres, more or less.

Additional acreage was subsequently added to the original Hueco Tanks property. This additional acreage is described as lying in and being a portion of Sections 9, 10, and 16, Block 77, Township 1 of the Texas and Pacific Railway Company Surveys in El Paso County, Texas, and being more particularly described by metes and bounds as follows:

BEGINNING at a point which marks the corner common to Sections 3, 4, 9, and 10 of Block 77, Township 1 of the Texas and Pacific Railway Company Surveys, said point being marked by a 2-inch diameter pipe and being the Point of Beginning of the parcel being described;

THENCE from said Point of Beginning East along the line common to said Sections 3 and 10 a distance of 2478.46 feet to a point marked by a monument with a brass cap marked No. 7;

THENCE South 30° 00' East a distance of 551.69 feet to a point marked by a monument with a brass cap marked No. 8;

THENCE West a distance of 3250.00 feet to a point marked by a monument with a brass cap marked No. 2;

THENCE South 0° 31' 00" East a distance of 7150.00 feet to a point marked by a monument with a brass cap marked No. 1;

THENCE West a distance of 500.00 feet to a point marked by a monument with a brass cap marked No.

5;

THENCE North 0° 31’ 00” West a distance of 7627.78 feet to a point on the line common to Sections 4 and 9, said point being marked by a monument with a brass cap marked No. 6;

THENCE East along the line common to Sections 4 and 9 a distance of 1000.00 feet to the Point of Beginning of the parcel being described and containing 121.709 acres.

**4.** **Boundary Justification:** While the Native American rock imagery at Hueco Tanks is confined to the igneous outcrops on the Hueco Tanks State Park and Historic Site, archeological deposits extend across much of the remaining 500 acres of level terrain at the base of the outcrops on the property that composes Hueco Tanks State Park and Historic Site, and which retain integrity. The entire State Park and Historic Site is a State of Texas Archeological Site, site number 41EP2. Evidence of the Formative period, the period of significance, can be found across the site.

## 5. SIGNIFICANCE STATEMENT AND DISCUSSION

### INTRODUCTION: SUMMARY STATEMENT OF SIGNIFICANCE

> “Hueco Tanks State Historical Park is one of the most significant rock art sites in North America…..The rich legacy of pictographs, highly diverse, the early influence from Mesoamerica, the large number of masks that were precursors to the present day Pueblo katsina cult, and the unique geology require us to view and protect Hueco Tanks as a precious and sacred cultural resource, as important to southwestern prehistory as the Chauvet Cave [is to] France.” *Dr. Kay Sutherland, Anthropologist, 1997*[1]

Hueco Tanks, also known as archeological site 41EP2[2], covers most of Hueco Tanks State Park and Historic Site in El Paso County, Texas. The site is located thirty-two miles northeast of the city of El Paso, Texas, in the northern Chihuahuan Desert. Though a single trinomial has been assigned to Hueco Tanks, the site includes 29 archeological localities with artifact deposits and 304 known rock imagery panels. Of these resources, 28 of the archeological localities and 147 of the rock imagery panels date to the Formative period (1,800–550 years ago), which also represents the period of significance (Goodmaster et al. 2017; Howard et al. 2010). As will be discussed, these resources reflect national significance under NHL Criterion 6 under the themes “Peopling Places” and “Expressing Cultural Values.”

The cultural resources at Hueco Tanks are centered on four massive igneous hills that rise as much as 400 feet above the surrounding desert floor. Numerous eroded basins (*huecos* in Spanish) and cracks within these rocks collect and hold water for some or all of the year following rainstorms (“tanks”)[3], creating an oasis in an otherwise arid environment and drawing people to this location for more than 10,000 years. These outcrops also provided shelter, as well as the resources for tool-making, food processing, cooking, and other activities. In addition, the many caves and crevices within the rocks were considered entranceways to the spiritual realm, or Underworld[4], by Native Americans (cf. Beidelman 1964:121; Benson and Sehgal 1987; Hann et al. 2004; Vogt and Stuart 2005; Whitley 1994a, 1994b), and were also commonly linked with the dead (Grigsby, 1986:175–176; Hermitte 1964:124–125; Heyden 1987). As such, these natural portals were attractive, powerful locations for the placement of rock imagery that was intended to communicate with the deities and/or deceased ancestors. While there are multiple cultural-historical occupations represented among the

archeological deposits and rock imagery at Hueco Tanks, the most intensive occupations occurred during the Formative period.

Hueco Tanks is one of the most important repositories of religious, cosmological, and ideological symbols and iconography in the American Southwest. The vast majority of these figures are pictographs[5], but some petroglyphs[6] are also present. The assemblage of figures spans several thousands of years in age and includes six defined rock art styles—Chihuahuan Polychrome Abstract, Desert Abstract, Middle and Late Archaic Red Monochrome, Jornada, Jornada Abstract, and Plains Biographic (Howard et al. 2010:189–209; Sutherland 1995:7). Other images dating to the Historic period have not yet been attributed to a particular style. The Jornada and Jornada Abstract figures date to the Formative period, and include about one-half, or 147, of the known rock art panels at Hueco Tanks. The vast assemblage of imagery at Hueco Tanks is the reason that the property was designated a state historical park (now state park and historic site) in 1970 (Bryan et al. 1999:2; Texas Parks and Wildlife Department 2000:2). The site was subsequently listed in the National Register of Historic Places (NR#71000930) in 1971 and designated as an official Texas State Antiquities Landmark in 1983 (Harry et al. 2001:151; Howard et al. 2010:xiii).

Hueco Tanks is located near the center of a cultural area designated as the Jornada Branch of the Mogollon. The Mogollon culture was approximately contemporaneous with the Hohokam, Patayan, and Ancient Pueblo cultures of the American Southwest, but is distinguished from these other Formative groups by its distinctive pottery manufacture, ground stone tool design, architectural construction, habits and customs of residence location, mortuary treatment, and rock imagery styles. The Mogollon region was the largest of the four major Formative cultural regions, spanning 400 miles east-west by 500 miles north-south, and encompassing much of the southern third of New Mexico, southwestern Arizona, the western Trans-Pecos of Texas, and large portions of the states of Sonora and Chihuahua in Mexico. The Mogollon were early pottery producers and were among the first agriculturalists in the American Southwest. As such, they were also among the first in the region to experience the transition or acculturation that resulted in an eventual shift from mobile hunter-gatherer societies to that of more sedentary farmers, and other aspects of social change that accompanied this shift in lifeways.

The Jornada Branch, one of seven regional variants of the Mogollon culture, extends from Carrizozo, New Mexico, to Villa Ahumada in the state of Chihuahua, Mexico, and stretches from about 150 miles east to 75 miles west of El Paso (Lehmer 1948:9–11, 71). In the southern Jornada Mogollon area, including Hueco Tanks, the Formative period is divided into the Mesilla phase (1,500–1,000 BP[7]), the Early Doña Ana phase (1,000–850 BP), the Late Doña Ana phase (850–700 BP), and the El Paso phase (700–550 BP), based primarily on differences in pottery styles and architecture (Lehmer 1948:70–89; Myles 2005; Sayles 1935:72–79). A majority of the Formative archeological deposits at Hueco Tanks are attributable to the Doña Ana phases in the southern Jornada Mogollon settlement area.

As summarized by Miller and Kenmotsu (2004:237–238), the existence of the Doña Ana phases has long been a subject of contention, primarily because of the brief period of time that it represents and the limited archeological record known for this period of time. But, this phase is generally considered part of the pithouse-to-pueblo transition and is identified by the presence of specific local and nonlocal pottery types, and the appearance of pitrooms or one-room adobe structures. Pitrooms were more formal and uniform residential features than pithouses. At some Doña Ana phase sites, pitrooms were joined together to create mini pueblos. At Hueco Tanks, for instance, a rare example of a two-room pueblo was discovered among several isolated pitrooms when a Formative period hamlet, known as Hueco Tanks Village, was excavated there in the 1970s (University of Texas n.d.; Whelan n.d.). Based on the presence of extensive Doña Ana phase archeological deposits at Hueco Tanks, it is assumed that much of the Jornada and Jornada Abstract style rock imagery at the site was also produced during this time. There are other Doña Ana phase sites with archeological deposits or

rock imagery, but Hueco Tanks is the only site in the southern Jornada Mogollon settlement area that includes both significant Doña Ana archeological deposits and likely Doña Ana rock imagery.

Hueco Tanks is the largest of Jornada Mogollon pictograph sites (Davis and Toness 1974; Kirkland and Newcomb, Jr. 1967:173–198; Schaafsma 1980:211–217), both in terms of the distribution of Formative archeological deposits and the abundance of Formative period imagery. Among the Jornada motifs found at Hueco Tanks are goggle-eyed figures with rectangular or trapezoidal bodies resembling the Mesoamerican rain deity Tlaloc, who is associated with caves, springs, and sources of water (Schaafsma 1999:167). The Mesoamerican deity Quetzalcoatl, represented by feathered and sometimes horned serpents (Schaafsma 1992:64; Sutherland 1995:12–13), also is depicted at the site, though less frequently than the Tlaloc-like figures. These feathered or horned serpents are often compared to Puebloan horned or plumed water serpents (Ellis and Hammack 1968; Kelley 1966:109; Parsons 1939), which are considered to be the patron deity of rivers and underground water, and also are associated with fertility and rain (Williamson 1987:96–97). Other common Jornada style motifs are masks or face-like figures with almond-shaped eyes and abstract decorations, horns, feathers, and pointed caps. Hueco Tanks contains over 200 examples of such images, the largest concentration of painted masks in North America (Sutherland 1995:15). These too are associated with water, and probably played an important role in the petitioning for rain by the Jornada people (Schaafsma 2002:51–66). Additional images in the Jornada style include large blanket designs comprised of continuous unbroken lines; animals with bent legs and formal decorative patterns on their bodies; flying birds and spread-winged eagles; turtles, tadpoles, fish, dragonflies and other insects; and corn, cloud terraces, and rainbows (Schaafsma 1980:199; Stewart et al. 1990:309).

Several abstract rock imagery styles found across the American Southwest and northern Mexico, including Chihuahuan Polychrome Abstract imagery at Hueco Tanks, are thought to have been produced by Archaic hunters and gatherers (cf. Davis et al. 2000:395; Schaafsma 1992:46; Sutherland 1995:8–9). However, another abstract style, the Jornada Abstract style, has more recently been attributed to the Jornada Mogollon (De Pastino 2014; Loendorf et al. 2015:99–109; United States Bureau of Land Management 2016). Though this style remains rather poorly understood, and has not yet been directly dated as of this writing, it is characterized by the presence of triangles, chevrons, and diamond shaped motifs painted in combinations of red, yellow, and black (United States Bureau of Land Management 2016). Some triangles are connected to form what resembles an hourglass –like figure. Because of the similarity of these figures to double gourds, which were often used to store water, these depictions may be symbols for water (cf. Lumholtz 2011:220–221). Though Jornada Abstract imagery can be difficult to differentiate from earlier Archaic abstract imagery, the archeological deposits on sites with Jornada Abstract figures consistently produce pottery sherds that are attributable to the Jornada Mogollon (De Pastino 2014). It is also interesting to note that Jornada Abstract imagery is often accompanied on sites by the presence of a potent species of native tobacco[8] or datura[9], either of which could have been used by Native American inhabitants to induce trances (De Pastino 2014; United States Bureau of Land Management 2016). While this abstract rock art style has been identified on an increasing number of sites in southern New Mexico and western Texas, it is relatively uncommon at Hueco Tanks in comparison with Jornada style figures.

Jornada Mogollon rock imagery sites appear to share a number of universal motifs among their assemblages, but it is not uncommon for these sites to have one particular motif that is dominant among its array of painted or abraded images. For example, the circle-dot motif or similar forms are prevalent at the Three Rivers petroglyph site (LA 4923) in Otero County, New Mexico (Yeo n.d.), while animal figures are the dominant motifs at Jaguar Cave (41HZ375) in El Paso County, Texas. Spirals and concentric circles are common at the Little Cunningham Tank site in Hudspeth County, Texas, and anthropomorphized tadpoles with teeth are the dominant forms at the Pony Hills site in Luna County, New Mexico. Goggle-eyed figures are especially prevalent at the Alamo

Mountain (LA9076) and Three Rivers (LA4923) petroglyph sites. Other examples of dominant motifs on Jornada Mogollon rock imagery sites are shown in Table 1.

Hueco Tanks is distinguished from other Jornada Mogollon rock imagery sites by the dominance of the previously noted masks or face-like pictographs. Schaafsma (1992:62, 67) states that these figures probably reached an apex in their development at Hueco Tanks, and that Jornada imagery at Hueco Tanks in general shows distinctiveness and a higher degree of stylistic sophistication compared to other sites with such imagery. Two categories of masks or mask-like figures exist at Hueco Tanks—solid masks, created with solid, separated blocks of color, and outline masks, which were created by painting the outline of a face. Hueco Tanks is one of few Jornada rock imagery sites that includes solid masks. These masks, as well as goggle-eyed deities, rain altar motifs, plumed serpents, and other figures, are thought to represent water, rain, clouds, or lightning symbols.

The prevalence of particular motifs at individual sites suggest that each site may have played a particular role in the belief system of the Jornada Mogollon, similar to what was still practiced by the Hopi well into the early twentieth century (Simmons 1942:139; also see Hays-Gilpin 2006:283).[10] Concentric circles and similar motifs are often associated with calendrical events (cf. Snow 2007:123–126), while a prevalence of animal forms may be associated with petitions for successful hunts. The pervasiveness of goggle-eyed or Tlaloc motifs at Alamo Mountain and Three Rivers may be attributable somehow to the common occurrence of lightning strikes in these locations during thunderstorms (Margaret Berrier, personal communication December 9, 2016). The prevalence of masks, as well as other water related imagery at Hueco Tanks suggests that the site was a rain shrine for the Jornada Mogollon inhabitants of the region (Schaafsma 2002:60–61), and a focal point in their spiritual landscape or cosmoscape.[11]

Given the apparent differences in the functions of a number of the Jornada rock imagery sites, based on the prevailing rock imagery motif(s) at these locations, the Jornada people or certain segments of their population would have moved between and among the sites as seasons or events dictated. The movement of people between these sites, and the trails that they created in the process, may point to an area of study at Hueco Tanks that has only recently been touched upon—the symbolic importance of trails among the Jornada (Goodmaster et al. 2017:124–127). For example, among the Hopi, trails represent metaphorical umbilical cords that spiritually link villages to outlying sacred places on the landscape (Ferguson et al. 2009). Similarly, contemporary Pueblo people believe that petroglyphs in the Petroglyph National Monument, New Mexico, area are linked with local volcanoes and spirit trails to form a communication link that provides access to the spirit world “that can be used by living people to help their prayers and medicine” (Evans et al. 1993:17). As a life-giving rain shrine and a focal point in the spiritual landscape of the Jornada Mogollon, it is possible that travel corridors to and from Hueco Tanks were viewed in a similar way. The role of Hueco Tanks in this connectivity with other Jornada sites would fit very well with the indigenous Puebloan concept of center, emergence, place, movement, and connectedness (cf. Darling 2009).

The variety of rock imagery at Hueco Tanks provides the opportunity to also examine intra-site variations in spatial patterns between rock imagery styles or motifs within a particular style and how that might reflect the purpose(s) of the imagery. For example, among Jornada style figures at the site, outline masks are frequently situated on exposed surfaces nearer to ground level, while solid masks are commonly found in niches, caves, and crevices that are higher on the mountains. Perhaps images in the more easily accessible ground-level locations may have served as household shrines, whereas panels hidden high on the hills were considered more sacred and intended for a smaller segment of the population or perhaps only for certain individuals within the community (Sutherland 1995:19). Much of the more-hidden imagery includes the previously noted water or storm related motifs. They are painted within the natural entranceways to the spiritual realm and the deities that control the rains or the deceased ancestors that return to this world as impersonal rain spirits (Brown

2005:383–384, 387; Christensen 2001:84, 2009:105–1101; Herring 2005:206–229; Redfield and Villa Rojas 1934:205; Schaafsma 2002:57; Vogt and Stuart 2005:157). The placement of imagery in these places may have played a role in the prayers and corresponding ceremonies for rain and, in turn, successful crops (Creel 1989:83–84; Schaafsma 1980, 1999:178–183, 2002:60–61; Stewart et al. 1990:313; Sutherland 1995:13–15). This process was, and still is, essential to the ritual of rain-bringing among Puebloan societies (Schaafsma 2002:57).

[redacted]

Therefore, the extensive archeological deposits at this site also play an important role in understanding the spiritual, as well as the secular, lives of its former inhabitants.

Criterion 6

As is discussed in more detail in the 'Comparative Analysis' section of this nomination, there are no early agrarian communities represented in the current listing of designated NHL properties. This absence of early farming communities among NHL rock imagery sites is accompanied in the United States, and worldwide, by a lack of rock art ethnographies for these same groups. Though Conkey (1997) recognized the revolution in the use of ethnographic information in rock art research by the late 1990s, the focus of these early rock art ethnographic studies was on shamanistic hunter-gatherer societies. Early farming communities were not represented. In the first edition of his book, *Introduction to Rock Art Research*, Whitley recognized that ethnographic rock art studies of early farming groups were still a significant need in 2005 (Whitley 2005:165) and, despite some progress in that area of research prior to the printing of the second edition of that book eleven years later (cf. Hays-Gilpin and Whitley, eds. 2008; Zubieta 2006, 2009), Whitley continued to see it as a need in 2016 (Whitley 2016). Ethnographic information and oral traditions are important to rock art research because they can contain the cultural metaphors that enable a much deeper understanding and interpretation of the imagery (Keyser and Poetschat 2004:129). Fortunately for Hueco Tanks, there is considerable ethnographic information available for Puebloan communities providing an important metaphorical vocabulary for use in the study of the imagery and archeological deposits at Hueco Tanks (cf. Schaafsma 2002:51–66). In addition, studies of the imagery at Hueco Tanks have also benefitted from ethnographic information from Mesoamerica.

In part because of the available ethnographic information, the Formative period components at Hueco Tanks, including both the archeological deposits and rock imagery, are nationally significant under National Historic Landmark Criterion 6. These resources have yielded and will continue to yield information of major scientific importance. This includes the recovery of data that can help address archeological research questions such as those regarding the cultural changes that occurred when autonomous, kinship-based Archaic period hunter-gatherer groups aggregated into larger Formative period agricultural communities in which kinship may have played a lesser role. These data include details of pitroom features excavated at Hueco Tanks, and the recovery of associated artifacts, that reflect the aggregation of people from small pithouse hamlets to eventual multi-roomed pueblos (Kegley 1980).

The variety and abundance of non-local pottery and lithic material recovered from the site reflects the expansion of trade that occurred as populations became more settled. While in depth pottery analyses have not yet been conducted on assemblages from Hueco Tanks, observed changes in vessel form, size, and paste composition can reflect changes in cooking techniques and food storage needs that resulted from shifts in subsistence strategies between the Late Archaic and Formative periods. Similar analyses of pottery sherds from the nearby Turquoise Ridge site (41EP762), a Formative Mesilla phase pithouse village, showed technological changes in pottery between the early and late Mesilla phase that corresponded with changing food storage and cooking needs (Roberts 2002b:11–44; Whalen 1994a:90). These changing needs accompanied increased availability of corn and other cultigens.

Researchers have proposed that Jornada rock imagery was developed to help address organizational problems that arose with the availability of surplus food (this has also been suggested as one reason why some Jornada iconography was, in turn, adopted by upper Rio Grande pueblos [Schaafsma and Schaafsma 1974]). As posited by Bourdieu (1977, 1990:112–121) and others (Comaroff and Comaroff 1991:22; Foucault 1977:201, 208), those seeking to effectively achieve and maintain influential political power to organize community labor, redistribute food, and retain general control over growing communities of divergent populations must exploit symbols, in this case rock imagery and pottery motifs, that are themselves recognizable as indicators of power. Development and use of associated ceremonies and dances further helped integrate divergent populations (Adams 1991:184). Additional study of the use of public and private space in the placement of rock imagery at Hueco Tanks, and how the use of that space differed between the Archaic and Formative periods, may help us better understand the development and function of Jornada imagery especially when examined in conjunction with the archeological record.

Other scholars have posited that Jornada figures, namely the mask motifs like those recorded at Hueco Tanks, are the antecedents of the Pueblo katsina belief system (Schaafsma and Schaafsma 1974:535–545; Sutherland 1995:15, 1996). A katsina can represent anything in the natural world or spiritual realm, from a revered ancestor to an element, a location, a quality, a natural phenomenon, or a concept. They act as intermediaries between humans and the deities and, if given veneration and respect, can use their particular power for human good, bringing such things as rainfall, healing, fertility, or protection. It is said that these spirits can be seen by the community if men properly perform a ritual while wearing katsina masks. The spirit depicted on the mask is thought to be actually present within the performer, temporarily transforming him. Regardless, it is clear that Hueco Tanks was both a focal point in the cosmoscape as well as a place where people lived, and that these realities existed in close proximity.

As Furst (2006), Kelly (1995) and others have noted, Native Americans carried their sacred beliefs with them in all activities. As a result, Hueco Tanks provides a unique opportunity to learn about the interaction of daily life and spiritual beliefs during the Formative period, especially during the Doña Ana phase. This can be accomplished through studying such things as variations in spatial patterns among the Jornada rock imagery (Sutherland 1995:19); identifying Formative travel routes across the site based on the placement of pigment (Goodmaster et al. 2017:124–127), similarities in Jornada motifs, or individualized painting techniques (Cool-Flowers 2007); determining the use of site space through examinations of feature types, including potential communal structures, and artifact assemblages (cf. Whalen 1994:45–69); examining exotic/ornamental/ceremonial items and their placement on the site (Whalen 1994:128–129); and, re-examining the ways and locations in which the Jornada interred the dead.

The rock imagery at Hueco Tanks is also significant for the opportunities it provides researchers to study and to conserve these features (Harry et al. 2001:152). This potential has been demonstrated by the successful carbon dating of some of the paintings at this site (Hyman and Rowe 1999; Hyman et al. 1999); through non-invasive

testing of pictographs to identify the pigments and binders used to create the paints (Lins and Price 2011); through the use of portable lasers designed and used to remove graffiti that was painted over some of the Native American imagery (Dajnowski and Dajnowski 2011; Roberts and Olszewski 30); and, through the many publications that have focused on the rock art, as well as the archeological deposits (cf. Davis and Tonness 1974; Howard et al. 2010; Kegley 1980a; Kirkland 1940; Kirkland and Newcomb, Jr. 1967; Sutherland 1975, 1977, 1991, 1998; Sutherland and Geise 1992; Sutherland and Parker 1991). Because these resources provide a tangible expression of the regional prehistory and history, their interpretive potential is high.

The rock imagery motifs, archeological deposits, and the landform itself continue to hold great significance to several Native American communities today. The Ysleta del Sur Pueblo, the Pueblo of Isleta, the Mescalero Apache Tribe, the Kiowa Tribe of Oklahoma, and the Comanche Indian Tribe of Oklahoma maintain cultural associations with Hueco Tanks.[12] Members of these communities continue to visit the property and celebrate their heritage through sacred and celebratory ceremonies and by participating in educational and interpretive opportunities for both their communities and non-Native visitors to the site.

## RELEVANT PROPERTY-SPECIFIC HISTORY

The Native American rock imagery at Hueco Tanks drew the attention of passersby by the mid-nineteenth century. The first published descriptions of the rock paintings at Hueco Tanks were written shortly after the Duval-Harris party stopped there in 1849 (Dillon, ed. 1960:49–50; Moody 1963:86: Davis and Toness 1974:58). Two years later, in March 1851, John Russell Bartlett of the International Boundary Commission stopped at the Tanks and sketched the pictographs at several panels (Bartlett 1854:170–173; Mallery 1893:115–116). Years later, in the 1920s, Frank H. H. Roberts of the Smithsonian Institution Bureau of Ethnology apparently visited the Tanks during a trip to view Ceremonial Cave and other nearby caves (Creel 1997:76; Roberts 1929:1; *El Paso Post*, September 15, 1927). Numerous rock imagery investigations conducted since the 1920s culminated in the recording of 304 rock art panels. These investigations are described in detail in the 'Cultural Resource Investigations' section of this nomination.

Archeologists began to recognize the importance of the archeological deposits at Hueco Tanks when Donald Brand surveyed the site in 1930. Hueco Tanks is one of four archeological sites near El Paso that Brand surveyed for comparison with 400 sites in Chihuahua, Mexico (Brand 1933:Appendix III:69; Rakita and Raymond 2003:167, 173). Numerous additional archeological investigations, including the excavation of Hueco Tanks Village in 1972 (Kegley 1980a), have added to our knowledge since that first survey. Again, details of these investigations are summarized in the 'Cultural Resource Investigations' section of this nomination.

The National Park Service formally recognized the significance of the cultural resources at Hueco Tanks in 1971 when it listed the site in the National Register of Historic Places. The state of Texas officially recognized the site when it became a designated State Antiquities Landmark in 1983 (Harry et al. 2001:151; Howard et al. 2010:xiii).

## CONTEMPORARY NATIVE AMERICAN ETHNOGRAPHIC INFORMATION

Five federally recognized tribes identify Hueco Tanks as a place of cultural affiliation. These tribes include the Comanche Indian Tribe of Oklahoma, the Kiowa Tribe of Oklahoma, the Mescalero Apache Tribe, the Pueblo of Isleta, and Ysleta del Sur Pueblo (Roberts and Havlik, in progress).

Archival references to the use of Hueco Tanks by the Comanches are sparse, but Sonnichsen (1968:77) states that after the 1740s the Comanches pushed the eastern Apaches further and further south, ultimately into

Mexico in the 1770s. By 1835, Comanches were reportedly in the vicinity of El Paso (Campbell 1950:4). Through oral tradition, the Comanche people know they traveled through the Guadalupe Mountains region for trade, contacts with the Apaches, and resource gathering (Denny n.d.:6). Eickmeyer (1894) places the Comanche at Hueco Tanks, suggesting that some of the caves at the site were inhabited by the Comanche. The Biographic style pictographs at Hueco Tanks, including horse and rider figures and their trappings, might have been painted by Comanche or Kiowa Indians in the late eighteenth or early nineteenth centuries as they traveled through the area (Jackson 1938:323; Mooney 1898:Plate LXXIII; Polly Schaafsma, personal communication 2002).

A siege in 1839 is an important aspect of the Kiowa association at the Site. The siege occurred when a raiding party of Kiowa was trapped at the Tanks by Mexican forces. Mooney (1898) is the most detailed source for this historical event; he relied on Kiowa informants. According to Mooney, the besiegers were a large force of Mexican soldiers accompanied by several Mescaleros. The siege is depicted in a pictograph panel (Site 1) at Hueco Tanks (see Davis and Sutherland 1997:9), which Kiowa member Dewey Tsonetokoy believes was painted sometime in the 1840s by someone who was knowledgeable about the event. Newcomb (Kirkland and Newcomb, Jr. 1967:7) suggests that the pictograph might be Mescalero in origin, raising the possibility that one of the Mescalero that accompanied the Mexican soldiers may have painted the representation of the siege sometime after 1839. However, not everyone agrees that the besiegers were Mexicans. Eickhoff (1996) and Greenberg (1996) have both suggested that it was a group of Tigua rather than Mexican soldiers that pursued the retreating Kiowa. Little other information is available regarding the Kiowa in the area, and there is no other obvious indication among the archeological deposits and rock imagery at Hueco Tanks of their presence.

The Mescalero Apache were in the El Paso area by at least the 1720s (Schroeder 1974) and are said to have visited Hueco Tanks regularly during the 1700s (Miller 1985:21). Thomas (1941:17) summarizes one such visit in 1777 when the Mescaleros sued for peace at El Paso, “with one band then hiding near the village of San Elizario and another having taken refuge at the Hueco Tanks.” The Mescalero continued to visit Hueco Tanks even into the early 20$^{th}$ century. Jim Escontrias, born in 1907, recalled Apaches visiting his father’s (Silverio Escontrias) ranch at Hueco Tanks when he was a boy (El Paso Herald-Post, February 21, 1984).

Newcomb (Kirkland and Newcomb, Jr. 1967:21) believes that the Mescalero thought of Hueco Tanks as the home of Mountain Spirits, stating “…..it is clear that the mythological and ritual life of the Mescalero Apaches was rich and varied, and it is likely that they visualized it in pictographs at places which may well have been regarded as homes of Mountain Spirits, such as Hueco Tanks.” A number of the historic pictographs at Hueco Tanks are thought to have been painted by the Mescalero (Kirkland and Newcomb, Jr. 1967; Sutherland 1975:77–78, 1995:23–24). These figures are fluid and curvilinear (Sutherland 1995:23), and often are executed in a thick white pigment (Kirkland and Newcomb, Jr. 1967:199). They include lively dancers with rabbit-eared or feathered headdresses and individuals engaged in sexual acts, possibly depicting victory celebration rites (Kirkland and Newcomb, Jr. 1967:194), fertility dances (Toness 1974:8), or Mountain Spirit dances (Ferg and Kessel 1987:109; Schaafsma 1980:336). Other possible Mescalero Apache images at Hueco Tanks include shield motifs, figures holding shields or guns, crosses, horses, and large white snakes with red, yellow, and black details (Kirkland and Newcomb, Jr. 1967:200; Schaafsma 1980:336; Seymour 2002:238). Comb-like images resembling jellyfish and lizard-like figures also have been attributed to Mescalero Apaches (Toness 1974:8, 21).

A Tigua creation story tells of their emergence from a cave at Hueco Tanks (Greenberg and Esber 2000:9). They subsequently moved from the Hueco Tanks area, the “…area guarded by the *kokopelli*, thus making it a sacred place of peace and contentment…”, to Gran Quivira (Eickhoff 1996:93). By 1672, a combination of disease, drought, famine, and Apache raiding led to the abandonment of Gran Quivira and the movement of the

Tigua to the Pueblo of Isleta in New Mexico. According to Houser (1979:336), the Tigua later immigrated to the Ysleta del Sur Pueblo near El Paso, from the Pueblo of Isleta, during the Pueblo Revolt against the Spanish in 1680. This was perhaps more of a forced migration. Among its Puebloan captives, Spanish soldiers took 385 people from Isleta before retreating south to El Paso. Upon arriving in El Paso, Franciscans established three new pueblos: Senecu, Socorro, and Ysleta. Each pueblo was named for its old pueblo and given the designation of del sur ("of the south"). Thus, the people taken by the Spanish from Isleta came to live in Ysleta del Sur.

A sun shield pictograph at Hueco Tanks has been claimed by the Tigua of Ysleta del Sur Pueblo, as well as the Mescalero Apaches. The Tigua see this image as a narrative, illustrating the history of their immigration from the Pueblo of Isleta to Ysleta del Sur (Greenberg 1999). Several names marked in black paint below the sun shield image apparently are Tigua individuals (Alex Mares, personal communication 2001); one is dated Octubre [October] 1900. Additional Tigua family names dating back to the turn of the nineteenth century are inscribed in other rockshelters and caves at Hueco Tanks (Gerald 1974:59–60; Gray 1995:69).

In recent years the Tigua Indians have claimed the Jornada style mask or face-like paintings at Hueco Tanks as symbols of their *abuelos* or tribal protectors (Greenberg 1999:9). Although these figures are stylistically distinct from prehistoric and historic Pueblo masks in the historic homeland of the Tigua on the upper Rio Grande (Schaafsma 1980:256), the Tigua are among the many Pueblo communities that are heirs to the ideas expressed in Jornada style iconography at Hueco Tanks.

## CULTURAL OVERVIEW OF THE STUDY AREA

The Native American prehistoric archeological record in the Jornada Mogollon area is divided into four major cultural-historical periods: Paleoindian, Archaic, Formative, and Precontact/Protohistoric. These cultural-historical periods are further subdivided into phases, including recent revisions to the phase sequence for the Middle Archaic, Late Archaic, and Formative periods (Miller 2005, 2017; Miller and Kenmotsu 2004).

Early Paleoindian Period (12,000 - 10,200 BP):

The Early Paleoindian period time span of 12,000 to 10,200 BP is estimated based on the age of Clovis and Folsom projectile points in dated contexts in other areas, as no early Paleoindian components in the vicinity have been firmly dated (Miller 2006:14). Clovis points were manufactured between 12,000 and 11,000 BP (Miller 2006:13) and are rarely found in the region (Bever and Meltzer 2007:73–74). Only one Clovis point has been reported from the Hueco Bolson, a broad flat basin in the region that extends along the Rio Grande for about 130 miles from southeast to northwest (Krone 1976). However, the identification of this point is not certain (Carmichael 1986:7). Folsom points were used from ca. 11,000 to 10,200 BP (Haynes et al. 1992:96; Miller 2006:13, 15) and are considerably more common. Most of the Early Paleoindian sites in the Jornada Mogollon area appear to be short-term residential camps, positioned at locations offering an overview of the surrounding area and ready access to water. Temperatures during this time were milder than they are today, with cooler summers, warmer winters, and greater rainfall, most falling in the winter (Van Devender 1990:124–125). The northern Chihuahuan desert was covered by pinyon-juniper-oak woodland, but the pinyon disappeared between 12,000 and 10,800 BP, marking the onset of a vegetation shift (Van Devender 1990:117, 121). At the same time, summer temperatures started to rise and a monsoon season began to develop (Van Devender 1990:126).

Late Paleoindian Period (10,200 - 8,000 BP):

A variety of dart point forms were used during the Late Paleoindian period. They bear distinctive parallel flaking and are collectively assigned to the Plano and Cody complexes (Carmichael 1986:8; Miller 2006:16). Sites dating to this period are relatively rare in the Jornada Mogollon area (Miller and Kenmotsu 2004:217). Between 10,000 and 7,000 BP, a period of aridity resulted in widespread deflation and erosion of soils (Monger and Buck 1995:34–36). By 9,000 to 8,000 BP, summer temperatures had risen; precipitation shifted to a dominant summer monsoonal pattern, while the frequency of severe winter freezes increased (Dick-Peddie et al. 1993:16; Monger 1993:91; Van Devender 1990:126; Van Devender and Riskind 1979:138). These changes in climate and vegetation apparently precipitated the demise of *Bison antiquus* and other large game animals, necessitating a shift to a broader subsistence base (Miller 2006:16; Van Devender 1977:192). The drying trend also may have caused humans to congregate near shall depressions, streams, and other permanent and ephemeral water sources (Carmichael 1986:8; Miller 2006:16). Late Paleoindian sites have been found in a variety of topographic settings including alluvial fans, but most are near shallow depressions, in basins, or along the Rio Grande valley margin (Miller 2006:16; Miller and Kenmotsu 2004:217).

Early Archaic Period (8,000 - 6,000/5,000 BP):

Defined primarily on the basis of dart point styles, the Early Archaic period is not well understood because few firmly dated Early Archaic components have been identified in the region (Miller 2006:17). Early Archaic projectile point technology represents a change from lanceolate Paleoindian forms to strong-stemmed dart point types (Miller and Kenmotsu 2004:221, 232). Use of rock or caliche to retain heat in hearths becomes apparent during the Early Archaic period, and possibly reflects an increased emphasis on plant processing (Miller and Kenmotsu 2004:221). The onset of the Early Archaic period coincides generally with the establishment of grassland communities in the southwestern United States around 7,500 BP (Van Devender and Spaulding 1979:707), although some grass species had appeared much earlier (Hall and Riskind 2010:727–728; Monger and Buck 1995:60). During this time, small bands of people probably employed a seasonally mobile hunting and gathering strategy across an increasingly diverse environmental landscape (Miller and Kenmotsu 2004:222–223).

Middle Archaic Period (6,000 - 3,400 BP):

Miller (2017) recently revised the phase sequence for the Middle Archaic period to include a Tularosa phase (6,000–4,500 BP) and a Keystone phase (4,500–3,400 BP), based largely on the appearance of new projectile point styles and feature types. The drying trend that began in the Early Archaic continued through the first half of the Middle Archaic, the Tularosa phase. As the distribution of plants and animals became more restricted and their timing more variable, a land use pattern may have been adopted that focused on seasonally available food resources. The rock hearths and ground stone tools that date to this period suggest a focus on plant foods in addition to hunting (Miller 2007:3–3). There is some indication that the population was increasing during this time (Miller and Kenmotsu 2004:223), and clusters of features on some sites may indicate the presence of larger social groups (Miller 2006:18; Miller and Kenmotsu 2004:224). The use of obsidian from Chihuahua in the manufacture of some dart points during this period (Miller and Kenmotsu 2004:234; Miller 2006:27) indicates the extent of the territorial range and/or the trade relationships between Middle Archaic populations (Miller 2002, 2006:27). Most known Middle Archaic sites are temporary camps, but evidence of semi-sedentary settlement has also been found in the region (Miller and Kenmotsu 2004:224; O'Laughlin 1980:135–149). The Keystone phase marks the onset of wetter conditions and, with it, evidence of population growth, the first use of maize, and the beginnings of ritual practices (Myles Miller, personal communication December 5, 2017).

Late Archaic Period (3,400 - 1,500 BP):

This period in the Jornada region includes the Fresnal (3,400–2,750 BP), Arenal (2,750–2,300 BP), and Hueco phases (2,300–1,500 BP) (Goodmaster et al. 2017:6, 11–13; Miller 2017). During this time, transitions in settlement patterns, subsistence, and technology were initiated, foreshadowing the Formative period (Miller 2007:3–3; Miller and Kenmotsu 2004:225–226). The modern climatic regime had been established by around 4,000 BP, with fewer winter freezes and adequate summer rainfall, punctuated by more frequent droughts (Van Devender 1990:126). An interval between 2,600 BP and 2,300 BP may have been slightly cooler with higher effective moisture (Mauldin 1995:164–165; cf. Van Devender 1990:117–118). Late Archaic subsistence was centered on hunting and gathering, augmented by early attempts at plant cultivation (Doleman 2005:115–116; Miller 2007:3–3). In the Jornada Mogollon area, cultivated plants appeared around the beginning of the Late Archaic period (Miller and Kenmotsu 2004:226–227; cf. Upham et al. 1987:412).

Although cultivated plants constituted a relatively reliable food source, they comprised a very small part of the diverse Late Archaic diet (Miller and Kenmotsu 2004:227–228). Instead, there is evidence of an increase in bulk processing of leaf succulents like lechuguilla and sotol (Miller 2007:11–59; O'Laughlin 1980:106–107). The meat diet in areas near mountains consisted primarily of large mammals like mule deer (Miller 2007:12–6; Wimberley and Eidenbach 1981:23), but faunal remains from most Late Archaic open-air sites consist primarily of rabbit bones (Miller and Kenmotsu 2004:228). Late Archaic dart points are corner- and side-notched forms with convex or flat bases and became significantly smaller in the latter half of the period, foreshadowing introduction of the bow and arrow (Miller 2007:3–3; Miller and Kenmotsu 2004:226, 229; Roney 1985b:22). The use of basin areas reached a peak during this period, although sites were located in all environmental zones (Miller 2007:3–4; Miller and Kenmotsu 2004:230–232). Cultivation of plants on even a minor scale decreased mobility, necessitating occupation of places that offered access to both agriculturally productive land and favored foraging areas (Doleman 2005:118; Mauldin 1995:114). The population density continued to increase during this time (Whalen 1994a:625).

Formative Period (1,500 – 1,000 BP):

The beginning of the Formative period in the study area is marked by the appearance of El Paso brownware pottery around 1,500 years ago (Miller 2005:68, 2007:3–1, 2017; Miller and Kenmotsu 2004:258). In the southern Jornada Mogollon area, including Hueco Tanks, the Formative period is divided into the Mesilla phase (1,500–1,000 BP), the Early Doña Ana phase (1,000–850 BP), the Late Doña Ana phase (850–700 BP), and the El Paso phase (700–550 BP), based primarily on differences in pottery styles and architecture (Lehmer 1948:70–89; Sayles 1935:72–79).

The climate at the beginning of the Formative period, during the Mesilla phase, was effectively modern with periods of drought (Grissino-Mayer et al. 1997:52; Mauldin 1995:159–166). Subsistence at the onset of the Mesilla phase was based primarily on wild plant foods, supplemented by small amounts of cultivated plants (Miller and Burt 2007:2–2; Miller and Kenmotsu 2004:237). Broad-scale gathering of an array of wild plants shifted by the end of the phase to intensive procurement and bulk processing of leaf succulents like agave and sotol (Miller 2007:11–40). There was also an increasing use of corn and other cultigens, though an economy including corn as a staple element did not occur until 900 years ago (Hard et al. 1996:298; Miller and Kenmotsu 2004:244). The wild and cultivated plant diet was supplemented by meat from rabbits and other small game, while hunting of deer and other artiodactyls declined (Miller 2007:3–6, 12–7).

At the outset of the Mesilla phase, occupations were widely distributed across the interior of the Hueco Bolson (Carmichael 1986:227–229; Miller and Kenmotsu 2004:244–245; Whalen 1977:140, 1978:33–34). However,

by about 1,450 years ago, there was decreased use of the central area of the Bolson, accompanied by intensified land use and a greater degree of residential stability. Shrinking territorial ranges are suggested by a decrease of Chihuahuan obsidian in Mesilla phase chipped stone assemblages (Miller 2002, 2005; Miller and Shackley 1998), and only rare occurrences of nonlocal marine shells, minerals, and turquoise (Miller 2007:4–13 through 4–14; Miller and Burt 2007:9–8). In response to increasing population density, groups began to aggregate into small settlements composed of two to three household clusters (Miller and Burt 2007:9–6). Houses consisted of shallow, circular huts and square to sub-rectangular pithouses or pitrooms (Hard 1983a:42–44; Lehmer 1960:127; Miller 2005:69; Miller and Kenmotsu 2004:241). This period of transition marks the end of the early Mesilla interval and the beginning of the late Mesilla interval (Mauldin 1995:277–278; Mauldin et al. 1998:158; Miller 2005:74; Whalen 1994b:625). Regardless, Hueco Tanks was probably used as a seasonal water source throughout the Mesilla phase (Carmichael 1990:126–127; Hard 1983b; O'Laughlin 1979:5).

Originally defined by Lehmer (1948:78–80, and subsequently refined by Carmichael (1986), the Doña Ana phase was conceived to encompass the transition from pithouse to pueblo occupations (Lehmer 1948:78–80). More recently, the phase was divided into early and late intervals at 850 BP based on differences in settlement pattern, subsistence, technology, and social organization (Miller 2005:73–74). However, two types of structures were occupied throughout the Early and Late Doña Ana phases—sub-rectangular pithouses or pitrooms and one-room adobe structures (Miller and Kenmotsu 2004:239–241; cf. Lehmer 1948:78–80). Sub-rectangular pithouses or pitrooms probably represent fairly short-term occupations because they required little effort to construct. One-room adobe structures required a greater level of effort to construct and maintain, probably representing longer occupations (Miller 2005:68; Miller and Kenmotsu 2004:239; Scarborough 1989:422). By the onset of the Late Doña Ana phase the number of freestanding one-room adobe structures in the Jornada Mogollon area had doubled, while construction and use of sub-rectangular pithouses declined and essentially ended by 700 BP (Miller and Kenmotsu 2004:240). Major changes in regional settlement patterns occurred during the Doña Ana phases. Use of the central basin declined markedly (Mauldin 1995:218), while occupation of alluvial fans and runoff zones increased (Miller 2005:69, 2007:3–8). Around 850 years ago, utilization of alluvial fans reached a peak and settlements near shallow depressions became common (Miller 2005:69; Miller and Kenmotsu 2004:246). These locations probably were preferred due to the proximity of arable soils and reliable water sources (Beckes et al. 1977:73; Carmichael 1990:129–130; Miller 2007:3–6).

Climatic conditions fluctuated considerably during the Doña Ana phases. On the heels of the warm and dry late Mesilla phase, the climate became relatively cool and moist between about 950 and 800 years ago (Grissino-Mayer et al. 1997:52; Mauldin 1995:159–166). That interval was followed by a period of below-average rainfall, culminating in a severe drought between about 700 and 725 years ago (Grissino-Mayer et al. 1997:49, 52, 60). Changes in subsistence occurred at the beginning of the Early Doña Ana phase, perhaps in response to the period of relatively cool and moist conditions that characterized the beginning of the phase (Doleman 2005:117; Grissino-Mayer et al. 1997:52; Mauldin 1995:159–166). Agricultural dependence increased (Miller 2005:71; Miller and Kenmotsu 2004:249), and exploitation of succulents and other wild plants intensified (Hard et al. 1996:298; Miller 2005:71; Miller and Kenmotsu 2004:249). Hunting generally decreased in importance during the Doña Ana phase (Miller and Kenmotsu 2004:232), with smaller animals being more commonly found within Doña Ana deposits than larger game (Miller 1989:293–297; Peterson, ed. 2001:243; Shafer et al. 1999:296–297). This corresponds with the fact that projectile points typically comprise a very low percentage of chipped stone assemblages dating to the Doña Ana phase (Miller and Kenmotsu 2004:255).

Ceramic assemblages dating to the Doña Ana phases continued to be dominated by locally made brownware (Hard et al. 1994:278), but the proportion of decorated brownware increased gradually (Miller and Kenmotsu 2004:252; Whalen 1981:220). Nonlocal pottery comprised a small but consistent percentage of Doña Ana assemblages. Vessel forms also evolved; the quantity of neckless jars declined while the proportion of jars with

necks and everted rims increased, vessel sizes expanded, and vessel walls became thinner (Miller 1989:186; 2007:3–9; Miller and Kenmotsu 2004:253; Whalen 1981:223–226). This may reflect changes in cooking techniques and/or storage needs during this time.

The El Paso phase represents the peak of Native American cultural development in the Jornada Mogollon area. It saw the highest level of permanent settlement in pueblos, maximum concentration of populations near areas suitable for agriculture, and greatest degree of interregional interaction and spiritual expression (Lehmer 1948:80–82; Miller and Kenmotsu 2004:238). These developments were facilitated by a period of reduced climatic variability that began about 700 years ago (Grissino-Mayer et al. 1997:54). Precipitation increased considerably and was abundant between about 650 and 600 BP (Grissino-Mayer et al. 1997:62). This period of increased precipitation was followed by multiple short-term droughts (Grissino-Mayer et al. 1997:63) that may have ushered in the end of the intensive El Paso phase lifestyle.

Ceramic assemblages dating to this phase are dominated by El Paso Polychrome. The Classic variant of this type was made between about 750 and 550 years ago (Miller 1995:212–216). Nonlocal pottery is present on El Paso phase sites in minor amounts. Projectile points generally comprised a very small part of El Paso phase chipped stone assemblages, as they had prior to 700 BP (Miller 2007:3–10; Miller and Kenmotsu 2004:255). Ornaments and other non-utilitarian artifacts are relatively abundant on El Paso phase sites, and include shell jewelry, turquoise, other shaped stones, and (rarely) copper bells (Bentley 1993:28; Brook 1976:26–27; Hill 1971:92; Miller and Graves 2009:385–392; Phelps 1967:24–25). Some of these items were imported from outside the Hueco Bolson and others were obtained from local sources; altogether, they may indicate the development of a religious complex (Miller and Kenmotsu 2004:238). The quantity of nonlocal items on El Paso phase sites far exceeds previous phases, representing a high level of participation in a regional exchange network (Hard, Patterson, and Tennis 1996:243–244; Lehmer 1948:80–82).

Agricultural dependence and specialization increased during the El Paso phase, although subsistence was not based entirely on cultivated plants (Miller and Kenmotsu 2004:251). Wild plant foods made up a smaller portion of the El Paso phase diet (O'Laughlin 2005:221), and hunting continued to provide a minor part of the diet. A growing emphasis on accumulation of food reserves is indicated by increased construction and use of storage and refuse pits after 800 BP (Miller 2005:72).

Structures occupied during the El Paso phase include freestanding one-room structures and pueblo room blocks (Miller 2005:70; Miller and Kenmotsu 2004:240–241, 244), sometimes occurring on the same site. Their construction differed primarily in terms of whether structures had common walls (Miller and Kenmotsu 2004:239). Pueblo room blocks were laid out on two general plans, both resulting from incremental construction: linear tiers, and (rarely) squares facing onto interior plazas (Lehmer 1948:80; Lowry 2005:304; Miller and Kenmotsu 2004:242). Both freestanding and adjoining rooms typically had east/west alignments, with doorways opening to the south (Brook 1979:27; Miller and Kenmotsu 2004:242). Many linear room blocks included single larger rooms that may have had a communal function (Marshall 1973:95).

El Paso phase settlement generally was characterized by an increased number of large and small residential sites, a clustered settlement pattern, and decreased mobility (Miller 2007:3–6, 3–9; Whalen 1978:33–34). Use of the central basin was non-intensive (Mauldin 1994:200–201) and there was a marked decline in occupation of alluvial fans, while occupations in proximity to shallow depressions reached a peak (Brook 1971:68; Miller 2005:69, 72; Miller and Kenmotsu 2004:238). The large settlements may not have been occupied year-round (Beckett and Wiseman 1979:399). Residential permanency at large sites may have been possible during wet years while seasonal movement would have been necessary during droughts (Miller 2007:3–7).

The end of the El Paso phase around 550 BP is marked by the demise of pueblo occupations in the Jornada Mogollon area, coinciding with region-wide depopulation of the southern Southwest by agricultural groups (Miller and Kenmotsu 2004:258). The causes of these dramatic changes have not been determined, but one of the more compelling theories is that climate change brought an end to the overspecialized El Paso phase agricultural economy, causing populations to disperse to more productive areas and/or return to a simpler subsistence based primarily on wild plants and animals (Tainter 1985:146–147; Upham 1984:248–249; Wimberly and Rogers 1977:450–453).

Precontact and Protohistoric Periods (550 BP - ~340 BP):

The Precontact period in the region began in 1450 and ended when Spanish explorers first encountered native groups at the Paso del Norte in 1581; the Protohistoric period extended from that date until 1659, when a mission was established at the pass and European contacts with native groups became sustained (Miller 2007:3–1; Sale 1997:131–132). Historic accounts indicate that native groups identified as Manso, Suma, and Apache occupied the Hueco Bolson and adjacent areas during the Protohistoric period, and probably earlier. But only the Apache Indians are reported to have occupied the area around Hueco Tanks when the Spanish arrived. They were known to occupy hilltops with commanding views of surrounding areas (Seymour 2004:158).

Recognition of Precontact/Protohistoric archeological components has been challenging, and there is disagreement as to what constitutes sufficient proof of them (e.g., Kenmotsu and Miller 2008, Lukowski et al. 2007:57–60; Seymour 2008). The few features of this age (Miller 2001b:117–120) typically have been found on multicomponent sites, increasing the difficulty of their identification. Structures described in historic accounts are informal straw, brush, and pole huts that bear a strong resemblance to earlier pithouses, and their archeological signatures might be indistinguishable (Beckett 1985:150; Miller 2001b:149). A greater percentage of hearths dated to this period include rocks than in the periods that precede and follow it, but similar rock hearths are also known from the Archaic period (Miller 2001b:122–123).

Artifacts indicating the Precontact/Protohistoric periods—including Tabira Black-on-white and late glazeware ceramics, metal and glass arrow points, and glass trade beads—have rarely been found on sites in the Hueco Bolson (Miller 2001b:124; Sale 1997:140–141; Seymour 2004:168). Ceramics are rarely mentioned in historic accounts and could have been almost absent (Bandelier 1892:349; Beckett 1985:150). Arrow points might include the Soto type, which resembles Garza arrow points that date between 1450 and 1650 in the Texas Pan-handle-Plains, but Soto points are uncommon north of the Rio Grande and are not well-dated (Boyd 1997:428–429; Miller 2001b:126, 129; Phelps 1987:9, 16, 19). Other arrow points apparently include small triangular side-notched or basally-notched forms similar to those found on El Paso phase sites (Miller 2001b:128). To date, radiocarbon assays have provided the only incontrovertible evidence of the Precontact/Protohistoric period in the Hueco Bolson (Miller 2001b:115, 122, 124).

## COMPARATIVE ANALYSIS

The significance of Hueco Tanks in relation to other Jornada sites rests not only in its abundance of Formative rock imagery—147 panels with Formative imagery, including more than 200 mask or face-like pictographs—but, also in the archeological deposits left behind by those that created the imagery. No other Jornada rock imagery site has on-site archeological deposits that are as extensive as those at Hueco Tanks or that include known residential pithouses or pitrooms. These features and associated artifacts are representative of the brief Doña Ana phase, and their presence at Hueco Tanks allows researchers to more fully examine not only the ongoing transition from a hunter-gatherer society to an agrarian one, but also the continued move towards increased aggregation of people (pitrooms are considered to represent the transition from pithouses to multi-

room pueblos). The presence of both Jornada imagery and habitational material at Hueco Tanks also allows the interplay of the secular and spiritual aspects of these people to be more easily examined. More detailed comparisons with other rock imagery sites are provided in the following paragraphs.

Comparable National Historic Landmarks

Presently, there are only three NHL sites or districts in the western United States that include rock imagery: Pictograph Cave in Montana, Coso Rock Art District in California, and Carrizo Plain Archeological District, also in California. These NHL properties represent a small sample of the rock imagery sites and associated cultural groups in the western part of the country, and represent only hunter-gather societies. Early Native American agricultural communities, such as the Jornada Mogollon, are not represented among the current NHL rock imagery properties. As a result, these NHL sites and districts are culturally very different from the Formative period inhabitants of Hueco Tanks. Physiographically, however, and in terms of the abundance of archeological resources, Hueco Tanks is most comparable to the Carrizo Plain Archeological District.

Although Hueco Tanks is recorded as one archeological site, it is comprised of 304 rock art panels and twenty-nine identified locales with archeological deposits. Approximately one-half, or 147, of the rock imagery panels and twenty-eight of the twenty-nine archeological locales are known to include Formative material. This abundance of associated archeological deposits and rock imagery, the predominance of pictographs versus petroglyphs, and the environmental setting within which these resources are situated reflects at least a general similarity between Hueco Tanks and the Carrizo Plain Archeological District. This District is comprised of pictograph sites with and without cultural deposits and some sites with cultural deposits but no rock art and is situated around exposures of the local sandstone on the foothills of the northeastern edge of the Caliente Range in central California (Whitley 2012).

Designated an NHL in 2012, the Carrizo Plain Archeological District is named after the National Monument where it is located. The District includes 100 sites in eight site complexes (Whitley 2012). Eighteen of the sites contain rock imagery, most of which is polychromatic red, black, and white pictographs. However, some petroglyphs are also present. The imagery is depicted on open sandstone outcrops, in crevices, or within small rockshelters. Motifs include turtles, rattlesnakes, and geometric shapes with figures superimposed over each other rather than in readily apparent planned compositions. The 18 sites with rock imagery are within or very close to village middens, and are thought to date from 4,000 to 800 BP. The period of significance for the entire district is 10,000 to 200 BP

Unlike the Carrizo Plain Archeological District, Hueco Tanks is much smaller in area. However, Hueco Tanks has multiple distinctive archeological locales situated around the bases of the hills. Almost all of these locales include Formative occupations and may reflect individual social or political units, perhaps not unlike the complexes of sites on the Carrizo Plain. There is evidence of at least one, and possibly two Formative period villages or hamlets. Some of the archeological locales at Hueco Tanks also include rock imagery, although there are also figures at Hueco Tanks that are located away from archeological deposits. As has been previously discussed, most of the Formative rock art at the site consists of pictographs, with many fewer examples of petroglyphs.

The environmental settings between Hueco Tanks and the Carrizo Plain Archeological District differ considerably. The Carrizo Plain sites are situated along the Caliente Range, a coastal range in California. Vegetation in the area is dominated by oak, chaparral, and grassland. Hueco Tanks is located in the northern Chihuahuan Desert, within the southeast part of the Basin and Range physiographic province (Fenneman 1931:326–438). The province is characterized by isolated, nearly parallel mountain ranges separated by broad

flat basins (Church et al. 1996:3). Surface water in the general area is extremely scarce (Anschuetz et al. 1990:9), and the average annual precipitation is only 8 inches (Jaco 1971:57). However, the many *huecos* on the site can hold water for periods ranging from several days to several months, depending on their size, depth, and exposure to evaporation. Summers at Hueco Tanks generally are long and hot, while winters typically are short and cool (Ramos, ed. 1999:88). Vegetation primarily includes desert scrub and degraded desert grassland. However, because its igneous-derived soils hold water more effectively than soils in the surrounding area, the plant community also includes a number of woody and water-dependent species (Bryan et al. 1999:16; Van Devender and Riskind 1979:138).

Both the Carrizo Plain sites and Hueco Tanks are dominated by polychromatic pictographs of moderate size, with the focus of the painters being on individual motifs rather than large compositions. Use of space differs, however, between the two properties. Much of the imagery at the Carrizo Plain sites was placed on open sandstone faces, while the Formative figures at Hueco Tanks are split between what might have been considered public space and private space, perhaps to satisfy somewhat different purposes. While the rock imagery in the Carrizo Plain District would have been created to fulfill a role in hunter-gatherer societies, the Formative figures at Hueco Tanks were created in support of an increasingly agrarian society. These paintings reflect the importance of water and may represent the early stages of a religion or belief system that developed around the increased importance of water.

Comparable Sites Listed in the National Register

While there are no NHL rock art sites in west Texas or immediately adjacent regions, there are rock imagery sites that are listed in the NRHP or that are eligible for such listing. Among these sites are Alamo Canyon/Wilkey Ranch National Register District, Hudspeth County, Texas, Seminole Canyon National Register District, Val Verde County, Texas, and Petroglyph National Monument, outside of Albuquerque, New Mexico.

Located about 60 miles southeast of El Paso, the Alamo Canyon/Wilkey Ranch National Register District is perhaps closest in similarity to Hueco Tanks among these National Register properties. The boulder-strewn canyon that characterizes this District includes at least 16 rock imagery panels, with a total assemblage of more than 500 petroglyphs or pictographs. Pictographs are limited to a couple of rockshelters in the area, while petroglyphs dominate the exposed boulder surfaces across the District. The imagery contains motifs that are attributable to Archaic and Formative period inhabitants. Among these figures are Jornada style images, including depictions of plumed serpents, masks and faces with abstract decorations, cloud terraces, and an abundance of geometric designs. Many of these motifs are universal among the rock art panels, but some panels have specific figures that are dominant. For example, spirals and circles significantly outnumber other motifs at a site within the District known as Little Cunningham Tank, while animal forms typify the panel at Jaguar Cave, and figures known as “burden bearers” are prominent on the Storyteller Panel (Myles Miller, personal communication December 6, 2017). In addition to the rock imagery, rockshelters, burned rock middens, bedrock mortars, and a variety of pottery and lithic artifacts have also been identified. These resources represent multiple cultural components spanning about 4,000 years of cultural history. The Alamo Canyon/Wilkey Ranch National Register District is distinguished from Hueco Tanks by an absence in the solid variety of mask images and pithouse features that occur at Hueco.

Seminole Canyon National Register District in the Lower Pecos region of Texas represents a variety of rock imagery and multiple cultural groups, with an especially impressive assemblage of Middle and Late Archaic Pecos River style pictographs and associated rockshelter deposits. The sites in this District are very important for the abundance and depth of the archeological deposits, much of which is contained in dry rockshelters where preservation is high, and for the multiple rock art styles that are present. Among these figures are Pecos River

style pictographs that are known to represent murals that depict creation stories and other aspects of the mythology of Middle and Late Archaic inhabitants (cf. Boyd 2016). Nonetheless, the sites in this District, like those among the existing NHL sites and districts, differ significantly from Hueco Tanks and the archeological record left behind by the early agriculturalists of that area.

The rock imagery of Petroglyph National Monument, with its assemblage of petroglyphs produced by sedentary Puebloan farmers, is perhaps somewhat similar to the resources at Hueco Tanks. Many of the figures, all of which are petroglyphs, are individual figures or small groups of figures. There is little overlap of images. Motifs include such things as concentric circles, handprints, anthropomorphs, zoomorphs, masks or face-like figures, stepped fret designs, and more. But there are important differences between Petroglyph National Monument and Hueco Tanks. In addition to the figures at the Monument being petroglyphs, they also differ stylistically and in their placement on the rocks. According to the National Park Service, perhaps ninety percent or more than 15,000 petroglyphs at the Monument are attributable to the Rio Grande style and were produced between about 300 and 700 years ago (Schaafsma 1992:87–89, 99). These figures are located on the boulders and rock face of a long escarpment known as the West Mesa escarpment. Based on the nature of the landform and the placement of the imagery, there is no obvious distinction between public and private space, as there is at Hueco Tanks.[13] Perhaps most importantly, the rock imagery at the Monument is not directly associated with habitation deposits. While there is evidence of Formative period habitation sites along the Rio Grande, located more than a mile from the West Mesa escarpment, habitation debris is sparse in the vicinity of the petroglyphs. Thus, there is less ability to draw direct connections between the secular and spiritual lives of the people that created the petroglyphs at the Monument when compared with the Formative inhabitants of Hueco Tanks. This is also an important distinction between Hueco Tanks and other Jornada Mogollon rock art sites.

In general, much of the rock imagery in west Texas and surrounding regions is attributable to hunter-gatherers. Given the vast time span within which a hunter-gatherer subsistence strategy was practiced, this is no surprise that much of the rock imagery and associated deposits are attributable to hunter-gatherers. During much of the Archaic period, and perhaps earlier, abstract elements representing several different pictograph and petroglyph styles, were widely used by hunter-gatherers. These early abstract styles are thought to perhaps represent a broad cultural tradition, a Desert Archaic Tradition. Individual rock imagery styles in the western Trans-Pecos that are possible components within this Tradition include the Chihuahuan Polychrome Abstract style, Desert Abstract Petroglyph style, Great Basin Abstract style, Guadalupe Mountains Hunter-Gatherer style (Bilbo 1997:46), Bold Line Geometric style (Turpin 1986), San Luis Rey pictograph style, and perhaps others (Schaafsma 1975:62, 91–95; 1980:35, 55–61; 1992:46–48; Turpin 2001:381–382). Although the Jornada Abstract pictograph style is characterized by abstract elements, and some abstract motifs continued to be used into the Historic period, much of the earlier abstract imagery appears to have fallen out of use by the Formative period. It is difficult to know what prompted the creation of the abstract figures during the Archaic, but one prevailing theory is that they may represent entopic (inside the eye) phenomena observed by shamans during altered states of consciousness (Lewis-Williams 2001).

Sometime during the Middle to Late Archaic period, there was an apparent florescence of red-painted representational rock art styles across west Texas and the surrounding regions, possibly resulting from new cultural influences arriving in the eastern Trans-Pecos from Central Texas (Carpenter et al. 1996:89; Hester 1988:59–61; Mallouf 1985:116). The arrival of new cultural groups with distinctive ideological beliefs could be at least partly responsible for changes in rock imagery and related ritual practices. There is considerable evidence for ritual obliteration of Middle Archaic/Late Archaic Lower Pecos River style pictographs (Roberts 2005b), and to a lesser extent, Late Archaic Red Monochrome style pictographs (Carolyn Boyd, personal communication July 1, 2008). Ritual obliteration of red monochrome pictographs also is evident in the Big Bend region of west Texas. However, obliteration of rock imagery has not been identified in the western Trans-

Pecos, including Hueco Tanks. Red monochromatic rock art styles in the western Trans-Pecos and adjacent part of Mexico include the Middle and Late Archaic style, Candelaria, Shumla, and Diablo Dam. These styles fall under the Shumla Tradition and share a common motif—Shumla dart point–like figures. It is thought that this imagery may reflect animist beliefs that things in nature have souls and consciousness. The association of hunters with dart points, including the apparent transformation of Shumla-like forms into anthropomorphs, suggests a spiritual relationship between hunter and prey. Sutherland (1995:10) has speculated that the metamorphosis from death to life, as reflected in killing game for the survival of the group, was a component of Archaic religion in the region. Metamorphosis could have been reflected spiritually in the ritual death and rebirth that shamans underwent while in a trance state, so their visions could benefit the group through healing, successful hunting, good weather, and other advantages.

Comparable Jornada Mogollon Sites

Among Jornada rock art sites, Hueco Tanks is the largest of those sites containing pictographs (Davis and Toness 1974; Kirkland and Newcomb, Jr. 1967:173–198; Schaafsma 1980:211–217), both in terms of the distribution of Formative archeological deposits and the abundance of Formative period imagery. Jornada petroglyph sites, such as Alamo Mountain (LA 9076) and Three Rivers (LA 4923), both located in Otero County, New Mexico, are larger in size but include minimal or no on-site habitation deposits. In addition, as will be discussed further, there is no apparent distribution of the petroglyphs at these sites and many others into what would be considered private and public space. The nature of the landforms at these sites did not support that division of space in the same way that it was accomplished at Hueco Tanks. They lack the abundance of caves, boulder shelters, crevices, and other natural openings that characterize Hueco Tanks. In fact, the use of petroglyphs rather than pictographs at these other sites may be the result of limited or no natural portals to the spiritual realm in these locations; the act of etching or abrading the rock surface may have created the opening to the spirit world. This can be contrasted with the presence of pictographs in Picture Cave (41EP737), Otero County, New Mexico, and Centipede Cave and Jaguar Cave (41HZ375), both located in Hudspeth County, Texas. Of course, these caves or rockshelters represent natural openings to the spiritual realm. However, these pictograph sites still differ significantly from Hueco Tanks in the absence or minimal occurrence of habitation material at these sites, and the limited number of painted figures that are present. Hueco Tanks, with its abundance of Formative rock imagery and associated archeological deposits, and its division of private and public space, allows researchers to examine the interplay of secular and spiritual activities of the Jornada Mogollon in a way that cannot be achieved on other sites.

Jornada imagery is thought to represent the blending of representational hunter-gatherer Archaic figures and Mesoamerican imagery (Sutherland 1998:64–66), suggesting that aspects of Mesoamerican ideology influenced local inhabitants. Thompson (2007) believes that Jornada, Mesoamerican, Mimbres, Casas Grandes, and Pueblo IV cultures shared a widespread ideology, manifested through common elements, icons, and motifs in rock and ceramic imagery. Much of this imagery is thought to represent water-related motifs and was important in petitioning for rain. As noted, Jornada motifs include goggle-eyed figures, feathered or horned serpents, large blanket designs, desert bighorn sheep and other quadrupeds, birds, turtles, tadpoles, fish, dragonflies and other insects, corn, cloud terraces, and rainbows. In addition, masks or face-like figures appear on some Jornada sites, including locations in the Hueco Mountains to the north of Hueco Tanks, the Sacramento Mountains in Lincoln and Chaves counties, New Mexico, and at San Diego Mountain in Doña Ana County, New Mexico (Schaafsma 1980:211). However, mask motifs occur only in small numbers on these sites. This is in stark contrast to the abundance of masks at Hueco Tanks. Hueco Tanks contains over 200 examples of such images, the largest concentration of painted masks in North America (Sutherland 1995:15). Furthermore, the masks at Hueco Tanks are considered distinctive within the Jornada style and the degree of sophistication they exhibit (Schaafsma 1980:211), representing the apex in the development of these figures within the Jornada style.

Many of the Jornada rock art motifs are universal among Jornada sites with rock imagery. However, a number of these sites include one motif that is more dominant than all others on any given site (see Table 1). At Hueco Tanks, masks dominate the assemblage of Jornada imagery. At Alamo Mountain petroglyph site goggle-eyed Tlaloc forms dominate, while horned serpents overshadow the other pictographs at Picture Cave. The circle-dot motif is the single most common element at Three Rivers petroglyph site (Yeo n.d.), and spirals and concentric circles are the predominant images at Little Cunningham Tank in Hudspeth County, Texas. Animal tracks are abundant at Frying Pan Canyon (LA5376) north of Deming, New Mexico, in Luna County, and animal figures are the dominant forms at Jaguar Cave. Anthropomorphized 'tadpoles' with teeth are the most obvious petroglyphs at the Pony Hills site in Luna County, New Mexico. Other examples can be seen in Table 1.

While dominant motifs on some sites across the American Southwest have been shown to identify differing clans, the occurrence of dominant figures on Jornada sites appears to be more a reflection of spiritual requirements of these people. As previously noted, concentric circles and similar motifs are often associated with calendrical events, while the illustration of animal forms may be associated with petitions for successful hunts. Many of the Jornada motifs are related specifically to water or moisture related themes (Slifer 1998:40). The prevalence of masks, as well as other water related imagery at Hueco Tanks, suggests that the site was a rain shrine for the Jornada Mogollon inhabitants of the region (Schaafsma 2002:60–61), and a focal point in their spiritual landscape or cosmoscape. As noted by Loftin (1991:11–12) in reference to modern Puebloan beliefs, life-giving water, the spiritual source of all life, originates from the land of the dead, the realm of the katsinas. Katsinas are masked deities that, at the request of the living, return from the spirit world in the form of clouds and rain (Schaafsma 2002:57). Jornada masks are believed to be ancestral to the katsina belief system, representing deities that brought life-giving water to the Jornada people. The influence of Jornada style rock imagery continues to be expressed in modern Pueblo dance costumes, katsina forms, altar painting, and to a lesser degree, Navajo sand painting (Schaafsma 1992:60).

Jornada imagery is unique to western Texas, south central New Mexico, and adjacent parts of the state of Chihuahua, Mexico. Unlike the entopic phenomena of the earlier Archaic abstract imagery in the region, or the narrative imagery of the Lower Pecos River style figures in the Lower Pecos region of Texas and adjacent parts of Mexico, Jornada motifs were considered to be imbued with the power to communicate with the gods and/or deceased ancestors. Placed in the appropriate setting, and probably in conjunction with corresponding ceremonies, these figures were used in prayers for rain or other needs of the group. There are indications that the placement of this imagery was governed by functional and spiritual needs on both an intra-site and an inter-site level, requiring some amount of advanced spatial planning. With few exceptions, this degree of advanced spatial planning has not been recognized among other rock imagery styles. For example, the earlier Chihuahuan Polychrome Abstract pictograph style and Middle and Late Red Monochrome rock imagery style at Hueco Tanks are placed in a much more random way across the site, not utilizing the huecos and other niches in the rock in the way that Jornada imagery does. Furthermore, inter-site patterning is not evident among these earlier rock imagery styles, as has been recognized for Jornada panels. Whether or not for the same purpose as Jornada imagery, intra-site patterning has been recognized among the aforementioned Lower Pecos River style paintings (Boyd 2016:21). There may also be some degree of regional variation of select motifs among Lower Pecos style figures (Harrison 2004); it has been suggested that these figures represent possible territorial or clan markers (Boyd 2003:112). If so, this differs from the inter-site patterning of Jornada imagery, which was more a function of the spiritual needs of the Jornada people. Jornada rock imagery sites are unique in this way, and Hueco Tanks is a premier example among these sites.

## NATIONALLY SIGNIFICANT INFORMATION YIELDED TO DATE

Archeological investigations at Hueco Tanks have yielded nationally significant information that is beneficial to current research and will continue to benefit future research. Subsurface excavations at the site, including large-scale excavations of Hueco Tanks Village and shovel tests conducted during subsequent archeological surveys, have revealed intact buried multi-component archeological deposits that include substantial Formative occupations. Formative deposits are present within some of the sheltered locations at Hueco Tanks, as well as in open settings. Cultural features include numerous hearths, water control features, house features, extensive rock imagery, and more. These resources have contributed to a better understanding of the transition from a hunter-gatherer society during the preceding Archaic Tradition to one that was becoming increasingly dependent on agriculture during the Formative period. For example, excavation of pitrooms at Hueco Tanks Village reflect the transition from pithouses to pueblos during the Formative period, reflecting an increasingly sedentary lifestyle during this time. Well-preserved floral remains, including pollen, phytoliths, and macrofloral specimens, have provided details about the diet and subsistence strategies of the Jornada Mogollon inhabitants (Howard 2010:383–394; Puseman et al. 2010:413–423), as well as the paleoenvironment at the time. Faunal items have added to this body of data (Shaffer 2010:425–428). In addition, the recovery of packrat middens from the Site have yielded important information about the paleoclimate of not only Hueco Tanks, but the broader southwestern United States (Van Devender 1990; Van Devender, Thomas and Riskind 1979; Van Devender, Thomas and Spaulding 1979).

Researchers have conducted a number of investigations of the rock imagery at Hueco Tanks. Studies of the motifs themselves show an apparent amalgamation of the regional Archaic imagery with Mesoamerican figures from the south, suggesting that while there continued to be a strong bond with the Archaic imagery and the animistic beliefs represented by those figures, there were also perceived benefits in adopting and adapting some elements of Mesoamerican imagery (and probably accompanying ceremony) namely water related figures. This imagery may have been developed to help address organizational problems that arose with the development of, and growing dependence on, agriculture and the establishment of larger villages. Regardless of the exact scenario in which Jornada imagery developed, it does represent the beginnings of a new or adapted belief system, one which may be the origin of the Southwestern katsina belief system that still guides Puebloan societies today. The ways in which religions or belief systems are created, and the purpose(s) that they serve, are questions of national significance.

While many studies have focused on Jornada rock imagery motifs, other studies have focused on the physical make-up or dating of the figures. Although the earliest attempts to date pictographs did not occur at Hueco Tanks, some of the first attempts to date Jornada imagery did occur at the site using plasma oxidation (Hyman et al. 1999:76; Rowe 2005:91). The dates that were established helped to refine the dates of Jornada paintings, moving the starting date for Jornada imagery 600 years earlier than what was anticipated.[14] The technique for dating pictographs was also refined as a result of these earlier studies. The resulting process for dating pictographs has now been successfully utilized at other rock imagery sites across North America and around the world.

More recently, a combination of non-invasive techniques including portable X-Ray Fluorescence Radiography (pXRF), Raman Spectroscopy (Raman), and Fourier Transform Infrared Spectroscopy (FTIR) were used to identify the composition of paints used to create some of the Jornada pictographs at Hueco Tanks (Lins and Price 2011). These analyses were done, in combination with laboratory analysis of samples of graffiti paint, in preparation for the removal/treatment of graffiti painted on pictographs at the Site. Graffiti treatment was accomplished with the use of portable lasers, and calibration of the lasers was accomplished with the aid of the information gleaned from the aforementioned analyses (Dajnowski and Dajnowski 2011). The Hueco Tanks

project was the first to utilize this combination of non-invasive analyses in preparation for treating graffiti on rock art. Culturally affiliated tribal representatives favor this approach at Hueco Tanks, and multiple federal agencies are now considering use of this approach to treat similar occurrences of graffiti on their properties.

## NATIONALLY SIGNIFICANT RESEARCH POTENTIAL OF HUECO TANKS

The availability of water, food, fuel, and shelter—the four criteria necessary for the long-term survival of humans—has drawn people to this location for over 10,000 years, as reflected in the extensive archeological record at the Site. Many of these inhabitants were mobile hunter-gatherers. But, during the Formative period, after the advent of agriculture in the region and the ability to store surplus food, populations began to grow and became increasingly sedentary. There was a gradual transition from pithouse hamlets or small villages to multi-room pueblos. It was against this backdrop that the Jornada Mogollon culture developed within the present study area, and Hueco Tanks reached its apex as a cultural hub.

Of special importance when discussing Hueco Tanks and other Jornada sites is the cosmoscape that emerged during the Formative period that incorporated (whether borrowed from other cultural groups or developed by native inhabitants of the area) elements of this world and the varying realms of the spiritual world, with an apparent emphasis on the importance of water. Although ceremonies or other forms of human interaction would have undoubtedly been a component of the Mogollon cosmoscape, evidence of their cosmoscape is perhaps best identified today in the rock imagery or painted wares that they left behind. As a result of the combination of archeological deposits and rock imagery at Hueco Tanks, the Site is well positioned to address multiple avenues of research regarding the day to day lives of the Jornada Mogollon people, their cosmology, and perhaps the external influences on their culture. It allows us to consider several avenues of future research that is significant on a national level.

### The Development of a New Rock Imagery Style—Jornada Style—and Its Role in Jornada Mogollon Development

Rock imagery is a direct manifestation of prehistoric human thought systems. As discussed by Miller, et al. (2009:12–15), it was sometimes used as a form of communication, or a means of recording oral traditions. Its function was to communicate ideas and concepts to others in the absence of the artist (Layton 2001). Jornada style rock imagery is a product of the Jornada Mogollon culture, and, as previously noted, is thought by some to represent a symbiosis of local animistic Archaic imagery with select Mesoamerican symbols and design motifs (Sutherland 1998:64–66). This suggests that aspects of Mesoamerican ideology influenced local Archaic inhabitants. The development of Jornada imagery may be able to shed light on the origins of the Jornada Mogollon.

Presently, there are two possible scenarios considered for Jornada Mogollon origins. The Mogollon may have emerged from a preceding “Desert Archaic” tradition that links Mogollon ancestry with earlier human occupations of the area. In this scenario, cultural distinctions may have emerged in the broader region when populations grew large enough to establish villages and even larger communities. The second scenario suggests that the Mogollon were descendants of early farmers who migrated from farming regions in central Mexico around 5,500 years ago, and who displaced or absorbed into their community the descendants of the antecedent Desert Archaic population.

The answer to the question of Mogollon origins may be found among the Archaic and Jornada styles of rock art or archeological deposits at Hueco Tanks. The advent of the Jornada style coincides with changes in cultural systems, including a rise in population, large, aggregated villages, and a greater reliance on agriculture. Hueco

Tanks, with its abundance of rock imagery that includes Archaic and Jornada figures, as well as corresponding archeological deposits, is in an unparalleled position to provide additional data about the origins of the Mogollon and the Jornada style of rock art. Of notable importance are the religious, ideological, or symbolic roles of the Jornada pictographs on the site. The assemblage of Jornada rock imagery at Hueco Tanks includes over 200 painted masks or face-like figures, the largest concentration of such painted motifs in North America. These figures and other Jornada motifs at the site are thought to represent antecedent imagery of the Pueblo Katsina belief system. It is uncertain why a new style of imagery would have been adopted by those that already had an established rock art style. Perhaps there was a perception that Mesoamerican motifs, and the belief system represented by these figures, were closely tied to the success of agriculture in that region; if Jornada Mogollon farmers were to be equally successful, then these same symbols would need to be incorporated into their own rock imagery and ideology. Some researchers have suggested that the development of Jornada imagery and the subsequent Katsina belief system may have arisen from the need to address organizational problems that resulted from the aggregation of previously autonomous hunter-gatherer groups, probably organized along kinship lines, to larger agricultural communities that were not necessarily related by kinship (cf. Schaafsma and Schaafsma 1974). This process resulted in social stresses that could be addressed by the adoption of organizational systems not related to kinship, such as the Katsina belief system.

While definitions of rock imagery styles typically consider only the motifs themselves, stylistic differences can also be reflected in the placement and corresponding function of that imagery. This is apparent between the Archaic pictographs and the Jornada paintings at Hueco Tanks. The vast majority of Archaic figures at Hueco Tanks are on exposed surfaces that are readily visible, while many of the Jornada pictographs at Hueco Tanks are situated higher on the rock formations, within less accessible huecos, overhangs, caves, crevices, or other similar features. These locations would have been considered natural access points to the Underworld and to the deities or deceased ancestors that resided within (Schaafsma 2002:57). The painted masks, goggle-eyed deities, cloud-like motifs, and water-dwelling creatures depicted in these places are thought to represent rain or water related motifs and were likely placed in these natural entranceways to the spiritual realm as petitions for rain (Schaafsma 2002:60–61; Sutherland 1995:13–15). Because of the hidden nature of much of this imagery, and its likely purpose, it may have been considered more sacred than those figures placed in more obvious locations and intended for a smaller segment of the population or perhaps only for certain individuals within the community (Sutherland 1995:19). The prevalence of this imagery and especially the painted masks at Hueco Tanks has led to the identification of the site as a rain shrine for the Mogollon inhabitants of the region (Schaafsma 2002:60–61) and a focal point in their spiritual landscape. The importance of rain to these early agriculturalists elevated the role of Hueco Tanks.

The landform also influenced the placement of specific Jornada motifs, such as those used to help mark solstices or other important calendrical events. The placement of goggle-eyed figures, commonly identified as representations of the supreme Aztec[15] god of the rain—Tlaloc, appears to have also been influenced by the landscape. This motif is especially common at Three Rivers and Alamo Mountain. Hueco Tanks is a distant third in the number of occurrences of these figures, though seven goggle-eyed figures occur in a single location at the site. These figures are considerably rarer, or entirely absent at other sites in the region. It is perhaps not coincidental that Three Rivers, Alamo Mountain, and Hueco Tanks are said to be frequent targets of lightning during storms. This characteristic of these locations likely had influence on the placement of goggle-eyed figures, or Tlalocs. As the supreme god of the rain, Tlaloc was not only considered as a beneficent giver of life and sustenance, but he was also feared for his ability to send hail, thunder, and lightning (Miller and Taube 1993; Sahagun 1569). Based on the predominant motifs at other rock imagery sites in the region, these sites had their own unique and important functions that contributed to the broader Mogollon cosmoscape.

In comparison to the placement of pictographs at Hueco Tanks and other pictograph sites in the Jornada region, Jornada petroglyphs tend to be located on more readily accessible boulders or bedrock surfaces within canyons or other drainageways. Maybe there was a functional or ceremonial reason for this differential placement of pictographs and petroglyphs, and perhaps the process of etching or abrading into the rock to create the petroglyphs was another way of creating the entranceways to the spiritual realm that occurred naturally at Hueco Tanks and other locations.[16] Possibly the drainageways themselves were avenues to the spirit world, or perhaps the occurrence of water in these locations enhanced the representations of much of the Jornada imagery as symbols of water or water related subjects. Regardless, this differential treatment of pictographs and petroglyphs on the landscape does appear to be an important distinction between Hueco Tanks and many other rock imagery sites within the Jornada Mogollon cultural area.

Furthermore, the use of pigment itself at Hueco Tanks and other pictograph sites may have served a purpose. For example, in her chemical analysis of Mesoamerican painted codices, Magaloni Kerpel (2014:35, 38) found that colors had a specific significance based on their raw material and their natural state. Pigments mined from below the surface were used to illustrate images associated with the underworld, while organic materials were used in colors intended for use in portraying upper world figures. If an image was related to both the upper and lower worlds, then mineral and organic materials were combined to achieve the desired color. The surviving codices cover a span of Mesoamerican history from about 1,375 to 360 years ago, overlapping the time of Jornada habitation at Hueco Tanks. While it is unknown whether the information in the codices has any direct application to the Mesoamerican-influenced Jornada imagery, the study of color among Jornada figures is at least a possible avenue of research to pursue. This topic of research has been fruitful elsewhere. For example, microscopic examinations of pigment on Lower Pecos River style painted murals, in combination with ethnographic research, led to the recent revelation that the paint on these panels was applied one color at a time in a stratified fashion, with specific meaning being ascribed to each color used (Boyd 2016:37–44, 52).

Archeologists and other researchers place considerable emphasis on stylistic variations, whether within rock imagery or diagnostic artifacts, to identify cultural groupings and corresponding timelines. As noted, this emphasis on stylistic trends is often focused on individual motifs within rock imagery and not on corresponding placement or function. Hueco Tanks provides the opportunity to study the placement and function of rock imagery as one aspect of stylistic development within rock art. Although the Mogollon region depopulated and the culture ceased to exist as a distinctive archeological entity by about 550 years ago, Jornada imagery or derivations of this imagery remain important to Puebloan societies today.

Landform and Function in Inter-Site and Intra-Site Planning

The presence of water, food, fuel, and shelter probably attracted the first Native Americans to Hueco Tanks and continued to be vital to the survival of all subsequent inhabitants and passersby. However, there also were social and religious requirements of settlement organization (Miller et al., eds. 2009:11–5). The landform itself probably played an important role in the selection of a site to meet these requirements. As an example, the indigenous settlers in Mesoamerica selected the locus of a new town based on specific qualities of the cosmoscape that linked the people to the primordium from which the earth was created (Garcia-Zambrano 1994:217–218). In Mesoamerica, the specific characteristics of these locations included an aquatic universe framed by four mountains, with a fifth elevation protruding from the water. The mountain at the core had to be dotted with caves and springs, and sometimes had to be surrounded by smaller hills. Southwestern Puebloan concepts of water sources and landscape reflect a similar visual acuteness (Schaafsma 2002:57). Numerous historic accounts of Puebloan groups mention the presence of ritual and sacred hills, springs, caves, mountains, and other locations of spiritual or cultural memory (Ortiz 1969; Parsons 1939). Puebloan societies often view the Underworld as being an interconnected watery place underground that is accessible via springs and caves

(Schaafsma 2002:57). It is possible that Hueco Tanks, with its numerous huecos, caves, crevices, and other natural openings into the rock, was selected by the Jornada people as a residential area and a focal point in their spiritual landscape.

When compared with most other Jornada rock imagery sites, Hueco Tanks has much more extensive on-site Formative archeological deposits and is known to have been the location of at least one and possibly two pithouse hamlets or villages and numerous cultural features that can be attributed to the period. Among the cultural features are 194 fire-cracked rock features that are scattered around the base of the mountains at Hueco Tanks, outside the area of Hueco Tanks Village or the other possible hamlet/village location in the central part of the site. While not all of these hearth features necessarily date to the Formative period, the majority probably do date to the period based on the abundance of other Formative cultural features and artifacts. Based on ethnographic observations, domestic hearths are frequently found in proximity to house structures (Miller et al 2009:10–32). As a result, it is probable that there are other Jornada residential features in addition to those known to have existed at Hueco Tanks Village.

While there are universal Jornada motifs that occur on every Jornada rock imagery site, many of these sites appear to include only one dominant motif. The prevalence of select motifs on these sites further suggests that site locations were selected based on the intended function of a site, not only in terms of availability of lithic materials, water, or other such resources, but in its ability to meet a particular spiritual need and/or perhaps a calendrical function (which is not necessarily divorced from a spiritual need). These varying site functions, especially when viewed across a broad landscape and cosmoscape, reflect a certain level of inter-site planning. Intra-site planning is also indicated by the placement of rock imagery within specific parameters of a site. For example, Jornada imagery at Alamo Mountain is limited to the lower reaches of that landform (versus Apache imagery which is located higher on the mountain). At a number of Jornada rock imagery sites, there also appear to be very specific lateral boundaries for the placement of figures. Despite the presence of adjacent rock surfaces that appear as adequate as any place else on the site for the placement of imagery, the occurrence of rock art abruptly stops.

The use of pictographs versus petroglyphs also appears to have been dictated by the landform and its role in the belief system of the Jornada Mogollon. Apparently, pictographs were largely limited to natural entranceways to the spiritual realm, such as caves, rockshelters, huecos, and crevices, while petroglyphs are frequently found on more exposed rock surfaces. It is possible that by abrading through the rock surface, the creators of these figures were creating a doorway to the spiritual realm. Regardless, these processes helped in strengthening what was probably already considered sacred space at the select locations where rock imagery is found and required some amount of pre-planning within individual sites or among the broader assemblage of sites. However, placement of this imagery would probably have been only one aspect of the required reciprocity between residents of this world and the Underworld. Among Puebloan groups today, this reciprocity also involves ritual petitions in the form of prayers, offerings of food, and the planting of feathered prayer sticks (Hieb 1994:27–28).

All things in the daily lives of the Jornada Mogollon, including the rock imagery, landform, and the broader landscape, contributed to their cosmoscape, and provided important visual cues that prompted and supported the oral traditions within which the belief system was passed from one generation to the next. This helped maintain and strengthen cultural ties within the group and defined regional cultural boundaries. Intra-site and inter-site planning were also important aspects of land tenure among the Jornada Mogollon. It helped regulate the way in which people used the land (Kelly 1995). Management of the land was important to all North American groups, including the early agriculturalists within the present study area.

Hueco Tanks, a Place for the Living and the Dead

[redacted]

Grave types and associated offerings, if any, reflect ritual life and hint at spiritual beliefs. A variety of burial practices were used among the Jornada Mogollon, but most often burials were placed in shallow pit-graves either intramurally (inside the dwellings) or in refuse heaps surrounding village sites [redacted] The many caves and crevices within the rocks at Hueco Tanks and elsewhere in the Jornada Mogollon cultural area are thought to be entranceways to the spiritual realm (cf. Beidelman 1964:121; Vogt and Stuart 2005), and were considered attractive, powerful locations for the placement of rock imagery intended to communicate with the deities and/or deceased ancestors. However, there is no archeological evidence that indicates their dead were interred in these same locations.

Mortuary practices among the Jornada Mogollon differ considerably from their Late Archaic predecessors, and from their contemporaries in neighboring regions. During the Late Archaic period across much of the American Southwest, many of the dead were buried in caves, rockshelters, sinkholes, crevices, or other natural openings in the earth; to the east, in the Trans-Pecos region of west Texas, rock cairn burials were also common. During the following Late Prehistoric period in the Lower Pecos region of Texas, the dead were also placed within sinkholes or rockshelters (cf. Turpin 1985), perhaps to hasten their access to the spirit world. These burials were frequently accompanied by elaborate grave goods, suggesting that the dead were being prepared for the afterlife (Shafer, ed. 2013:121). The Ancestral Puebloan people, located to the north of the Jornada Mogollon, buried their dead in the ground with pottery, fetishes and other grave goods, perhaps reflecting a similar belief in the afterlife as their counterparts in the Lower Pecos.

As with the establishment of a new rock imagery style by the Jornada Mogollon, the change in mortuary practices between the Late Archaic period and the Formative period in the region may be indicative of a changing belief system. Whether that changing belief system was the result of the movement of outsiders into the region, or the movement of ideas, remains unknown. But future DNA analyses could help provide the answer to this question.

Ethnographically, concern for the dead is also sometimes reflected in the treatment of rock imagery. For example, rock imagery was occasionally blamed as the cause of illness, death, or other misfortunes among some tribal communities, resulting in ritual obliteration or damage to some motifs (Roberts 2005:21). Though there are examples of ritual obliteration in other parts of the American Southwest, there is no indication of such practice among Jornada imagery.

The way in which a society treats their dead, and what that treatment indicates about their spiritual beliefs, is a topic of not only national interest but of universal interest. Hueco Tanks provides an excellent opportunity to study the mortuary practices of the Jornada Mogollon.

## CONCLUSION

Hueco Tanks, as one of the largest rock imagery sites in the American Southwest, is an important repository of Native American religious, cosmological, and ideological symbols and iconography in the region. Furthermore, the daily lives of the site's inhabitants are represented by an extensive unbroken record of archeological deposition that spans thousands of years and represents every known cultural-historical period in the region (Howard et al. 2010:242, 245; Myers 1997:8). The most widespread of these archeological deposits and rock art figures date to the Formative period, ranging in age from about 1,800 to 550 BP and representing the period of significance. The Formative resources at Hueco Tanks are further attributable to the Jornada Mogollon people.

Hueco Tanks is distinguished from other Jornada Mogollon rock imagery sites by the prevalence of masks or face-like pictographs. There are over 200 of these painted figures at the site, the largest concentration of mask pictographs in North America (Sutherland 1995:15). Jornada figures at Hueco Tanks are further distinguished from Jornada imagery elsewhere by having a higher degree of stylistic sophistication; according to Schaafsma (1992:62, 67), Jornada figures at Hueco Tanks probably represent an apex in the development of these motifs. The prevalence of masks or face-like figures and other water related pictographs at Hueco Tanks has led to the identification of the site as a rain shrine for the Jornada (Schaafsma 2002:60–61), and a focal point in their spiritual landscape or cosmoscape.

Unlike any other Jornada rock imagery site, Hueco Tanks has far more extensive on-site archeological deposits and includes known residential pithouses or pitrooms. These features and associated artifacts are representative of the brief Doña Ana phase (1,000–700 BP) of the Formative period, and their presence at Hueco Tanks allows researchers to more fully examine not only the ongoing transition from a hunter-gatherer society to an agrarian one, but also the continued move towards aggregation as diverse groups of people aggregated into village settings (the Doña Ana phase is considered a time of pithouse-to-pueblo transition [Miller and Kenmotsu 2004:237–238]). This aggregation of populations resulted in social stresses that could be managed by the adoption of organizational systems not related to kinship. The establishment of a new rock imagery style—one that was an amalgamation of local Archaic imagery and Mesoamerican iconography—likely played a pivotal role in the establishment of such an organizational system, eventually developing into the Katsina belief system. The beginnings of this belief system are thought to be represented by the mask pictographs at Hueco Tanks, and what they represent. The Katsina belief system is still evident among Pueblo people today, 1,800 years after the appearance of the first Jornada motifs (assuming they date to approximately the beginning of the Formative period, 800 BP).

Hueco Tanks consists of twenty-nine separate archeological localities situated around the base of its mountains (Howard et al. 2010). Both open and sheltered archeological deposits are present, including at least one and possibly two Formative period pithouse or pitroom hamlets or villages. One of these hamlets, Hueco Tanks Village, was partially excavated in the early 1970s (Howard et al. 2010:63–78), during which time a rare example of a two-room pueblo was discovered (University of Texas n.d.; Whelan n.d.). In addition to the hamlets or villages, at least 163 sheltered areas with evidence of human habitation have been documented at Hueco Tanks, as have 399 bedrock grinding features (mortars, cupules, and metates), 194 fire-cracked rock features, and ten water retention features (Bury 2019/2020; Howard et al. 2010).

Hueco Tanks is the only site in the southern Jornada Mogollon cultural area that includes both significant Doña Ana phase archeological deposits and rock imagery. Furthermore, Hueco Tanks is the largest of Jornada Mogollon pictograph sites (Davis and Toness 1974; Kirkland and Newcomb, Jr. 1967:173–198; Schaafsma 1980:211–217), both in terms of site area and abundance of imagery. But, it is the importance of the rock

imagery at Hueco Tanks that was the reason that the site was designated a State Historical Park (now State Park and Historic Site) in 1970 (Bryan et al. 1999:2; Texas Parks and Wildlife Department 2000:2), and was subsequently listed in the National Register of Historic Places in 1971 (NR#71000930; Harry et al. 2001:151; Howard et al. 2010:xiii). The site was designated as an official Texas State Antiquities Landmark in 1983.

The cultural resources at the site, including both the archeological deposits and rock imagery, further reflect national significance under NHL Criterion 6 under the themes “Peopling Places” and “Expressing Cultural Values.” They have yielded nationally significant information of scientific importance and will continue to yield much more in future studies.

## 6. PROPERTY DESCRIPTION AND STATEMENT OF INTEGRITY

| Ownership of Property | | Category of Property | |
|---|---|---|---|
| Private: | | Building(s): | |
| Public-Local: | | District: | |
| Public-State: | 1 | Site: | 1 |
| Public-Federal: | | Structure: | |
| | | Object: | |

**Number of Resources within Boundary of Property: 15**

| Contributing | | Noncontributing | |
|---|---|---|---|
| Buildings: | | Buildings: | 9 |
| Sites: | 1 | Sites: | |
| Structures: | | Structures: | 5 |
| Objects: | | Objects: | |
| Total: | 1 | Total: | 14 |

## PROVIDE PRESENT AND PAST PHYSICAL DESCRIPTIONS OF PROPERTY
**(Please see specific guidance for type of resource[s] being nominated)**

### INTRODUCTION

Hueco Tanks is one of the most important repositories of religious, cosmological, and ideological symbols and iconography in the American Southwest, containing 304 known rock art panels with an estimated 3,000 to 6,000 individual figures. Approximately one-half of the known panels include Formative period (1,800–550 BP) imagery and are contributing features to this nomination. There also is an unbroken record of human occupation represented among the archeological deposits at the site (Howard et al. 2010:242, 245; Myers 1997:8). While there are multiple cultural-historical occupations represented among the archeological deposits and rock imagery at Hueco Tanks, the most intensive occupations occurred during the Formative period.

Although there are fourteen noncontributing structures or buildings within the Hueco Tanks property, as well as some residential development outside the boundaries of Hueco Tanks State Park and Historic Site, the site retains a high level of physical and archeological integrity. Standing in the center of the property, among the igneous hills at the site, one can still imagine what life at Hueco Tanks must have been like for the Jornada Mogollon residents at this desert oasis that fed the secular and spiritual lives of these people.

### LOCATION AND SETTING

Hueco Tanks is located in the southeast part of the Basin and Range physiographic province (Fenneman 1931:326–438), near the northeast end of the Hueco Bolson, a broad basin that extends along the Rio Grande for about 130 miles from southeast to northwest (Fenneman 1931:387–388; Gustavson 1991:3; Knowles 2008:2). The Hueco Bolson is flanked on the east by the Hueco Mountains and on the west by the Franklin Mountains. Hueco Tanks is situated on the sloping surface of accumulated sediments that have eroded from the west flank of the Hueco Mountains. The four large igneous outcrops in the center of the state property are the dominant topographic features on the site. West Mountain is the tallest of the outcrops, rising up to 470 feet

above the surrounding terrain. Numerous natural hollows, or *huecos*, in the outcrops are the source of the name for the property.

Surface water in the Hueco Bolson is extremely scarce (Anschuetz et al. 1990:9). Following storms, rainfall and runoff from the adjacent mountain ranges flow toward the center of the basin and pond in shallow depressions, at the base of alluvial fans (Blair et al. 1990:201–203). These ephemeral lakes are filled during the late summer and early fall and retain water for a few days to several months before losing it to evaporation (Carmichael 1986:36; Seaman and Mills 1988:21). Several substantial depressions are located near Hueco Tanks or are believed to have existed in prehistoric times. These shallow depressions, as well as the *huecos*, would have been the primary sources of water in the vicinity of the site. Although it is unknown how long water would have been available in shallower depressions, the *huecos* are known to hold water for periods ranging from several days to several months, depending on their size, depth, and exposure to evaporation. Within Hueco Tanks, runoff is delivered to the area by arroyos. Moisture is retained in soils near the arroyos and in areas where the water ponds (Mauldin 1995:173–174), making these the most likely areas where crops would have been grown by the Jornada Mogollon.

The semiarid climate of the area is characterized by significant seasonal and annual variations in temperature, precipitation, and wind. Summers generally are long and hot, with around 104 days reaching a maximum temperature of 90°F or higher; winters typically are short and cool, with 65 days dropping to a minimum temperature of 32°F or lower on average (Ramos, ed. 1999:88). The average annual precipitation for the area is 8 inches (Jaco 1971:57), with over 50 percent of the annual precipitation usually falling between July and October (Dering et al. 2001:60–61).

These climatic conditions would not be much different than those experienced by the Jornada Mogollon. The modern climatic regime was established by around 4,000 years ago, with fewer winter freezes and adequate summer rainfall, punctuated by more frequent droughts (Van Devender 1990:126). The modern desert scrub plant community within the northern Chihuahuan Desert soon followed, being in place by around 3,600 years ago (Van Devender 1990:117, 121–122). Nonetheless, black grama and other grasses continued to cover the floor of the Hueco Bolson into the mid-nineteenth century (Gibbens et al. 2005:665).

A wide variety of animal species would have been available to the Jornada Mogollon. Archeological evidence of bison, pronghorn, and mule deer among the deposits at Hueco Tanks Village indicates that past occupants hunted those ungulates (Davidson 1982:75). Other animals are depicted among the Jornada rock imagery, including desert bighorn sheep, deer-like quadrupeds, road runners, quail, frogs, and more (Kirkland 1940:10; Kirkland and Newcomb, Jr. 1967).

## HISTORIC DESCRIPTIONS OF THE SITE

It is unknown how Native Americans referred to Hueco Tanks prior to the arrival of the Spanish, but Captain General Diego de Vargas apparently was the first person to use the term *hueco* (hollow in Spanish) for Hueco Tanks. More specifically, De Vargas referred to Hueco Tanks as *cerro hueco* (hollow hill) (De Vargas 1692:folio 110). The first known Spanish map using the term *hueco* to designate the Tanks is the *Plano del Rio del Norte desde San Elceario hasta el Paraje de San Pasqual*, drawn in the 1770s by Don Bernardo de Miera (Broaddus 1976:9; Dominguez 1956:268–269).

As one of few reliable water sources between the Pecos River and the Rio Grande, many travelers seeking their fortunes during the California gold rush passed by Hueco Tanks, beginning around 1848. In late April or early May of 1849, a member of one of the earliest groups of fortune seekers described Hueco Tanks:

> The path pointed to a mountain of rocks lying across our course…On near approach, the boulders grew to the view and the travelers wondered how they could be crossed when, at half a mile of distance, they perceived an aperture in the rocky mass the width of an ordinary door. It enlarged several feet in width when reached and we entered it by a smooth path without apparent ascent. The boulders receded right and left and we found ourselves in an enclosed park of a hundred or more acres, containing elder, acacia, and other bushes, and grass abundant enough for our beasts. This plain was named Hueco Tanks (Dillon, ed. 1960:49).

The redundant "Tanks" designation was applied to the landmark at some time in the late 1840s by persons visiting the location (e.g., Dillon, ed. 1960:49). Around that same time, in 1849, a map showing the return route of the Neighbors and Ford expedition from El Paso to Austin showed Hueco Tanks as 'Waco' Tanks (Ford 1849; also see Marcy 1950 for a similar spelling used in his text); however, subsequent maps and texts pertaining to the area returned the name to its original spelling.

Those traveling through west Texas to California were soon followed by land surveyors for the railroad, searching for the most practical and economic route for a rail line between the Mississippi River and the Pacific Ocean. One surveyor described Hueco Tanks as being composed of:

> …a dark gray sandstone, scattered about in high masses in the most grotesque disorder and confusion. The tanks containing the water are immense reservoirs, hollowed out by the hand of nature. That upon the west side is capable of holding about 500 gallons; the other, upon the east side, would contain, when full, perhaps fifteen hundred gallons…..Besides the water contained in the Tanks, there are numerous holes and crevices in the mountains, which contain sufficient for every purpose to last for a considerable time (United States War Department 1855–60:53).

Located in what is now known as Comanche Cave (rock imagery location E06D), near what was a trail in 1850, one of the larger *huecos* was more specifically described by boundary commissioner John Russell Bartlett (1854:134). It was "…a great cavity in the rock, containing about 50 barrels of pure, sweet water. This cavity was covered by a large boulder weighing some hundred tons, and its lower surface was only four or five feet above the water." Bartlett was also perhaps the first to note the presence of bedrock mortars and rock imagery at Hueco Tanks (Bartlett 1854:170), though he provided no details about what he referred to as "inscriptions".

Travelers continued to provide occasional descriptions of Hueco Tanks through the nineteenth century, one of the better of which was provided by Captain Randolph B. Marcy (1850:199):

> There is a plain wagon road from here to El Paso. We found a great abundance of good water in an immense tank up a ravine on the South mountain. This is a huge deep basin, scooped out of the solid rock with great symmetry and regularity, and of sufficient capacity to contain several hundred gallons of water. We also found sufficient water for our animals in the ravine. The road passes between the two mountains, which approach within a few rods of each other, leaving a level pass, bordered by immense ledges of rocks, standing out in bold relief directly over the road. The rocks composing the mountains are large masses of dark-gray sandstone, thrown up in the utmost disorder and confusion, leaving numerous holes and caverns, which have often served the Apache as hiding places.

By the mid-1880s the Tanks were being used temporarily by ranchers who reportedly took their stock there several times a year and "drain[ed] the rocks dry" (*El Paso Times*, June 28, 1885). In 1895, prominent El Paso

area politician Juan Armendariz purchased Sections, 9, 10, and 15, but forfeited Section 10 in 1898 due to non-payment of interest (Texas General Land Office School File 36899). Section 10, which includes most of what is now Hueco Tanks State Park and Historic Site, was subsequently purchased by Silverio Escontrias. By 1915, Escontrias possessed at least six sections centered on Hueco Tanks, four of which (9, 10, 15, and 16) would eventually comprise the state property. Hueco Tanks became the location of the Escontrias ranch complex (Howard et al. 2010:98).

In the mid-1930s, a brief, intense effort was made to turn Hueco Tanks into a state park. While that attempt did not come to fruition, the Tanks was being operated as a private recreational park by the fall of 1964 (*El Paso Times*, October 4, 1964). As a result of local concern about the cultural resources at the site, an approximately 739–acre parcel of land that included Hueco Tanks was transferred to El Paso County in 1965. In 1969, this parcel was conveyed to the State of Texas (El Paso County *Deed Record* 254:274). The following year, an additional 121.7 acres was added to the property, bringing it up to its current size and configuration (El Paso County *Deed Record* 333:356). A verbal boundary description of Hueco Tanks State Park and Historic Site, which constitutes archeological site 41EP2, is detailed on pages 2–4 of this nomination.

## OWNERSHIP AND MANAGEMENT

In 1965, concerned by the various land development schemes that had been proposed for Hueco Tanks by private landowners and the potential impacts of this development to the cultural resources on the property, local conservationists made an appeal to the El Paso County Commissioners Court to preserve the site for public use (*El Paso Herald*, June 14, 1965). The commissioners passed a resolution at that time to purchase Hueco Tanks for use as a county park, until it could be transferred to the State of Texas. El Paso County purchased 737 acres that included Hueco Tanks, and the property came into the public domain on September 2, 1965 (El Paso County Commissioner's Court 1965; El Paso County *Deed Record* 78:103; *El Paso Herald-Post*, September 2, 1965).

In November 1965, the county commissioners court approved an agreement with a private concessionaire to start "cleaning up the historical area and begin building a tourist attraction" at Hueco Tanks County Park. The concessionaire was required "to preserve the Indian pictographs on the walls of the tanks and the Butterfield Trail stage station." The agreement was to run for 25 years, but could be cancelled if the commissioners deemed that the operation was inefficient or unprofitable (*El Paso Times*, November 9, 1965).

In 1968, anticipation began to build for conveyance of the property to the State of Texas. On April 1st of that year, the El Paso County Commissioners Court passed a resolution authorizing the county judge to convey the property known as Hueco Tanks to the State of Texas (El Paso County Court, Court Records; El Paso County *Deed Record* 209:1028). However, because the County of El Paso still owed a final $20,000 to the former landowner, conveyance of the property was temporarily delayed (Myers 1997:68–69). In January 1969, the state legislature asked the Texas Parks and Wildlife Department to prepare a report and preliminary budget for operation and development of Hueco Tanks State Park. Formal transfer to the state occurred on June 12, 1969 (El Paso County *Deed Record* 254:274), and Hueco Tanks State Historical Park officially opened to the public on June 1, 1970.

The facilities and acreage of the state park expanded in the early 1970s. An additional 121.7 acres was added to the property, and new roads, picnic areas, camping areas, and utilities were established (El Paso County *Deed Record* 333:356; *El Paso Herald-Post*, July 26, 1973). Other improvements made to the site during the first few

years of state ownership, include the construction of a manager's unit, restrooms, an entry station, water systems, and signage in 1972 (*El Paso Herald-Post*, July 26, 1973).

Competing interests involving the use of Hueco Tanks presented challenges for site management during this period. One of these was sport climbing, which had begun as early as the 1950s. After a gap of a couple of decades, a resurgence of climbing at Hueco Tanks began around 1975. Climbing continued at Hueco Tanks, with boulder climbing increasing substantially in the mid-1980s (Harry et al. 2001:151). By the end of the 1990s, Hueco Tanks had become a world-class boulder-climbing destination, and annual visitation reached 140,000, more than triple the level of a decade earlier.

Native American connections with Hueco Tanks continue to this day. Five Native American communities, including the Comanche Nation of Oklahoma, the Kiowa Tribe of Oklahoma, the Mescalero Apache Tribe, the Pueblo of Isleta, and the Pueblo of Ysleta del Sur, are known to have cultural affiliations with Hueco Tanks State Park and Historic Site. Some consider the Site to be sacred ground (cf. Green 1974:66–68, 138–140). Connections between the tribes and Hueco Tanks are reflected in historic rock imagery at the Site, oral traditions, and landmarks where significant tribal events are thought to have occurred. In March 1984, for example, a delegation of Kiowa and Tigua Indians visited the site and the cave in which a siege was believed to have taken place in 1839 (Miles 1984:66).

Concerns about graffiti covering the pictographs, including territorial markings by gangs, caused TPWD to close the Site for several weeks in the fall of 1992. A public meeting was held to consider solutions for problems related to visitor impacts and vandalism (*El Paso Herald-Post*, October 26, 1992; *El Paso Times*, November 15, 1992). The first steps toward development of long-range plans to minimize or eliminate damage to natural and cultural resources were taken in the mid-1990s (Texas Parks and Wildlife Department 1998:1).

In the late 1990s, the condition of the Site again reached a crisis point. To increase protection of the significant cultural and natural resources on the property, the Texas Parks and Wildlife Department developed a draft public use plan and released it for public review and comment in September 1997. A hearing was held in February 1998 to solicit input on the plan, provided by a diverse array of Site visitors including boulder climbers and other recreational users, Native Americans, archeologists, biologists, state representatives, and state agency officials. The Department held additional work sessions with these constituents in the summer of 1998, and the revised public use plan was implemented in September 1998 (Texas Parks and Wildlife Department 1998). The plan strove to balance outdoor recreation with resource conservation, calling for substantial reductions in visitation levels while implementing a reservation system so visitors could ensure that they would be able to enter Hueco Tanks. Visitors were required to receive an orientation on the significance and fragile nature of the cultural and natural resources, and the laws that protect them. Over half of the Site was set aside for access by groups led by trained guides. Special use permits were made available for Native American ceremonial and religious activities.

In conjunction with implementation of the public use plan in 1998, TPWD conducted intensive inventories of the rock imagery (Rupestrian CyberServices 2000) and archeological deposits (Howard, et al. 2010) in the spring of 1999. The Texas Parks and Wildlife Department reviewed the condition of the Site one year after the public use plan was implemented, and found that graffiti and other vandalism had declined (Texas Parks and Wildlife Department 2000:4), while awareness of the significance of the cultural and natural resources had increased, along with support for the plan (Harry et al. 2001:157). Following another public hearing in March 2000, TPWD implemented a revised public use plan in June of that year that currently guides management of Hueco Tanks (Texas Parks and Wildlife Department 2000). In January 2002, the state legislature designated

Hueco Tanks and 33 other state historical parks as state historic sites, and in 2008 the property was renamed Hueco Tanks State Park and Historic Site, in recognition of the multiple roles that this site plays in serving the public. Recently, the public use plan again underwent review; minor revisions to the plan are being considered.

## CULTURAL RESOURCE INVESTIGATIONS

Hueco Tanks was the focus of one of the earliest archeological investigations in the southern Southwest, drawing researchers from Texas, New Mexico, and elsewhere to view and contemplate the origins and meanings of the rock imagery. The imagery at Hueco Tanks plays a significant role in the study of prehistoric and historic Native American ideology, cosmology, and artistic expression through symbolic metaphor. The prehistoric paintings and abraded figures at the Site have figured prominently in discussions of the origins of Southwestern ideology, its iconographic expression through rock art, pottery design, and kiva murals, and possible relationships with Mesoamerica, as well as parallel relationships with Mimbres and Jornada pottery and rock art motifs and Mesoamerican mythology.

The images of masks or face-like figures and other icons such as rain altars/cloud terraces common among Jornada rock art sites contribute to debates over the origins of the Southwestern Katsina belief system. The figures at Hueco Tanks continue both to inspire discussions and serve as an essential source for debates over the origins and meanings of the symbolic imagery and iconography of Southwestern pueblo societies. To date, illustrations of prehistoric and historic rock imagery at Hueco Tanks appear in hundreds of academic archeological publications and popular books on Southwest prehistory. All major academic, scientific, and popular rock art studies of Texas and the greater American Southwest, and many broader North American studies, reference figures and research conducted at Hueco Tanks (e.g., Hampson 2015:153–155; Kirkland and Newcomb, Jr. 1967; Loendorf et al. 2005; Schaafsma 1980, 1992, 2002:51–66; Slifer 1998:37–40; Sutherland and Giese 1992; Sutherland and Parker 1991; Whitley, ed. 2005:22; Whitley et al. 2001). Indeed, as noted by Hampson (2015:81), Hueco Tanks is a “world-famous” rock imagery site. The importance of Hueco Tanks is further reflected in a statement by anthropologist and Hueco Tanks researcher, Dr. Kay Sutherland (in Bryan et al. 1999:1):

> Hueco Tanks State Historical Park is one of the most significant rock art sites in North America. It occupies a special place as a diffusionist frontier in the transformation of Mesoamerican religious ideas to the ‘Pueblo Cosmovision.’ The water-laden mountain was a religious shrine, sacred geography of the Jornada Mogollon peoples. *Dr. Kay Sutherland, Anthropologist, 1997*[17]

The earliest published descriptions of the rock art at Hueco Tanks were written in the mid-nineteenth century by persons traveling along the trail that led through the Tanks. The trail/road was known by various names through the years, including the Upper Emigrant Road, Upper El Paso Road, Butterfield Overland Mail Route, and others. The Duval-Harris party stopped there in 1849, and Harris later described the pictographs, including rock imagery site N6E (Dillon, ed. 1960:49–50; Moody 1963:86: Davis and Toness 1974:58). John Russell Bartlett of the International Boundary Commission stopped at the Tanks in March 1851; he camped at the Site and sketched the pictographs he observed at several rock art panels (Bartlett 1854:170–173; Mallery 1893:115–116).

Years later, in 1921 and/or 1927, Frank H. H. Roberts of the Smithsonian Institution Bureau of Ethnology apparently visited the Tanks during a trip to view Ceremonial Cave and other nearby caves (Creel 1997:76; Roberts 1929:1; *El Paso Post*, September 15, 1927). After the El Paso Archaeological Society (EPAS) was formed in 1922, members began to record the rock imagery at the Site. One of them was professional

photographer Otis A. Aultman, who became vice-president of the society (Hedrick 1972:52; Walsh 1950:1). EPAS member Colonel M. L. Crimmins published descriptions and sketches of pictographs at the Tanks. He estimated that there were about 2,000 images and recommended that the State of Texas acquire Hueco Tanks in order to protect them (Crimmins 1931:29–30). In 1927 and 1935, A. T. Jackson of the University of Texas at Austin made brief visits to Hueco Tanks and photographed and sketched pictographs at some of the panels that he observed (Jackson 1935, 1938:10–21).

The archeological deposits at Hueco Tanks also received attention. In 1930–1931, archeologist Donald Brand surveyed four sites near El Paso, including Hueco Tanks, for comparison to 400 sites in Chihuahua (Brand 1933:Appendix III:69; Rakita and Raymond 2003:167, 173). Brand collected 38 sherds from the Tanks, which would eventually be classified as El Paso Polychrome, Chupadero Black-on-white, Three Rivers Red-on-terracotta, Little Colorado Black-on-red (St. Johns Polychrome), indented rim redware (Playas Red), corrugated, and unclassified painted pottery (Brand 1933: Plate 10; Carlson 1970:31; Rakita and Raymond 2003:173). Archeologist E. B. Sayles visited Hueco Tanks in 1932, during which time he collected a number of pottery sherds and a few chipped stone artifacts and photographed some of the rock imagery at the Site (Sayles 1932).

Forrest and Lula Kirkland undertook the first systematic rock imagery recording at Hueco Tanks in July of 1939, on the recommendation of A. T. Jackson (Kirkland and Kirkland 1939). The Kirklands found images in thirteen overhanging cliffs, twenty-three niches and crevices, and thirty-seven of the approximately sixty smoke-stained rockshelters that they examined (Kirkland and Kirkland 1939; Kirkland 1940:9). Shelters near the natural water tanks had the greatest quantity and variety of imagery (Kirkland 1940:9). Forrest devised a designation system for the Hueco Tanks pictographs; he assigned sequential numbers to twenty-seven clusters of rock imagery panels, plotting them on a map where he labeled the rock hills as North, East, and West Mountains. Within each rock imagery site, groups of images were indicated by letter suffixes, beginning at the left end of the site (Kirkland and Kirkland 1939). Over a period of ten days, Forrest Kirkland made precise watercolor copies of hundreds of pictographs. Kirkland's images were published in 1967 (Kirkland and Newcomb, Jr. 1967:173–203), and his designation system is used to this day.

Inscriptions dating to 1941 near the pictographs at Cave Kiva, also known as panel N30, indicates that those particular pictographs were visited by that time (Toness and Hill 1972:4). A Boy Scout group, led by El Paso Archeological Society (EPAS) member Mack Hill, was also known to have visited the location in 1956. However, the panel was not formally reported until 1972 (Toness and Hill 1972:4). Due to the inaccessibility of Cave Kiva, Toness and Hill (1972:13–14) suggested that it may have been used for ceremonial purposes.

After almost three decades of little attention to the archeological deposits at Hueco Tanks, the focus returned to the deposits in 1963, when archeologist John Greer made a brief trip to the Tanks during his west Texas ring midden study (Greer 1968:1; personal communication 2004). Greer gathered some 225 pottery sherds and a few chipped stone artifacts during his visit.

Scholarly interest in the rock imagery of Hueco Tanks continued when the State of Texas acquired the property in 1969. More pictographs were soon discovered, such as those at Cave of the Masks (W29) (Binion 1970:43). In December 1971, John Davis recruited fellow EPAS members and the Anthropology Club of the University of Texas at El Paso to inventory the 1,200 images previously recorded by Kirkland, note any damage, and assess the causes of the damage (Davis and Toness 1974:5). During twenty-three days between January and October of 1972, Mike Bilbo, John and Marguerite Davis, Tom and Cynthia Martin, Odin and Kay Toness, and members of the Anthropology Club of the University of Texas at El Paso relocated, sketched, and photographed the pictographs (Bilbo 1972a, 1972b, 1972c; Davis and Toness 1974:2; Toness 1972). They found 300 additional

images that had not been noted by Kirkland, recording them as addenda to existing sites and as new sites (Davis and Toness 1974:57). Condition assessments indicated that twenty-five percent of the panels recorded by Kirkland had been destroyed; of the seventy-five percent remaining, half had suffered some type of damage, mainly from graffiti and picnic fires (Davis and Toness 1974:8). Anthropologist Toness (later Sutherland) became interested in rock imagery and began analyzing and classifying the Hueco Tanks pictographs, which became her lifelong passion (Sutherland 1975, 1991, 1995, 1996; Sutherland and Geise 1992; Sutherland and Parker 1991; Toness 1973, 1974).

In January 1972, a few years after Hueco Tanks became a state park, members of the EPAS and the Anthropology Club of the University of Texas at El Paso inspected areas where new infrastructure was built or was being proposed. Among their discoveries was a large area of midden-stained sediments and numerous artifacts, covering one to two acres, within what is now known as locality NE2. The discovery was brought to the attention of TPWD archeologists, and excavations were subsequently conducted in the area in October and November of 1972 and 1973 (Bilbo 1972a:1–3, 1972c:7; Kegley 1972a:7–8, 1979:19). Excavations began on a small rise where a concentration of artifacts on the surface appeared to indicate the most intact archeological deposits (Kegley 1980a:5). Hand excavations during the 1972 season encompassed ninety-three square meters, most of which were arrayed in three blocks. In addition, one backhoe trench measuring thirty-one meters long was excavated, along with several shorter trenches (Kegley 1972 field maps; Kegley 1982:4–5). Texas Parks and Wildlife Department archeologists recovered evidence of three pithouse or pitroom structures [redacted] dating to the Doña Ana phase (Kegley 1982:21–22). The area was designated as Hueco Tanks Village.

In February 1972, volunteers surveyed an area where backhoe trenches had been dug for water/wastewater lines (Bilbo 1972b:1–2). The team noted some fifteen prehistoric hearths, chipped stone debitage, and pottery sherds (Bilbo 1972b:1). West of the hearths was another midden estimated to be fifteen meters long and at least one meter thick (Bilbo 1972b:2).

In November of 1972, Kegley conducted test excavations in two areas outside Hueco Tanks Village. In the southwest part of the state property, five test units were dug in an area that Kegley designated as 41EP2B, perhaps to identify what Toness (1974) later suggested was a “possible pueblo site.” Midden deposits up to one meter thick were encountered, but no features were identified that could be interpreted as structures (Kegley 1972b; Ralph 1978). Kegley also tested an area in the Escontrias ranch complex, near the center doorway of the three-room stone ruin. Over 1,700 historic artifacts were recovered.

In October 1972, EPAS members tested cultural deposits in the crevice that contains rock imagery site W36 (Davis 1972:2). Inside the cave at the upper end of the crevice, a reservoir had been created by building a rock dam across a watercourse (Davis 1972:2, 5–6, Figures 5–6; Kegley 1982:39, Appendix VIII). Pottery sherds littered the floor. Two mounds of sediment at the upper end of the cave were tested. A trench into the taller of the two mounds hit water at a depth of forty-one inches (1.04 meter), and a trench in the other mound struck water at eighteen inches (46 cm). Davis suspected that the mounds of sediment had been dug up to access a natural bedrock basin (Davis 1972:3–4). The trench excavations yielded El Paso Polychrome and Chupadero Black-on-white sherds, and a few chipped stone artifacts (Davis 1972:3–5). Further down the crevice, a crawlway of highly polished bedrock led to two deep huecos (Davis 1972:6). After the water was drained from one of them, its fill yielded many El Paso Brown and Chupadero Black-on-white pottery sherds, as well as whole and fragmentary dart points (John Davis slides; Davis 1972:5–6).

At the beginning of the 1973 field session at Hueco Tanks Village, a magnetometer survey of the area was also initiated. Five anomalies were found and tested with one-by-two meter units, which located three additional pithouses or pitrooms, an artifact concentration, and an iron stake from the 1972 grid (Arnold 1982:46–48). A

less precise magnetometer search covering a broader area located six anomalies; three were tested, but no cultural features were found. The 1973 hand excavations, including eleven isolated units to test magnetometer anomalies and other locations between and around the aforementioned residential features, covered seventy-five square meters. In addition, several small backhoe trenches also were excavated (Kegley 1982:4–5).

In October 1973, a test pit was excavated by EPAS members in the rockshelter containing rock imagery site W37E. Little information is available about this test excavation, but slides of the excavation indicate that the unit produced ceramic sherds and bone fragments (John Davis slides).

Professional archeological survey and rock imagery documentation at Hueco Tanks resumed in 1977, when archeologists with the Texas Parks and Wildlife Department examined areas proposed for an overflow picnic area, campground extension, and amphitheater (Ralph 1977; 1996:172–173). With the help of EPAS member Mike Bilbo, midden-stained sediments, rock imagery, packrat middens, water storage features, and artifacts were mapped on large-scale TPWD topographic maps and aerial photographs (Bilbo 1978; Ralph 1996:173, 176; Sutherland 1978:83). In the course of this work, Bilbo located additional pictograph sites that had not been previously recorded (Bilbo 1978; Ralph 1999; cf. Riskind 1994).

[redacted]

In September 1985, archeologists surveying the All American Pipeline examined an existing one hundred feet wide pipeline corridor that crosses the southwest corner of the state property. Cultural material identified within the corridor was limited to a chert core and a ceramic sherd with black and red paint (Plog et al. 1989:26).

As a result of extensive vandalism that was occurring to rock imagery at Hueco Tanks, Ralph spearheaded an effort in 1991 and 1992 to make detailed records of rock imagery threatened by vandalism. He led a group of TPWD employees and volunteers who compiled measured sketches, photographs, and watercolor paintings of rock imagery panels (Montgomery 1994). But, concerned with the slow pace of documentation, Ralph (1993) recommended that TPWD contract for a property-wide rock imagery survey.

Beginning in the mid-1990s, attempts were made to directly date Hueco Tanks pictographs via radiocarbon assay (Hyman et al. 1999; Rowe 1996, 2005). Charcoal and/or organic binder was extracted from pigment samples by means of low-temperature, low-pressure oxygen and argon plasmas, and dated via accelerator mass spectrometry. Eight of the seventeen samples were red, white, or black inorganic pigments that did not yield sufficient carbon to be dated (Hyman and Rowe 1999:68). Nine black organic pigment (charcoal?) samples produced dates spanning the Mesilla, Doña Ana, and El Paso phases of the Formative period. These dates ranged from approximately 1,590 – 980 BP to 980 – 610 BP (Hyman et al. 1999:76; Rowe 2005:91).

In 1995, a proposed parking area was surveyed (Ing 1996), as was a one hundred feet wide existing pipeline corridor in the northwest corner of the state property, where another pipeline was to be installed (Herder et al. 1996:3, 10). No archeological resources were identified within the proposed parking area, but two ceramic scatters were recorded as isolated occurrences within the pipeline corridor (Herder et al. 1996:192). In May

1996, a trench for a telephone line on the north boundary of the site hit a gasoline pipeline. A subsequent survey of the spill area did not identify any artifacts or features (Ing and Bryan 1996).

Texas Parks and Wildlife Department archeologist Margaret Howard directed a pedestrian survey covering 500 acres at Hueco Tanks in 1999 and 2001. The investigations focused on three tasks: 1) intensive pedestrian survey of the level ground around the rock hills, 2) reconnaissance of the lower elevations of the hills, and 3) recording and sample collection in areas defined as archeological localities. Because the entire property is designated as one site (41EP2), archeological localities were defined within it to encompass areas where the densities of cultural materials and features are relatively high. In areas where the cultural deposits are extensive, locality boundaries were arbitrarily set at natural and/or constructed landmarks, to delineate smaller units for analysis and management. The twenty-nine localities were numbered sequentially within six geographic areas designated by prefixes: CA – Central Area; ES – East Strip; NE – Northeast Area; NW – Northwest Area; SB – South Basin; WS – West Strip. A total of 163 sheltered areas with evidence of cultural use were documented. Other cultural features recorded on the lower elevations of the rock hills were rock imagery, 399 bedrock grinding features (mortars, cupules, and metates), 125 fire-cracked rock features, and ten water retention features. While not every one of these features can be readily dated to the Formative period, most are located in proximity to Formative period artifacts, Jornada rock imagery, and/or known pithouse/pitroom locations and are attributable to Jornada Mogollon occupations at the Site.

The data and materials recovered from the 1999–2001 investigations were analyzed, and all of the previous investigations at Hueco Tanks also were reviewed. A total of nearly 4,100 artifacts were examined during this project. Ceramic clay source areas were ascertained through instrumental neutron activation analysis of pottery sherds, and radiocarbon dates were obtained from corncobs and other organic materials recovered from the Site (Howard et al. 2010). Based on the number of Formative period cultural features and artifacts examined during the 1999–2001 investigations by Howard and her team, it can be said that Hueco Tanks contains by far the largest assemblage of Formative period archeological deposits of any Jornada Mogollon rock imagery site. The results of the 1999–2001 investigations provide much of the information in this nomination.

Also in 1999, TPWD contracted with Evelyn Billo and Robert Mark of Rupestrian CyberServices to create a digital rock imagery database for Hueco Tanks. They recorded 273 panels, including 34 which were discovered during the project (Harry et al. 2001:154). The panels were designated by prefacing Forrest Kirkland's aforementioned designations with letters indicating the mountains where the panels were found and adding leading zeros to rock imagery site numbers below ten. Each panel was photographed, mapped via global positioning system (GPS), and entered into a geographic information systems (GIS) database. Billo and Mark also compiled a portfolio of ca. 6,000 images, including photographs by John Davis, Kirkland's paintings, and other existing records. In the process of scanning and filtering the photographs they took in 1999, Mark discovered that digital color enhancement revealed pictographs that were invisible or nearly invisible to the naked eye (Mark and Billo 2002, 2006:12–14).

Other small projects were undertaken by TPWD archeologist Tim Roberts between 2001 and 2005, during which time he conducted two surveys related to construction of an interpretive trail (Roberts 2002a, 2005a). In 2001, Roberts examined a 457 meters-long trail segment that was to be rerouted along an existing gravel road. Ground-disturbing impacts were limited to the foundations of two pedestrian bridges that would span an arroyo. Roberts surveyed the proposed trail segment and excavated soil probes, which hit disturbed sediments. He dug test units at the locations where the bridge abutments were to be placed, recovering a mixture of recent materials and prehistoric artifacts (Roberts 2002a:98–102). In 2004, Roberts surveyed the ends of a large earthen dam between North and West Mountains that were being cut down by bulldozers to allow for emergency vehicle access (Roberts 2005a). The dam was comprised of sediment from an extensive borrow pit

to the east, where a Formative period village or hamlet reportedly had been located (Roberts 2005a:65; Sutherland 1996:72). Screening of substantial quantities of sediment from the bulldozer cuts produced only modern materials, but a visual examination of the dam's surface beyond the immediate project areas revealed El Paso Brown, Bichrome, and Polychrome rim sherds, Chupadero Black-on-white body and rim sherds; body sherds of Playas Red, Mimbres Boldface, and corrugated wares; chipped and ground stone artifacts; and fire-cracked rocks (Roberts 2005a:66–67). Roberts also surveyed the margins of the borrow pit. He observed artifacts similar to those exposed on the dam and collected one obsidian arrow point typed as Harrell. Roberts concluded that at least part of the sediments comprising the dam represented a Formative (possibly Doña Ana) occupation that had been located between the mountains (Roberts 2005a:71–72).

In 2010, TPWD contracted with a team of conservators and scientists from Conservation of Sculpture and Objects Studio in Illinois, the Philadelphia Museum of Art, and the Bruker Corporation in Massachusetts, to begin treating graffiti that overlies rock art, using portable lasers. First, non-invasive techniques, including X-Ray Fluorescence, Raman Spectroscopy, and Fourier Transform Infrared Spectroscopy, were used to analyze the pictograph pigments and binders, while samples of graffiti paint not directly on pictographs were removed and tested in a laboratory to determine their composition (Lins and Price 2011). The results were used to create test samples and calibrate portable lasers for treating the graffiti. Then, in 2011, after tribal consultations, lasers were successfully used to remove spray painted and brush painted graffiti from on top of pictographs at Hueco Tanks without harming the underlying Native American paintings (Dajnowski and Dajnowski 2011).

In 2016, TPWD commissioned an extensive photographic survey of climbing routes at Hueco Tanks by Versar, Inc., Springfield, Virginia, and researchers also applied a decorrelation stretch image enhancement algorithm (DStretch) to each survey photograph to determine whether previously unidentified Native American pictographs are present in any of these locations. Researchers examined approximately 2000 climbing routes, revealing previously unknown rock imagery at twenty-nine locations (Goodmaster et al. 2017). TPWD has closed these areas to climbing. The final report for this project, *Survey of Bouldering Problems and Enhanced Documentation of Native American Rock Imagery, Hueco Tanks State Park and Historic Site, El Paso County, Texas*, by Christopher V. Goodmaster, Lawrence L. Loendorf, and Myles Miller, was completed in the summer of 2017.

## RESOURCES

Hueco Tanks was originally recorded as one very large archeological site under the trinomial 41EP2. But more recent surveys have identified 29 archeological localities within the 860.3–acre area that comprises Hueco Tanks State Park and Historic Site. All localities contribute to the significance of the site (Table 2), except for ES3, which does not have cultural deposits or rock art dating to the Formative period.

The twenty-eight localities contributing to the site's national significance are defined within six geographic areas: CA – Central Area, ES – East Strip, NE – Northeast Area, NW – Northwest Area, SB – South Basin, and WS – West Strip. These localities consist of areas with moderate to high surface artifact densities and include cultural features. Prehistoric features, when present, can include fire-cracked rock features, bedrock grinding areas, midden-stained sediments, rockshelters, water control features, [redacted] Shovel test excavations within twenty-eight of the twenty-nine archeological localities have revealed buried cultural deposits in those areas (Howard et al. 2010:176). [redacted] In addition to the archeological deposits, there are also over 300 known rock art panels on the Site, some of which occur within or immediately adjacent to the aforementioned archeological localities. Evidence of more recent historic occupation and land development at Hueco Tanks are also present, including extant buildings or structural ruins, dams, historic inscriptions, and related artifacts. Multiple

occupations are represented at the Site, but it is those resources attributable to the Formative period that are the contributing elements of this nomination.

**Contributing Resources**

Archeological Localities

Most of the twenty-nine archeological localities at 41EP2 have produced evidence of multiple cultural components, including twenty-eight that have deposits attributable to the Formative period. Among these twenty-eight localities contributing to the site's significance, twelve contained temporally diagnostic artifacts or produced radiocarbon dates dating to the Mesilla phase (CA2, CA4, CA5, NE1, NE2, NW1, NW2, SB1, SB2, SB3, SB4, SB7), fourteen include Doña Ana phase occupations (CA2, CA4, CA5, CA7, NE1, NE2, NW2, SB3, SB4, SB5, SB6, SB7, WS1, and WS3), and twelve include El Paso phase deposits (CA1, CA2, CA5, CA7, NE1, NW1, SB4, SB5, SB6, SB7, WS1, WS2) (Howard et al. 2010:284). All twenty-eight of the localities with Formative deposits have also produced pottery sherds that overlap both the Doña Ana and El Paso phases stylistically (Howard et al. 2010:285). Formative period rock imagery, including figures attributable to the Jornada style or the more recently defined Jornada Abstract style, have been identified in twenty-two of the twenty-nine archeological localities and is described below.

The archeological localities with Formative period components are summarized in the paragraphs below, and in Table 2 that follows.

*Locality CA1*

This locality has produced Formative period pottery sherds, as well as chipped stone debitage, lithic tools, fire-cracked rocks, and faunal remains. In addition to the Formative period artifacts, at least some of the thirty-nine bedrock grinding features, as well as seventeen rockshelters and midden-stained sediments recorded in CA1 may be attributable to the Formative inhabitants (Howard et al. 2010:132, 176, 284, 288).

This locality also includes Jornada style and Jornada Abstract style rock imagery, including multiple solid and outline masks, katsina-like figures, a goggle-eyed or Tlaloc motif, blanket designs, a rain altar, anthropomorphic figures (including some that are wearing bighorn sheep headdresses), bird figures, bighorn sheep, deer, a serpent, numerous abstract figures, and more.

*Locality CA2*

Among the archeological deposits at this locale is evidence of intensive occupation during the Formative period, including numerous pottery sherds, as well as chipped stone debitage, lithic tools, fire-cracked rocks, and faunal material. Prehistoric features include thirty-two bedrock grinding features, thirteen rockshelters, one water control feature, and midden-stained sediments, as well as Jornada and Jornada Abstract style rock imagery (Howard et al. 2010:132, 176, 284, 288). The imagery includes goggle-eyed or Tlaloc motifs, anthropomorphic figures, a bighorn sheep and another unidentified quadruped, bird figures, and abstract forms.

*Locality CA3*

Based on a moderately dense concentration of Formative pottery sherds and midden-stained sediments, it appears that there was intensive occupation of this locality during the Formative period. Other artifacts from the area include chipped stone debitage, lithic tools, fire-cracked rocks, and faunal remains. Cultural features include five bedrock grinding features and nine rockshelters (Howard et al. 2010:132, 176, 284, 288). Rock imagery documented in this area includes an outline mask and a diamond motif with two crenulated elements, representing the Jornada and Jornada Abstract styles.

*Locality CA4*

This locality includes a moderately low density of Formative period artifacts, including pottery sherds, chipped stone debitage, and faunal remains. A total of eighty-eight bedrock grinding features, eleven rockshelters, two fire-cracked rock features, midden-stained sediments, and Jornada style rock imagery have been identified within the area (Bury 2019/2020; Howard et al. 2010:132, 176, 284, 288). Among the Jornada and Jornada Abstract style imagery is a rain altar, a goggle-eyed figure, a desert bighorn sheep, a quadruped, and numerous abstract forms.

*Locality CA5*

The concentration of artifacts in this area is moderately dense and includes numerous pottery sherds, arrow points, chipped stone debitage, other lithic tools, and faunal remains. The depth of cultural material in this locality is among the deepest on the site, extending to a depth of ninety centimeters below ground surface. A total of sixty-one bedrock grinding features, twenty-four rockshelters, one fire-cracked rock feature, one water control feature, and midden-stained sediments have been identified. Jornada style rock imagery is also present (Howard et al. 2010:132, 176, 284, 288), including solid and outline masks (including one with a bighorn sheep headdress and one with a horned plumed serpent helmet), anthropomorphic figures, blanket designs, goggle-eyed figures, a rain altar, a horned serpent head, quadrupeds, bighorn sheep, bird motifs, and star figures.

*Locality CA6*

This locality has produced Formative period artifacts including pottery sherds, arrow points, chipped stone debitage, and faunal remains. Cultural features in the area include six bedrock grinding features and four rockshelters. Jornada style pictographs are among the rock imagery documented in this area (Howard et al. 2010:132, 176, 284, 288), and include an outline mask, a horned serpent head, bird tracks, stars, and a centipede figure. Jornada Abstract imagery is represented by a solid chain of triangles and a diamond chain. [redacted] An El Paso brownware sherd and chipped stone debitage were found [redacted] indicating that it dates to the Formative period (Ralph 1997:105).

*Locality CA7*

Artifacts in this area include Formative pottery sherds, arrow points, chipped stone debitage, other lithic tools, and faunal remains. These deposits extend to a depth of 90 cm below ground surface. Sixty-one bedrock grinding features, fourteen rockshelters, one water control feature, and midden-stained sediment have also been observed in the area. Multiple styles of rock imagery here include Jornada style figures and possibly Jornada Abstract motifs (Howard et al. 2010:132, 176, 284, 288). Among the Jornada style imagery are both solid and outline masks, blanket designs, goggle-eyed figures, rain altars, skirted dancers and other anthropomorphic figures. An abstract line with three triangles may be representative of the Jornada Abstract style.

*Locality ES1*

Formative period resources in this locality include a single pottery sherd, an arrow point, another chipped stone tool, and chipped stone debitage. Six fire-cracked rock features have also been documented in this locality (Bury 2019/2020). There is no known rock imagery in the area (Howard et al. 2010:132, 176, 284, 288).

*Locality ES2*

Among the Formative artifacts in this area were pottery sherds and chipped stone debitage. Twenty-one fire-cracked rock features and Jornada style rock imagery were also documented (Bury 2019/2020; Howard et al. 2010:132, 176, 284, 288). The imagery includes three masks.

*Locality NE1*

The moderately high to very high density of artifacts in this locality indicate an intensive occupation of the area during the Formative period. Among the artifacts were numerous pottery sherds, as well as arrow points, chipped stone debitage, lithic tools, fire-cracked rocks, and faunal material. Cultural features in the area include five bedrock grinding features, nine rockshelters, three water control features, midden-stained sediments, and rock imagery (Howard et al. 2010:176, 284, 288). Jornada style figures are among the rock art in the area and include solid and outline masks, a dancing katsina-like figure, a blanket design, zoomorphs, a frog, bird motifs, and feline paw prints. The Jornada Abstract style may be represented by a diamond chain, chevrons, and other geometric elements.

*Locality NE2*

Locality NE2 includes what is commonly known as Hueco Tanks Village, which is known through intensive excavations in 1972 and 1973 (Kegley 1980a). Evidence of six one-room structures was encountered; one is slightly larger and may have been a communal structure. Over 58,000 artifacts were recovered, extending to a depth of up to one meter below surface. Macrobotanical remains include cultivated corn and beans, along with an array of wild plants. Faunal remains indicate that rabbits were the mainstay of the meat diet. Five persons were laid to rest in and near the structures. Twenty radiocarbon assays date the occupation to a 300–year span in the late Doña Ana phase (Howard et al. 2010:63–78).

In addition to the features discovered during the excavations of Hueco Tanks Village, thirty-five bedrock grinding features, four rockshelters, one water control feature, midden-stained soils, and Jornada style rock imagery exists at NE2. Among the artifacts in this locality are numerous pottery sherds, arrow points, chipped stone debitage, lithic tools, fire-cracked rocks, and faunal material (Howard et al. 2010:132, 176, 284, 288).

Hueco Tanks Village is the only Doña Ana phase occupation in the southern Jornada Mogollon cultural area where Jornada style imagery is associated with a substantial occupation site. Jornada style figures in this area include both solid and outline masks, blanket designs, goggle-eyed figures, a tablita motif, a human torso, jaguars/mountain lions, desert bighorn sheep, deer and other quadrupeds, roadrunners and other bird motifs, a bat-like element, and other zoomorphs. Jornada Abstract imagery may be represented by chevrons, ‘S’ curves, zigzag designs, and other lines.

*Locality NE3*

This locality [redacted] associated with an El Paso Brownware pot that contained shell beads (Howard et al. 2010:156, 176, 284, 288).

*Locality NE4*

Formative resources in this locality include Jornada style and Jornada Abstract style rock imagery in area rockshelters (Howard et al. 2010:132, 176, 284, 288). The Jornada style imagery consists of solid masks or face-like figures, an apparent dragonfly, and numerous dots (Goodmaster et al. 2017:31–32). The Jornada Abstract style is represented by chevrons, diamond chains, and other figures.

*Locality NW1*

Formative items from this locality include pottery sherds, chipped stone debitage, fire-cracked rocks, and faunal material. A total of fifteen grinding features, eight rockshelters, two fire-cracked rock features, a water control feature, and extensive midden-stained sediments are in the area. In addition, Jornada style figures are among the known rock imagery (Howard et al. 2010:132, 176, 284, 288). These figures include solid masks or face-like images, an anthropomorphic figure, a rain altar, and one blanket design. Recently identified remnants of a segmented or partitioned rectangular form and several vertical lines may also be attributable to the Jornada rock art style (Goodmaster et al. 2017:53–56).

*Locality NW2*

Among the Formative artifacts recovered from this area are pottery sherds, chipped stone debitage, lithic tools, fire-cracked rocks, and faunal remains. A total of thirty-one bedrock grinding features, thirteen rockshelters, fourteen fire-cracked rock features, two water control features, rock imagery, and midden-stained sediments have been identified in this locality. Jornada and Jornada Abstract style figures are among the known rock imagery in this area (Howard et al. 2010:132, 176, 284, 288). Blanket designs, some of which include goggle-eyed figures, characterize the Jornada style assemblage. The Jornada Abstract style is represented by chevrons, connected triangles, diamond chains, a zig zag line, curvilinear lines, connected circles, and a centipede-like figure; a recently discovered panel of five pairs of faint parallel lines may also fall into this stylistic category (Goodmaster et al. 2017:43–44).

*Locality NW3*

Formative period artifacts from this area include pottery sherds, an arrow point, and chipped stone debitage, some of which have been recovered from a depth of up to ninety centimeters below ground surface. Cultural features in the area include four rockshelters and one bedrock grinding feature, as well as midden-stained soil (Howard et al. 2010:132, 176, 284, 288). Jornada style rock imagery identified in this locality includes one mask, a corn plant, and a possible anthropomorphic figure. Of note, is the use of corn stalk depictions to illustrate the mouth and turned up cheeks on the mask figure. The corn motif is uncommon among Jornada rock imagery panels and is entirely missing from many of these sites.

*Locality NW4*

The artifact density in this area is very high and includes numerous Formative pottery sherds that originated from two El Paso Polychrome pots that apparently were dropped there. Other artifacts include chipped stone debitage and one lithic tool (Howard et al. 2010:176, 216, 284, 288).

*Locality SB1*

The number of cultural features in this locality includes two rockshelters, one bedrock grinding feature, midden-stained sediments, and Jornada style rock imagery. Artifacts include Formative pottery sherds, a lithic tool, chipped stone debitage, fire-cracked rocks, and faunal material (Howard et al. 2010:132, 176, 284, 288). Jornada style paintings in the area include at least five of the most elaborate blanket designs that occur at Hueco Tanks.

*Locality SB2*

The artifact assemblage in this locality is entirely attributable to the Formative period, and includes pottery sherds, an arrow point, chipped stone debitage, and lithic tools. Three rockshelters and a variety of rock imagery are present at SB2 (Howard et al. 2010:132, 176, 284, 288). Among the imagery are three connected red diamonds associated with the Jornada Abstract style.

*Locality SB3*

Three rockshelters and rock imagery are documented in the locality, as are a number of Formative pottery sherds. Rock imagery in the area includes a diamond chain that is indicative of the Jornada Abstract style (Howard et al. 2010:132, 176, 284, 288).

*Locality SB4*

The Formative period in this locale is represented by pottery sherds, arrow points, chipped stone debitage, lithic tools, faunal remains, and fire-cracked rocks. Archeological deposits extend to a depth of ninety centimeters below ground surface. Cultural features include seven bedrock grinding features, one fire-cracked rock feature, six rockshelters, midden-stained sediments, and rock imagery (Howard et al. 2010:132, 176, 284, 288). Among the Jornada style figures in this area are solid and outline masks, goggle-eyed figures, rain altars, serpents, turtles, bird motifs, an insect, and a bear paw within a circular element. Jornada Abstract style imagery includes linked triangles among a concentric circle, a figure ‘8’, and tic marks.

*Locality SB5*

Artifacts from the area include a number of pottery sherds and chipped stone debitage. A total of nineteen fire-cracked rock features and Jornada style rock imagery have also been documented in this locality (Bury 2019/2020; Howard et al. 2010:132, 176, 284, 288). Among the Jornada style figures are masks, a blanket design, and an ‘H’-like pictograph.

*Locality SB6*

The Formative period in this locality is represented by pottery sherds, chipped stone debitage, and fire-cracked rocks. Thirteen fire-cracked rock features are also present. No rock imagery is evident in this locality (Howard et al. 2010:132, 176, 284, 288).

*Locality SB7*

Formative artifacts in this locality include pottery sherds and chipped stone debitage, some of which extend to a depth of ninety centimeters below ground surface. No cultural features are in the area (Howard et al. 2010:176, 284, 288).

*Locality WS1*

Three rockshelters, one bedrock grinding feature, midden-stained sediments, and Jornada style rock imagery have been reported in this locality, as have a number of Formative pottery sherds (Howard et al. 2010:132, 176, 284, 288). Among the Jornada style figures is one mask or face-like pictograph. There are other unidentifiable pictographic remnants in the area, but their attribution to the Jornada style is less certain.

*Locality WS2*

This locality has produced a number of Formative period artifacts, including pottery sherds, chipped stone debitage, stone tools, fire-cracked rocks, and faunal material. Eight bedrock grinding features, four rockshelters, seventy-six fire-cracked rock features, and midden-stained sediments, as well as Jornada style rock imagery, are in the area (Howard et al. 2010:132, 176, 284, 288). Jornada style figures include outline and solid masks (two of which are depicted wearing conical helmets), a blanket design, anthropomorphic figures, a jaguar with conical helmet, an apparent lizard, and other symbols that are reminiscent of Mayan numeral glyphs.

*Locality WS3*

Formative artifacts from this locality include pottery sherds and chipped stone debitage. In addition, eight rockshelters, two fire-cracked rock features, and rock imagery were documented in this area (Bury 2019/2020; Howard et al. 2010:132, 176, 284, 288). Jornada style pictographs include one outline mask and an anthropomorph. Three triangles among a zigzag motif are indicative of the Jornada Abstract style at this location.

*Locality WS4*

This locality has a very high density of Formative pottery sherds, with eighty-two sherds being recovered. Other artifacts include one stone tool and twelve pieces of chipped stone debitage. No cultural features, including rock imagery, are present in this area (Howard et al. 2010:176, 284, 288).

Rock Imagery

As previously noted, there are 304 known rock art panels located among the rock outcrops at Hueco Tanks, 147 of which are attributable to the Formative period. It is difficult to say with certainty how many individual figures are represented at Hueco Tanks, including how many are attributable to the Formative period. These numbers fluctuate depending on how a person identifies individual motifs. However, estimates of the total

number of rock art figures at Hueco Tanks range from over 3,000 (Sutherland 1995:1) to 6,000 individual images (Meadows 2008:69), most of which are pictographs. A few petroglyphs are also present. While there are at least five different styles of rock imagery at the Site representing as many as 8,000 years of occupation (Sutherland 1995:8), it is the Jornada style and Jornada Abstract style pictographs and petroglyphs that are representative of the Formative period in the region. Many of these figures, which date between about 1,000 and 550 BP (Schaafsma 1992:60), are described under the previous archeology locales. However, a number of the Jornada figures at Hueco Tanks are situated higher on the rock outcrops, outside the defined archeological locales. Panel W55, for example, is located near the top of West Mountain, the highest elevation at which Jornada style figures occur at Hueco Tanks. The only two panels at Hueco Tanks known to contain Jornada style petroglyphs are located at the base of North Mountain and East Mountain. The additional contributing Jornada and Jornada Abstract style rock imagery is summarized in Table 3.

Natural Features/Viewshed

As discussed in Howard et al. (2010:299), the Jornada Mogollon inhabitants of Hueco Tanks probably adhered to beliefs about sacred landscapes that are still widely held by many North American Indian people, including traditional Plains cultures. These groups believed that the entire landscape was charged with spiritual power, concentrated in unusual or outstanding landscape features that are thought to have been created under supernatural circumstances. Mountains, unique rock formations, overlooks, caves, springs, and other such extraordinary landscape elements are believed to connect individuals with the cosmic framework that gives life meaning (Feld and Basso, eds. 1996). Hueco Tanks embodies all of these unique landscape elements, and clearly was a focal point in the prehistoric sacred landscape of the eastern Hueco Bolson.

The location of Jornada style figures at Hueco Tanks appears to further emphasize the importance of the landform and of water to the creators of these images. While the other styles of rock imagery at Hueco Tanks are limited primarily to the lower rock outcrops, Jornada style figures also are found on the upper levels of the rock hills. These elevated pictographs could relate to the role of mountains in rainfall production. In the Pueblo hydrologic cycle (Phillips et al. 2006:18), waters move up from the underworld, through the mountains, and into the upper world to be released as rain. The water in caves, crevices, and hollows at Hueco Tanks undoubtedly led early agriculturalists in this otherwise arid environment to view the locale as sacred (Eliade 1959:11, 14, 1963:2–4; Mallam 1984:66–71; Schaafsma 1999:179). Many Native American groups consider water to have beneficent and protective powers (Marriott and Rachlin 1968), and caves and crevices are considered to be avenues to the spiritual realm and the deities within (Heyden 1975:134; Vogt 1976:16–17, 25). Placement of water symbols in the caves and crevices of the Tanks were an appeal to these deities (Schaafsma 1992:77), analogous to modern Pueblo shrines in small caves and shallow depressions near villages or houses (Fewkes 1924; Kirkland 1940:24). The sheer number of images in particular locations was intended to strengthen petitions for rain (Young 1982:184).

**Noncontributing Resources**

Archeological Localities

Prehistoric components that predate the Formative were identified at 22 of the 28 contributing localities and are not considered to be contributing resources. Paleoindian projectile points were recovered from CA6, CA7, and NE1. Early Archaic dart points were found at CA5, CA7, ES3, NE2, and SB3. Middle Archaic components were identified at CA1, CA2, CA4 through CA7, NE1, and NW1. Late Archaic dart points were recovered from fifteen localities: CA1 through 7, NE1, NE2, NW1, NW2, SB1, SB4, WS1, and WS2. Five other localities include components that date broadly to the Archaic period: ES1, ES2, NE4, WS3, and WS4.

*ES3*

This locality is the only one of the twenty-nine archeological localities at Hueco Tanks that does not include any evidence of occupation during the Formative period. Instead, this area has produced an Early Archaic dart point and chipped stone debitage. No cultural features, including rock imagery, are present in this area (Howard et al. 2010:176, 284, 288). A partial human fibula (lower leg bone) is reported to have come from ES3, but there is no information on its exact provenience or other information regarding its discovery (Howard et al. 2010:156).

Historic Structures

Historic structures and features in Hueco Tanks State Park and Historic Site are buildings, walls, and dams. These features are concentrated in the central, northeast, and northwest areas of the state property, in localities CA1, CA2, CA7, NE1, NE2, NE4, NW1, NW2, and NW3. The buildings and walls are in NE4 and are associated with the Escontrias ranch, established around the turn of the century. The fifteen historic dams are in six localities; all but one of them were constructed during the ranching era.

*Buildings and Walls*

Three historic buildings and three stone walls on the northeast side of North Mountain represent the Escontrias ranch headquarters. The adobe ranch house is intact though modified, while two other buildings and the walls are in ruins. Although the buildings could have been constructed by Juan Armendariz as early as 1895, they probably were built by Silverio Escontrias, who purchased the property in 1898 and filed proof of occupancy in 1904.

The Escontrias ranch house is a forty feet square, one-story adobe structure occupied by Silverio Escontrias and his family as early as 1898 until around 1910. It was then used by other Escontrias family members who ran the ranch until the property passed to James and Helen Davis in 1956. The structure was modified since that time

When the property was transferred to the State of Texas in 1969, the house structure initially was used for storage. The building was designated as the interpretive center for Hueco Tanks State Park and Historic Site in October 1995 and was opened to the public in August 1996.

In front of the ranch house are the ruins of two masonry buildings built of porphyritic syenite from the rock hills. One of these ruins was originally a three-room residence constructed by 1904 and occupied until the 1930s (Escontrias and Escontrias 1996). A 1939 photograph shows the fifty-five by fifteen feet structure in ruins.

The second ruin was a two-room building apparently used as a stable by 1904. It measures thirty-seven and one-half by thirty-five feet and is oriented parallel to the house and other ruin. A wooden hitching post adjacent to the southeast corner of this structure likely dates to the mid-1960s, when a ‘ghost town’ was established briefly around the ranch house as part of a land development scheme.

South of the two-room ruin and west of the ranch house are two free-standing stone walls. A sixteen feet long dry-laid wall that is three and one-half feet high originates near the southwest corner of the two-room ruin, and its south end abuts a large boulder. It appears to have replaced a wooden fence visible at that location in a 1939 photograph, which constituted part of the fenced corral between the two-room structure and North Mountain. The second wall is a remnant of a low stone retaining wall that encircled the slightly elevated yard around the house in 1939; it parallels the west side of the house and is forty-two feet long.

The entrance of a nearby rockshelter at the base of North Mountain is partly enclosed by the remnant of a thick, dry laid stone wall that has a maximum height of ca. three feet. It apparently enclosed a small pen in 1939. The shelter also contains a historic dam, as well as historic inscriptions.

*Dams*

Fifteen dams were constructed at Hueco Tanks during the historic period. Most are positioned at the mouths of canyons in the hills, to retain the water that flows down the rocks. The majority are in open-air settings, but two are inside rockshelters. Seven dams are earthen, seven are made of porphyritic syenite rocks and concrete, and the material comprising one dam that no longer exists is unknown.

Most of these dams were probably built by the Escontrias family or their contractors between 1898 and 1950. Three dams are associated with the Escontrias ranch complex on the east side of North Mountain. Behind the house is *Tanque de la Casa* (house tank), an earthen dam that measures 650 feet long, forty to seventy feet wide, and two to ten feet tall. The second dam is located in a canyon on the east side of North Mountain, above the ranch house. *Tanque de las Campanas* (tank of the bells) is constructed of stone and concrete mortar and is curved, measuring 120 feet long, twenty feet wide, and twelve feet tall. It was built by 1939. The third dam is inside a rockshelter west of the ranch house at the base of North Mountain. *Las Tinajas* are two huecos separated by a low stone and concrete dam. This dam may have been present by 1939 (Kirkland and Kirkland 1939:Plate 129).

South of the ranch complex is a dam on the southeast flank of North Mountain, on a gently sloping rock surface around thirty feet above ground level. Remnants of a mortared stone dam are on both sides of a broad canyon; the dam continues to the south as a meandering wall that incorporated boulders by sealing the cracks around them with rocks and concrete. The dam is breached in the canyon and in several other places, but its original length was around 130 feet. Its date of construction is unknown.

A small dam at the north end of East Mountain is known only from its plotting on the 1950 and 1955 USGS Hueco Tanks topographic quadrangles. Three dams are in and near the canyon between North and East Mountains. The largest is an earthen dam, built by the 1920s, that stretches between the two rock hills, measuring 270 feet long, seventy-five feet wide, and ten feet tall. The second dam is in Mescalero Canyon, on the north side of East Mountain. Its two tiers are composed of stone and concrete, and it is 130 feet long, twenty feet wide, and sixteen feet tall. The most well-known water source at Hueco Tanks is inside the rockshelter dubbed Comanche Cave, in upper Mescalero Canyon. The pool in this location could have existed in prehistoric times, but may have been reinforced during the historic era, when the popularity of this water source is affirmed by inscriptions dating as early as 1849, including WATTER HEAR (undated).

Before the large earthen dam that stretches between North and West Mountains was built in the early 1960s, another rock dam crossed the central basin of Hueco Tanks on a parallel alignment further east. The rock dam had been built by 1916 but was destroyed in the early 1960s when that area was excavated to build the large earthen dam.

Three earthen dams are between East Mountain and East Spur in an area known as East Maze. The largest is 170 feet long, thirty feet wide, and seven feet tall. This dam first appears on a 1942 aerial photograph (Myers 1997:107). Two nearby dams were in existence by 1939. One is fifty feet long, thirty feet wide, and eighteen feet tall, enclosing the mouth of a canyon. The third dam adjoins East Mountain and is sixty feet long, thirty feet wide, and four feet tall.

Three stone dams are in a canyon on the northwest side of North Mountain. The largest is an earthen dam measuring eighty feet long, twenty feet wide, and ten feet tall. It first appeared on a 1916 map of the area. Two small dams, including a ten feet long stone and concrete structure and a twenty feet long stone and concrete dam, are of unknown age.

*Buildings and Structures No Longer Present*

The Butterfield Overland Mail established a stage station at Hueco Tanks in 1858 and abandoned it in 1859. It consisted of a building, corral, and at least one water tank, which are no longer evident. Historians (Conkling and Conkling 1947:407, 408, 410) provide the following information on the stage station:

> The station, which was a meal and change station, was located on the flat plain on the north side of the Tanks near the entrance leading into the natural amphitheater through which the mail road led. The station is described as a house built of rock slabs and adobe surrounded by a high walled corral built of the same material. Nothing remains [in the 1930s] but a rounded heap of adobe and gravel concealed in desert undergrowth. . . . The property is now part of the estate of Silverio Escontrias. Descendants of the family have their home a short distance from the old station site.

The station walls stood as late as December 25, 1878, when a crew surveying railroad tracts took shelter there after a heavy snow (Bowden 1975:35).

Water tanks were another component of the Hueco Tanks stage station; they seem to have been natural features that were enhanced:

> The Waco Tanks have been reported to be inexhaustible, but the unusual droughts had drained them, and the most rigorous search through the mountain did not bring to light any more. The tanks had been recently enlarged, so as to hold water enough to last a year when the rain next fell, but until that time the station would have to be abandoned, unless by chance water could be found in the vicinity (Ormsby 1858).

It is very possible that the rough-hewn rocks used in the construction of the stage station were salvaged for use in the construction of the Escontrias ranch complex at the turn of the twentieth century. It is also possible that in the early 1960s, when large earthen berms were built for a drainage diversion project in the area, the former location of the stage station was concealed or destroyed. A mound of earth measuring 250 by 200 feet and seven feet tall now covers the suspected location (Howard et al. 2010:173).

Modern Site Facilities and Roads

Most of the present-day facilities at Hueco Tanks State Park and Historic Site were constructed in the 1970s, and include a headquarters building, two residences, and a maintenance compound. Twenty campsites, a restroom, and a 40–seat amphitheater were built on the northeast side of East Mountain. Restrooms also are located on the northwest and north sides of North Mountain, and a self-composting toilet was more recently installed in the central basin. The site contains 3.1 miles (5.0 kilometers) of paved roads and six miles (9.7 kilometers) of designated hiking trails, two miles of which are surfaced with crushed rock (Howard et al. 2010:26).

## INTEGRITY

Water, the same resource that drew Native American inhabitants to Hueco Tanks for millennia, continued to attract passersby and others to the location throughout the Historic period. The earliest on-site evidence of non-Native visitors to Hueco Tanks is historic graffiti that was placed on the rocks in 1849, as travelers were passing through the area on their way west to the goldfields of California.

Ranching eventually came to the area, resulting in the depletion of grasses and increased erosion as livestock consumed the vegetation. Attempts to divert and capture additional water during the ranching era and subsequent land development era of 1956–1965 resulted in more impacts to the site over the years. During the land development era, when the property was still privately owned, a large earthen dam was constructed between North and West Mountains in an attempt to establish a small lake. Construction of this dam created a large borrow area in the central basin of Hueco Tanks. However, construction of the dam had minimal impact on the rocky hills that were considered to be imbued with spiritual power by the Jornada Mogollon inhabitants and still are considered sacred by Native American communities today. Ultimately, the impoundment never materialized into the permanent reservoir that developers hoped for, and the idea of developing the site was eventually abandoned. Today, the dam actually serves as a visual separation between visitors in the central area of Hueco Tanks and a handful of residences that have been constructed west of the state property.

Beginning as early as the late 1800s, and continuing throughout the twentieth century, Hueco Tanks experienced increased visitation by those intrigued by the Native American paintings and, eventually, by those more interested in recreational activities. The accessibility of the site led to increased impacts to some of the rock imagery. These impacts resulted from the placement of graffiti, smoke blackening from campfires, and even the attempted removal of some figures. Early attempts at removing graffiti resulted in further damage. Natural weathering processes, including exposure to sunlight, wind, and rain, as well as mineralization, has caused fading of some pictographs.

Despite previous impacts to the cultural resources at Hueco Tanks, ample evidence remains of an unbroken record of human occupation spanning thousands of years and representing every known cultural-historical period in the region, from Early Paleoindian to Historic (Howard et al. 2010:242, 245; Myers 1997:8). During an archeological survey in 2000, archeologists identified 29 archeological localities around the base of the mountains at Hueco Tanks based on the presence of artifacts and cultural features that continue to be abundant on the surface of the site. Features reported during the 2000 investigation include 125 fire-cracked rock features, 399 bedrock grinding features, 163 rockshelters with evidence of cultural habitation, ten dams, [redacted] (previously identified, but reported in the 2000 report); midden-stained sediments were also noted in fifteen of the twenty-nine localities (Howard et al. 2010:132). Excavations within the twenty-eight Formative period localities, including shovel tests and the large-scale excavation of Hueco Tanks Village, revealed that intact archeological deposits remain at all twenty-eight locations, and extend to a depth of up to one meter in some places (Howard et al. 2010:176).

Both open and sheltered archeological deposits are present at Hueco Tanks. Among the open deposits is at least one Formative period pithouse/pitroom hamlet, known as ‘Hueco Tanks Village’. This hamlet was partially excavated in the early 1970s (Howard et al. 2010:63–78; Kegley 1982), revealing six residential features, associated hearths, pits, and other features. The residential features included pithouses and at least one rare example of a pitroom. Hueco Tanks is one of few sites that are known to contain pitrooms, which reflect the pivotal transition from pithouse to pueblo architecture (University of Texas n.d.; Whelan n.d.).

Numerous artifacts were recovered from the Hueco Tanks Village, including seventy projectile points, an exceptionally large number of points when compared with other Jornada Mogollon sites (Kegley 1982). For comparison, excavations at the Jornada Mogollon sites of Turquoise Ridge, Gobernadora, Ojasen, North Hills, and Meyer Range, including at least thirty-five pithouses and hundreds of burned rock features, pits, and middens, recovered a combined total of only twenty-seven points (Miller and Kenmotsu 2004:255). In addition to Hueco Tanks Village, the remnants of a second probable pithouse/pitroom hamlet or village remain in the central basin of Hueco Tanks, despite being severely damaged during the construction of the large earthen dam in that area (Roberts 2005a).

Like the archeological deposits, new rock imagery discoveries are still being made, and the condition of rock imagery is being improved with the help of new technologies. The use of hand held portable microscopes, portable X-ray fluorescence, Raman spectroscopy, and Fourier infrared spectroscopy has enhanced the research value of even those pictographs that are faded (Lins and Price 2011), and has provided necessary data to allow for the safe and effective use of portable laser technology in the treatment of graffiti that is on top of Native American pictographs (Dajnowski and Dajnowski 2011). This treatment has been very successful in improving the condition of previously vandalized pictographs. While portable lasers are a relatively new technology for treating graffiti on pictographs, Texas Parks and Wildlife Department has worked with professional conservators since 1993 to treat graffiti at Hueco Tanks. In addition, the Department implemented a Public Use Plan at the site in 1998 that required a certified guide for visitors to be able to access some areas of the site, reduced the number of visitors that could be on-site at any one time, and required visitors to view an orientation video before accessing the property. Very few instances of new graffiti have occurred since the Plan was implemented.

Newer technology is being used not only to improve the condition of known imagery, and to gather additional research data about these figures, but it is also being used to identify pictographs that went previously undetected due to their faded appearance. DStretch, a digital imaging tool that enhances pictographs, was recently used to survey approximately 2000 climbing routes that exist in locations at Hueco Tanks that were thought not to contain rock imagery. The survey identified thirty-one locations that did include evidence of pigment on or adjacent to climbing routes that had not been previously closed to climbing (Goodmaster et al. 2017). Among the locations where pictographs or pictograph fragments could be stylistically identified, seven included Formative imagery. As a result of DStretch findings, the thirty-one locations were immediately closed to further recreational activities.

The ability of Hueco Tanks to reveal previously unknown archeological deposits and rock imagery now, after decades of previous research and despite previous impacts, is a testimony to the intensity of Native American occupation and use of this site, especially during the Formative period. The site not only contains the resources necessary to answer the research questions outlined in this nomination, but it is the premiere example among Jornada Mogollon sites. Hueco Tanks is integral to telling the story of these early desert farmers and their influence across the broader Southwest and beyond.

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2006 *The rock art of Mwana wa Chentcherere II Rock Shelter, Malaŵi: A site-specific study of girls' initiation rock art*. African Studies Centre, Leiden, Netherlands.

2009 *The rock art of Chinamwali: Material culture and girls' initiation in South-Central Africa*. Unpublished Ph.D. dissertation, Rock Art Research Institute, University of the Witwatersrand, Johannesburg.

**Previous documentation on file (NPS):**

_X_ Previously listed in the National Register (fill in 1 through 6 below)
__ Not previously listed in the National Register (fill in **only** 4, 5, and 6 below)

1. NR #: 71000930
2. Date of listing: 07/14/1971
3. Level of significance: National
4. Applicable National Register Criteria: A__ B__ C__ D_X
5. Criteria Considerations (Exceptions): A__ B__ C__ D__ E__ F__ G__
6. Areas of Significance: Archeology – Prehistoric; Art

__ Previously Determined Eligible for the National Register: Date of determination:
__ Designated a National Historic Landmark: Date of designation:
__ Recorded by Historic American Buildings Survey: HABS No.
__ Recorded by Historic American Engineering Record: HAER No.
__ Recorded by Historic American Landscapes Survey: HALS No.

**Location of additional data:**

State Historic Preservation Office: Texas Historical Commission, Austin

Other State Agency: Texas Parks and Wildlife Department, Austin

Federal Agency:

Local Government:

University: Texas Archeological Research Laboratory, University of Texas-Austin

**Other (Specify Repository):**

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[1] This statement is taken from comments made by Dr. Kay Sutherland during a public meeting in El Paso, during which the Texas Parks and Wildlife Department was soliciting comments regarding the impending preparation of a Public Use Plan for Hueco Tanks State Park and Historic Site.

[2] This number represents the Texas archeological site trinomial for Hueco Tanks. The state of Texas is represented by '41', El Paso County is 'EP', and '2' is the sequential number for Hueco Tanks.

[3] According to the United States Department of Agriculture's Natural Resources Conservation agency, the term "tank" is defined as "A natural depression or cavity in impervious rocks in which water collects and remains for the greater part of the year" (https://www nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcs142p2_053182&ext=pdf).

[4] Within the Puebloan perception of the universe, there are three levels—the sky, the earth's surface, and the Underworld or spiritual realm (for example, see Ortiz 1969).

[5] Pictographs are figures that are painted on rock surfaces.

[6] Petroglyphs are figures that are etched or abraded into rock surfaces.

[7] 'BP' is years before present, using AD 2000 as the 'present' in this nomination.

[8] The native tobacco is *Nicotiana trygonophylla*.

[9] Native datura in the study area is *Datura wrightii*, and is also known as sacred datura.

[10] Simmons (1942:139) noted that "upon the stone were tracings of chickens carved by the War Twins, a rooster daubed with red ocher, and drawings of hens and baby chicks." He was told by the Hopi War Chief that "Here is a Chicken shrine. If you wish to have success with chickens, make an offering and pray for good luck."

[11] Cosmoscape refers to all things that constitute the spiritual universe, including landscapes/landforms, objects, features, ceremonies, and more. It also includes all levels of the spiritual world, which are frequently composed of this world, the sky world, and the underworld within Native American belief systems.

[12] The listed tribes have indicated cultural affiliation with Hueco Tanks, and the Texas Parks and Wildlife Department has consulted with them regarding Section 106 projects and Native American Graves Protection and Repatriation Act issues. Among other things, tribal representatives are also invited to participate in the annual Interpretive Fair at Hueco Tanks and to take part in the interpretive guide training program.

[13] For example, the placement of imagery within a discrete rockshelter rather than on an exposed surface that is readily visible may be an indicator of private space verses public space.

[14] The plasma oxidation dates obtained by Hyman, Rowe, and others for the Jornada pictographs at Hueco Tanks have since been confirmed by radiocarbon dating of perishable items with the same iconography as those pictographs (Miller 2013).

[15] Or earlier manifestation at Teotihuacan in Mesoamerica.

[16] While it is proposed that the act of etching or abrading through the rock surface may have been sufficient to create an entranceway to the Underworld, Hann and Bettles (2006:187; also see Benson and Sehgal 1987) suggest more specifically that the creation of circle and concentric circle petroglyphs at the House of the Rising Sun site in the Klamath Basin of south-central Oregon and northeastern California was done to open a tunnel-like passage through which the shaman could travel to the spirit world.

[17] This statement is taken from comments made by Dr. Kay Sutherland during a public meeting in El Paso, during which the Texas Parks and Wildlife Department was soliciting comments regarding the impending preparation of a Public Use Plan for Hueco Tanks State Park and Historic Site.

## List of Photographs, Hueco Tanks, El Paso County, Texas

| Photo No. | Caption | Camera facing | Date | Photographer |
|---|---|---|---|---|
| TX_El Paso County_Hueco Tanks_0001. | PHOTOGRAPH 1. GoogleEarth oblique aerial view of Hueco Tanks (41EP2) with NHL boundary in green. | East | 6/9/2020 | GoogleEarth |
| TX_El Paso County_Hueco Tanks_0002. | PHOTOGRAPH 2. USGS 1998 aerial view of Hueco Tanks (41EP2). | Overhead aerial | 2/2/1998 | USGS |
| TX_El Paso County_Hueco Tanks_0003. | PHOTOGRAPH 3. View of North Mountain, Hueco Tanks State Park and Historic Site. Courtesy Texas Parks and Wildlife Department. | Southeast | 10/14/2014 | Nicolas Havlik |
| TX_El Paso County_Hueco Tanks_0004. | PHOTOGRAPH 4. View of the summit of North Mountain. Courtesy Texas Parks and Wildlife Department. | East | 10/14/2014 | Nicolas Havlik |
| TX_El Paso County_Hueco Tanks_0005. | PHOTOGRAPH 5. Looking east from the summit of West Mountain. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | East | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0006. | PHOTOGRAPH 6. *Huecos* on the summit of North Mountain following a rain. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | Northwest | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0007. | PHOTOGRAPH 7. A natural pond may have been present in this area on the west side of North Mountain, where a dam was later built to impound *Laguna Prieta*. While this dam was constructed by Hispanic ranchers, some of the other dams at Hueco Tanks were constructed by Native American inhabitants. Courtesy Texas Parks and Wildlife Department. | East | Unknown | Chase Fountain |
| TX_El Paso County_Hueco Tanks_0008. | PHOTOGRAPH 8. Dallas artist, Forrest Kirkland, documenting the pictographs at rock imagery panel E01A on the north side of East Mountain. Courtesy of Texas Archeological Research Laboratory, The University of Texas at Austin. | Northeast | 1939 | Lula Kirkland |
| TX_El Paso County_Hueco Tanks_0009. | PHOTOGRAPH 9. One of several Jornada style anthropomorphic figures at Hueco Tanks. This is one of the first pictographs at Hueco Tanks that was subjected to digital enhancement. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | East | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0010. | PHOTOGRAPH 10. Pictograph known as White-Horned Dancer, Hueco Tanks. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | South | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0011. | PHOTOGRAPH 11. One of 23 goggle-eyed pictographs at Hueco Tanks. These figures are also often referred to as Tlaloc figures. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | Northwest | 1999/2000 | Rupestrian CyberServices |

| Photo No. | Caption | Camera facing | Date | Photographer |
|---|---|---|---|---|
| TX_El Paso County_Hueco Tanks_0012. | PHOTOGRAPH 12. Good example of another goggle-eyed figure at Hueco Tanks. This motif is especially common at Three Rivers and Alamo Mountain. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | East | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0013. | PHOTOGRAPH 13. Pictograph of what appears to be a roadrunner. Enhancements were done using DStretch. Courtesy Rupestrian CyberServces, Flagstaff, Arizona. | South | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0014. | PHOTOGRAPH 14. An apparent Jornada style bighorn sheep and anthropomorphic figure at Hueco Tanks. Courtesy Rupestrian CyberServces, Flagstaff, Arizona. | East | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0015. | PHOTOGRAPH 15. Jornada style motif that is generally referred to as a blanket design. These intricate images appear to be much less common on most other Jornada rock imagery sites. Courtesy Rupestrian CyberService, Flagstaff, Arizona. | Looking upward | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0016. | PHOTOGRAPH 16. One of several solid mask figures in what is known as Cave Kiva (N38). There are over 200 masks or face-like pictographs at Hueco Tanks, the most painted images of this type anywhere in North America. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | North | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0017. | PHOTOGRAPH 17. The mask figure is known as 'Starry-Eyed Man' (E10C). The blue-green pigment is not only a rarity at Hueco Tanks, but across the entire Jornada Mogollon cultural region. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | Southwest | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0018. | PHOTOGRAPH 18. Solid masks at 'Cave of the Masks', Hueco Tanks. Courtesy Texas Parks and Wildlife Department. Courtesy Texas Parks and Wildlife Department. | East | Unknown | Chase Fountain |
| TX_El Paso County_Hueco Tanks_0019. | PHOTOGRAPH 19. Series of red monochromatic solid masks. This is representative of the preference by the authors of these figures to place them within natural 'portals' to the Underworld. Courtesy Texas Parks and Wildlife Department. | East | 10/13/2012 | Tim Roberts |
| TX_El Paso County_Hueco Tanks_0020. | PHOTOGRAPH 20. Another example of a multichromatic solid mask at Hueco Tanks. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | Northwest | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0021. | PHOTOGRAPH 21. Example of an outline mask at Hueco Tanks. While this mask type is somewhat more common among Jornada rock imagery sites, solid masks are limited to only a few sites. Courtesy Rupestrian CyberServices, Flagstaff, Arizona. | Looking upward | 1999/2000 | Rupestrian CyberServices |
| TX_El Paso County_Hueco Tanks_0022. | PHOTOGRAPH 22. Excavation of a pithouse feature at Hueco Tanks Village, Hueco Tanks. Courtesy Texas Parks and Wildlife Department. | East | 1972 | TPWD |

| Photo No. | Caption | Camera facing | Date | Photographer |
|---|---|---|---|---|
| TX_El Paso County_Hueco Tanks_0023. | PHOTOGRAPH 23. Three of the 194 fire-cracked rock features that have been identified around the base of the mountains at Hueco Tanks. Courtesy Texas Parks and Wildlife Department. | Northwest | 1999/2000 | TPWD (Logan McNatt) |
| TX_El Paso County_Hueco Tanks_0024. | PHOTOGRAPH 24. Bedrock mortars at pictograph panel E48. Courtesy Texas Parks and Wildlife Department. | Northeast | 3/31/1999 | TPWD (Logan McNatt) |
| TX_El Paso County_Hueco Tanks_0025. | PHOTOGRAPH 25. Examples of the many cupules at Hueco Tanks. Courtesy Texas Parks and Wildlife Department. | | 1999 | TPWD (Logan McNatt) |
| TX_El Paso County_Hueco Tanks_0026. | PHOTOGRAPH 26. Basketry fragment recovered from Hueco Tanks. In addition, net cordage, a number of corncobs, and other floral and faunal items have been recovered. Sheltered areas at Hueco Tanks provide good conditions for the recovery of perishables. Courtesy Texas Parks and Wildlife Department. | N/A | 1999/2000 | TPWD |
| TX_El Paso County_Hueco Tanks_0027. | PHOTOGRAPH 27. Interior view of El Paso Polychrome bowl recovered from archeological locale NE1, Hueco Tanks. Courtesy Texas Parks and Wildlife Department. | N/A | 1999/2000 | TPWD |
| TX_El Paso County_Hueco Tanks_0028. | PHOTOGRAPH 28. Stone form effigy bowl recovered from Hueco Tanks. Courtesy Texas Parks and Wildlife Department. | N/A | 1999/2000 | TPWD |
| TX_El Paso County_Hueco Tanks_0029. | PHOTOGRAPH 29. A team of professional conservators, scientists, and technicians using non-invasive techniques to identify the pigments and binders used to create one of the pictographs at Hueco Tanks. Analyses included portable X-Ray Fluorescence Radiography (pXRF), Raman Spectroscopy (Raman), and Fourier Transform Infrared Spectroscopy (FTIR). This was the first combined use of these techniques to analyze Native American pictographs. Courtesy Texas Parks and Wildlife Department. | Southwest | 5/23/2011 | Tim Roberts |

| Photo No. | Caption | Camera facing | Date | Photographer |
|---|---|---|---|---|
| TX_El Paso County_Hueco Tanks_0030. | PHOTOGRAPH 30. Introductions of Native American dances during the annual Interpretive Fair at Hueco Tanks. Courtesy Texas Parks and Wildlife Department. | East | 2/2/2005 | Chase Fountain |
| TX_El Paso County_Hueco Tanks_0031. | PHTOGRAPH 31. Site staff leading a tour at Hueco Tanks. Staff and volunteers conduct a variety of tours throughout the year. Volunteers, as well as new staff, are required to take certified guide training prior to conducting tours of the site. Courtesy Texas Parks and Wildlife Department. | South | 2/25/2017 | Cassie Honolka |

**Photo 1.** GoogleEarth oblique aerial view of Hueco Tanks (41EP2) with NHL boundary in green.

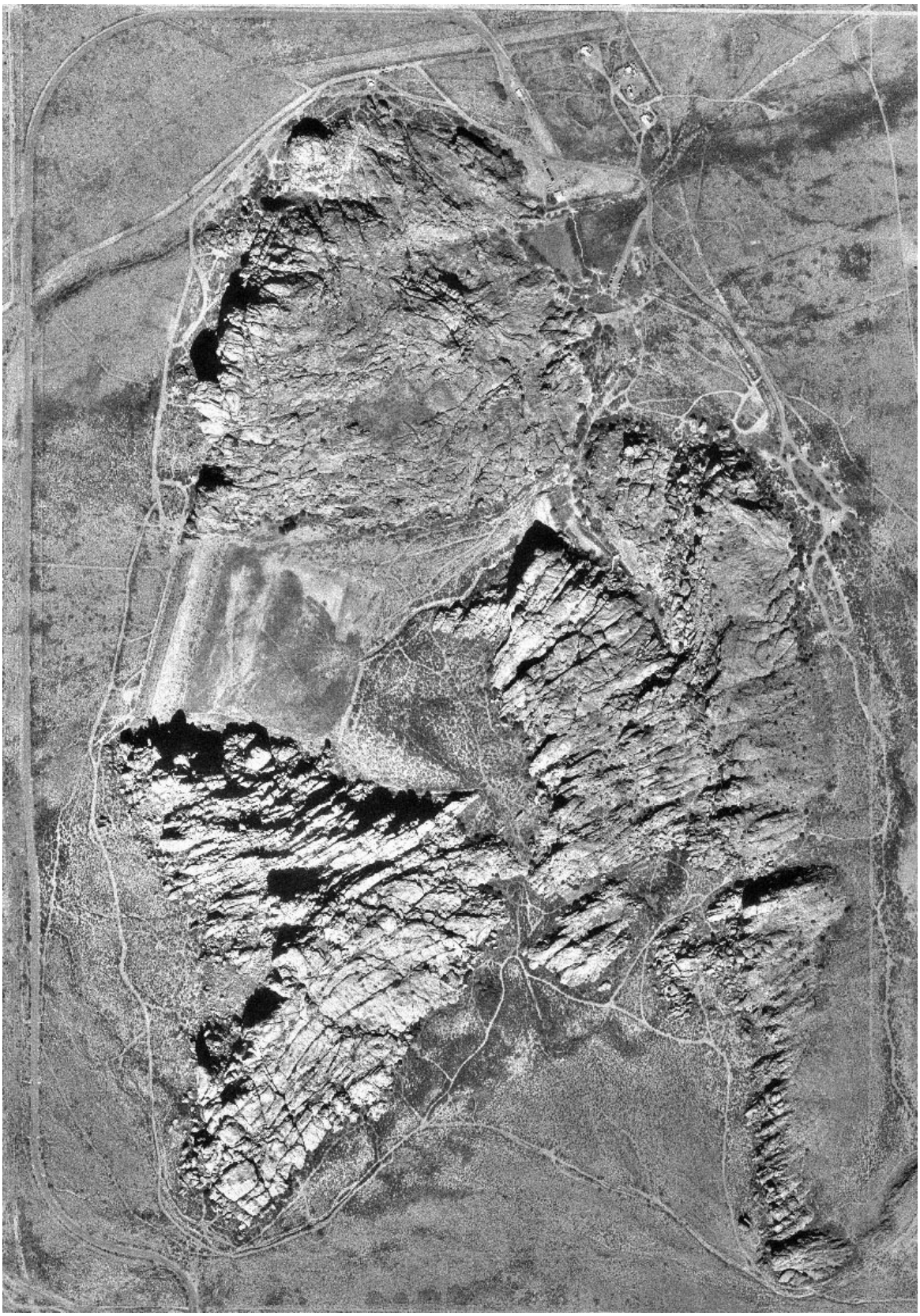

**Photo 2.** USGS 1998 aerial view of Hueco Tanks (41EP2).

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**Photo 4.** View of the summit of North Mountain.

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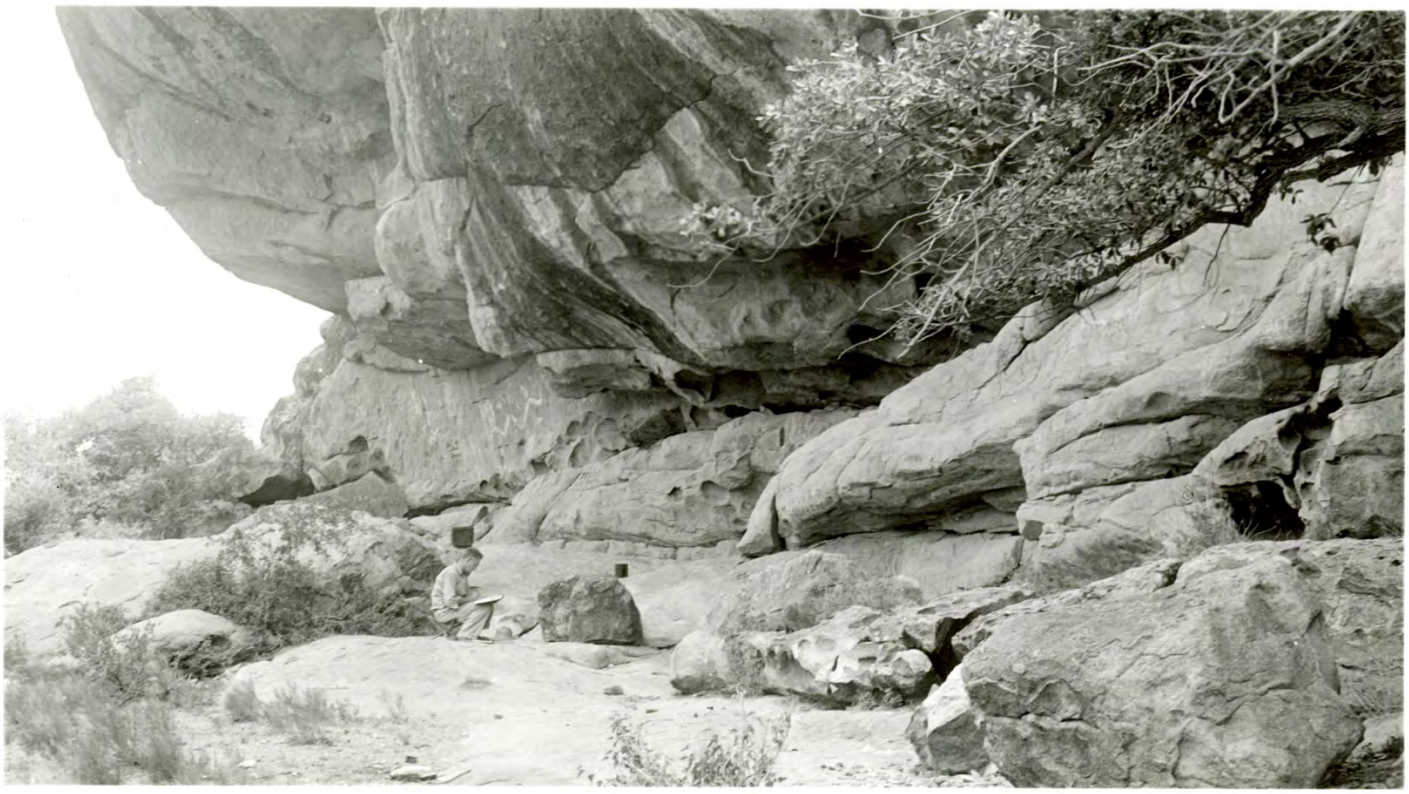

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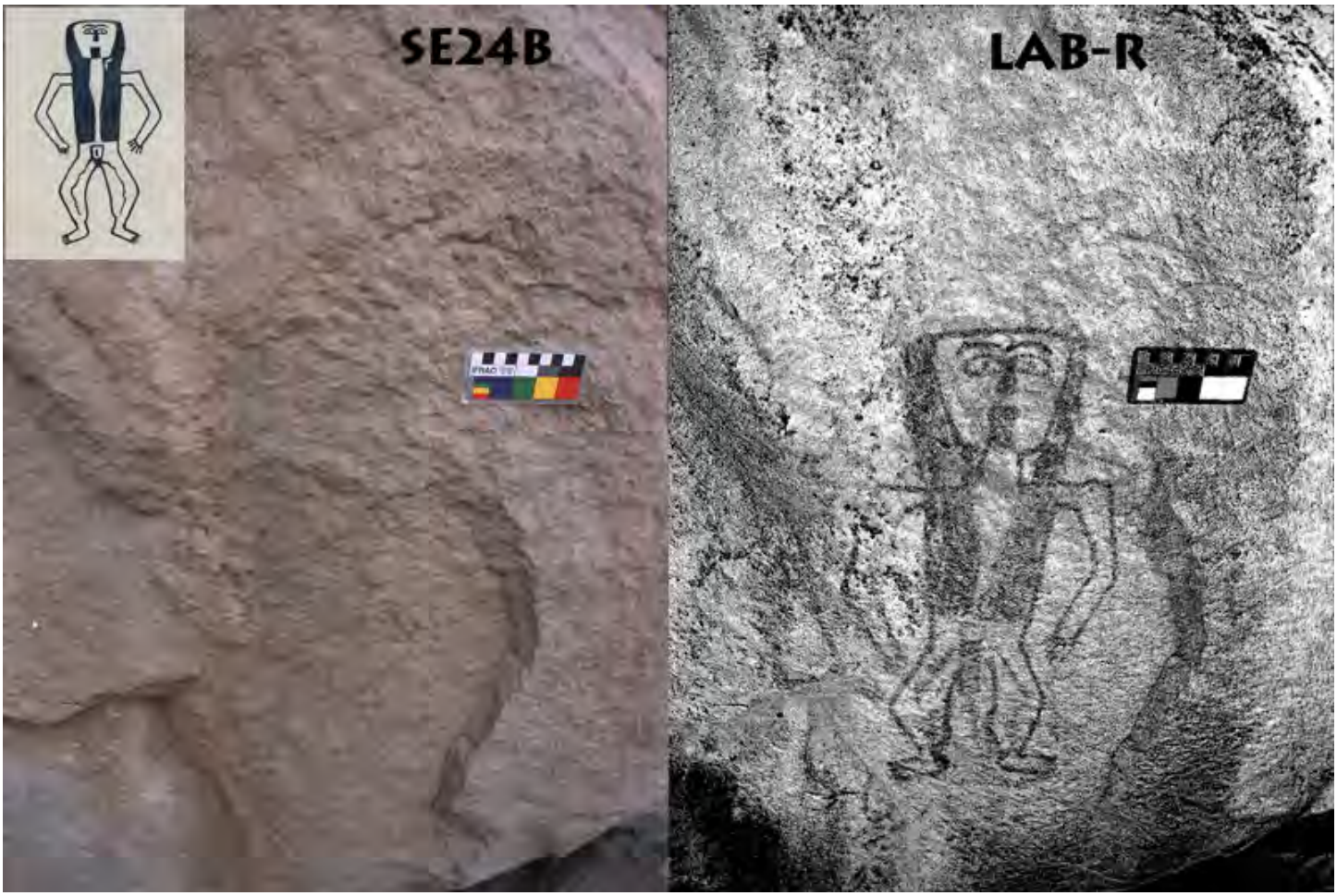


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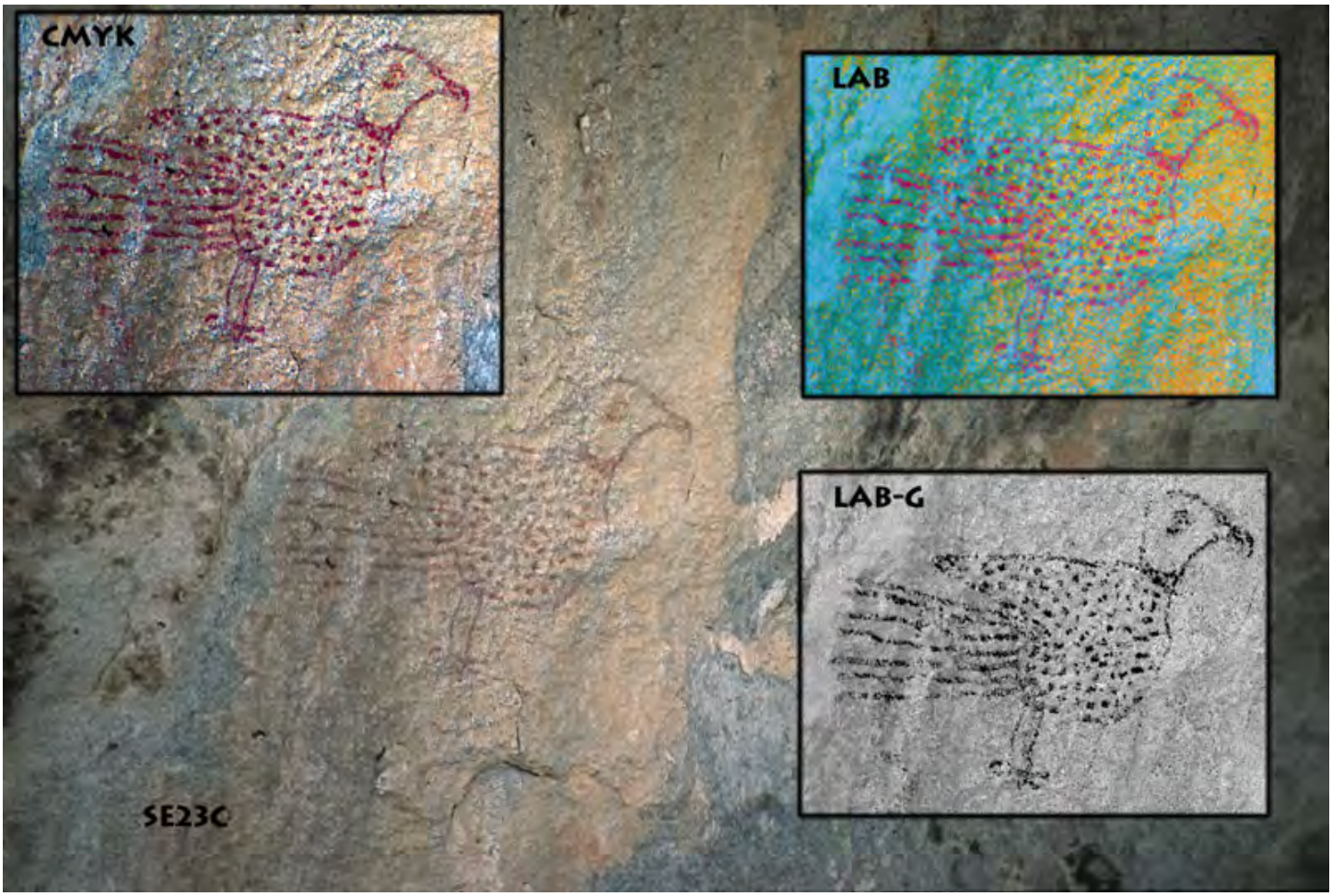


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**Photo 22.** Excavation of a pithouse feature at Hueco Tanks Village, Hueco Tanks.

**Photo 23.** Three of the 194 fire-cracked rock features that have been identified around the base of the mountains at Hueco Tanks.

**Photo 24.** Bedrock mortars at pictograph panel E48.

**Photo 25.** Examples of the many cupules at Hueco Tanks.

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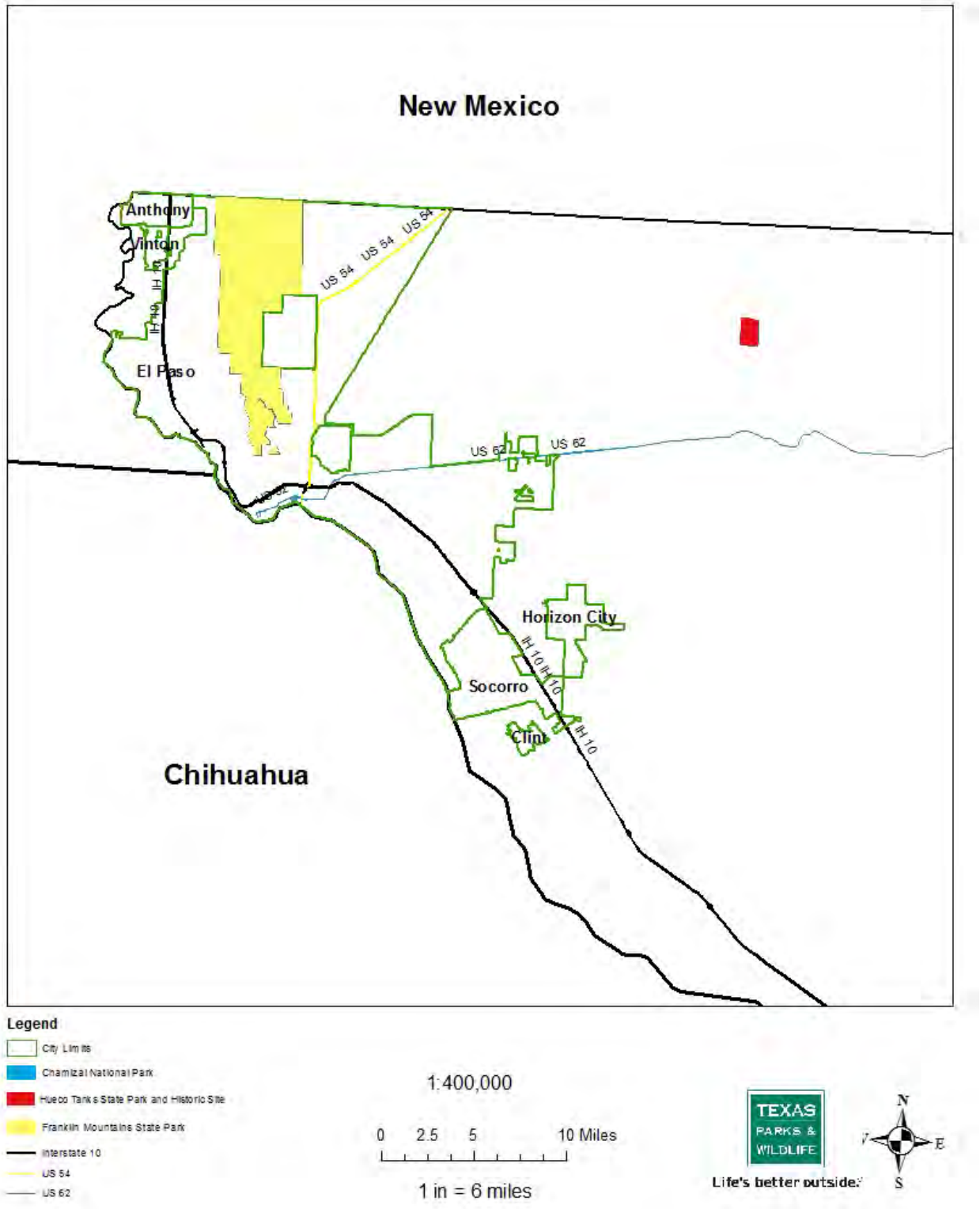
**Photo 30.** Introductions of Native American dances during the annual Interpretive Fair at Hueco Tanks.

**Photo 31**. Site staff leading a tour at Hueco Tanks. Staff and volunteers conduct a variety of tours throughout the year. Volunteers, as well as new staff, are required to take certified guide training prior to conducting tours of the site.

## List of Maps, Hueco Tanks, El Paso County, Texas

| Map Number | Description |
|---|---|
| 1 | Regional Map of the General Area of Hueco Tanks, showing Highways, Towns, and Public Property (Map by Texas Parks & Wildlife Department). |
| 2 | Map showing the Jornada Branch of the Mogollon Cultural Area within the American Southwest and Northern Mexico (Map by Texas Parks & Wildlife Department). |
| 3 | Map showing the proximity of Hueco Tanks to the Hueco Bolson and other Natural Features (from Texas Beyond History website, at http://www.texasbeyondhistory.net/hueco/setting.html; map adapted from U.S. Geological Survey). |
| 4 | GoogleEarth Map Showing Other Select Jornada Rock Imagery Site Locations. |
| 5 | USGS map of Hueco Tanks and the Surrounding Area. |
| 6 | Hueco Tanks SP & HS. Map of the Archeological Localities and Rock Imagery Sites, or Panels, at Hueco Tanks (41EP2) (Map by Texas Parks & Wildlife Department). |
| 7 | Plan Map of Excavations at Hueco Tanks Village in Locality ES1, shown on Map 6 (Map by Texas Parks & Wildlife Department). |

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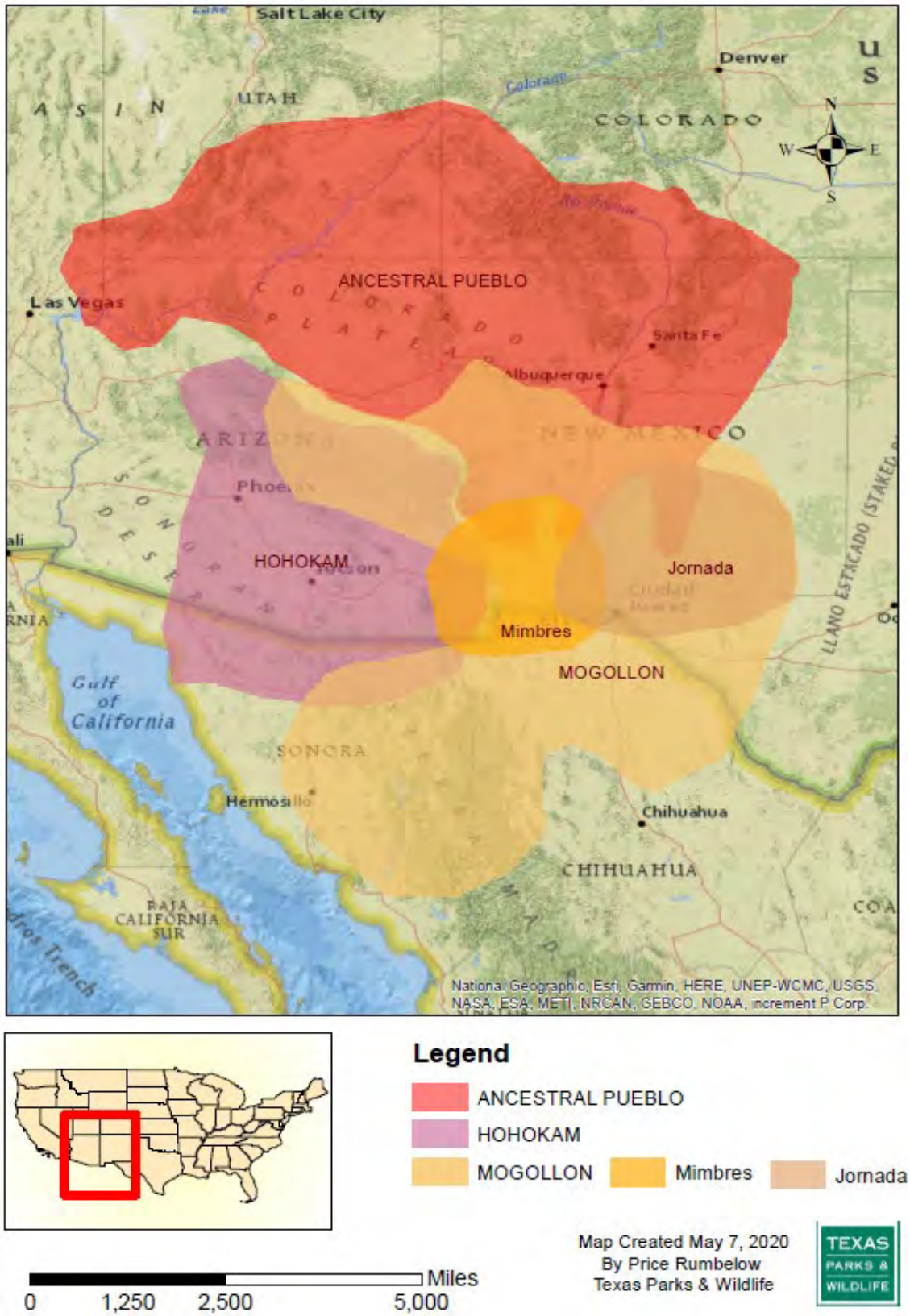
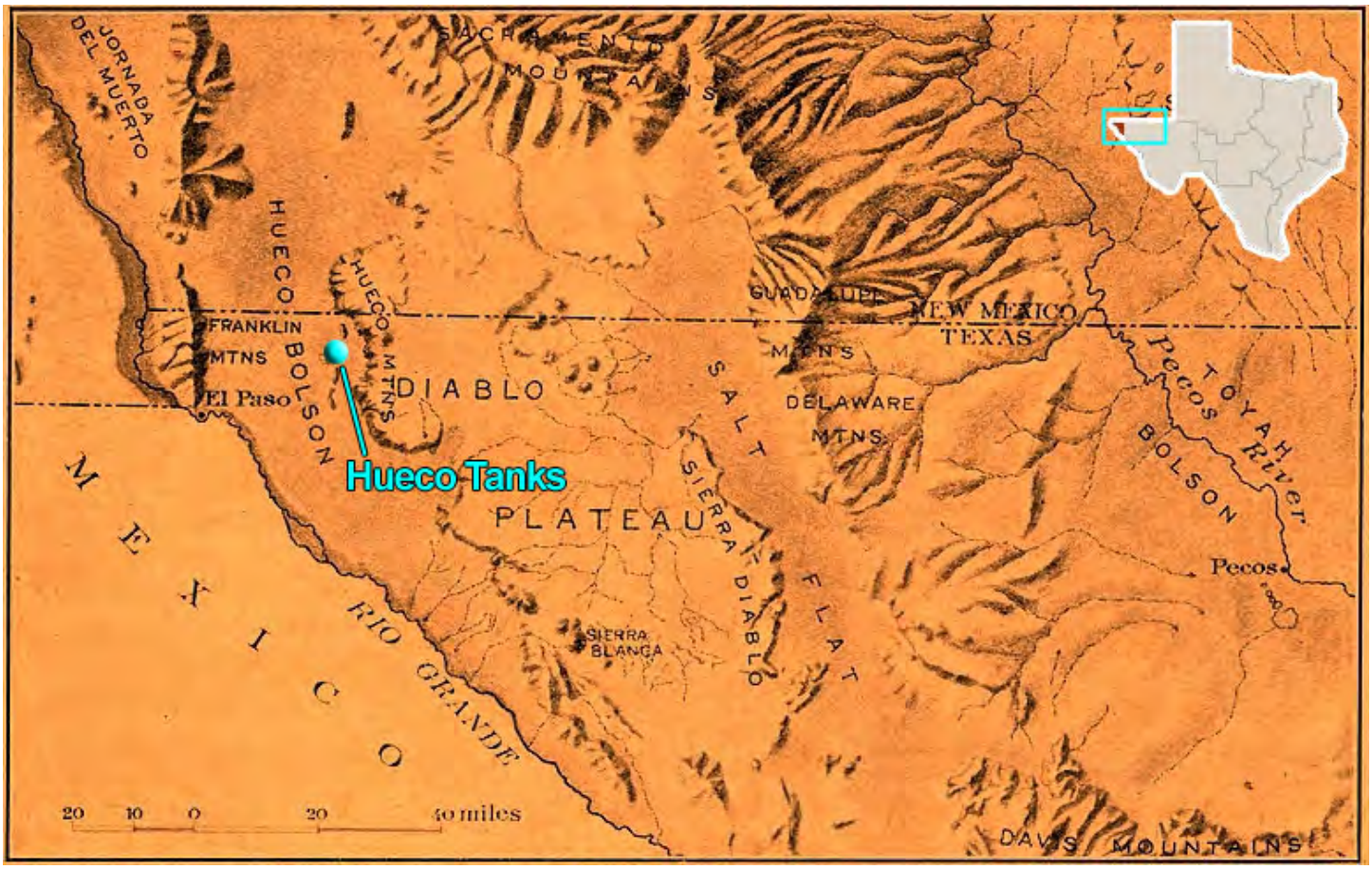



**Map 2:** Map showing the Jornada Branch of the Mogollon Cultural Area within the American Southwest and Northern Mexico (Map by Texas Parks & Wildlife Department).

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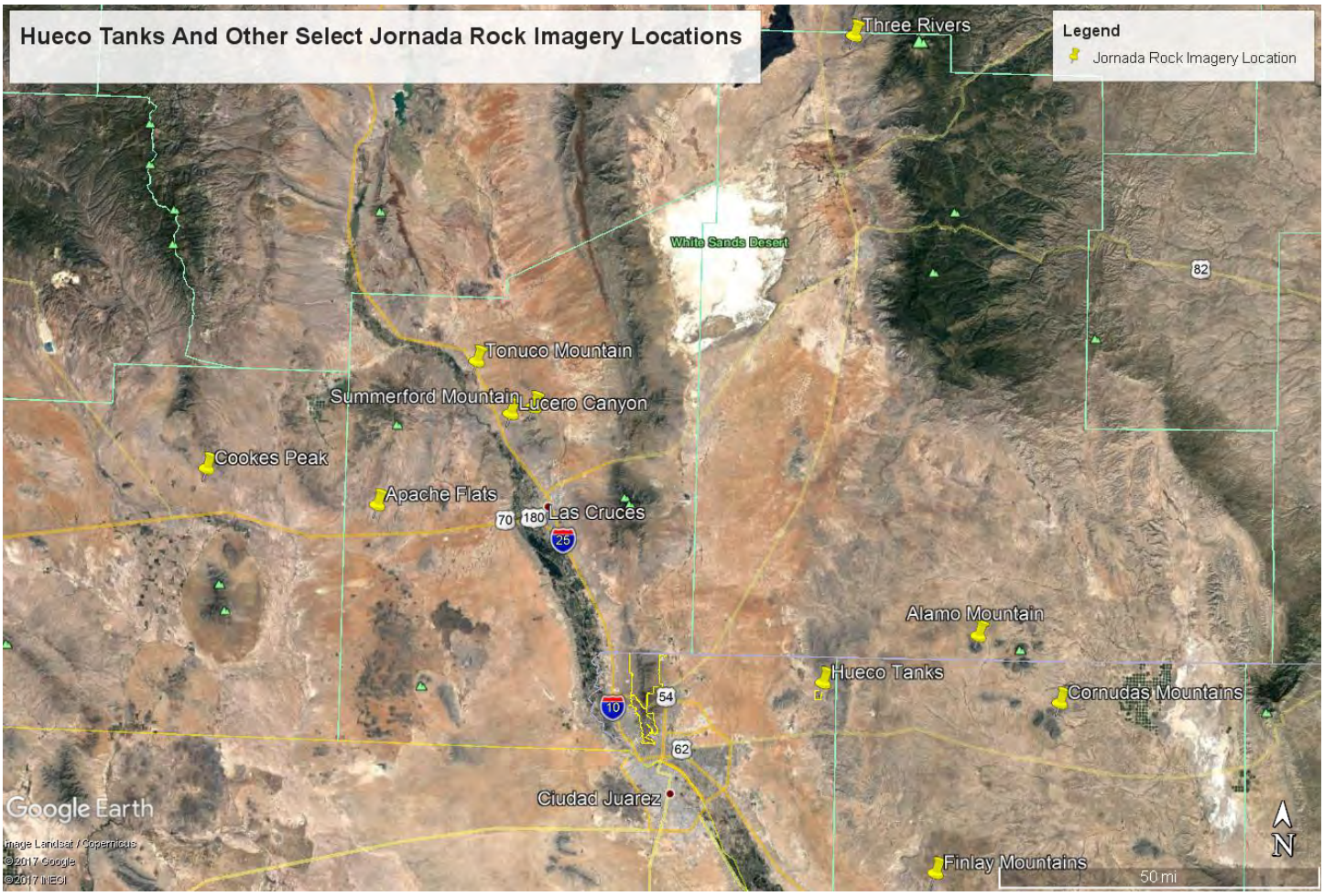
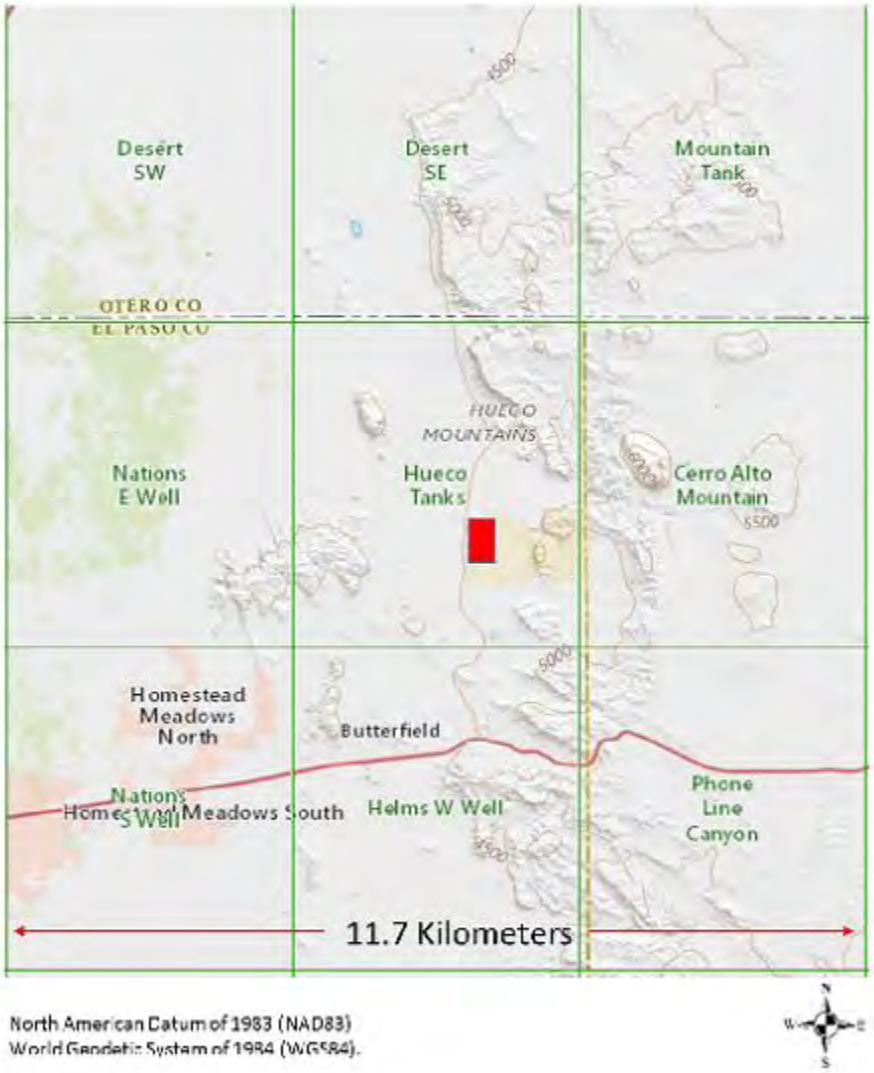



**Map 4:** GoogleEarth map showing other select Jornada rock imagery site locations.




**Map 5:** USGS map of Hueco Tanks, El Paso County, Texas.

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