Results of Testing and Data Recovery at Nine Archaeological Sites along **US 82**

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RESULTS OF TESTING AND DATA RECOVERY AT NINE ARCHAEOLOGICAL SITES ALONG US 82

Eddy County, New Mexico

Project and Control Number: 2101770

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CHAPTER 1: INTRODUCTION

The proposed US 82 road improvement project is located in southeast New Mexico in Eddy and Lea Counties (Figure 1). The study area begins at milepost (MP) 107.7 in the City of Artesia (approximately 0.5 miles east of US 285) where the highway transitions from a 4-lane section to a 2-lane section. Progressing eastward, the highway crosses the Pecos River and passes through the communities of Riverside, Loco Hills, and Maljamar before the project terminus at MP 170.3 (17th Street) in the City of Lovington. The total project length is 63 miles. Improvements to US 82 include the addition of auxiliary lanes at major intersections, the addition of travel lanes and passing lanes, shoulder widening, various drainage improvements and rehabilitation of the roadway in areas where the pavement is in poor condition.

The New Mexico Department of Transportation (NMDOT), in conjunction with the Federal Highway Administration (FHWA), is proposing roadway improvements that will cross private, Bureau of Land Management (BLM), and State Land Office (SLO) lands. The FHWA, represented by the NMDOT, is providing funding for the proposed undertaking. NMDOT reference numbers are Project and Control No. 2101770.

Because the project is federally funded and entails ground-disturbing actions, it is considered an undertaking as defined in Section 106 of the National Historic Preservation Act (NHPA, P.L. 89-665, as amended). The NHPA requires the consideration of the effects that a proposed undertaking may have on historic properties as defined under this legislation. Therefore, WSP USA (WSP), in conjunction with Parametrix (PMX), conducted a cultural resource survey of the area of potential effects (APE) for the proposed undertaking (NMCRIS No. 133503) and documented nine archaeological sites that extend into or overlap the APE.

The combined testing and data recovery effort reported on in this document (NMCRIS NO. 137092) determined the nature and extent of intact subsurface cultural deposits within the project APE. This was done in order to mitigate adverse effects to nine Laboratory of Anthropology (LA) archaeological sites: LA 15901, LA 17041, LA 83680, LA 89659, LA 104182, LA 118318, LA 120949, LA 120950, and LA 137120 along the US 82 corridor (Figures 2–4). All nine sites are located on BLM-managed land and this testing and data recovery effort was implemented under a BLM-issued Archaeological Resource Protection Act (ARPA) permit. All testing and data recovery methods and subsequent documentation adhered to applicable state and federal regulations and guidelines.

Testing and data recovery fieldwork was conducted from May 2 to July 11, 2016. Jeff Fredine served as Principal Investigator for the project; Hollis Lawrence served as Field Director; Ethan Kolasky, Greg Mastropietro, and Ryan Brucker served as Field Supervisors; and Darryl Del Frate, Jessica Alden, Steven Gilbert, and Joshua Vallejos served as Field Technicians.
Figure 1 – Project vicinity map
The public disclosure of the location of archaeological sites on state and private lands is prohibited by § 18-11.1 NMSA 1978. The public disclosure of the location of archaeological sites on federal lands is prohibited by 36 CFR 296.18.

(4 NMAC 10.15.2.J.[1])
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(4 NMAC 10.15.2.J.[1])
CHAPTER 2: ENVIRONMENTAL SETTING

The project area lies within the Southern High Plains section of the Great Plains physiographic province (Fenneman 1931), and more specifically in the Mescalero Plain, also known as the Pecos Plain or Querecho Plain (Hall and Goble 2006, 2008; Raisz 1957). A map of the depositional characteristics of the area is presented in Figure 5.

The Mescalero Plain is east of the Pecos River and west of the Llano Estacado. The Pecos River probably formed during late Tertiary and early Pleistocene times (Thomas 1972). The river and its tributaries have deposited, eroded, and redeposited alluvial sediments within the broad valley, leaving behind terraces and other now-elevated erosional remnants of river valley deposits (Fiedler and Nye 1933; Kelley 1971). Vegetation along the Pecos is characterized as a riparian woodland and shrubland. Overall, the river has been impacted by development and agriculture. Cottonwood and willow multi-layered forests would have occurred in the past, but are now almost entirely gone due to the effects of dams and diversions. Rather, today the Pecos riparian vegetation is dominated by saltcedar, common reed, and cattails (Whitehead and Flynn 2017:20).

While the Pecos River, with its riparian vegetation and alluvial sediments, represents the eastern boundary of the project area, the western boundary is marked by the Llano Estacado. One of the largest mesas in North America, the Llano Estacado is composed of plains grassland vegetation and is covered in several small playa lakes. Vegetation on the Llano Estacado is dominated by blue grama grass with perennial subshrubs such as Fendler’s bladderpod, broom snakeweed, and plains blackfoot. Soaptree yucca, tree cholla, and juniper are also present, though not as common (Whitehead and Flynn 2017:7). Gravel and sand from the Ogallala formation constitute the surface geology of the area and the Llano Estacado is separated from the Mescalero Plain by the Mescalero Escarpment, an approximately 100-ft rise of exposed sediments (Chronic 1987). This rise gives the Llano Estacado its name as it resembles a “staked” or “stockaded” plain when viewed from below the caprock.

The archaeological sites excavated within the current project area lie between these two landforms, on the Mescalero Plain. The Mescalero Plain is mostly a low, undulating landform, and about 80 percent of it is largely covered by eolian sands eroded from river valley alluvium and redeposited during Quaternary times. Much of this area consists of extensive fields of coppice dunes, but other dunal types, such as parabolic dunes stabilized by shinnery oak, also occur (Hall and Goble 2006, 2008). The coppice dunes formed beginning in the late nineteenth century through increased desertification resulting from overgrazing and groundwater overuse. Before that, the Mescalero Plain was more of a desert grassland (Whitehead and Flynn 2017:24).

The Mescalero Plain lies within a northern extension of the Chihuahuan Desert (Hall 2002:1). Natural vegetation in and around the project area consists of semiarid desert scrub and grassland. Grasses include blue and black grama, muhly, dropseed, tobosa, and alkali sacaton. In historic times, grass cover has been reduced in favor of xeric scrub species, including cholla, prickly pear, yucca, saltbush, Apache plume, mesquite, creosote bush, greasewood, tarbush, and shinnery oak. The grasslands provided native peoples of the area with seeds and other plant foods that were foraged and collected on a seasonal basis. Mesquite pods were a very important food source for prehistoric peoples, as the pods
could be dried and ground into a meal, as well as stored for consumption at any time of the year. Acorns from shinnery oak, which are low in tannic acid, may have been an especially important seasonal food source (Wiseman 2000:5), although this has not yet been well documented archaeologically. Prickly pear presented a very reliable food source for native peoples in the region and was likely exploited for both its pads and fruits. Plants were also used for various non-subsistence materials, including textiles, rope, twine, and thatch for covering dwellings. Mesquite and various shrubs also provided construction material, tool wood, and firewood, and thus were critical to the native people’s survival in this challenging landscape.

Bear Grass Draw is a landform of special note to the project area. An extensive north/south-oriented drainage on the Mescalero Plain, Bear Grass Draw is immediately west of four of the excavated sites and may have provided a reliable water source prehistorically. Today the ephemeral drainage is dry with a dense layer of grasses, fewer mesquite bushes, and a lack of coppice dunes relative to the surrounding areas on either side. However, during periods of increased moisture, the drainage may have provided a more reliable water source along with plant and animal resources commonly associated with a more riparian setting.

Among the mammals in the area are pronghorn, mule and white-tailed deer, peccary (javelina), bobcat, cottontail and jackrabbit, coyote and fox, porcupine, raccoon, skunk, badger, otter, beaver, and weasel. Smaller mammalian species include various bats, squirrels, prairie dogs, mice, rats, shrews, and pocket gophers. Introduced species include nutria and feral domestic swine. Except for bats, all mammalian species are year-round residents. Most of the mammals are nocturnal or crepuscular. Bison are absent in the project area today, but were present in the past. Archaeological evidence shows that both bison and pronghorn were intensively hunted prehistorically in southeastern New Mexico, although bison was present or numerous only at certain times during the Holocene (Dillehay 1974). Reptiles, including both snakes and lizards, along with various insects, are abundant in the area.

Paleoclimate

Paleoclimatic conditions can be inferred from various lines of evidence including pollen, macrobotanical remains, insects, packrat middens, playa-lake levels, stratigraphy and geomorphology, tree rings, and stalagmites. In his 2013 cultural overview of southeastern New Mexico (see next chapter), Railey summarizes previous investigations in order to characterize how climatic conditions have varied throughout the prehistory of southeast New Mexico. Overall, the Pleistocene Epoch (2.6-million years ago to 11,700 years ago) was a wetter and cooler climate than today; however, the general warming and drying trend that occurred throughout the subsequent Holocene Epoch was punctuated by several climatic fluctuations over the centuries (Railey 2013). From 11500–10800 B.C. the climate was cool but dryer than during the Pleistocene (Polyak et al. 2004; Cordell 1997:89) and then got gradually warmer and wetter through approximately 9800 B.C. (Cordell and McBrinn 2012:15; Polyak et al. 2004). From this period to approximately 7000 B.C. the warming trend continued but precipitation lessened (Mallouf 1981). An exceptionally dry period known as the Altithermal, where warming trends were experienced nearly worldwide, occurred between 6000 and 2500 B.C. (Antevs 1948, 1953, 1955; Haynes 1975; Johnson and Holliday 2004:290-291; Meltzer and Collins 1987). Based on evidence from Lubbock Lake in
west Texas, Johnson and Holliday (1984:44) further suggest a relatively wet interval from 3500-3000 B.C. with intensely dry periods preceding and following (4400-3500 B.C. and 3000-2500 B.C.). Post Altithermal, conditions generally got cooler and wetter and remained such until approximately A.D. 300 (Berry and Berry 1986:312-314). Generally wet conditions continued between A.D. 400-900 with an exceptionally wet period from A.D. 570-660 (Grissino-Mayer et al. 1997; Johnson and Holliday 2004:292; Polyak and Asmerom 2001). Tree-ring data reported by Grissino-Mayer et al. (1997) further notes:

- A.D. 622-725 was a highly variable period though generally dry overall
- A.D. 726-808 was a wetter than average period
- A.D. 809-885 was a dryer than average period
- A.D. 886-920 was a wetter than average period

A warming trend started around A.D. 900 culminating in severe drought from A.D. 940–1040 (Hall 1982; Wandsnider 1999:10). This occurred during what has been called the Medieval Climatic Anomaly (MCA), which dates from around A.D. 800/900 to A.D. 1350 (Railey 2013:56). After this period of drought, A.D. 1040–1120 was one of the wettest periods identified by tree-ring data. This is followed by average-to-wet conditions with various short-term droughts from A.D. 1120 through the mid-nineteenth century (Grissino-Mayer et al. 1997). However, stalactite data vary somewhat from the tree-ring data and indicate dry conditions from A.D. 1200 until a period of cooler and wetter climate called the “Little Ice Age.” The Little Ice Age lasted from the mid-sixteenth century to the mid-eighteenth century (Polyak and Asmerom 2001). As described in the next chapter, these climatic fluctuations had a great effect on the human population of southeast New Mexico as populations tended to congregate near predictable water sources during times of drought and then expand onto more marginal landscapes during wetter periods.

**Geomorphological Setting**

The geomorphology of the Mescalero Plain is pertinent to the current investigation as it has a direct effect on how archaeological sites are formed and preserved within the project area. The surface geomorphology of the Mescalero Plain area is characterized by large parabolic and coppice dunes ranging from 1 to 3 m in height. These deposits are thought to be of historic age and less than 100 years old (Hall 2002:5). The dunes overlie massive sand sheets designated by Hall (2002:3-5) as Unit 1 Eolian Sand and Unit 2 Eolian Sand. Unit 1 is older and deeper than Unit 2 and formed as sand accumulated in the area over the course of about 14,700 years between 70,000 to 90,000 years ago. It thus predates human settlement in North America. It rests on the Mescalero Paleosol, which is the distinctive carbonate-rich caliche (sometimes referred to as caliche bedrock) that can be seen exposed in various places throughout the sand sheet. In most portions of the Mescalero Plain, Unit 1 Eolian Sand is yellowish red to red (5 YR 5/8 to 2/5 YR 5/8) in color and measures between 40 and 60 cm in thickness, although in other areas it appears to have eroded immediately following deposition and may therefore be absent from the stratigraphy. A paleosol is sometimes present at the top of Unit 1 sands. This red to dark red (2.5 YR 4/8 and 2.5 YR 3/6) paleosol appears where Unit 1 sands are shallow (30 to 50 cm thick) and sometimes comprises the entirety of the Unit 1 Eolian Sand.

Unit 2 Eolian Sand overlies Unit 1 sands and accumulated over a 3,700-year period between 5,000 and 9,000 years ago. Unit 2 can measure up to 4 m in thickness in the central part of the Mescalero sand...
sheet, but is less than 1 m in thickness near the margins of the region. It is reddish yellow (5 YR 6/6) in color. In the project area, Unit 2 sands may be overlain by an A-horizon soil known as Loco Hills soil. This is a 10- to 30-cm-thick A-horizon soil and is reddish brown to reddish yellow to yellowish red (5 YR 4/4, 5 YR 6/6, and 5 YR 5/6) in color. In the field, it is typically darker in color than the underlying Unit 2 sands. Radiocarbon assays from organic matter in the Loco Hills soil indicate the A horizon developed between 500 and 100 years ago, and thus predates the overlying historic parabolic and coppice dune deposits (Hall 2002).

**Lithic Raw Material Sources**

The nine sites under investigation for this project fall within the Upper Pecos River Group. This geological group, as defined by Kremkau et al. (2013), is located east of Artesia and extends eastward to the Llano Estacado. The area likely includes residual Ogallala Formation gravels left behind as the Llano Estacado retreated eastward. These residual gravels and pebbles include chert, quartzite, sandstone, limestone, basalt, and conglomerates. Within the more immediate vicinity of the sites, cobble fields are present on the ground surface, particularly in deflated areas. Other materials such as andesite, rhyolite, and petrified wood have been identified (Kremkau et al. 2013:27). Farther to the west along the Pecos River, numerous gravel deposits are present. These include abundant siliceous materials (e.g., chert, quartzite, and jasper) originating in the Sangre de Cristo Mountains, as well as materials added via tributaries in the Capitan and Sierra Blanca Mountains. All locally available raw material for the creation of stone tools is therefore present as secondary deposits, meaning that no primary sources such as bedrock outcrops are present in the immediate vicinity of the sites, and the area lacks potential for lithic quarries. The nearest primary sources for high-quality lithic material are in San Andres Formation bedrock outcrops located west of Artesia in the foothills of the Sacramento Mountains.
The public disclosure of the location of archaeological sites on state and private lands is prohibited by § 18-11.1 NMSA 1978. The public disclosure of the location of archaeological sites on federal lands is prohibited by 36 CFR 296.18.

(*4 NMAC 10.15.2.J.[1]*)
CHAPTER 3: CULTURAL HISTORY OF SOUTHEAST NEW MEXICO

The following cultural history is largely drawn from The Human Landscape in Southeastern New Mexico: A Class I Overview of Cultural Resources within the Bureau of Land Management’s Carlsbad Field Office Region, Revised Draft (Railey 2013). Railey’s research covered the entire extent of the Carlsbad Field Office including Eddy and Lea counties as well as the southwest portion of Chaves County in southeastern New Mexico. Throughout the overview, Railey refers to four geographic regions including the Sacramento and Guadalupe mountains and foothills, the Pecos River Valley, the Mescalero Plain, and the Mescalero Escarpment/Llano Estacado (see Figures 1 and 5). As described in the preceding chapter, the current project area crosses the Pecos River Valley, the Mescalero Plain, and the Llano Estacado, with the excavated sites located on the Mescalero Plain. The Sacramento and Guadalupe mountains are outside of the project area to the west, but still provide general contextual information. Railey’s culture history is the definitive context acknowledged by the Carlsbad Field Office and provides the cultural/temporal framework used for this data recovery effort as presented below.

PALEOINDIAN TRADITION

The earliest, well-established presence of humans in southeast New Mexico dates to the Paleoindian tradition (ca. 11,500–7000 B.C.), which is customarily divided into three periods: Clovis (11,500-10,800 B.C.), Folsom (10,800-9800 B.C.), and Late Paleoindian, or Plano (9800-7000 B.C.). Paleoindian sites and components in the Jornada Mogollon region are recognized almost exclusively by diagnostic artifacts associated with each of these periods (Miller and Kenmotsu 2004:213), and chronometrically dated at camp or kill sites, including ones in eastern New Mexico and west Texas (e.g., Haynes 1992; Holliday 1997; Johnson and Holliday 1986). There are few identified Paleoindian components in this region, although there are concentrations of Paleoindian components along the Pecos River, the Mescalero Escarpment Base, and in far southeastern Lea County near what were probably pluvial lakes (Condon and Smith 2012).

The low number of Paleoindian sites in the region is probably due to a combination of low population densities, difficulty recognizing Paleoindian occupations in the absence of diagnostic projectile points, and the complete absence of Paleoindian radiocarbon dates. The lack of radiocarbon dates is probably attributable in large part to Paleoindian cooking technologies, which involved the use of direct heat, as opposed to pit baking and hot-rock cooking, which came into use during the subsequent Archaic tradition (see Thoms 2009). Baking pits created, and enhanced the preservation of, datable contexts, and the absence of these and other features that normally provide datable materials (such as storage pits, pit houses, and midden deposits; see Elston and Zeanah 2002) during the Paleoindian period is probably a large factor in the paucity of radiocarbon dates. The Paleoindian emphasis on formal, retouched tools reflects a reliable and maintainable tool kit which would have kept highly mobile hunter-foragers prepared for a variety of circumstances and encounter situations (Bleed 1986; Kelly and Todd 1988; Jennings et al. 2010). Groundstone tools were rarely, if ever, used during Paleoindian times. This absence of groundstone (along with baking pits and hot-rock cooking) reflects an emphasis on meat in the diet and a lack of exploitation of seeds and other low-ranking food resources that required extended processing prior to consumption (see Bettinger 2001).
**Clovis Period (11,500–10,800 B.C.)**

The Clovis period corresponds to the Younger Dryas, a climatic interval toward the end of the Pleistocene that was cool and dry (Cordell 1997:89; Haynes 2008; Holliday and Meltzer 2010; Polyak et al. 2004). Under these conditions, people in the region probably concentrated their camps near reliable water sources and perhaps even dug some water wells, as has been documented for this period at Blackwater Draw to the north (Haynes et al. 1999). Clovis people hunted mammoths and other Pleistocene megafauna, along with smaller animals (Cannon and Meltzer 2008; Cordell and McBrinn 2012:110). Tool assemblages include not only the distinctive Clovis fluted point, but also large flake blades, biface and blade cores, knives, scrapers, core choppers, and burins (see Collins 2007). In the southeast New Mexico region, only 15 sites in the Archaeological Records Management Section (ARMS) database have a reported Clovis component. Among the excavated sites, only LA 105244 has a reported Clovis point (Phippen et al. 2000). Burnet Cave (LA 101435), which contained the remains of now-extinct, late Pleistocene big game, also yielded what appear to be Clovis points, although Howard (1935) reported these as “Folsom-like.” Clovis people in the region probably pursued a mobile hunting-foraging way of life and likely hunted mammoths, as in surrounding regions, but direct evidence is lacking (Railey 2013).

**Folsom Period (10,800–9800 B.C.)**

During the Folsom period (10,800–9800 B.C.), the climate in the eastern Southwest and Southern Plains became both warmer and wetter (Cordell and McBrinn 2012:115; Polyak et al. 2004). The mobile hunter-forager lifeway continued. Mammoths were extinct by this time, and the focus of big-game hunting shifted to *Bison antiquus*, a larger ancestor of the present-day bison (MacDonald 1981; Meltzer 2009; Surovell 2009). Smaller animals were also hunted by Folsom and later Paleoindian groups as well (Amick 1996; Cannon and Meltzer 2004). Tool kits were more diverse than those of the Clovis period and include the diagnostic Folsom fluted points and their unfluted counterparts (called Midland points), along with knives, gravers, spokeshaves, pointed scrapers, cores (bifacial, discoidal, and informal), drills, burins, choppers, abrading stones, awls, and needles (Frison and Bradley 1980: Huckell and Judge 2006; Meltzer 2006). For southeast New Mexico, the number of Folsom components reported in the ARMS data (n = 37 Folsom/Midland components) is more than double that of Clovis components. This may reflect an increase in human populations within southeast New Mexico. Folsom point fragments are reported from two excavated sites in the area; LA 98820 (Acklen and Railey 2001) and Burnet Cave (LA 101435; Howard 1935).

**Late Paleoindian Period (9800–7000 B.C.)**

The warming trend during Folsom times continued during the subsequent Late Paleoindian or Plano period (9800–7000 B.C.), but precipitation trends reverse as drier conditions once again set in (Mallouf 1981; Monger and Buck 1995; Van Devender 1990). The fluted points of the Clovis and Folsom periods were replaced by various unfluted lanceolate styles, classified within various complexes such as Plainview, Firstview, and Cody (Cordell and McBrinn 2012:106–107). Otherwise, tool assemblages were similar to those of the previous periods. People continued to rely on hunting and foraging for their subsistence (Cannon and Meltzer 2004). Bison continued to be the main big-game prey, although *Bison*
*antiquus* was extinct by this time, with smaller bison similar to the present-day species having taken their place (MacDonald 1981). In the ARMS data, there are 26 Late Paleoindian components identified in the Carlsbad Field Office area, which are fewer than for the Folsom period, but whether this reflects demographic changes or other factors is unclear. Among the excavated sites, Late Paleoindian projectile points are reported from only LA 32229 and LA 149279, and they were also recovered from Burnet Cave, although Howard (1935) did not specifically identify them as such. A major Late Paleoindian occupation is present at the Rattlesnake Draw site, along the Mescalero Escarpment Base (Smith et al. 1966).

**Archaic Tradition**

The Archaic tradition covers a vast swath of time between the end of the Paleoindian tradition and the appearance of ceramics around A.D. 500. Archaic cultural history, classification, and chronology in the region have mostly been developed in neighboring regions (e.g., Irwin-Williams 1973, 1979; Johnson and Holliday 2004:290–292; MacNeish 1993; MacNeish and Beckett 1987; Mallouf 1985, 2005; Sayles 1983; Sayles and Antevs 1941; see also Huckell 1996:319–323; Miller and Kenmotsu 2004:218). Three Archaic periods are widely recognized in the region: Early Archaic (6000–3200 B.C.), Middle Archaic (3200–1800 B.C.), and Late Archaic (1800 B.C.–A.D. 500). However, these periods and their bracketing dates do not correspond very closely to some important changes in climate, subsistence economics, and other developments over the course of the Archaic tradition. Also, depending on which chronology is used there is a hiatus lasting anywhere from 500 to 1,000 years between the dates bracketing the end of the Paleoindian and beginning of the Archaic tradition. There is debate as to the significance of this apparent hiatus; Irwin-Williams (1979:35) argued that the hiatus reflects migration of Paleoindian hunters out of the desert Southwest to the north, with desert-adapted hunter-gatherers from the Great Basin filling in behind them.

As with the Paleoindian tradition, identification of Archaic periods at sites in the region relies primarily on diagnostic projectile points, although the advent of pit baking led to the creation and enhancement of chronometrically datable archaeological deposits. As a result, there are many radiocarbon dates for the Archaic tradition, and the identification of components does not rely as much on projectile points as it does for Paleoindian components (Railey 2013).

**Early Archaic Period (6000–3200 B.C.)**

After Paleoindian times, there was a transition from lanceolate to mostly stemmed projectile points, including the Jay and Bajada types of Irwin-Williams’ (1973, 1979) Oshara tradition, and Uvalde and other types identified in central and west Texas (Prewitt 1981; Turpin 1994:70; Weir 1976; see also Miller and Kenmotsu 2004:220). Scapers, knives, and chopping tools are common. Although Irwin-Williams (1973, 1979) reports that groundstone was lacking in the Jay phase (5500–4800 B.C.) and does not mention its occurrence in the subsequent Bajada phase (4800–3200 B.C.), milling tools are reported from Early Archaic contexts by MacNeish (1993). In west Texas and the western Jornada area hot-rock cooking and a broad-spectrum subsistence pattern were established during the Early Archaic period (Dering 1999; Mallouf 1985; Miller and Kenmotsu 2004:220–221; Turpin 1994:70). Irwin-Williams (1973:6–7) notes the appearance of cooking pits with burned rock in the Bajada phase.
The Early Archaic period falls mostly or entirely within the Altithermal, an exceptionally dry interval that apparently led to a drastic reduction of available surface water (Antevs 1948, 1953, 1955; Haynes 1975; Hester 1972; Holliday 1989; Johnson and Holliday 1986, 2004:290–291; Meltzer 1991). Whether this involved an increase in average temperatures or reduced precipitation remains unknown, but in all likelihood both factors were at play (Meltzer and Collins 1987). These conditions prevailed for a long interval beginning around 6000 B.C. and lasting until sometime between 3000 and 2000 B.C. (i.e., into the Middle Archaic period).

In southeastern New Mexico, there are few Early Archaic components compared to both the previous and subsequent periods. The earliest radiocarbon dates from cultural sites in the region fall in the Early Archaic period, but the number of dates from the region remains low throughout the time span of the Altithermal. The ARMS data report only six Early Archaic components, which is fewer than each of the three Paleoindian periods. Only one of the excavated sites, LA 149280 (Boggess 2010), has a reported projectile point (a Bajada type) that belongs exclusively to this period. These data suggest that human population levels were low throughout this time span, and that those populations were probably concentrated in areas where surface, or near-surface, water could still be found. This would include the Pecos River Corridor, but perhaps also the eastern slopes of the Sacramento and Guadalupe Mountains, where precipitation was probably higher than in the desert lowlands, just as it is today. This cannot be confirmed at present, however, given that there are no excavated and radiocarbon-dated features for the Early Archaic period in these areas. The dearth of Early Archaic materials within the Mountain Slope area may be due to a combination of low archaeological visibility, less intensive archaeological coverage than in the Mescalero Plain, and perhaps disproportionate destruction or burial of datable contexts as a result of localized geomorphic conditions. In the Pecos River Corridor, there is only one Early Archaic radiocarbon date, from LA 131882 (Gibbs 2003). Along the river, materials from this time period may be disproportionately buried, destroyed by erosion, or obscured by the remains of later occupations.

East of the Pecos River many springs, marshes, and playa lakes probably dried up during the Altithermal, leaving available water sources localized and dispersed. This may have led to intensified competition, starvation, and out-migration on an appreciable scale. At least some of those who stayed on the Llano Estacado and around its margins resorted to digging water wells near dry springs and playas, but where water could still be found just below the surface. Such wells are known from Blackwater Draw Locality 1 (Evans 1951; Green 1962; Hester 1972; Warnica 1966), Mustang Springs in west Texas (Meltzer and Collins 1987), and, in the region, Rattlesnake Draw (Smith et al. 1966). Hunter-gatherers tethered to localized and dispersed water sources tend to sacrifice foraging efficiency in favor of keeping their camps close to scarce water sources (Cane 1987; Gould 1969; Kelly 1995:126–127, 145; Taylor 1964, 1972). This includes more distant subsistence forays from camps than is typical of most hunter-gatherers, and staying at a water source until the net return from a resource’s exploitable location are reduced to near zero. Under such a scenario, we can predict that campsites (and associated facilities, such as cooking pits) will be much less ubiquitously distributed across the landscape. This situation amounts to lower odds for encountering recognizable site components and radiocarbon-datable contexts. The dearth of Early Archaic components and radiocarbon dates from the region (especially the Mescalero Plain and Mescalero Escarpment Base) may be attributable to such conditions (Railey 2013).
Some occurrences of mid-Holocene archaeological remains, however, suggest that at least some intervals during this period experienced enough precipitation that people could survive in the more marginal zones east of the Pecos. These include six recently excavated features radiocarbon dated to the Early Archaic period, two at LA 130738 in the Maroon Cliffs area (Jones et al. 2010), one at Quehada Ridge (Boggess 2009), three in the Loco Hills area near the sites discussed in this report (Simpson 2010), and one in a stratigraphically buried context at LA 155888 in the far southeastern corner of the state near Jal (Railey 2011). Johnson and Holliday (1986:44) suggested a relatively wet interval during the Altithermal at 3500–3000 B.C., bracketed by two intensely dry periods (4400–3500 B.C. and 3000–2500 B.C.).

However, the calibrated ranges for the Early Archaic dates from the region extend from 4900 to 3980 B.C., earlier than the 3500–3000 B.C. mesic interval, which actually ranges into the Middle Archaic period. This pattern suggests several possible interpretations that are not mutually exclusive. One is that at least some or all of the dates are from old wood, and that some of the actual burning events may in fact fall within 3500–3000 B.C. Another possibility is that sometime during the dates' time span there were one or more as-yet-unidentified intervals of increased precipitation that were sufficient to recharge springs and other sources of surface water in the area. If so, such conditions could have allowed people to range back out to hunt and forage on the vast desert floor east of the Pecos River. It is possible that the Early Archaic occupations associated with at least some of these dates indeed occurred under especially arid intervals, but that there were localized water sources and/or people were digging wells at some of these sites, similar to those documented on the Llano Estacado and along its margins. No wells have been discovered at these sites, however, and it seems just as likely that none were present. In the case of LA 155888, at least, the site is not situated in a place similar to those where prehistoric wells have been documented in the region. Rather than being within or adjacent to an area that held water before and after the Altithermal, LA 155888 is on high ground approximately 1 km (0.6 mile) from the nearest water course (Antelope Draw). At any rate, available paleoclimatic data for the Early Archaic period may simply lack the resolution to identify specific intervals of higher-than-average effective moisture during the Altithermal. Unfortunately, there are essentially no faunal or floral remains from dated Early Archaic contexts in the region, which might otherwise shed some light on this issue, and on the lifeways of the Early Archaic peoples who left us these features (Railey 2013).

**Middle Archaic Period (3200–1800 B.C.)**

During the Middle Archaic period, projectile point styles diversify somewhat, both within and between regions, although in general points have either contracted stems with flat, rounded, or pointed bases or expanded stems with concave bases (Miller and Kenmotsu 2004:225). A broad-spectrum subsistence economy was well-established by Middle Archaic times, including the use of low-ranking seeds and roots that require extensive processing prior to consumption. This is evidenced not only by biotic remains but also by the common occurrence of groundstone milling tools, cooking pits, and burned rock in Middle Archaic contexts (Huckell 1996:336–342; Mallouf 1985; Miller and Kenmotsu 2004:224–225). The earliest maize in the Southwest dates from near the end of the Middle Archaic time frame (Mabry 2005), although no maize or other cultigens are known for this period in or near the region.
The arid climate of the Altithermal continued into at least the early portion of the Middle Archaic period (Antevs 1948, 1953, 1955; Haynes 1975; Hester 1972; Johnson and Holliday 1986, 2004:290–291; Meltzer 1991), but conditions became wetter and cooler across the region sometime between 3000–2000 B.C. (Berry and Berry 1986:312–314; Cordell and McBrinn 2012:125; Hogan 1983, 1994; Johnson and Holliday 2004:291; Mehringer 1967; Mehringer et al. 1966; Oldfield and Schoenwetter 1975; Petersen 1981; Smith 2002; Smith and McFaul 1997; Wendlund and Bryson 1974). This led to a proliferation and resurgence of reliable sources of surface water and a widespread expansion and enrichment of the available biomass (Johnson and Holliday 2004:291). The improved climatic conditions are probably largely responsible for a dramatic increase of archaeological sites and radiocarbon dates, and a much more extensive distribution of sites across the landscape that begins in the Middle Archaic period (Berry and Berry 1986; Mallouf 1985, 2005:219; Miller and Kenmotsu 2004:223; Railey et al. 2011; Walth and Railey 2011:352–366). Sites become common in many upland areas, and desert basin floors and plains away from river corridors, which had been largely unoccupied during the Early Archaic.

In the region, it is not precisely known when the post-Altithermal climatic trend kicked in, and what effect these conditions had on late Middle Archaic populations. San Jose projectile points, the clearest diagnostic artifact for the Middle Archaic period, are reported from at least six of the excavated sites in the Carlsbad Field Office area, which is more than the numbers of excavated sites with diagnostic points for any of the previous periods. Radiocarbon dates span the Middle Archaic period after 2900 B.C., and these include the earliest dates from burned-rock middens in the Mountain Slope area. But the frequency of dates remains low throughout this period, and there is no conspicuous increase in dates for the region during Middle Archaic times. At present, the data suggest some increase in population levels from the Early to Middle Archaic periods, but the evidence is weak and population levels apparently remained low throughout Middle Archaic times (Railey 2013).

**Late Archaic Period (1800 B.C.–A.D. 500)**

This period witnessed a continuation and intensification of trends set in motion following the end of the Pleistocene and, in many respects, marks a major turning point in the prehistory of the Southwest and Southern Plains. Diagnostic projectile points are mostly expanded stem forms with varying blade shapes that may or may not have strong shoulders (e.g., Miller and Kenmotsu 2004), although other styles are found as well, including bifurcated base and straight-stem forms (Mallouf 2005:226). Maize-based subsistence becomes widespread throughout the Southwest as an addition to the broad-spectrum hunting-gathering subsistence economy (Cordell and McBrinn 2012:136–149; Huckell 1996:343–349).

There was pre-ceramic maize in portions of the Jornada Mogollon region (e.g., Campbell and Railey 2008; Tagg 1996; Upham et al. 1987; Wills and Huckell 1994:42), but thus far there is no clear evidence of Late Archaic farming in the region or adjacent portions of west Texas. A proliferation of pit houses, bell-shaped pits, and sites with middens and abundant artifacts, suggests reduced mobility under increasing population densities (Huckell 1996:343–349), but again these trends are not well established at present in the region. In fact, there are currently no discernible structure remains or storage pits known for the Late Archaic period in the region, rich midden deposits are rare or absent, and the vast majority of features consists of hearths, roasting pits, and burned-rock middens, the latter mostly west of the Pecos River. In other words, the archaeological evidence strongly suggests a continuation of
highly mobile, hunter-gatherer lifeways across at least most of southeast New Mexico during Late Archaic times.

Among the supporting evidence for this inference is a comparative analysis of the lithic assemblage from LA 143755, a stratigraphically sealed Late Archaic occupation in the far southeastern corner of the state near Jal, with three other late pre-ceramic assemblages from elsewhere in New Mexico (Railey 2011:344–361). The results of this analysis suggested the occupants of LA 143755 were probably residentially mobile hunter-gatherers, as opposed to more sedentary or logistically mobile groups which were represented at the sites investigated. This finding appears to be symptomatic of the differences between far southeastern New Mexico and many other parts of the Southwest during the last millennium of the Late Archaic time frame, the primary difference being that a highly mobile lifeway persisted in southeast New Mexico throughout the Late Archaic.

Despite the continuation of a highly mobile, hunter-gatherer lifeway, there were some important changes and developments in the Late Archaic period of the region. The favorable climatic trend that began during Middle Archaic times continued into the Late Archaic period, with the cooler and wetter conditions resulting in increased biomass and proliferation of new water sources across the landscape (cf., Berry and Berry 1986:312–314; Cordell and McBrinn 2012:125; Hogan 1983, 1994; Johnson and Holliday 2004:291; Mehringer 1967; Mehringer et al. 1966; Oldfield and Schoenwetter 1975; Petersen 1981; Polyak and Asmerom 2001; Smith 2002; Smith and McFaul 1997; Wendlund and Bryson 1974). The vast plains east of the Pecos River were probably too dry for intensive and efficient foraging during the Early Archaic and most of the Middle Archaic period, but by Late Archaic times hunter-gatherers in the region were beginning to fully realize the potential of the landscape’s enriched resource abundance. The widespread occurrence of freshwater mussel shell at many sites across the landscape suggests the possibility that aquatic habitats occurred along many now-dry drainages in the region, most of which were probably also dry during the Altithermal. The favorable climate and enhanced biomass that continued into Late Archaic times included an enrichment of grassland habitats, which apparently resulted in increased numbers of bison and a new round of bison hunting over a broad region. Bison hunting is documented for the Late Archaic period over a wide area, including the Albuquerque Basin (Hibben 1992; Higgins and Lundquist 2004; Walth and Railey 2011), the San Jon site at the northern edge of the Llano Estacado, the Texas Panhandle (Lintz et al. 1991; Quigg 1997), and the southeast New Mexico region (Railey 2011; Wiseman 2003a, 2003b).

Archaeological evidence suggests the improved climatic conditions of Late Archaic times had two important effects within the region:

1) a sharp population increase, and
2) new foraging opportunities for hunter-gatherers that allowed for more ubiquitous use of the landscape through residential mobility.

Several lines of data suggest a sharp population increase across the region by Late Archaic times. The number of Late Archaic components identified in the ARMS “Temporal Phase” data table for the region jumps to 132, nearly eight times the number of Middle Archaic components. A similar increase is evident among projectile points from the excavated sites, with a dramatic increase over earlier periods. True,
the Late Archaic covers a longer time span than any of the earlier periods, but even correcting for these differences there is still a substantial increase in the numbers of recognizable components.

Another indicator of population growth is the sharply increased frequency of radiocarbon dates for the Late Archaic period relative to earlier times. The number of radiocarbon dates increases within the Mountain Slope, Pecos River Valley, and Mescalero Plain portions of the Carlsbad Field Office area. In the Mountain Slope area, there is a prominent spike in dates around 800 B.C. This is caused in part by variation in the ranges of calibrated dates, but also suggests an intensified use of burned rock-middens, which contribute most of the dates within this spike (Railey 2013).

The dramatic increase in Late Archaic components and radiocarbon dates also indicates intensified and more ubiquitous exploitation of the landscape. This is part of a broad pattern across the Southwest and Southern Plains, in which people expanded into all ecological zones, including once-marginal ones such as uplands and intermountain desert basins (Berry and Berry 1986; Mallouf 1985, 2005:219; Miller and Kenmotsu 2004:226; Railey et al. 2011; Walth and Railey 2011:352–366). Similarly, in the region not only do site components, dates, and diagnostic artifacts increase sharply at this time, but they are also distributed widely across the landscape, including the Mescalero Plain. In terms of hunter-gatherer mobility and subsistence, these patterns are probably the result of the improved climatic conditions, population growth, and changes in mobility. Assuming the improved climatic conditions led to a rise in groundwater levels and resurgence of springs, wet meadows, and other reliable sources of surface water, then it follows that local hunter-gatherers (especially those in the Mescalero Plain) were no longer “tethered” to scarce and dispersed water sources. The more common availability of surface water and increased resource abundance across the landscape meant that hunter-gatherers could now forage more efficiently, moving their camps more frequently around the landscape.

This strategy would have decreased the distance and time involved in daily foraging trips, translating into a greater return of caloric intake per unit of energy expended (cf. Kelly 1995:111–148). Archaeologically this would result in higher numbers of and a wider distribution of preserved camp remains (such as artifact scatters and cooking pits) relative to previous time periods. This would be due to a reduced need for logistical base camps near reliable water sources, and an increased use of smaller camps as groups moved across the landscape to access and exploit various resources. This is precisely what we see for the Late Archaic period in the region, especially on the Mescalero Plain.

Population growth would also have affected mobility and foraging behavior among Late Archaic hunter-gatherers in the region. Both theoretical models and empirical evidence suggests that the basic, closely-knit group size among highly mobile hunter-gatherers averages 25 persons, or five to six nuclear families (Birdsell 1968; Braun 1991; Johnson 1982; Johnson and Earle 1987:19, 320; Kelly 1995:210–213; Williams 1981). Larger aggregations of mobile hunter-gatherers, at varying scales, occurred seasonally and/or periodically for specific subsistence, social, or ceremonial reasons (see Hamilton et al. 2007; Johnson and Earle 1987:28–61; Kelly 1995:213–221), but the 25-person average basic group size is fairly constant cross-culturally (and serves as a basic building block of larger, more complex societies [Johnson 1982]). Accordingly, as populations increased, and the basic group size remained unchanged, an expected outcome would be that hunter-gatherers joined into larger numbers of groups. With a larger number of
groups competing for the same resources, foraging territories would decrease in size (Kelly 1995:151–152). This condition, in turn, could have led to several potential outcomes:

1) more intensive foraging within shrinking territories, potentially involving use of an even broader spectrum of low-ranking food resources and decreased energetic efficiency;
2) the use of maize and farming into the subsistence economy, to increase the carrying capacity of a group’s territory;
3) an expansion of social networks to help even out fluctuating disparities in resource productivity between group territories, which archaeologically might be signaled by the appearance of ornaments and prestige goods of exotic materials;
4) intensified territoriality, including symbolic representation of group territorial claims;
5) inter-group conflict as competition over available resources intensified.

For the Late Archaic period in the region, the record is at best mixed with respect to these indicators of population growth and packing. The sharp increase in site components, and the more ubiquitous spatial distribution of Late Archaic components relative to earlier periods, is consistent with more intensive and extensive foraging and use of the landscape under conditions of population growth. West of the Pecos River, more intensive use of lower-ranking food resources is suggested by the sharp increase in the number of dated burned-rock middens (Jones et al. 2010; cf. Dering 1999). However, despite the identification of maize residues and microfloral remains in Late Archaic contexts in the region (e.g., Yost and Cummings 2011), there is no clear evidence at present that farming was added to the subsistence economy anywhere in the region during the Late Archaic period. Given recent discoveries in the Sierra Blanca highlands northeast of the region (Campbell and Railey 2008), it would not be surprising if archaeologists eventually find evidence of maize-based farming in the Mountain Slope area, but there is no evidence at the present time. In fact, with the exception of burned-rock midden sites there is little direct evidence of plant use for subsistence.

Likewise, across most of the region there is little or no evidence for intensified, extra-local exchange (i.e., items of exotic materials), territoriality, and conflict for the Late Archaic period. There is, however, one exception to this widespread pattern, presenting a possible indicator of intensified territoriality and expanded social networks during the Late Archaic, and that is the site of Punto de los Muertos (LA 116471) (Wiseman 2003a, 2003b). Located on a prominent bluff edge along the Pecos River just outside Carlsbad, this important site was badly looted prior to formal excavation. It consisted of some sort of stone structure built from tons of the local limestone and contained the remains of several burials with grave goods and very little domestic debris. A series of radiocarbon dates indicate Punto de los Muertos was built and used during the Late Archaic period, with a series of dates ranging widely within the interval 1500 B.C.–A.D. 500. Although its precise structural character and function remain unknown, the considerable effort that went into the construction (and presumably maintenance) of this facility underscores its importance as a symbolic monument on the landscape.

The fact that Punto de los Muertos lies along the Pecos River is very likely no accident. Regardless of prevailing climatic conditions, lands along the Pecos River were probably among the hottest of properties throughout the span of human occupation in the region. To the extent that this is true, then we should expect some of the earliest evidence of territoriality to occur along the river corridor. The
formation of territorially based descent groups is one potential outcome of these conditions. Such groups may be conceived as autonomous corporate units within a modular society lacking the centralized authority mechanisms of complex chiefdoms (Renfrew 1976). The spatial relationships of territories may be structured by relative social and genetic proximity between groups. In this circumstance, there tends to be a strong symbolic identity between lineage and territory, and the critical resources within those territories.

Such claims are sometimes validated by the construction of monuments containing the remains of deceased ancestors. Lineal ties to dead ancestors may assume a crucial role in efforts to legitimize claims of restricted access to critical resources (Campbell 1959:125–129; Charles 1985; Charles and Buikstra 1983; Goldstein 1976; Hodder 1982:104; Saxe 1970; Saxe and Gall 1977). Formal mortuaries thus become particularly instrumental as territorial markers, since they provide a sanctified, spatially fixed locus for the disposal and treatment of dead ancestors. Moreover, to the extent that such facilities assume monumental proportions they also serve as prominent symbols of a group’s territorial claims.

Such a scenario may help explain the unusual site of Punto de los Muertos, and if so then it was probably a territorial marker for a local group of hunter-gatherers, symbolizing their claims to critical, and spatially restricted, resources along the Pecos River. Punto de los Muertos is a rare example of what appears to have been a formal mortuary facility, and as such is unique in the region. Similar sites have been documented in the vicinity of Abilene, Texas (Railey 2013).

Periodic reductions in effective precipitation, and associated reduction in water sources and resource abundance, would have exacerbated many of the challenging conditions normally associated with population growth. The climate record in southeastern New Mexico is unclear as to the potential for episodic droughts during the Late Archaic period, but this may be simply due to a lack of data and poor temporal resolution for climatic trends at this time. Some researchers have noted a downturn in effective precipitation levels for some parts of the Southwest during the early to mid-first millennium B.C. (e.g., Antevs 1955; Hogan 1983, 1994), although stalagmite data indicate that this same interval was exceptionally wet in the Carlsbad Caverns area (Polyak and Asmerom 2001).

The stalagmite record indicates another spike in effective moisture around A.D. 1 (Polyak and Asmerom 2001). By A.D. 300, however, a period of severe drought is evidenced in both north-central New Mexico (Grissino-Mayer 1995), and in the Carlsbad Caverns area. The stalagmite data also indicate a drier interval at A.D. 300–700, albeit one that was still slightly wetter than present (Polyak and Asmerom 2001). By this time a pattern of more closely spaced cycles of dry and wet intervals set in across a broad region (Grissino-Mayer 1995; Grissino-Mayer et al. 1997; Johnson and Holliday 2004:292). With populations having already expanded during the mostly favorable, post-Altithermal climatic regime, the impact of drought conditions on hunter-gatherers across the region must have been especially severe, forcing some changes in foraging behavior, mobility, and territoriality.

**FORMATIVE TRADITION**

“Formative” is a term commonly applied by archaeologists to the ceramic periods of the Jornada Mogollon region (Miller and Kenmotsu 2004:236–237). The well-dated sequence of sites in the Hondo Valley, northwest of the project area, suggests that ceramics appeared there around A.D. 500 (Campbell
and Railey 2008), and this date is used here for the beginning of the Formative tradition. The addition of ceramics to the inventory of artifacts provides a tremendous advantage in recognizing Formative period site components and providing more precise dating, as compared to pre-ceramic or aceramic sites. As diagnostic artifacts, ceramics also enhance temporal resolution and age estimates of site components. In part because of the dating advantages offered by ceramics, for southeastern New Mexico a variety of phase sequences have been proposed for the Formative period.

However, many of the purported trends separating the phases in these various sequences are not very well established. As such, Railey organizes his overview of the Formative tradition into two periods: Early (ca. A.D. 500–1100) and Late Formative (ca. A.D. 1100–1450), with the appearance of Chupadero Black-on-white, Three Rivers wares, and El Paso painted wares being the most prominent markers separating the two (Railey 2013). See Table 1 for a summary of the chronologies and assemblage characteristics. Phase divisions within these periods can certainly be suggested, based in part on the appearance of certain key marker traits, such as early black-on-white ceramics toward the end of the Early Formative, and a variety of distinctive glaze ware and polychromes after ca. A.D. 1300. But the development of well-established phase sequences will depend on excavation data from more sites with securely dated, single-component contexts. In the southeast New Mexico region, the early centuries of the Formative time frame witnessed little change in subsistence and mobility from the Late Archaic. Significant changes did occur in the Late Formative period however. It is generally thought that two distinct subsistence regimes co-existed in southeastern New Mexico—highly mobile hunter-gatherers and more sedentary horticulturalists—although much of the evidence for this and other Late Formative developments are inferred from surrounding regions. Further research is needed to clarify the specifics of these cultural developments in far southeastern New Mexico.

**Early Formative Period (A.D. 500–1100)**

Two prominent changes in artifact assemblages mark the beginning of the Early Formative period. One is the appearance of ceramics, which in the beginning consist of undecorated brown wares. These are variously classified according to paste characteristics as Jornada Brown, McKenzie Brown, Middle Pecos Micaceous Brown, South Pecos Brown, and Alma Plain (D. Hill 1996, 2000, 2001; Hogan 2006; Jelinek 1967; Katz and Katz 1985a, 1993, 2001a; Kelley 1984; Leslie 1979; Mera 1943; Reed et al. 2002:550–551; Runyan and Hedrick 1987; Whalen 1981; Wilson 2000a, 2000b, 2003; Wiseman 1996, 2002), and all persist well into the Late Formative period. Early black-on-white ceramics (e.g., Cebolleta, Red Mesa, and Mimbres) appear in the region after ca. A.D. 750 (Katz and Katz 1993), but do not occur at all sites in the later centuries of the Early Formative, and undecorated brown wares continue to dominate ceramic assemblages throughout the period.

The second change is the introduction of the bow and arrow is inferred from a sharp reduction in the size of projectile points, which occurs across most of sub-boreal North America around A.D. 500–600, (Bettinger and Eerkens 1999; Bettinger and Taylor 1974; Blitz 1988:130–132; Cordell 1979:134; Guernsey 1931:71–72, 99, 107; Huckell 1998; Justice 2002:44; Lipe 1978:369; Nassaney and Pyle 1999; Railey 2010; Seeman 1992; Shott 1993; Torres 2000:227; VanPool 2006:433; Yerkes and Pecora 1991). In the Southwest and Southern Plains, the earliest arrow points are strongly shouldered, corner-notched or stemmed forms. At the series of sites in the Sierra Blanca highlands (Campbell and Railey 2008; Railey
Table 1 – Formative Period and Post-Formative Chronologies and Assemblage Characteristics in Southeastern New Mexico
(Adapted from Railey 2013)

<table>
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<tbody>
<tr>
<td>&gt;1750</td>
<td>Historic/ Post-Formative</td>
<td>[none]</td>
<td>Post-Ochoa</td>
<td>Historic</td>
<td>[none]</td>
<td>Absent or poorly known</td>
<td></td>
</tr>
<tr>
<td>1725-1750</td>
<td>Historic/Post-Formative</td>
<td>[none]</td>
<td></td>
<td>Ethnohistoric 2</td>
<td>[none]</td>
<td>Absent or poorly known</td>
<td></td>
</tr>
<tr>
<td>1600-1725</td>
<td>Historic/Post-Formative</td>
<td>[none]</td>
<td></td>
<td>Ethnohistoric 1</td>
<td>[none]</td>
<td>Absent or poorly known</td>
<td></td>
</tr>
<tr>
<td>1525-1600</td>
<td>Historic/Post-Formative</td>
<td>[none]</td>
<td></td>
<td></td>
<td>[none]</td>
<td>Absent or poorly known</td>
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<tr>
<td>1500-1525</td>
<td>Historic/Post-Formative</td>
<td>[none]</td>
<td></td>
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<td>[none]</td>
<td>Absent or poorly known</td>
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<tr>
<td>1450-1500</td>
<td>Historic/Post-Formative</td>
<td>[none]</td>
<td></td>
<td></td>
<td>[none]</td>
<td>Absent or poorly known</td>
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<tr>
<td>1375-1450</td>
<td>Historic/Post-Formative</td>
<td>[none]</td>
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<td></td>
<td>[none]</td>
<td>Absent or poorly known</td>
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<tr>
<td>1350-1375</td>
<td>Late Formative</td>
<td>Ochoa</td>
<td>Ochoa</td>
<td>Formative 7</td>
<td>Oriental</td>
<td>Variety of painted wares appears, including Lincoln Black-on-red, Rio Grande Glaze wares, White Mountain red wares, and Mexican polychromes; Ochoa Indented, Corona Corrugated</td>
<td>Side-notched, weak shoulders</td>
</tr>
<tr>
<td>1300-1350</td>
<td>Late Formative</td>
<td>transitional</td>
<td></td>
<td>Formative 6</td>
<td></td>
<td>Chupadero Black-on-white and Three Rivers wares appear, followed by El Paso painted wares; the latter becomes very common and continue until ca. A.D. 1450</td>
<td>Side-notched, strong shoulders</td>
</tr>
<tr>
<td>1200-1300</td>
<td>Late Formative</td>
<td>Maljamar</td>
<td>Maljamar</td>
<td>Formative 5</td>
<td></td>
<td>Non-local, black-on-white wares appear (Cebolleta, Mimbres)</td>
<td></td>
</tr>
<tr>
<td>1125-1200</td>
<td>Late Formative</td>
<td>Maljamar</td>
<td>Maljamar</td>
<td>Formative 4</td>
<td>[none]</td>
<td>Undecorated brown wares</td>
<td></td>
</tr>
<tr>
<td>1100-1125</td>
<td>Late Formative</td>
<td>Querecho</td>
<td>Querecho</td>
<td>Formative 3</td>
<td>Late Globe</td>
<td>Undecorated brown wares</td>
<td></td>
</tr>
<tr>
<td>1075-1100</td>
<td>Late Formative</td>
<td>Querecho</td>
<td>Querecho</td>
<td>Formative 2</td>
<td>Middle Globe</td>
<td>Undecorated brown wares</td>
<td></td>
</tr>
<tr>
<td>950-1075</td>
<td>Late Formative</td>
<td>Querecho</td>
<td>Querecho</td>
<td>Formative 1</td>
<td>Early Globe</td>
<td>Undecorated brown wares</td>
<td></td>
</tr>
<tr>
<td>750-950</td>
<td>Early Formative</td>
<td>Hueco (Late Archaic)</td>
<td>Hueco (Late Archaic)</td>
<td>Formative 2</td>
<td>Middle Globe</td>
<td>Undecorated brown wares</td>
<td></td>
</tr>
<tr>
<td>500-750</td>
<td>Early Formative</td>
<td>Hueco (Late Archaic)</td>
<td>Hueco (Late Archaic)</td>
<td>Formative 1</td>
<td>Early Globe</td>
<td>Undecorated brown wares</td>
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2010), the earliest arrow points have shouldered, recurved blades similar to the Bonham and Homan types in northeast Texas (Turner and Hester 1993:202, 219). These point types are quickly followed by straight-bladed points with tanged shoulders and corner notching. The latter forms, similar to the Scallorn type of the Plains (Turner and Hester 1993:230) and the Trujillo and Dolores types in northern New Mexico (Justice 2002; Turnbow 1997:202–205) persist throughout the remainder of the Early Formative period and continue into the early portion of the Late Formative. Except for the addition of ceramics and arrow points, Early Formative artifact assemblages remain similar to those of the Late Archaic, with a variety of flaked stone tools and groundstone milling implements which stay much same throughout the Formative on the Mescalero Plain.

Other aspects of the Early Formative archaeological record also persist from Late Archaic times. There is still a notable lack of preserved house remains; the few dating from the Early Formative period in the region come from just four sites (Jones et al. 2010; Railey 2011; Zamora 2000), and their characteristics suggest rather expedient, wickiup-like brush huts set in shallow excavated basins. The lack of evidence for substantially constructed houses prior to the Late Formative suggests people across at least most of the region did not invest heavily in residential architecture, and this is typical of highly mobile hunter-gatherers (Binford 1990; Kelly 1995:139–140). The abundance of thermal features suggests a continued heavy emphasis on plant foods, although as with the Late Archaic, direct subsistence evidence is rather sparse for the Early Formative periods. Botanical remains of various wild plants, including cheno-ams, wild barley, and others are common occurrences (e.g., Acklen and Railey 2001; Brown 2011; Condon et al. 2008; Lord and Reynolds 1985; Railey 2011; Simpson 2004), along with succulents processed in burned-rock middens in the western portion of the region (Jones et al. 2010). Like the Late Archaic period, potential evidence of maize cultivation in the Early Formative is provided by microfloral and residue identifications (Brown and Brown 2011; Condon et al. 2008). Unlike the Late Archaic, in the southeast New Mexico region there is one instance of charred maize associated with a radiocarbon date for the Early Formative, at a site in the Guadalupe Mountains (Kemrer 1998). Otherwise, at present there is a complete lack of domesticates in macrobotanical assemblages in securely dated, pre-Late Formative contexts. This indicates that farming was not an important part of the subsistence economy (or was not practiced at all) across most of the region during Early Formative times. This stands in contrast to the Hondo Valley, on the eastern slope of the Sierra Blanca highlands, where the well-dated sequence of sites included evidence of intensive, maize-based farming and substantial storage by the latter portion of the Late Archaic period and throughout the Early Formative (Campbell and Railey 2008).

Present evidence suggests a considerable difference in subsistence patterns and associated lifeways between people living in the upper valleys of the Sacramento (and perhaps Guadalupe) Mountains, and the Early Formative people of the Pecos River Corridor and open plains in far southeastern New Mexico.

Bison hunting, which had experienced a widespread resurgence during Late Archaic times, declined or disappeared on the Southern Plains around the beginning of the Early Formative period (Dillehay 1974).

In the Mescalero Plain and Pecos River Corridor, the dramatic increase in the frequency of radiocarbon dates, which began toward the end of the Late Archaic period, peaks in the seventh and eight centuries A.D. This peak is partially attributable to variation within the radiocarbon-calibration curve, but the magnitude of the peak almost certainly reflects continued population growth, and extensive land use,
into the Early Formative period. If so, then many of the processes and trends discussed above for the Late Archaic period are also relevant to the first few centuries of the Early Formative. In other words, population growth and extensive use of the landscape through high residential mobility, persists through this time. Insofar as this is true, effective precipitation levels must have remained sufficiently high to sustain, at least periodically, the post-Altithermal enriched resource abundance and water sources. Paleoclimatic evidence is somewhat mixed on this point, but tree-ring, stalagmite, and other lines of evidence suggest that comparatively wet conditions occurred during at least portions of the Early Formative period prior to A.D. 900 (Grissino-Mayer et al. 1997; Johnson and Holliday 2004:292; Polyak and Asmerom 2001). This includes the wettest interval in the southern New Mexico tree-ring sequence at A.D. 800–808 (Grissino-Mayer et al. 1997), and a distinctly wetter period in the stalagmite data at A.D. 750–900 (Polyak and Asmerom 2001). This is followed by an extensive period of drought from approximately A.D. 900–1000 (Hall 1982; Wandsnider 1999:10).

This slightly post-dates the radiocarbon-frequency peak, but if there is an old-wood effect on the radiocarbon dates (see Baker et al. 2008; Dello-Russo 1999:48-59; Geib 2008; Schiffer 1986; Smiley and Ahlstrom 1998), then the actual peak of population levels and ubiquitous landscape use occurred sometime after the radiocarbon frequency peak. It is tempting to suggest that the combined demographic/extensive land use peak occurred during the apparently favorable climatic conditions of the ninth century, but a careful study of the old-wood effect would have to occur before this can be determined with certainty. While the frequency of radiocarbon dates skyrockets in the Pecos River Valley, Mescalero Plain, and Llano Estacado toward the end of the Late Archaic period and into the Early Formative, over the same period there is a drop in radiocarbon dates in the Mountain Slope area. This pattern is interesting but difficult to explain. Whether it denotes a real trend or a sample bias is unknown. If it does mark a real trend, then it may indicate a temporary de-emphasis on the use of burned-rock midden sites (which have produced most of the Mountain-Slope dates) at this time west of the Pecos River.

The spike in radiocarbon dates in the Mescalero Plain is followed by a plunge in the number of dates for the later centuries of the Early Formative. Similarly, the frequency of dates in the Pecos River Valley also declines during this time, although not as abruptly as in the Mescalero Plain. This pattern is consistent with the paleoclimatic data which show severe drought conditions setting in around A.D. 900 and lasting for about a century. This downturn in precipitation levels no doubt had equally drastic effects on the region’s mobile hunter-gatherers, especially those with foraging territories in the Mescalero Plain. It is very likely that the region’s biomass plummeted, and many water sources dried up. Under these deteriorating conditions, hunter-gatherers in the Mescalero Plain would no longer be able to maintain their use of the landscape and foraging efficiency. Given what we know about ethnographic hunter-gatherers in desert environments (see Kelly 1995), the deteriorating conditions potentially had three effects on the regions human populations at this time:

1) reduced fertility and/or increased mortality, resulting in a reduction of the region’s human population;
2) reduced residential mobility as hunter-gatherers once again became “tethered” to fewer and more dispersed water sources; and
3) migration of hunter-gatherers to better-watered areas outside the Mescalero Plain, such as the Mescalero Escarpment Base, Pecos River Corridor, and Mountain Slope area.

Whether population levels fell is an open question, but the archaeological evidence does strongly indicate much less extensive foraging across the Mescalero Plain and migration to the other areas. With drastically reduced foraging and residential mobility, there were far fewer campsites established across the desert lowlands. This translates into a much lower frequency of cooking pits and other contexts with chronometrically datable materials. This is consistent with the sharp reduction in radiocarbon dates in the Mescalero Plain following the frequency spike in the first centuries of the Early Formative. Over the same period, however, there is prominent rise in the number of dates (most of which are associated with burned-rock middens) in the Mountain Slope area, which spikes at the end of the Early Formative period. In the Pecos River Corridor, the frequency drop is not as dramatic as that in the Mescalero Plain, and along the river there is also a second spike in dates at the end of the Early Formative, which coincides with one in the Mountain Slope area. Along the Mescalero Escarpment Base there is also a slight increase in the number of dates toward the end of Early Formative, but the number of dates from this area is so small that the frequency changes for this area may not be meaningful. Taken together, the data suggest that people responded to the drastic climatic change at ca. A.D. 900 by withdrawing to areas where reliable sources of surface water could still be found, which includes the Pecos River and, apparently, playas, areas below escarpment edges (most notably along the base of the Mescalero Escarpment, where freshwater springs were probably accessible), and in the Mountain Slope area. In the latter area, most of the dates are from burned-rock middens, so the numbers may also indicate an upswing in the use of this method of cooking at these sites and exploitation of the low-rank, high-cost food resources processed at them (see Derig 1999). Although precipitation levels apparently increased again toward the end of the Early Formative, the response to the period of severe drought may have helped prompt some fundamental changes in cultural adaptations that took hold during the subsequent Late Formative period (Railey 2013).

**Late Formative Period (A.D. 1100–1450)**

The Late Formative period indeed witnessed some of the most profound changes in the prehistory of the region. In terms of artifacts, the most prominent temporal indices of this period are a variety of distinct and well-dated, decorated ceramic types. Chupadero Black-on-White and El Paso painted wares (bichrome and early polychromes, and later just El Paso polychrome) present by the beginning of this period, eventually edge out undecorated brown wares. Further they persist as common types throughout the Late Formative time frame (Miller and Kenmotsu 2004:252–253; Speth and Newlander 2012; Wilson 2000b). Three Rivers Red-on-Terracotta is another distinctive type that appears in the region around the beginning of the Late Formative period, but is less common than the Chupadero and El Paso painted wares (Runyan and Hedrick 1987). Chupadero wares were manufactured in the Sierra Blanca highlands (Clark 2006; Creel et al. 2002; Reed et al. 2002). Also from this region is Corona Corrugated, a utilitarian ware that appears around or soon after A.D. 1200 (Kelley 1984; Wiseman 2002). St. Johns Polychrome also appears at about this same time (Miller 1995; Runyan and Hedrick 1987). After A.D. 1300, exotic ceramic types from a variety of areas in the Southwest arrive in southeastern New Mexico, including Rio Grande glaze wares, Lincoln Black-on-red from the Sierra Blanca highlands,
Ramos Polychrome from the Casas Grandes area, and Gila Polychrome from the Salado region (Katz and Katz 1993; Miller 1995). Another post-A.D. 1300 ceramic type is Ochoa Indented, a Southern Plains type that appears to be restricted to areas east of the Pecos River (Katz and Katz 1993).

Also occurring in the Late Formative period is a widely documented shift in arrow point morphology during the thirteenth century. The earlier, corner-notched arrow point styles with strong shoulders are replaced by side-notched arrow points with wide, squared, or concave bases. These late forms are usually referred to as Harrell, Desert Side-notched, Washita, or Pueblo Side-notched (Justice 2002; Speth 2004; Turnbow 1997; Turner and Hester 1993). Unnotched triangular points are rare in the Southwest but do occur in the Plains (and are especially common in eastern North America) and spill over in small numbers into southeastern New Mexico. In Texas these are usually referred to as Fresno points and their reported time span (ca. A.D. 800–1700) is not as restricted as those for the other arrow point types discussed above. There is evidence to suggest that these unnotched triangular points are actually preforms that were intended to be finished and notched, and they were widely transported as they were less fragile and susceptible to breakage than finished points (cf. Chesier and Kelly 2006; Dawe 1987).

By A.D. 1300, if not earlier, substantially occupied “villages” were established across much of the region, from the Mountain Slope area in the west to near the Texas state line in the east. This was part of a widespread pattern of greater sedentism and village formation across the southeastern Great Plains and Jornada Mogollon region in the early to mid-second millennium A.D. (Brooks 2004; Campbell 1976; Collins 1966, 1968; Drass 1998; Drass and Flynn 1990; Jelinek 1967; Kalasz et al. 1999:195–198; Kelley 1984; Lintz 1984, 1986, 1991; Lutes 1959; Miller and Kenmotsu 2004; Speth 2004, 2005; Speth and Newlander 2012; Wendorf 1960; Wiseman 1981, 2002; Zamora and Oakes 2000).

Late Formative village sites tend to occur in areas where springs, precipitation runoff, or playa lakes offered reliable sources of surface water, and at least limited riparian environments and associated resources. The base of the Mescalero Escarpment was an especially favored zone for these sites, but they also occur near playas (such as Laguna Plata and San Simon Sink), and below more localized escarpments such as the Maroon Cliffs. In the Mountain Slope area, at least the larger river valleys appear to have hosted intensively occupied residential sites, judging from the early discoveries at Peñasco Bend and nearby sites (Jennings 1940). Similar sites have yet to be clearly documented along the Pecos River Corridor, and this includes a recent survey as part of the Permian Basin Mitigation Program that covered two parcels along the river (McCormack et al. 2010). Although this data gap may be the result of a sampling, discovery, or preservation bias, it remains unknown whether Late Formative “village” sites indeed occurred along the river. While none have yet been documented it would seem the river corridor would have been among the most likely zones for such sites to occur.

Excavations at some Late Formative sites in the region have yielded remains of house structures. These range from the rather shallow pit houses at Laguna Plata to what appear to have been much more substantial structures at several sites. At least one of the rooms excavated by Jennings (1940) at Peñasco Bend had four interior support posts arranged in a square around a central, collared hearth. This configuration is common to special-purpose rooms within room blocks of the El Paso phase of the western Jornada Mogollon region (e.g., Railey et al. 2002:142–143). At the Merchant site, Leslie (1970:25) reported several pit houses and what appear to be room blocks, including an exceptionally
large pit house. He also reported a large, deep pit house at Monument Spring (Leslie 1968:80–81). LMAS (2001) reported several room blocks at sites near Merchant and Monument Spring. The size and character of these structures suggests some might have served a ritual function rather than a domestic function. Given that the room blocks are reported from poorly controlled excavations and survey data only, their correct identification may be in doubt. Regardless, the appearance of substantial structures across such a broad region, and the possibility that some of the larger structures may have served a ceremonial or communal function, marks a significant shift in settlement patterns and sociopolitical organizations in the region during Late Formative times (Railey 2013).

These Late Formative developments correspond to climatic conditions that fluctuated frequently between wet periods and drought (Grissino-Mayer et al. 1997; Johnson and Holliday 2004:292; Polyak and Asmerom 2001). This almost certainly signals a continuation of the changes in settlement patterns and land use that occurred after the severe drought that set in around A.D. 900 (see above), with a shift toward reduced mobility, less extensive use of the landscape, and concentration of the region’s human population into fewer sites. Whether the data also evidence a reduced regional population is another question, but for the moment it can be suggested that the changes in settlement patterns and land use alone can account for the drop in radiocarbon dates—perhaps even in the face of regional population growth. But regional demographic trends remain unknown at this time, and further, more systematic research would be needed to better explore this issue. But at any rate, the appearance of intensively occupied “village” sites signals a profound change in lifeways and social organization, and the continued drop in radiocarbon dates across the region indicates that the previous pattern of broad-spectrum, hunting and gathering based on high residential mobility and ubiquitous exploitation of the landscape, was never re-established in the region. Instead, more sedentary villagers “dug in” at locations where water remained available through both wet and dry periods.

To what extent these developments were, or were not, supported by maize-based farming is still unknown. In the Mountain Slope area, maize-based farming certainly appears to have been important at Peñasco Bend, where Jennings (1940) reported an abundance of maize, along with charred mesquite beans. Further to the east, macrobotanical remains of maize have been only sporadically reported, including a charred maize cob from surveys at Indian Hill (Hunt 1989). The Lea County Archaeological Society (LCAS) did not report maize from their early excavations at Late Formative sites in the eastern part of the region, although the excavations were not geared toward recovery of plant remains (Railey 2013). Still, no maize macrobotanical remains were recovered during TRC’s recent excavations at Laguna Plata (LA 5148) (Brown 2010) or Boot Hill (LA 32229) (Brown 2011). Maize microbotanical materials and residues are more commonly reported for likely or confirmed Late Formative contexts from recent excavations in both the Pecos River Corridor and Mescalero Plain (e.g., Boggess 2010; Brown 2011; Condon et al. 2008), but the absence of associated macrobotanical maize at these same sites leaves the significance of these findings in doubt (Railey 2013).

The closest comparative evidence we have concerning the role of maize in Late Formative subsistence economies of southeastern New Mexico comes from two settlements west of Roswell: Henderson and Bloom Mound (Kelley 1984; Speth 2004, 2005). For these sites, the evidence points to farming as a modest contributor to the diet, with little or no evidence of significant intensification. The findings include small
numbers of recovered maize remains; ubiquity and abundance of wild seeds; carbon isotope values indicating modest overall intake of C4 plants; low incidence of [dental] caries; small numbers of metates, mostly basin-shaped; and wholly unstandardized one- and two-hand manos (Speth and LeDuc 2007:46).

Another important subsistence trend that Late Formative village inhabitants pursued was an increased emphasis on bison hunting across southeastern New Mexico and elsewhere in the southern Plains after circa A.D. 1250 (Baugh 1986; Bozell 1995; Brooks 2004; Collins 1968, 1971; Creel 1991; Dillehay 1974; Drass and Flynn 1990; Greer 1976; Hughes 1989; Jelinek 1967; Speth 1979, 1983, 1984, 2004; Speth and Parry 1978, 1980; Spielmann 1991; Staley 1996). At some point during the Formative time frame, people on the Plains began killing bison beyond what was required for their own subsistence and other resource needs. These surplus resources were then traded for hides, dried meat, and perhaps other products to the more settled farmers to the west (Creel 1991; Speth 2004, 2005; Speth and Newlander 2012; Spielmann 1991). Creel (1991) argues that this regional exchange system was underway around A.D. 1300, with the key archaeological indicators being the appearance in the southern Plains of numerous beveled knives and endscrapers that were used to process bison hides.

Whether Late Formative “villagers” in the region were involved in this regional interaction sphere is not completely understood. Speth (1984:11) reports large quantities of bison bone in the LCAS’s backdirt piles at the Merchant site, suggesting at least some “villagers” in far southeastern New Mexico were probably associated with the regional trade system. Laguna Plata is the only site in far southeastern New Mexico where the percentage of bison remains has been reported. There, however, bison accounted for only 3.4 percent of the animal bone fragments identifiable to at least the level of genus, whereas rabbits were the most numerous at 64.3 percent, followed by pronghorn at 19.1 percent (Gray 1977). This contrasts with the Henderson site, which was occupied between ca. A.D. 1250 and 1400, and from which the most detailed faunal analysis in all of southeastern New Mexico was conducted (Speth 2004). At Henderson, rabbit still made up the majority of mammal bones, followed by pronghorn, but bison bones were nearly as numerous as pronghorn and comprised nearly a quarter of all mammal remains found at the site. Considering the differences in potential meat yield between rabbits, pronghorn, and bison, the contribution of bison to the diet of the Henderson Pueblo occupants was obviously substantial. Whether the percentage disparity in bison bones between Laguna Plata and Henderson is a real reflection of difference in reliance on bison is unclear.

It is possible that the much lower percentage of bison bones in the Laguna Plata assemblage is due to sampling biases stemming from the location of excavations. At both Henderson and Laguna Plata, bison kills apparently occurred at some distance from these sites, as the skeletal elements in faunal assemblages from both sites indicate that only choice parts were transported back to the home village (Gray 1977; Speth 2004). At Henderson, the selective culling of bison parts appears to have increased in the late phase of the site’s occupation (early to middle fourteenth century). This corresponds to other evidence suggesting an increased reliance on bison by the site’s inhabitants at this time, with more logistical hunts focused on herds that were roaming farther from the village than was the case in the early (middle to late thirteenth century) phase.

Speth (2004, 2005) paints a speculative, but plausible scenario to account for increased bison hunting and processing. According to this scenario, it was not only environmental conditions that favored an
increase in bison hunting beginning in the late thirteenth century, it was also a response to the abandonment of the Four Corners region by A.D. 1300. This abandonment caused a huge influx of people into the Rio Grande valley of central and northern New Mexico (Cordell and McBrinn 2012:268-270; Jones et al. 2010:148), where large pueblos (some containing more than 1,000 rooms) were constructed in the Classic period (A.D. 1300–1600). Depletion of game and other resources in the vicinity of these mega-villages may have encouraged Pueblo peoples to establish symbiotic trading arrangements with Plains groups, with bison meat and products flowing from the Plains to the Pueblos, and maize, pottery, obsidian, turquoise, marine shell, and other items going in the opposite direction.

At Henderson, this region-wide process apparently prompted the site’s inhabitants to focus increasingly on bison hunting, and the site’s occupants themselves (or perhaps only some of them) may have become full-time, nomadic bison hunters following the abandonment of the site (Speth 2004:426; 2005; Speth and Newlander 2012). At the same time, there was an apparent reduced focus on bison hunting at the nearby (and slightly later) Bloom Mound, coupled with the substantial increase in exotic items relative to Henderson. This may signal that the occupants of this site were less focused on bison hunting and instead served as middlemen between the Pueblo world to the west and the nomadic hunters to the east (Speth 2004; 2005; Speth and Newlander 2012). Also, changes in projectile point raw materials suggest that Bloom Mound hunters did not venture as far to the east as did their predecessors at Henderson (Speth and Newlander 2012). Long-distance mobility may have been curtailed as a result of increasing competition and specialization among nomadic bison hunters out on the plains, some of whom may have been the very assailants that massacred the victims found at Bloom Mound (Speth and Newlander 2012).

As far southeastern New Mexico, at present there is mostly indirect evidence concerning the role of Late Formative peoples in the Pueblo-Plains interaction sphere. Creel (1991:41) reports that this exchange system extended all the way down to present-day Chihuahua. Occasional bison remains also appear in Late Formative sites in the western Jornada Mogollon (Miller and Kenmotsu 2004:250), and it seems likely that bison hides (which would not show up in the faunal record) were probably traded to the people of the El Paso phase (A.D. 1250/1300–1450). Late Formative villagers in far southeastern New Mexico would have been well-positioned as the most likely suppliers of bison products to the western Jornada Mogollon and settled groups further to the south. But it still remains an open question whether and to what extent Late Formative villagers in far southeastern New Mexico developed an export economy fueled by bison products. Further research is needed to elucidate the details pertaining to this question (Railey 2013).

**POST-FORMATIVE NATIVE AMERICANS**

The Post-Formative period begins with the widespread abandonment of late prehistoric villages in the southern Plains around A.D. 1450, as groups throughout the region shifted to a more nomadic lifeway focused on bison hunting (Baugh 1986; Bozell 1995; Brooks 2004; Collins 1968, 1971; Creel 1991; Dillehay 1974; Drass and Flynn 1990; Greer 1976; Hughes 1989; Jelinek 1967; Speth 1979, 1983, 1984, 2004; Speth and Parry 1978, 1980; Spielmann 1991). Archaeologically, this period is difficult to identify as ceramics are either absent in the region at this time or consist of undiagnostic style types (Katz and Katz 1993). Side-notched arrow points, similar to those that appeared after A.D. 1200 (see above), continued into this period to an unknown date and were eventually replaced by metal arrow points and
firearms. One critical item for late Pueblo peoples was the bison-hide shield, which became important and widespread following the advent of the recurved bow in the region around A.D. 1300 (see LeBlanc 1999; Speth 2004:425).

As part of the shift to nomadism during post-Formative times, it is reasonable to expect that tipis became a more common dwelling form. Seymour (2002, 2004; LMAS 2001) has identified tipi rings in both the western Jornada Mogollon and far southeastern New Mexico. She argues that tipi rings in the region are very late in time, postdating other types of structures, and even concludes that at least some are late nineteenth century Apache or Comanche dwellings. While such conclusions lack supporting evidence, tipi rings do date back several thousand years on the Plains, and it is entirely possible that at least some tipi rings in southern New Mexico predate the post-Formative time frame (Railey 2013).

The extent to which the abandonment of southern Plains villages resulted from the economic opportunities of Pueblo-Plains interaction, and/or other factors is unknown.

1) Did people on the southern Plains give up village life and farming (to whatever extent that farming was practiced) due to a downturn in environmental conditions?
2) Did they decide that a more intensive focus on nomadic bison hunting—in exchange for maize, beans, squash and other cultivated foods—simply made more sense economically?
3) Was it some combination of both?

Regardless, by A.D. 1500 or earlier, people on the southern Plains had given up village life with its mixed focus on farming and bison hunting, and became nomadic, tipi-dwelling bison hunters. This probably occurred at least in part due to increased demand from pueblos for bison products and other resources from the southern Plains (such as Alibates and Edwards chert). As discussed below, during historic times along the western edges of the Plains, the Jumano, Apache, Comanche, and Hispanic ciboleros successively filled the role of mobile hunters who supplied the pueblo and Spanish villagers of the Southwest with meat and other bison products. To the north, the pueblo sites of Henderson and Bloom Mound, near Roswell (Speth 2004, 2005), were abandoned by the late fifteenth century, and Speth (2004:426, 2005; see also Speth and Newlander 2012) suggests their occupants may have decided on a fully nomadic lifeway based on bison hunting.

Railey 2013 identifies that the extent to which inhabitants of the region made the same adaptive move is an unknown. The excavation of a single bison kill at LA 22107, in the Permian Basin study area, produced radiocarbon dates ranging from A.D. 1445 to 1625, indicating a likely protohistoric or early historic age (Staley 1996). Along with dates from the Garnsey Bison Kill site (Speth 1979, 1983; Speth and Parry 1978, 1980) to the north, it is apparent that people in southeastern New Mexico continued to hunt bison following the abandonment of Late Formative villages. However, it is unknown if bison hunting was as productive at this time in the region as in the neighboring southern High Plains. If not, then the continued drop in the number of radiocarbon dates into the Post-Formative and historic time frame could be due to people moving out of the region to better bison-hunting areas.

If the former villagers dispersed across the study area’s landscape rather than emigrating out, then the continued decline in the frequency of radiocarbon dates during the post-Formative may relate to subsistence patterns. During the Late Archaic and Early Formative periods, high mobility and extensive
land use resulted in an abundance of thermal features and a high number of radiocarbon dates. Elsewhere, Railey et al. (2011:215–221) suggest one reason for this could be that low-ranking, high-cost plant foods were no longer exploited after the Early Formative period, or at least not to the extent that they were earlier and not through extensive foraging accomplished through high residential mobility.

In the post-Formative time frame, carbohydrate needs among the inhabitants of far southeastern New Mexico—which previously were supplied by seeds and roots from wild plants, and possibly home-grown maize—may have been satisfied by maize imported from the pueblo villages to the northwest. The closest of these would have been the Salinas Pueblos just north of the Jornada Mogollon region. However, this speculative scenario requires additional research (Railey 2013).

One additional characteristic of post-Formative occupations in southern New Mexico is the increased use of obsidian from sources in northern Chihuahua and southwestern New Mexico (Kenmotsu et al. 2009:92). This trend was also noted in the Middle Pecos River valley (just north of the region) by Jelinek (1967). Within the region, however, Jemez Mountain obsidians are also found in apparent protohistoric contexts, although the source of these could also be Rio Grande gravels in the western Jornada Mogollon region (Stein 2011).

The above culture history is a summary human behavioral adaptation in southeast New Mexico from the Paleoindian period to the Post-Formative period. It informs the research questions addressed in this report and provides the cultural/temporal framework used for this data recovery effort. As mentioned above, this chapter is composed of information presented in The Human Landscape in Southeastern New Mexico: A Class I Overview of Cultural Resources Within the Bureau of Land Management’s Carlsbad Field Office Region, Revised Draft (Railey 2013), as this is the definitive culture history context acknowledged by the Carlsbad Field Office.
CHAPTER 4: RESEARCH DESIGN

This chapter presents the theoretical approach, research issues, and fundamental data requirements that guided the archaeological investigations. The General Theoretical Orientation establishes the fundamental assumptions about human culture and the topics of interest to the research.

GENERAL THEORETICAL ORIENTATION

Ideally, archaeological research is driven by a theoretical orientation from which specific research questions follow. These questions in turn help to focus the collection, processing, analysis and interpretation of data relevant to one or more guiding themes. In this way, more specific issues or questions to which the affected cultural resources are potentially relevant can be identified. Given the diversity of cultural resources that are captured in a data recovery project, an ideal theoretical orientation would be one that is broad and general enough to encompass the types of evidence involved. From this general orientation, more specific research questions focused on the project area and problem domains relating to its particular cultural resources can be formulated.

The current project conducted archaeological investigations at nine sites with known prehistoric occupations thought to date from the Archaic (6000 B.C. to A.D. 500) and Formative (A.D. 500 to 1450) Traditions. All nine sites (LA 15901, LA 17041, LA 83680, LA 89659, LA 104182, LA 118318, LA 120949, LA 120950, and LA 137120) have been determined eligible to the National Register of Historic Places (NRHP) by the New Mexico State Historic Preservation Officer (SHPO) or Bureau of Land Management-Carlsbad Field Office (BLM-CFO). These previous determinations indicate that each of the nine sites is likely to contribute important information to our understanding of the prehistory of southeastern New Mexico.

The theoretical orientation for interpretation of the project data is a blended evolutionary/cultural ecological approach. Darwinian evolutionary theory will provide the overall framework for interpretation of the human ecological data gathered—including archaeological data—with the assumption that culture is the human niche.

Evolutionary theory provides a general framework for understanding the differential persistence of variation in biological populations. Evaluation of a system within a Darwinian framework requires three critical properties: variation exists between the units under analysis, differential persistence of one unit over others occurs over time, and traits composing the units of analysis are heritable. Lewontin (1970) and a host of others (e.g., Boyd and Richerson 1985; Cavalli-Sforza and Feldman 1973, 1981; Dunnell 1980, 1989; Leonard and Jones 1987) have argued that evolution occurs when these conditions are satisfied, regardless of whether the mode of inheritance is through the transmission of genetic or cultural information. Extending evolutionary theory to cultural evolution is based on the premise that natural selection acts upon behavioral, or phenotypic, traits as well as morphological traits. The application of Darwinian evolutionary theory to archaeology is based upon these premises, and the further assumption that artifacts and other aspects of material culture are part of the human phenotype (Dunnell 1989; Leonard and Jones 1987).

The following research program is aimed at gathering data that can form the basic building blocks (e.g., cultural affiliation, occupational history, etc.) for posing evolutionary questions about the selective
environment, or ecological niche, of the Mescalero Plain and its inhabitants, through time and at varying scales. The research is not intended to answer these questions, but rather to begin to gather the fundamental data needed to do so. These basic archaeological data, as well as information regarding the physical environment of the sites, can then be combined to provide an understanding of the broad human ecological context that shaped the technological evolution and history of the region and its prehistoric peoples.

The idea that culture constitutes the human ecological niche is not new in archaeology (e.g., Hardesty 1972); however, recent work by Odling-Smee and others (Day, et al. 2003; Odling-Smee et al. 2003; Smith 2007; Sterelny 2006) related to niche construction theory has provided greater rigor for application of the concept to archaeology and other disciplines related to the study of human behavior. Niche construction theory posits that organisms construct and modify their local environments, and that these changes are passed along to descendants, a process known as ecological inheritance (Day, et al. 2003; Odling-Smee et al. 2003).

Implicit in niche construction models is the concept that niche construction modifies the selective environment, and that ecological inheritance is a transmission process that is distinct from cultural and biological (genetic) transmission. Evolutionary archaeologists have proposed using the concept of niche construction to provide a more-robust “triple-inheritance” model of evolution that adds ecological inheritance to the previous “dual-inheritance” evolutionary model (Boyd and Richerson 1985) that incorporated genetic and cultural inheritance. Reide (2008) for example, argues that incorporating the concept of niche construction and ecological inheritance to evolutionary theory adds “an ecological dimension without relinquishing Darwinian rigor” (Reide 2008:188).

These Darwinian concepts alone may not be sufficient to bridge the gap between the archaeological record, specific human behaviors, and basic Darwinian assumptions about human culture and the decision-making process. However, processual and behavioral archaeology can provide links between behavior and the archaeological record, and also suggest scientific methods appropriate for collecting the necessary data and analyzing it (e.g., statistics). Processualists view culture as an integrative adaptive system and believe human behaviors can be understood as universally recurring natural responses (Arnold 2003). As a result, they rely heavily on systems theory and the creation of universal laws of behavior developed through the use of analogy and hypothesis testing. Based on universal laws, a set of expectations could be established for archaeological phenomena relating to specific behaviors, with the archaeological record serving as a test of specific hypotheses.

When appropriate, this project will also undertake a culture-historical approach. This approach posits that similarities and differences in material culture correspond to similarities and differences in ethnicity, and assumes that major ethnic groups correspond to specific material cultural cores. Such cores are assumed to have been static prehistorically. As a result, specific ethnic groups can be traced archaeologically (Trigger 1989). In essence, this approach involves the classification and sequencing of ethnic groups through time. While there are concerns with associating material culture with ethnicity, this approach remains a central element of cultural resource management in the American Southwest. As such, it is still a useful organizational concept for contributing to the body of archaeological research in southeastern New Mexico and throughout the Southwest.
Theoretically-driven research aims are often difficult to explore given the common financial and sampling constraints presented by cultural resource management (CRM) context. While such constraints are often prohibitive, there are several research themes that may be pursued in the current project area, given the nature of the resources within the APE. These themes are described below as research domains with specific research questions being stated for each.

**Research Domains**

To render archaeology and history pertinent to professionals and society there is an obvious desire to generate research questions that will inspire interest and insight on how local sites reflect the interaction between, and among the evolution of natural and cultural forces. This is particularly important where many of the fundamental parameters of several of the archaeological features at the site remain unknown, such as presence or absence of subsurface deposits at features, the range of artifact types present, etc. Fundamental questions such as those described in the following research domains will guide much of the early investigations, and the answers to them will inform us about additional research questions that further investigations may elucidate. The research domains described below include Chronology and Cultural Affiliation, Chronology and Occupational History, Site/Feature Function, Subsistence, Mobility and Interregional Interaction, and Post-Depositional Effects on Thermal Features.

**Research Domain 1: Chronology and Cultural Affiliation**

Chronological classification of prehistoric sites in southeastern New Mexico is notoriously challenging at the survey level because many sites in the region do not have temporally diagnostic artifacts or features, and may fail to fit neatly into cultural-evolutionary stages, such as the “Archaic” and “Formative”. These periods have been defined by suites of traits that commonly co-occur in other areas, but may not do so consistently across the Mescalero Plain. Moreover, in southeastern New Mexico, Archaic-style projectile points (usually interpreted to be dart points) persist into the Ceramic period; but some of these forms appear to become more common again in the Protohistoric period, making it difficult to draw a clear line between the Archaic, the Formative, and the Protohistoric periods (Hurt 2006). In addition, Archaic lifeways continue into the Formative period and the presence of multiple components at individual sites is common (Okun 2011:24).

These blurred lines have caused taxonomic difficulties for archaeologists attempting to establish cultural-historical sequences for the Jornada Mogollon and the eastern extension of the Jornada Mogollon. For example, “Formative” sites in the Southwest are generally associated with a sedentary cultural adaptation and some researchers label Ceramic-period sites on the Mescalero Plain as Formative despite the lack of evidence for sedentary agricultural villages, while others argue that Ceramic sites with dart points should be classified as Archaic. Further confounding this problem is the difficulty in choosing which typological sequence for projectile points is appropriate for the region. Sebastian and Larralde (1989:42) also note that southeastern New Mexico geographically falls in an area between several Archaic traditions, including the Cochise tradition of southwestern New Mexico, the Archaic of central and Trans-Pecos Texas, and similar manifestations in northern Chihuahua—with
additional researchers asserting that affiliations fluctuate among the groups through time (Bond 1979; Jelinek 1967; Laumbach and Beckett 1980).

Leslie (1978) developed a projectile point typology specific to the eastern extension of the Jornada Mogollon. This typology is limited by the fact that few absolute dates were available for Archaic sites in southeastern New Mexico when the typology was developed. As a result, researchers must rely on a combination of typologies, picking and choosing those they believe are most appropriate for a given place and time in the region, including typologies pertaining to the Archaic occupation of Texas (e.g., Turner and Hester 1993; Justice 2002). Jelinek (1967) also produced a point typology for the general area as a result of his work in the Middle Pecos region. However, none of the diagnostic projectile points identified during the survey of the project area closely matched the suite of defined morphological attributes for any of the various categories within Jelinek’s sequence.

Classification of projectile points and other diagnostic artifacts such as ceramic sherds can provide relative dating for some sites. Attribute-level analyses of flaked-stone debitage and tools, groundstone tools, ceramics, and features can address additional research domains, as well as the problem of chronological classification of sites lacking diagnostic artifacts. However, the most accurate source for establishing a site chronology is through absolute dating.

**Research Question 1: What are the temporal and cultural affiliations of the sites identified during survey?**

Related research questions include:

- Is there evidence for multiple temporal or cultural affiliations?
- Is there evidence for Archaic or Paleoindian occupation?
- Can narrower occupation dates be established?
- How do sites in the project area fit into broader cultural patterns for the Archaic, Formative, or other cultural affiliations (if found)?

**Data Considerations and Needs**

Basic research themes related to chronology and cultural affiliation have long been hampered in southeastern New Mexico by the relative dearth of excavation data and radiocarbon dates. Therefore, chronology building is consistently identified as a top research need in this region (See Miller 1996).

Radiometric samples (i.e., charcoal/carbonized plant remains) from thermal features, a feature type that occurs throughout most of the span of human occupation across the Mescalero Plain, offer an opportunity to establish dates of occupation while examining the established, albeit tenuous, projectile point typologies for the area. It is important to note, however, that these features rarely contain diagnostic artifacts making typological extrapolations to associated artifacts exclusively inferential. Nonetheless, it is necessary to link diagnostic artifacts to radiometric dates, as these samples will provide a gauge with which we can evaluate our expectations regarding the temporal placement of diagnostic artifacts, feature types, and site types within the APE. Further, these data should provide a local calibration of associated diagnostic artifacts that will allow for more accurate classifications of all sites within the APE containing diagnostic artifacts.
Three sites (LA 17041, LA 89659 and LA 118318) contain diagnostic projectile points within the surface assemblage:

- **LA 17041:** A tan chert, triangular arrow point with a convex base, wide notches, short barbs, and a slightly expanding stem was located on the surface of the site. These attributes are consistent with Tularosa Corner-notched projectile point (100 B.C. to A.D. 900) (Justice 2002:217).
- **LA 89659:** A tan chert, triangular form with a blunt tip and a slightly concave basal margin was located on the surface of the site. These attributes are consistent with a Bajada projectile point (6000–3000 B.C.) (Projectile Point Identification Guide 2015).
- **LA 118318:** A white chert, corner-notched, triangular and concave basal fragment was located on the surface of the site. These attributes are consistent with a Tularosa Corner-notched projectile point (100 B.C. to A.D. 900). It is thought that the point evolved from the San Pedro point type, and is firmly associated with the Late Archaic cultural tradition (Projectile Point Identification Guide 2015 and Justice 2002:217).

Any radiometric dates obtained during the testing and data recovery phase will be compared to the most applicable point typology/date ranges for these three points; and for any points found during the testing and data recovery phase.

In addition to chronometric dating and the identification of diagnostic projectile points, the presence and relative frequency of different ceramic types is often the primary means by which sites may be assigned specific cultural and temporal affiliations. In some cases, distinct occupations can be identified through intra-site distributions of different ceramic types. Although Jornada ceramics present challenges to dating because of their long production spans, previous research establishes several methods for using changes in morphological attributes to assign dates to sherds otherwise lumped into single brownware types (Carmichael 1986; Russell 2010; Seaman and Mills 1988; Speth and LeDuc 2007; Whalen 1978, 1993).

Within the project area, El Paso Brownware is a common ceramic type which has an extremely broad temporal span (A.D. 200 to 1400). Over the last three decades, numerous studies have documented temporal changes in the form and morphology of El Paso Brownware throughout the Formative period. By monitoring attributes such as rim shape, wall thickness, orifice diameter, and temper abundance, it is possible to microseriate these assemblages and establish a relative chronological order within a single type (Lehmer 1948, Whalen 1978, Way 1979). As observed by these researchers, the rim-profiles of El Paso Brownware ceramics became less tapered and more rounded or bulbous over time. In addition, jars tended to decrease in size, jar necks became more restricted, and rims became more everted over time (Carmichael 1986; Miller 1996; Seaman and Mills 1988; Speth and LeDuc 2007). Additionally, the size of temper particles in El Paso Brownware decreases over time (Whalen 1994 and 1996).

Of the nine sites surveyed, at least seven (LA 15901, LA 17041, LA 83680, LA 89659, LA 118318, LA 120949, LA 120950,) have ceramic artifacts dating to the Formative Tradition (A.D. 500 to 1450). No ceramics were observed on the other two sites (LA 104182, LA 137120), suggesting that these sites may date to the earlier preceramic Archaic Tradition (6000 B.C. to A.D. 500). Three sites (LA 17041, LA 118318, and LA 120949) contain El Paso Brownware sherds. Three sites (LA 118318, LA 120949, and LA 120950) contain a decorated ceramic type, Chupadero Black-on-white, which dates to the Late
Formative (A.D. 1050 to 1550). Given these broad temporal ranges, microseriation might be useful to refine the site chronology. Additionally, the ceramic assemblage, combined with other diagnostic artifacts, raises the possibility of multiple occupations at certain sites.

**Research Domain 2: Chronology and Occupational History**

Fundamental to all subsequent research questions is an understanding of when each site was used and how the use of each site changed over time, i.e., its occupational history. Assessing how sites in the project area relate to local and regional research issues requires an accurate reconstruction of the occupational history of each site, which in turn requires the recovery of chronometric data or temporally sensitive artifacts.

A number of absolute and relative dating methods are available to address questions of occupational history. For survey projects, relative dating based on temporally diagnostic projectile points and ceramics is the primary dating method. However, the limitations of this method are well known. For example, detailed morphological descriptions of diagnostic artifacts are often lacking or have different date ranges in different regional chronologies. Also, diagnostics found at a site may not indicate the full range of occupations and may even be incidental to the major occupations (e.g., pot drops at Archaic sites). Moreover, some sites, such as two of the project sites (LA 104182 and LA 137120), completely lack temporal diagnostics, either because they were never discarded at those locations or because the diagnostics were removed by site occupants or modern collectors (Hogan 2006:4-2).

Several absolute dating methods can often be used in southeastern New Mexico, including dendrochronology and archaeomagnetic dating. However, tree-ring dating has limited application and archaeomagnetic dating must be employed in conjunction with other chronological indicators, such as radiocarbon dates (Hogan 2006:4-2).

Radiocarbon dating is the principal chronometric method used to date sites in southeastern New Mexico and will be used, where appropriate, here. While not without issues (such as the effect of fluctuations in atmospheric carbon isotopes, isotope fractionations, and others), corrections can be made such that dates on charcoal are generally the most reliable (Hogan 2006:4-2).

In addition to chronometric and relative dating methods, the density and distribution of temporally diagnostic artifacts can be used to construct occupational histories of individual sites. Previous research has demonstrated that the frequencies and spatial distribution of specific diagnostic types can be used to reconstruct site use duration, as well as the duration of specific use areas within sites such as middens (Varien and Mills 1997). For instance, the frequency, condition, and recovery location of relatively long-lived tools such as milling implements can provide information on relative occupation duration (Schlanger 1991). The degree of investment in structures and features may also provide information related to occupation history and duration, as well as the abandonment of specific structures or parts of a site.

**Research Question 2: What is the occupational history of the sites identified during survey and testing?**

Related research questions include:

- When was each site first occupied?
- When was each site abandoned?
Is there evidence for multiple, temporally distinct occupations at each site?
Were sites in the project area occupied contemporaneously?
How do project sites fit into broader chronological patterns during the Archaic, Formative and other periods of southeastern New Mexico?

Data Considerations and Needs

A variety of data sources, including chronometric samples and temporally diagnostic artifacts, could potentially provide information to further evaluate the affiliations for the sites to be investigated within the current project area. When possible, radiometric samples will be collected from all features. These samples will provide a gauge with which we can evaluate our expectations regarding the temporal placement of diagnostic artifacts, feature types, and site types within the APE. Further, these data should provide a local calibration of associated diagnostic artifacts that will allow for more accurate classifications of all sites within the APE containing diagnostic artifacts, not just those being evaluated during the testing and data recovery phases of this project. Chronometric dates will be obtained from samples containing undifferentiated wood charcoal, if possible. Materials suited to archaeomagnetic and dendrochronological dating are not expected to be recovered.

This effort at reconstructing the occupational history of the project sites will occur at both the intra-site (identifying discrete occupations at each site) and inter-site scale (making comparisons among sites and reconstructing the occupational history of the project area). At the intra-site scale, the investigation will employ methods similar to Mauldin (1996), who successfully used statistical analyses, radiocarbon dates, and artifact analysis to differentiate between temporary, special purpose, and semi-permanent/permanent (residential) sites, and to delineate smaller, specific temporal occupations within larger occupations.

Research Domain 3: Site/Feature Function

Function refers to the entire range of human activities conducted across the site and within specific defined spaces such as structures and activity areas. The suite of associated facilities and materials comprising a site is often used to designate its function.

On a broad scale, habitation sites are defined by the presence of residential structures such as pithouses, surface rooms, or roomblocks. These sites usually contain a diversity of other features used during domestic activities, and a residential function can often be inferred from circumstantial evidence such as the presence of midden areas or diverse artifact assemblages, even if residential structures are lacking. Sites lacking structural remains and containing large thermal or pit facilities are commonly identified as logistical or resource-processing locations.

Research Question 3: What human activities were conducted across the sites and within defined use areas of the sites?

Related research questions include:

- What activities occurred at each site?
- Was each site used residually or logistically?
o Residential sites would show evidence of habitation structures, middens, storage features, and a diverse artifact assemblage.
o Logistical sites would have only thermal features or no features at all along with a limited artifact diversity.

• Do sites contain activity areas with specific functions such as lithic reduction or plant processing?
• What is the function of each feature, and is there evidence of use alteration at individual features during the occupation of the site?

Data Considerations and Needs

To approach this research issue, archaeologists must generate basic archaeological descriptions of architectural structures, features, and artifacts. Artifact assemblages provide information on function at the site and feature/activity-area scale. The morphology of individual flaked-stone and groundstone artifacts—as well as the use wear on these tools—can be correlated with specific functions such as hide scraping, plant processing, milling, or hunting. Statistical analysis on the entire assemblage can also provide information on site function. Residential sites, for example, tend to have more expedient tools and higher percentages of cortical debitage and local lithic material.

Ceramic assemblages may inform on site function and intensity of occupation through the frequency and density of ceramic artifacts, the relative proportions of different vessel forms represented, the distribution of vessel sizes, and the type and degree of mechanical usewear present.

• In general, sites with larger ceramic assemblages tend to be associated with occupations of greater duration than those containing only sparse sherd scatters.
• Ceramic vessel form is closely related to intended use—utility ware jars and decorated bowls are typically interpreted as representing cooking and serving vessels, respectively. The relative proportion of these forms in an assemblage indicates which types of activities were emphasized (Sebastian 1983, Mattson 2010, 2015, 2016).
• Vessel size, examined through rim and orifice diameter, may also be used to examine the types of activities conducted at a site. Where there is evidence for a large class of vessels, supra-household food preparation in the form of feasting may be indicated (e.g., Hayden 2001; Potter 2000).
• Direct evidence for the kinds of activities that were conducted using ceramic vessels may be examined through usewear and residue. Evidence for food preparation activities includes sooting, burning, thermal spalling and pitting, and presence of food residue. Evidence for both cooking and serving may be associated with attrition, abrasion, and striation or scoring of vessel surfaces.

Research Domain 4: Subsistence

The overall objectives of research under this problem domain are to understand the strategies used by aboriginal groups to meet their annual and long-term nutritional needs (Hogan 2006:4-23). This investigation is designed to gather data relevant to questions surrounding the plant and animal resources utilized by each sites’ occupants.
Research Question 4: What plant and animal food resources were collected, processed, and/or consumed by the sites’ occupants?

Related research questions include:

- Are there features or other contexts containing the remains of plant and/or animal food items?
  - If so what specific taxa are represented?
- What do such remains indicate about subsistence practices?
- Are there diachronic changes in the technologies used to procure and process subsistence resources?

The recovery of subsistence-related floral and faunal materials could also help shed light on paleoenvironmental conditions, particularly for those sites located along Bear Grass Draw in the Red Lake SE 7.5-minute USGS quadrangle map. Using these materials, it may be possible to address the following questions:

- What environmental conditions may have influenced the high-density Formative period occupation along Bear Grass Draw?
- How do those conditions compare to modern times, and what do they suggest about Formative period subsistence strategies?
- Was the reliability of water within Bear Grass Draw greater during the Formative period than in previous or subsequent periods?
- Is there evidence that corn was part of the subsistence regime within Formative period settlements along Bear Grass Draw? If so, what evidence is there that horticulture was practiced locally?

Data Considerations and Needs

Faunal remains, macrobotanical materials, plant microfossils, food residues, and indirect evidence of subsistence activities (such as the kinds of artifacts and features found at a site) can provide data with which to reconstruct the biotic community of the area and provide evidence of which resources were selected for consumption. These remains can also provide useful information on the seasonality of site use (Hogan 2006:4-23; Railey 2011:36). For this project, floral remains provide the most prominent empirical evidence needed to explore questions concerning subsistence behavior, although the types and diversity of other material remains—especially groundstone milling equipment—are relevant to this research domain as well. Seven of the nine sites (LA 17041, LA 83680, LA 89659, LA 118318, LA 120949, LA 120950, and LA 137120) included in this investigation contain groundstone milling equipment.

The models most commonly developed for cultural resource management applications in this domain examine the associations between site locations and environmental parameters. These models are typically directed toward predicting site locations, but can be used to identify correlations between site locations and environmental variables reflecting the distribution of potential food resources. The primary advantage of this approach is that it makes maximum use of sites with limited data potential. More complex models utilize optimal foraging theory to predict the food resources most likely to be exploited (Bettinger 1991: 83-111; Kelly 1995:73; Winterhalder and Smith 1981).
It is anticipated that addressing these issues in testing/data recovery here would likely encounter some rather severe limits, given that organic preservation is often poor in open sites (see e.g., Vaughan, et al., 2014) and that the inferences based on artifacts and features may not be specific to a particular food source. As such, the research questions dealing with this topic focus first on establishing the presence of features and contexts containing relevant information.

Macrobotanical and pollen analyses may provide evidence of the plants associated with riparian environments and thus reflect the reliability of water with Bear Grass Draw over time. The results of these analyses may also indicate the presence of corn at one of more of the sites. If so, the WSP team will investigate whether there is also evidence of local horticulture, such as field borders, check dams, or other water/sediment control devices from which it could be inferred that the occupants of sites along Bear Grass Draw practiced some form of horticulture.

Ceramics may provide information on past subsistence through their direct association with plant food remains (e.g., organic residues, pollen, and portions of plants). However, in the absence of such remains, evidence for intensive residential occupation combined with large ceramic assemblages may also serve as an indirect indicator of agricultural dependence. While ceramics were certainly used to some degree by mobile foragers in the late prehistoric and protohistoric periods in New Mexico, a reliance on ceramic technology is generally associated with the preparation of grains, particularly corn (Brown 1989; Crown and Wills 1995). For sites lacking evidence for substantial residential occupation but including other evidence for agricultural activities, a predominance of jars (vs. bowls) in a ceramic assemblage may also indicate hand-watering of nearby field or garden locations.

**Research Domain 5: Mobility and Interregional Interaction**

Ethnographic research has shown that hunter-gatherers share resources, including food, goods, and access to territory, on a regional scale (Binford 1989; Radcliff-Brown 1930; Yellen 1977). The costs and benefits associated with this interaction are based on a complex system of demands that are, in part, brought about by resource availability and risk minimization. For example, during periods of high resource density and moderate-to-low predictability, like that experienced in the seasonal round of basin environments, hunter-gatherer populations will be highly mobile and will share information on an intraregional basis. In contrast, during periods of low resource density and moderate-to-high rates of predictability, hunter gatherers will respond with low mobility and increased interregional social ties (including reciprocity, trade, and exchange) as means of insuring against starvation (Kelly 1995).

Condon has proposed that “[d]uring periods of resource abundance, foraging groups within the basin will exhibit minimal inter-regional interaction, resulting in the near absence of nonlocal artifacts...” (Condon et al. 2008:46). Based on this model and the climatic and archaeological data for the post-A.D. 200 period along Bear Grass Draw, Condon posits the development of a relatively extensive system of regional interaction in southeastern New Mexico over the course of the Formative period. This proposition is supported by, among other things, the appearance of nonlocal ceramics types in the region between A.D. 200 to 1000/1150, which may indicate a widening range of social interaction that began during the early Formative period and progressed into the Late Formative period.
It is generally thought that two distinct subsistence regimes co-existed in southeastern New Mexico—highly mobile hunter-gatherers and more sedentary horticulturalists. Ceramic manufacture is often attributed to these latter farming groups, while ceramics found at ephemeral sites lacking structures are assumed to represent trade items (Howey and Rocek 2008). Determining if brownware ceramics were produced locally in the project area thus has important implications for interpreting past social interaction and trade patterns, in addition to contributing to our knowledge of regional variability in ceramic technological organization in southeastern New Mexico and the Jornada region in general.

**Research Question 5: What degree of mobility and interregional interaction is suggested by site deposits?**

Related research questions include:

- Do the project sites contain nonlocal and/or exotic materials?
- If so, what is their nature and likely source?
- Is there evidence for preferential use of certain lithic raw material types or localized clay sources?
- Is there evidence that ceramics were locally manufactured or procured through trade/interaction?

**Data Considerations and Needs**

The results of the survey phase of this investigation suggest that at least seven, and possibly all of the nine sites, are of the same age (Early to Late Formative). These sites contain projectile points, groundstone artifacts, and nonlocal ceramic types, as well as similar features, including numerous burned-caliche scatters. The combined data from these sites will help inform on the nature and extent of interaction in the region during the Formative period.

Exchange and interaction on a regional scale can be evaluated through the relative presence or absence of nonlocal tool and nonlocal (“intrusive”) pottery types, and other materials, such as shell and turquoise. Obsidian is generally viewed as locally available in the region, but its cultural context is not well established (Condon et al. 2008:250). For this project, nonlocal ceramics and exotic lithic raw materials will be seen as primary indicators of regional interaction, trade and/or exchange.

The presence of nonlocal ceramics is a clear indication of interaction with other groups. While exotic and imported ceramics are often clearly identifiable based on decorative characteristics, determining where ceramics were manufactured within a region often requires compositional analyses. Once probable production areas are identified through sourcing, directionality in the movement of ceramics may then be examined. Although communities located in closer proximity are generally expected to interact more intensively, this is not always the case. Where the movement of ceramics appears to be primarily unidirectional, it may be inferred that the goods exchanged in return were either not ceramics (e.g., upland or Plains resources, lithic raw materials, agricultural produce) or were non-material in nature (e.g., allegiance during times of raiding/warfare).

**Research Domain 6: Post-Depositional Effects on Thermal Features**

In general, behavioral inferences about the past should be preceded by evaluations of post-depositional processes. The lack of subsurface testing during survey severely limits our ability to evaluate the effects of these processes on feature integrity. In the US 82 project area, this problem is compounded by the
fact that no established theoretical model exists for the life history of thermal features, which are the most common feature type in the project area. Thermal features include hearths, burned-caliche concentrations, and roasting pits. What is understood about thermal features most often pertains to their use life, not the post-depositional effects of the local environment. The variation we see in thermal features could be a result of either human behavior or post-depositional processes, including the effects of modern mechanical excavation related to roadwork, fencing, and fiber optic installation. Therefore, until we understand both the behavioral processes and the full spectrum of post-depositional processes, we cannot effectively distinguish between them.

In addition to being the most common type of prehistoric feature found within the study corridor, thermal features are among the most problematic feature types. Most thermal features in southeastern New Mexico are deflated to some degree and many are completely deflated and scattered by erosional processes. In addition, modern mechanical excavation has also contributed to the eroded state of many of these features, especially along transportation right-of-ways and in other developed areas. On the other hand, it is not uncommon for thermal features with very limited surface expressions to be found to have extensive intact subsurface deposits upon further testing, regardless of the disturbance mechanism. In addition, it is also possible that small thermal features might be mischaracterized as larger, deflated or disturbed features due to recorder bias. This presents a recurring problem for the characterization of these types of features, when based exclusively on surface observations made at the survey level.

Another confounding issue is the fact that thermal features may represent a series of short-term episodes of use over a broad period of time. This random composition makes delineating isolated functions difficult, especially if multiple material types are noted, and if specific rocks were exclusively used for specific tasks. Further, it makes correlating the radiometric dates with the actual functions nearly impossible unless a single function is defined. Again, the testing and data recovery of these features provides a rare opportunity for more in-depth evaluation of these issues.

Research Question 6: How well do surface observations characterize prehistoric thermal features within the APE?

Related research questions include:

- Do surface expressions of features accurately reflect feature size and morphology?
- In what ways are features masked or exposed by post-depositional geomorphological processes?

Data Considerations and Needs***

To answer this question, the research will compare the surficial feature observations obtained during survey (and used for eligibility recommendations), with subsurface observations of the features obtained during testing/data recovery. The WSP team will compare this information with data previously compiled by Parametrix for the US 62/180 data recovery investigation (Parrish et al. 2006). These data, combined with geomorphological data obtained in testing/excavation will be used to create a theoretical model for the common post-depositional processes that regularly affect these features in environments present in the study area (including in areas of limited mechanical disturbance). This model may prove useful to others attempting to characterize these features using only surface observations.
The most commonly used indicator of data potential as viewed from the surface is the spatial integrity of the thermal feature. Spatial integrity is quantified as a combination of the density of the burned rock and the extent to which it is clustered. Other considerations that will be recorded include the presence of ashy sediments, the total number of burned rocks, the diversity in the sizes of the burned rocks (mean size), and the presence of associated artifacts. However, the first impression is generally made by looking at and describing the spatial integrity visible on the surface, which is the density and clustering of the burned rock distribution. Computing the density of the burned rock will have to be restricted to a minimum individual size to avoid any bias related to heat spalling and fracturing, which could introduce small fragments or pieces from a single rock into the equation. The minimum rock size to be used will be determined in the field.

It is generally assumed that a dense cluster of burned rock indicates a higher degree of spatial integrity than that of a low-density scatter. Although thermal features can be completely deflated and still remain tightly clustered, this is usually not considered when making surficial assessments of feature integrity. In addition, a low density of burned rock may also indicate short duration use of the feature. For excavated thermal features, the most obvious indicator of integrity is the depth of the intact sediments and burned rock below the surface. This research question will explore the relationship, if any, between surface density of burned rock and thermal feature depth.

A positive linear relationship between surface density of burned rock and the depth of thermal features is usually assumed. The denser the surface manifestation of the feature, the deeper the cultural material is expected to occur. However, a deflated thermal feature can also appear to have integrity on the surface. In fact, completely deflated thermal features that remain somewhat clustered will exhibit a high burned rock density on the surface. This is due to the fact that all burned rocks once present within the feature at differing depths are now at the same level and are expressed as a single surface. In this case, the data will show a negative linear relationship.

In order to evaluate the relationship between these two variables, a chi-square test will be used for the excavated thermal feature (Thomas 1986). These two variables may also be compared with other thermal feature variables such as mean burned rock size and subsurface burned rock density. The geomorphological context of each feature will be described in detail in order to correctly interpret the results of the statistical tests. Factors such as mechanical disturbance will need to be considered. If the statistical tests show that there is a significant relationship between surface density of burned rock and feature depth, simple graphics will then be produced. The relationship of surface density to subsurface depth will be plotted in order to view the shape of the actual relationship, and evaluate whether surface density of burned rock is a reliable indicator of feature integrity.

*** The above information was presented in the approved Testing and Data Recovery Plan. However, during field observations, it became clear that the presence of burned caliche was not a good indicator of intact features. With a few exceptions, test unit excavations placed on burned-caliche concentrations uncovered no feature fill, indicating that the features were entirely deflated. Furthermore, intact features found during excavation frequently contained fewer than ten pieces of burned caliche, and these were typically nodules measuring less than 2 cm in maximum dimension. Quantification of burned caliche densities was therefore not undertaken. Rather, qualitative observations of surface versus subsurface feature integrity are discussed in Chapter 9 (Inter-site Synthesis).***
CHAPTER 5: GENERAL FIELD METHODS

The field methods utilized for this testing and data recovery project are consistent with guidance found within Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities (BLM 2005). Prior to the initiation of archaeological fieldwork, all project staff were provided with the results of background research on the project area, general research on the prehistory and archaeology of southeastern New Mexico, a copy of the survey report, and a copy of the testing and data recovery plan. To assure quality, all staff were briefed on the goals of the investigation, the expected resources, and field and laboratory methods. All nine sites were visited by field staff to discuss site-specific data recovery strategies. Pre-excavation photographic documentation was also conducted, and grid systems were established on each site for horizontal and vertical provenience control. Detailed mapping efforts continued at each site throughout the duration of field work.

PROVENIENCE CONTROL

Independent 1-by-1-m grid systems were established for provenience control at LA 15901, LA 83680, LA 89659, LA 104182, and LA 137120. At each of these sites, a central location was established within a locally defined coordinate system and assigned three dimensional coordinates of East 500, North 500 and Elevation 100. Due to the proximity of the four sites near Bear Grass Draw (LA 17041, LA 118318, LA 120949, and LA 120950) and their interrelated nature, a single grid system was established for these four sites with a primary control point placed at East 990, North 990, and Elevation 200. Using a Nikon DTM-352 Total Station, baselines consisting of horizontal control points were established parallel to the existing US 82 right-of-way fences. The directionality of the grid system at each site is therefore not aligned to true north. Rather, a local coordinate system was oriented to the road to provide greater ease of horizontal control. The base station elevation was used for vertical control, and sub-datums were established at each test unit to compare excavation depths and feature depths, when applicable, across the sites. Control points were mapped with Trimble Geo 7X series Global Positioning System (GPS) to allow for georeferencing of local grid systems into the Universal Transverse Mercator (UTM) North American Datum (NAD) 1983 Zone 13 North coordinate system.

Provenience information for collected artifacts and samples was logged into a Field Specimen (FS) catalog sheet. Each FS number refers to a defined three-dimensional space (context). All material recovered from a specific context received the same FS number, and each FS number will be linked in a Microsoft Access database to the three main aspects of archaeological provenience: location (i.e., easting, northing, and elevation), matrix (i.e., sediment characteristics and disturbances), and association (i.e., surface, feature, stratigraphic position). Additional provenience information for each FS describes recovery methods, including the excavation unit designation, size of unit, depth of excavation level, feature number, stratum or level designation, initials of excavators, date of excavation, and other basic descriptive and contextual information. Finally, the presence or absence of specific classes of recovered archaeological materials was recorded.
SURFACE COLLECTION

Prior to any subsurface testing, all artifacts located on the ground surface of the sites and within the APE were systematically flagged and collected. With the exception of LA 118318, artifact density across the sites was low to moderate, and collection within a 1-by-1-m grid was not warranted. Surface artifacts were therefore point provenienced by GPS and assigned UTM coordinates and individual FS numbers. When appropriate, groups of surface artifacts were collected under the same FS number when located within an area measuring less than 10 cm², or within a similar context (e.g., microdebitage from an isolated ant mound). Corresponding local grid coordinates were also assigned once the local grid systems were georeferenced. Artifact density at LA 118318 was extremely high, and surface collection proceeded within the established 1-by-1-m total station grid, with each surface grid unit receiving a unique FS number. For all sites, surface collection data was imported into ArcGIS software to generate artifact density plots. These plots defined the spatial extent of artifact concentrations on the present ground surface, and were used to address research questions relating to use of space, depositional patterns, occupational history, and site function.

GEOMORPHOLOGY

The geomorphological history of the region produces several expectations for the prehistoric archaeology of the Mescalero Plain. A general description of the Mescalero Plain geomorphology is provided above in Chapter 2. Prehistoric features will not be present within the recently formed parabolic and coppice dune sediments that dominate the surface of the region. Preserved features can exist in areas where recent eolian sediments have capped and preserved Unit 1 and Unit 2 Eolian Sands. No prehistoric features or living surfaces will be buried by Unit 1 Eolian Sand, as this stratigraphic unit predates human occupation of North America. However, it is possible that features may have been excavated into the uppermost levels of Unit 1 if this surface was exposed during prehistoric occupation of the region. Most prehistoric features are expected to occur in the Unit 2 stratum where it is preserved, and features may be present at the interface between Unit 1 and Unit 2. In areas where erosion has deflated sediments into Unit 1 sands, features will not be preserved. Therefore, features—such as burned-caliche concentrations—located in erosional blowouts will not retain integrity and feature fill will be absent. Where preserved, Loco Hills (A horizon) sediments may also cap prehistoric deposits as this stratum formed after most prehistoric activity in the region (Hall and Goble 2006, 2008).

TEST UNIT EXCAVATION

Several factors guided the placement of hand-excavated test units at each site. In some cases, in-field observations of geomorphological settings necessitated shifting the placement of test units from the locations depicted in the testing and data recovery plan. For example, a test unit placed at the crest of a 2-m-tall dune would be unlikely to encounter cultural deposits given the depth of historic to recent aeolian deposition. Test units were therefore strategically placed at varying elevations and in different physical settings (e.g., slight rise, toe of dune, blowout) to more adequately capture the range of geomorphology and stratigraphy at each site. In other instances, test units were placed directly atop surface manifestations of high density artifact locales or probable features in order to expose, define,
and excavate these deposits. The purpose of the test units was to (1) explore the potential for intact subsurface cultural deposits prior to any road improvements that may have an adverse effect on the portion of the site within the project APE, (2) develop an understanding of the landform’s geomorphology and major stratigraphic changes across the portion of the site within the project area, and (3) determine if different stratigraphic lenses and geomorphological contexts might contain intact cultural deposits.

Test units typically measured 1-by-1 m in size, although 1-by-3 m, 2-by-2 m, and 3-by-3 m test units were also excavated at LA 83680, LA 120949, and LA 118318 respectively. All units were assigned local grid coordinates at the southwest corner of the unit. A subdatum was assigned to each unit, and subdatum elevations were recorded via total station to establish vertical control. In general, hand excavation was conducted using arbitrary 10 cm levels, with the beginning and ending elevations of each level linked to the appropriate subdatum. Natural or cultural stratigraphic layers were also used in some cases as appropriate. As dunal landforms were present throughout the project area, test units often had significant elevation differences across their surfaces. To gain better vertical control, the first level was often excavated deeper than 10 cm in upslope areas to establish a level surface. All artifacts or samples recovered from a single excavation level received the same unique FS number. Any sediment removed from the units was screened through 1/8-inch hardware mesh, and all artifacts caught during screening were collected. Photographic documentation of all test units included pre-excavation photos, post-excavation photos, and profile photos. Additionally, a representative sample of test unit profiles was drawn at each site. In conjunction with profile maps, sediments/soils were recorded and described. Attributes included sediment type, color (using the Munsell Book of Color descriptors), texture, and observations on natural and cultural inclusions. Test units were typically excavated until either caliche bedrock or two culturally sterile levels were encountered. In some cases, test units extended deeper to expose stratigraphy. When features were encountered within test units, the units were either expanded, or additional contiguous units were excavated to fully expose the features.

**Mechanical Excavation**

Mechanical excavation was conducted after completion of test unit excavations and involved both backhoe trenches and mechanical scrapes. The purpose of the backhoe trenches was to expose site stratigraphy, develop a greater understanding of the geomorphology of each investigated area, and aid in determining the depth of cultural strata. When feasible, caliche bedrock was exposed in at least one portion of each trench, and representative profiles of a segment of each trench were drawn. Digitized trench profiles presented throughout this document depict all observable strata along with soil descriptions and Munsell color descriptions. Unexcavated sediments are also depicted with diagonal hatch to contextualize the shape and depth of the mechanical excavations. However, no sediment descriptions are provided for unexcavated areas, as the nature of these sediments was not examined. The mechanical scrapes were placed to expose a broader areal extent of the sites than could be achieved with a backhoe trench. Typically, the mechanical scrapes were excavated at minimum to the depth at which cultural deposits were anticipated or known to occur (e.g., to the level of A horizon sediments, or to the interface between A horizon sediments and an underlying red Bt paleosol [paleosol] [Hall 2002]). All mechanical excavations were monitored by experienced archaeological staff.
When features or other deposits of potential cultural origin were exposed or encountered, mechanical excavation ceased and the area was cleaned with hand tools. Trenches and mechanical scrapes were primarily placed at the locations depicted in the data recovery and testing plan. However, in some instances, trenches could not be placed in their proposed locations. For example, one trench at LA 118318 was proposed within the southern right-of-way of US 82, but could not be excavated due to the presence of a buried fiber optic line. Similarly, portions of LA 17041 outside of the right-of-way but within the APE could not be scraped because of the same buried utility. The locations of the mechanical excavations were mapped via GPS and total station, and relevant data such as size, grid location, depth, and associated features were recorded on mechanical excavation catalogue sheets. All trenches and scrapes were excavated with a backhoe equipped with a flat blade, and were photographed prior to backfilling.

**FEATURE EXCAVATION**

Numerous newly identified features were encountered at several of the sites during testing and data recovery, during both hand excavation and mechanical excavation. As mentioned above, when features were encountered in test units, it was often necessary to expand the units to fully expose and define the features. In these instances, test unit subdatums were used for vertical control. When features were exposed in trenches or mechanical scrapes new subdatums were placed. The location, elevation, and depth of each feature, along with any associated subdatum, were mapped via total station. Following initial exposure, features were cleaned with hand tools and photographed. Scaled planview drawings were made prior to excavation. Features were then bisected in order to observe their vertical morphology, and profiles were photographed and drawn to scale. Throughout this document, planview and profile drawings of features depict all observed sediments along with soil descriptions and Munsell color descriptions. Unexcavated sediments are also depicted with diagonal hatching to contextualize the shape and depth of the excavated feature. However, no sediment descriptions are provided for unexcavated areas, as the nature of these sediments was not examined. A portion of the fill of each feature was collected for flotation and macrobotanical analysis. When present, charcoal samples were also collected for radiocarbon dating. Any remaining fill was passed through 1/8-inch mesh, and any artifacts present were collected. Typically, all samples and artifacts recovered from a feature were assigned a single FS number. After profile documentation, the features were fully excavated. Post-exca vation photographs were then taken, and final planview drawings were made. All drawings and other relevant data were entered onto a Feature Description form. Additionally, excavators recorded general written observations on each feature including location, size and planview shape, depth and profile shape, sediment descriptions, stratigraphy, oxidation, inclusions, disturbances, discovery methods, excavation methods, preservation, probable function, and relationship to other features.

**BACKFILLING**

At the conclusion of archaeological excavation at each site, all back-dirt piles and push piles generated during the course of fieldwork were used to backfill all open excavations, including test units, trenches, and scraped areas, in an attempt to restore the site as nearly as possible to its pre-exca vation state. Backfilling was conducted with a backhoe and hand tools.
CHAPTER 6: LABORATORY AND ANALYTICAL METHODS

The following sections summarize the laboratory methods that were employed to process and analyze artifacts and other materials, including flaked-stone, groundstone, ceramic artifacts, faunal remains, macrobotanical samples, palynological, and radiometric (14C) samples. The methods and procedures employed during these in-house analyses are described below.

POST FIELD PROCESSING

In the laboratory, all collections made during the course of fieldwork were processed, bagged, and boxed in a manner consistent with the Museum of New Mexico’s Procedures Manual for the Submission of Archaeological Artifact and Records Collections (MIAC 2002). After the completion of fieldwork, field forms such as FS logs and feature logs were entered into a Microsoft Access database. All artifact analyses and supplemental data such as radiocarbon dates were entered directly into the database, which allowed for queries across different artifact classes and data sets during the analysis and report production phases.

RADIOCARBON DATING ANALYSIS

In order to establish date ranges for the occupation of each site and the use of individual features, samples of organic matter were collected for radiocarbon analysis from all features retaining intact cultural feature fill. Radiocarbon analysis measures the amount of radioactive decay of the carbon 14 (14C) isotope in a sample of organic matter to generate probabilistic date-ranges for the sample. In archaeological contexts, this process most typically involves analysis of charcoal from burned wood or seeds. The 14C isotope is incorporated into plants and animals through absorption of atmospheric carbon dioxide. When a plant or animal dies, it ceases to absorb 14C, and the radioactive isotope begins to decay. The amount of 14C remaining in a sample of organic matter correlates to the age of the sample. In other words, older samples of dead organic matter contain less 14C, while younger samples contain more 14C.

Measurement of 14C within a given sample is typically acquired through use of an accelerated mass spectrometer. This device measures the number of 14C and 12C atoms within a given sample, producing a 14C/12C ratio. This ratio is known as the “fraction modern” (Fm), which is then converted to a “radiocarbon age” by the following formula: \( \text{Age} = -8033 \times \ln(Fm) \). The radiocarbon age of a sample represents the age of the sample if the 14C/12C atmospheric ratio remained constant throughout history. Radiocarbon ages are reported as Before Present (BP) with a probabilistic error that is based on the length of time during which a sample was analyzed. Results appear as something like 1140 ± 30 BP. The year 1950 is used as the starting date for BP. Nuclear testing and bomb detonation during World War II has resulted in drastic fluctuations in the atmospheric ratio of 14C to 12C, such that any samples post-dating 1950 cannot be reliably dated via conventional radiocarbon analysis.

As mentioned above, radiocarbon ages assume a constant 14C/12C ratio in the atmosphere. However, this ratio (essentially the amount of atmospheric carbon dioxide) has constantly fluctuated throughout the history of the planet as a result of phenomena such as volcanic eruptions, solar flares, and long-term climatic fluctuations. The radiocarbon age of a sample therefore does not represent its age in calendar...
years. Fluctuations in the atmospheric ratio $^{14}\text{C}/^{12}\text{C}$ ratio have been calculated by measuring the amount of radiocarbon in tree rings such as those of bristlecone pine, thereby producing a curve of atmospheric radiocarbon that is directly tied to calendar years. Using bristlecone pine from the U.S., water-logged oaks from Ireland and Germany, and Kuari from New Zealand, this calendar year “calibration curve” has been extended back 14,000 years.

Hypothetically, the radiocarbon measurement of a sample can be tied directly to a tree ring with the same proportion of radiocarbon, thereby providing a calendar age of the sample. However, this is complicated by two factors. First, the measurements of the tree ring and the sample have limited precision, so there is a probabilistic range of possible calendar years to which the sample dates. Second, due to atmospheric variations in radiocarbon, there could be several possible date ranges for a sample. Calibration is thus performed by comparing the radiocarbon measurements of the sample to materials of known age (in this case tree rings) both of which have a degree of uncertainty due to the accuracy and precision constraints of accelerated mass spectrometry.

Computer-based probabilistic methods allow radiocarbon dates to be projected as calendar years, and display the probability in which a sample dates to a particular year within a broader date range. Results are typically presented within a two-sigma (95.4 percent) probability range.

Twenty radiocarbon samples were processed following excavation. All samples were collected from sealed features to reduce possible contamination. The samples were processed by International Chemical Analysis, Inc. (ICA), and calibrated (calendar) ages were attained using the IntCal13 (Reimer et al. 2013) calibration curve. Plotted curves were generated using OxCal Version 4.2.4 (Bronk Ramsey and Lee 2013).

CERAMIC ANALYSIS

Ceramic artifact assemblages can be used to address the research topics presented in this plan in a variety of ways. Diagnostic ceramic types will be identified in order to inform on site chronology, cultural affiliation, and occupational history. Ceramics also provide information pertaining to site function, as well as mobility and interregional interaction.

Based on ethnographic research, the raw materials used for ceramic production are generally selected on the basis of both quality and distance from the manufacturing locale. Clay and temper are extremely heavy materials to transport on foot. In a cross-cultural study of 111 traditional societies, Arnold (1985, 2000) found that potters typically travel no more than 4 km from their place of residence to collect clays. Therefore, locally made ceramics were defined as those utilizing materials within a 4-km radius of the sites in the project area. Following previous sourcing studies conducted in the Jornada Mogollon region of southern New Mexico, three complementary methods—mineralogical, geochemical, and oxidation analyses—were used to determine whether the ceramics collected during data recovery were produced locally or not (and if so, which sources were exploited).

A sample of the ceramic assemblage from each site was included in these analyses. A total of 45 sherds was subjected to oxidation analysis. The 45 sherds were selected from the total assemblage of 271 sherds collected from six of the nine sites (LA 17041, LA 83680, LA 89659, LA 118318, LA 120949, and LA 120950). From this sample, at least one sherd from each site was submitted for geochemical analysis by
Neutron Activation Analysis (NAA). Each of these sherds was also subjected to petrographic analysis. Conducting multiple compositional analyses on the same samples allowed for correspondence between the various methods (e.g., certain clay color groups associated with compositional groups as determined by NAA and tempering minerals as identified by petrography).

Mineralogical Analysis

Ceramic petrographic analysis included the identification of the mineral constituents of ceramic artifacts using principles of optical mineralogy. Thin sections of ceramic sherds were mounted to glass slides and ground to a thickness of 0.03 mm. Prepared thin sections were then examined under a polarizing light microscope. Aplastic (mineral additives or temper) components were evaluated in terms of size (textural analysis), density, crystalline shape, color, and pleochroism (color changes when rotated in plane-polarized light). Upon analysis, samples were divided into different petrographic groups based on characteristics of aplastic inclusions. A total of ten sherds were selected for petrographic analysis from the sites investigated in order to examine patterns in local pottery production and/or importation over time and to contribute to the ongoing improvement and refinement of the Jornada ceramic chronology. Petrographic analysis was performed by Emma Britton of the University of California, Santa Cruz. Additional information concerning the methodology for the mineralogical analysis can be found in Appendix B.

Geochemical Analysis

Fifteen sherds were submitted for NAA, a highly sensitive analytical technique used for measuring the concentration of various major, minor, and trace elements in a substance. This method involves bombarding a sample with neutrons produced with a reactor. The neutrons interact with the nuclei of the atoms in the sample, producing radioactive isotopes. As these isotopes return to stable states, they emit particles or gamma rays. The emitted spectral signature is unique to each element, allowing for the detection of the exact elemental composition of the sample. Analysis was performed by the University of Missouri Research Reactor. The laboratory divided the samples into compositional/chemical groups based on their large database of analyzed ceramic samples from the Southern Jornada area. Additional information concerning the methodology for the geochemical analysis can be found in Appendix C.

Oxidation Analysis

As noted by Shephard (1995:177) and Rice (1987:331-343), ceramic paste color is the result of both clay composition and specific firing conditions. If firing conditions are held constant, then clays of similar composition will produce similar colors. This is the underlying principle of clay oxidation analysis, also known as refiring analysis. Sherds are fired under the same conditions (the same firing temperature, atmosphere, and duration), usually at a fairly high temperature to ensure full oxidation of carbonaceous material, and then color is recorded using the Munsell color system. Sherds are then placed into color groups, comprised of ranges of Munsell colors thought to represent compositionally similar clays.

A sample of the ceramic assemblage from each site was selected for oxidation analysis, including 27 Jornada Brown sherds, 17 El Paso Brown sherds, and one Jornada Plain Slipped Red sherd. A small chip was cut from each sherd with a tile saw for further analysis. These chips were fired in an electric kiln in an oxidizing atmosphere for 45 minutes at a temperature of 1000 degrees Celsius. After the firing, the
Munsell color of the paste cross-section was recorded. Variation in fully oxidized color was then used to infer differences or similarities in the clay sources represented at each site and between different sites.

**Ceramic Attribute Analysis**

One hundred percent (n=271) of the ceramic artifacts collected during the current investigation were analyzed. This included the identification of tempering material, paste, and paint characteristics through microscopic examination; classification into wares and types; determination of vessel form, vessel part, and surface characteristics; and measurement of dimensions. Each of these attributes is discussed below.

Ware categories were determined primarily on the basis of paste characteristics (color and hardness) and tempering material (see ware and type descriptions). Two main ceramic traditions were identified—Jornada Mogollon and Rio Grande. Types within each tradition were identified largely on the basis of surface treatment (presence of slip, smoothing, polishing, and striations), material type and coarseness (very fine, fine, medium, coarse, and very coarse) of temper, paint attributes (mineral/carbon/glaze and color), and decorative style. Aplastic materials were identified through examination of the paste exposed within a small fresh break on each sherd through a binocular microscope. The main temper categories recorded include feldspar, limestone, crushed igneous rock, basalt, quartz, and biotite. If more than one tempering material was identified, then the most abundant type was listed first, followed by secondary and tertiary materials. Identified vessel forms include jars and bowls.

Documented vessel portions include rims and body fragments. For rim sherds, additional attributes recorded include rim shape (tapered, rounded, flat, thickened) and rim flare (inverted, direct, everted).

Basic metrics recorded for each sherd include weight (0.1 g), two maximum dimensions (mm), and two thickness measurements (mm). For body sherds, thickness measurements were averaged to arrive at a mean sherd wall thickness. Following Carmichael (1983) and Seaman and Mills (1988), the rim thickness of Jornada and El Paso Brown sherds were measured 2 mm below the lip of the vessel for tapered rims and at the thickest portion of the rim for bulbous rims. Wall thickness was measured 15 mm below the rim for tapered rims, and below the thickened portion of the rim for bulbous/rounded rims. These measurements were used to calculate Rim Sherd Indices.

**FLAKED-STONE ANALYSIS**

Flaked-stone assemblages can be used to address the research topics in a variety of ways. Diagnostic projectile points can provide specific chronological information, while the general nature of assemblages has been used to place sites within broad temporal periods. Lithic assemblages can inform on site function because specific activities such as lithic procurement create patterned assemblages, and the specific function of lithic tools can often be interpreted and correlated with specific past behaviors. Because sites rarely have only one function, interpretation usually involves identifying statistical patterns in the assemblage that provide information on the relative importance of various behaviors on a site. Lithic technological organization is also directly related to patterns of subsistence and mobility. For example, identifying the degree to which a lithic assemblage exhibits curated or expedient characteristics can help determine how the site was used and what role it may have played in the overall settlement system.
Technological organization is usually studied as a dichotomy or continuum between assemblages that are either expedient or curated (Bamforth 1986; Binford 1979; Nelson 1991). Curated tools are made in anticipation of future use and are therefore typically long-lasting, reliable, versatile, and require significant time investment. Expedient tools, on the other hand, are made as needed for a particular task and therefore require little investment and are usually discarded quickly (Nelson 1991). It is generally accepted that curated technologies are employed by more mobile groups as an efficient way to transport tools and material, while expedient tools are more common among sedentary groups—but it has also been noted that the need to maximize tool life and use material efficiently is conditioned by the quality and availability of raw material, regardless of residence pattern (Bamforth 1986). These patterns demonstrate that technological organization is closely associated with settlement patterns. Thus, we expect evidence of curated reduction technology at logistical sites representing high residential mobility, and evidence of expedient technology at habitation sites representing a more sedentary lifeway. Combined with analysis of site structure, feature types, and comparison with other assemblages on the landscape, lithic assemblages can be used to reconstruct mobility patterns throughout the region.

Additionally, the types of raw materials present in an assemblage inform on material acquisition and broader economic networks. Non-local lithic raw materials (e.g., obsidian, “finger-print” chert, and Alibates chert and other cherts from the Llano Estacado) could be present in the project area, and the occurrence of such materials offers implications towards acquisition strategies. Non-local raw materials could enter sites through means such as direct acquisition at primary sources (i.e., quarries) or through trade and exchange with other groups living either close to those sources, or encountered during seasonal rounds. No primary obsidian sources are located in Southeastern New Mexico. Primary sources in the state include the Jemez Mountains and Mount Taylor to the north-northwest, Gwynn Canyon, Red Hill, and Mule Creek to the northwest, and Antelope Hills in the west. All of these sources are hundreds of miles from the project area. Obsidian, however, does occur as a secondary source in gravels along the Rio Grande 200 miles to the west, washed downstream from the Jemez and Mount Taylor sources. Alibates chert, which is frequently found on Archaic and earlier sites on the Llano Estacado, is derived from the Alibates flint quarries north of Amarillo, Texas approximately 300 miles northeast of the project area. Direct procurement of obsidian from its secondary sources along the Rio Grande, and Alibates chert from its primary source in West Texas, would therefore require a significant investment of time and energy. Their presence in the Mescalero Plain region would therefore most likely result from trade and exchange with other prehistoric social groups during seasonal rounds. “Finger-print” chert, however, is present as a primary quarry source in San Andres Formation deposits approximately 75 miles west of the project area (Kremkau et al. 2013), and may be the only non-local lithic raw material that was acquired through direct procurement, although trade for this resource is also possible.

In the Testing and Data Recovery Plan, we proposed that a sample of obsidian artifacts would be subjected to X-Ray Florescence (XRF) analysis. XRF analysis determines the trace-elemental signature of obsidian, allowing individual specimens to be linked to known primary and secondary obsidian sources such as the Jemez Mountains and Rio Grande gravels, respectively. Determining the potential sources of obsidian artifacts allows for broader inferences about raw material acquisition strategies, mobility, and regional interaction. During our investigations, however, only three obsidian artifacts were recovered.
Obsidian was clearly not a preferentially targeted material type at the sites examined in this investigation, and therefore none of the limited number of recovered obsidian artifacts was subjected to XRF analysis.

**Lithic Attribute Analysis**

Analysis was completed using an “interpretation free” framework (Sullivan and Rozen 1985). More specifically, consistent and replicable attributes were recorded without making functional assumptions for each artifact, while functional interpretations were made statistically on the assemblage as a whole. As a result, functional categories such as “core-reduction flake” were not used, due to the difficulty in making such categories consistent. However, a limited number of functional categories were used to capture the variation within the assemblage, following Rozen’s (1984) distinction between intuitive and non-intuitive attributes. Some functional types such as “projectile points” are so intuitive they were used without compromising the reliability of the data. The analysis strategy relied mostly on the recording of interpretation-free attributes (e.g., length, width, thickness, weight), supplemented with a small number of functional categories that are either reliably intuitive (projectile points) or distinctive and necessary to capture the technological characteristics of the assemblage (e.g., bipolar flakes).

Debitage attribute analysis has been used successfully to identify the technological strategies and past behaviors that produced an assemblage (Andrefsky 2001). The following attributes were recorded for all pieces ofdebitage: material type, completeness, dimensions, weight, cortex, platform type, platform metrics (width and thickness), platform preparation, and dorsal scar count. Metric dimensions included length, width, thickness, and weight for all complete flakes and maximum dimension and weight for all fragments and angular debris. Length of complete flakes is defined as the dimension from proximal to distal margin regardless of whether it is the maximum dimension, and width is defined as the maximum measurement perpendicular to length. Completeness categories included complete flake, proximal fragment, medial fragment, lateral fragment, distal fragment, unidentified fragment, and angular debris. During data manipulation, non platform-bearing flakes (medial, lateral, distal fragments) were combined in an “other fragments” category, so that categories are consistent with those proposed by Sullivan and Rozen (1985).

For complete flakes, dorsal cortex was recorded in 25 percent intervals (0%, 1–25%, 26–50%, 51–75%, and 76–100%). Cortex was recorded on a presence/absence basis for fragments and angular debris, because the actual percentage of cortex on such pieces cannot be reliably determined. Platform type was recorded for all flakes retaining the point of impact (complete flakes and proximal fragments) using the following categories: single facet, multifacet, cortical, and crushed/collapsed. Any modification, preparation, or distinct characteristics of the platform (abrating, battering, lipping, flaking along the back of the platform, etc.) was also recorded. Platform metrics have been shown to be indicators of both the size and characteristics of the flake removed and the overall reduction strategy (Dibble 1997). In addition, any distinctive characteristic of the flake (e.g., evidence of burning) were recorded in a “comments” field. Attributes that failed to provide meaningful patterns were not discussed.

Cores were defined as non-tools with five or more flakes removed. Pieces with four or fewer intentional flake removals were classified as tested cobbles, nodules, or pieces. Core categories included bifacial, bipolar, unidirectional, bidirectional, or multidirectional (irregular). Parry and Kelly
(1987) note that the characteristics of cores within an assemblage can provide information on the nature of technological organization.

Flaked-stone tools may be formal or expedient. Formal tools exhibit evidence of their initial shaping and are distinguished from informal tools, such as utilized flakes, on the basis of facial flake scars that cover a significant portion of an artifact surface. Examples of formal tool types include projectile points, bifaces, and unifaces. A flake that exhibits evidence of retouch or utilization that does not extend across a significant portion of either surface is considered an informal tool. All artifacts that exhibited retouch or use wear were classified as tools. All artifacts were analyzed with a 10X lens, and only artifacts with definitive use wear clearly resulting from cultural use (rather than post-depositional or post-extraction processes) were included as tools.

A goal of the analysis program was to capture variation in both formal and expedient tool types. Because expedient technologies depend on the production of usable flake edges rather than formal tools, the tools produced rarely conform to traditional functional categories, often confounding analysis programs that assume a direct relationship between function and form or assume that specific tool types were consistently used for specific tasks. To that end, the current analysis employed a modified version of the retouched tool classification system designed by Rozen (1984), supplemented by the system used by Huckell (1988) for the classification of unretouched, utilized implements. These analysis systems classify tools by recording specific attributes of retouched and used edges on flakes or other pieces, such as the intensity, consistency, and extensiveness of the use or retouch, as well as specific characteristics of the used edge, to derive inferences regarding the selection of edges and general variability in the use of these tools.

The following attributes were recorded for all tools: completeness, cortex, length, width, thickness, weight, edge location, retouch type, edge type, edge angle, use/retouch extent, and use/retouch invasiveness. Edge angle was recorded for all expedient tools in 15 degree intervals (1–15°, 15–30°, and so on). When more than one edge was used or retouched, the more intensively used edge was recorded. When two or more edges were retouched or used fairly equally, the average angle of the two edges was recorded. Because edge angle has been shown to correlate with different types of use, it is an important attribute for the understanding of lithic technology. Generally, edges with higher (steeper) angles were used for scraping or planing, while lower edge angles are associated with cutting or slicing, although there is most likely considerable angle overlap between these functions.

**Groundstone Analysis**

Groundstone artifacts were collected on seven of the nine sites (LA 15901, 17041, 83680, 104182, 118318, 120949, and 120950). These tools were recovered in sufficient quantities to address the primary research themes of chronology/cultural affiliation, occupation history, site/feature function, subsistence, and mobility/social interaction. As discussed within the Research Design and Flaked-Stone Analysis sections, the organization of lithic technology is often framed in terms of expedient and curated strategies, each of which is associated with different mobility patterns (Bamforth 1986; Binford 1979). As an artifact class, groundstone does not fit as well within this framework because of an “anti-curation” bias resulting from severe limits on transport due to weight. Groundstone tools are almost always made...
from local materials and are discarded in, or near, the location in which they were used, regardless of the mobility strategies with which they are associated. Even so, site function, intensity, duration, and continuity influence groundstone design, wear, use, and discard in patterned ways (e.g., Adams 2002; Schlanger 1991). These links can be used to form expectations about the organization of groundstone technology and different occupation strategies.

Groundstone tools that are more “strategically designed” (Adams 2002:47), or ergonomic, are associated with more intensive use. A higher percentage of such tools are expected at sites that were either occupied for longer periods or repeatedly reoccupied over time. In addition, groundstone assemblages associated with such occupations are likely to include more unused tools and tools with moderate-to-heavy wear (or degree of grinding related to use in a specific task) than shorter-term occupations, which are expected to be associated with more lightly worn tools. Sites with short-term or limited occupations are expected to contain more groundstone tools associated with one, or a limited set, of activities, whereas long-term settlements are expected to contain groundstone associated with a wider range of activities. Occupation duration also influences groundstone discard patterns; in general, groundstone tools are likely to remain either in or near use contexts due to transport limits.

Grinding technology would have been utilized for the processing of both domesticated and wild plant resources. While the specific types of foods processed cannot be reconstructed from the morphology of grinding tools alone, other aspects of subsistence activities involving plant processing can be addressed, including grinding intensity. The research of Hard et al. (1996) suggests that variation in the grinding surface area is linked to the relative dietary dependence on the plants subject to processing. In general, surface area correlates positively with grinding capacity and energy expenditure. Therefore, both time investment and yield increase with tool surface area. Additionally, the intensity of grinding activities may be examined through the number of surfaces used on a particular tool and the degree of grinding (or wear) present.

Attributes included in the groundstone analysis are artifact type, material type, size, dimensional completeness, weight, shape in plan-view and cross-section, presence of burning, presence of residue, and characteristics of each worked surface. The identification of artifact type (mano, metate, etc.) generally followed the classificatory scheme of Adams (2002). Attributes recorded for each grinding surface on a tool included maximum length and width dimensions, the configuration or shape of the ground surface when observed in profile (“flat,” “concave,” “convex,” “irregular,” and “indeterminate”), the intensity or degree of grinding evident on the ground surface (“light,” “moderate,” or “heavy”), the orientation of the grinding surface relative to the long axis of the tool (“parallel,” “perpendicular,” or “indeterminate”), and evidence of intentional preparation of the surface through pecking. All data was entered into a Microsoft Access database and subjected to statistical analyses where appropriate.

**Faunal Analysis**

Only a limited amount of faunal remains (five bone fragments and four shell fragments) were found during excavation. These were found from three of the sites that form the cluster near Bear Grass Draw (LA 118318, 120949, and 120950). The bone fragments were too small to identify the animal type, although they most likely represent small mammals and the shell fragments most likely derived from freshwater
mollusks inhabiting the Pecos River or its tributaries, possibly even Bear Grass Draw. Due to the small size of the bone fragments and the overall sample size, additional detailed analysis was not undertaken.

ARCHAEOBOTANICAL ANALYSIS

Archaeobotanical analysis of material from the project involved flotation processing, full-sort analysis, and quantification. Samples were analyzed from all sites except for LA 104182 which did not yield features or resources appropriate for archaeobotanical analysis within the APE. The results of these analyses inform on questions concerning, or related to subsistence, such as identifying the plant resources utilized, seasonal land-use patterns, and site use.

As discussed within the General Field Methods chapter, fill from all feature segments was collected for flotation processing. Samples were processed by WSP and Parametrix personnel using a standard decant flotation system. The heavy fraction was water-screened and examined for the presence of lithic, ceramic, bone, or other artifacts. The light fraction was analyzed by an archaeobotanical specialist, Pam McBride. Identification of plant species was aided by the use of modern comparative collections and photographs in seed identification manuals. Additional information on archaeobotanical methodology is presented in the results chapter submitted by the specialist.

HUMAN BURIAL ANALYSIS

Human remains were not encountered during this undertaking; therefore, no analysis was performed.
CHAPTER 7: SITE-SPECIFIC RESULTS

During archaeological testing and data recovery, nine sites (LA 15901, LA 17041, LA 83680, LA 89659, LA 104182, LA 118318, LA 120949, LA 120950 and LA 137120) located within the APE were investigated. Effects to sites and site treatments are both related to the project APE. The APE was defined as a 20-ft wide buffer beyond the physical construction limits. If the construction buffer fell completely within the existing right-of-way, then the entire right-of-way was considered the APE.

LA 15901

General Site Summary

The following is a general site summary. It is based on the most recent update of the site (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 15901 is a medium-sized prehistoric artifact scatter containing two burned-caliche concentrations (Features 1 and 2). The site is located in an environment of active low parabolic dunes covered in shinnery oak and extends across both sides of US 82 (Figures 6 and 7). It is situated between LA 89659 to the west and LA 104182 to the east, in the eastern end of the project area (see Figure 4). Both features and most of the cultural material are located north of the existing right-of-way fence, outside the APE. A total of 72 artifacts were observed on the surface of the site during the most recent site update (Lawrence et al. 2015). Nearly all of these (n=56) were located within Artifact Concentration (AC) 1, which surrounds Features 1 and 2 north of the right-of-way fence. The assemblage was dominated by flaked-stone debitage (n=65). Raw material types included chert, chalcedony, obsidian, silicified wood, jasper, and quartzite. Other artifacts included two undifferentiated brownware sherds, one mano, one bifacial scraper, one core-tool, one core, and one utilized cobble. Based on the brownware sherds, the site was assigned an Early to Late Formative (A.D. 500–1450) cultural/temporal affiliation. The burned-caliche concentrations, along with the presence of a mano and bifacial tool, suggested that plant-processing activities likely occurred on site. Furthermore, the amount of flaked-stone debitage and variety of raw material types suggested that lithic reduction was also a prominent activity at LA 15901. The site was therefore interpreted as a temporary or repeatedly used encampment focused on resource procurement, processing, and lithic reduction.

Excavation Results

During the current testing and data recovery project, portions of LA 15901 falling within the project APE were excavated. As the 20-ft construction buffer was located entirely within the existing right-of-way, the full width of the right-of-way, fence line to fence line, was considered the APE within this site. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, feature excavations, and artifacts, are described below. Figure 8 depicts the locations of testing/data recovery investigations and findings at LA 15901 during the current investigation.
Figure 6 – LA 15901, north side of US 82, view to the east-northeast

Figure 7 – LA 15901, south side of US 82, view to the southeast towards the buried utility line
Figure 8 – LA 15901 planview map
Surface Collection

Due to the density of vegetation, no artifacts were observed on the surface of the site within the project APE. However, as noted above, numerous artifacts are located on the surface of the site outside the APE.

Test Unit Excavations

Four 1-by-1-m test units were excavated within the project APE at LA 15901. Summary data on test unit location, depth, and sediment matrix are presented in Table 2. All test units were placed within the US 82 right-of-way, three on the northern side of the highway and one on the southern side.

Due to the absence of surface artifacts and features within the project area, test units were placed at varying elevations atop or along the edges of parabolic dunes (Figure 9). The dunes had the highest potential to contain intact subsurface cultural deposits as shinnery oak stabilizes the landform by trapping aeolian sediment and preventing deflation (Hall and Goble 2006). Test units extended between 20 cm and 100 cm in depth. With the exception of TU 1, test units were terminated as sterile sediments were encountered and no artifacts or features were identified. Examination of the test-unit profiles and the geomorphological setting of the site indicated that hand-excavated 1-by-1-m test units were unlikely to encounter intact cultural horizons, as such horizons were likely over 1 m in depth below modern ground surface. Mechanical excavations were therefore implemented to better assess the likelihood of intact cultural deposits within the APE. No features were identified in any of the test units, and only two artifacts were recovered, both from TU 1.

Figure 9 – LA 15901, north side of US 82, view to the northeast with TU 3 in foreground
<table>
<thead>
<tr>
<th>TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifacts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 503 E 491</td>
<td>1 x 1</td>
<td>100</td>
<td>10</td>
<td>N/A</td>
<td>1 biface and 1 projectile point</td>
<td>Placed on top of a roughly east-west oriented parabolic dune; dune is situated within the US 82 northern right-of-way; Test Unit (TU) 1 was placed in this location to explore the depth of the dune and potential for subsurface cultural deposits; a biface was encountered in Level 5 and a projectile point in Level 10 (see Figure 14); unit was terminated after 10 levels for safety and upon determining that additional exploration was more feasible with mechanical excavation.</td>
</tr>
<tr>
<td>2</td>
<td>N 500 E 483</td>
<td>1 x 1</td>
<td>40</td>
<td>4</td>
<td>N/A</td>
<td>None</td>
<td>Placed halfway up a roughly east-west oriented parabolic dune; dune is situated within the US 82 northern right-of-way; TU 2 was placed to test for subsurface artifacts, features, and a living surface or A horizon; no artifacts or features were encountered during excavation; unit was terminated after 4 sterile levels; based on geomorphological observations of the surrounding area and the unit’s stratigraphy, it was determined that additional hand-excavated levels would be unlikely to encounter cultural horizons.</td>
</tr>
<tr>
<td>3</td>
<td>N 497 E 474</td>
<td>1 x 1</td>
<td>20</td>
<td>2</td>
<td>N/A</td>
<td>None</td>
<td>Placed at the base of a roughly east-west oriented parabolic dune; dune is situated within the US 82 northern right-of-way; TU 3 was placed to test for subsurface cultural deposits on the lowest part of the landform; no artifacts or features were encountered during excavation; unit was terminated after 2 sterile levels; based on geomorphological observations of the surrounding area and the unit’s stratigraphy, it was determined that additional hand-excavated levels would be unlikely to encounter cultural horizons.</td>
</tr>
<tr>
<td>4</td>
<td>N 463 E 519</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed on top of a low east-west oriented parabolic dune within the southern US 82 right-of-way; unit was placed to explore the potential of subsurface cultural deposits within the southern right-of-way and to assess the depth of the landform; no artifacts or features were encountered during excavation; unit was terminated after 3 sterile levels; based on geomorphological observations of the surrounding area and the unit’s stratigraphy, it was determined that additional hand-excavated levels would be unlikely to encounter cultural horizons.</td>
</tr>
</tbody>
</table>
**Mechanical Excavations**

Following hand excavation of the test units, two 54-by-6-m scrapes were excavated at LA 15901 within the APE: one on the northern side of the highway (Mechanical Scrape [MS] 1) and one on the southern side of the highway (MS 2). Both scrapes were excavated parallel to the highway. Both mechanically scraped areas exhibited potential disturbance from previous roadway maintenance and construction activities. The location of MS 2 was shifted to the west from its proposed location in the testing and data recovery plan. This shift occurred to avoid a buried utility line in the eastern portion of the site. The density of vegetation at LA 15901 also precluded the identification of surface features and artifacts. Therefore, MS 2 extended beyond the site boundary to investigate areas adjacent to the site for the presence of subsurface cultural deposits.

Both MS 1 and MS 2 were placed over shinnery oak-covered parabolic dunes. These dunes contained a thick stratum of consolidated fine to medium-grain yellowish red sand (5 YR 4/6). Two thermal features (Features 4 and 5) were discovered within the south-facing walls of MS 1 (see Figure 12), while Feature 3 was encountered during shovel scraping of the area surrounding Feature 4. These features were exposed between 1.0 and 1.2 m below the surface of the dunes at a similar depth, but did not occur at any distinct sediment transitions. The mechanical scrapes were terminated at a depth between 1.0 and 2.5 m below the dunes, depending on the size of the dune and depth of sterile sediment below the cultural horizon. Table 3 provides detailed information on the mechanical work completed.

<table>
<thead>
<tr>
<th>Mechanical Excavation</th>
<th>Location</th>
<th>Size</th>
<th>Dimensions</th>
<th>Features Encountered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 1</td>
<td>Central portion of site within right-of-way on north side of US 2</td>
<td>324 m²</td>
<td>54 m (NE-SW) by 6 m (NW-SE)</td>
<td>Features 3, 4 and 5</td>
</tr>
<tr>
<td>MS 2</td>
<td>Southeastern portion of site within right-of-way on south side of US 2</td>
<td>324 m²</td>
<td>54 m (NE-SW) by 6 m (NW-SE)</td>
<td>None</td>
</tr>
</tbody>
</table>

**Feature Excavations**

Three thermal features were discovered at LA 15901, all on the north side of the highway. Feature 3 was discovered during scraping of Feature 4 in MS 1, while Feature 5 was exposed several meters to the west in MS 1. Features 1 and 2 are previously recorded surface features located outside of the APE and were not treated during testing and data recovery. Table 4 presents summary data on the features subjected to data recovery investigations.
Feature 3

Feature 3 was located on the northern side of US 82 within the highway right-of-way at LA 15901. It was first identified as a charcoal stain in MS 1 during hand-scraping of the area surrounding Feature 4 (located 10 cm to the southeast). It was situated at local coordinate system elevation 99.59 (nearly the same elevation as Feature 4) approximately 100 cm below the surface of an overlying parabolic dune. Bioturbation from rodents and roots was apparent on the surface of the feature in the form of mottled sediment staining.

In planview, prior to excavation, the feature measured 60 cm (north-south) by 44 cm (east-west). After pre-extraction cleaning, mapping, and photography, the feature was bisected with trowels and other hand tools to expose its vertical morphology. A one-gallon flotation sample was collected from the northern half of the feature. Two one-gallon flotation samples and several large pieces of charcoal were also collected from the southern half. Feature 3 was basin-shaped in profile and measured 20 cm in maximum thickness. Following profile mapping and photography, the remainder of the feature was excavated. Its post-extraction dimensions were slightly larger than what was initially exposed in planview prior to excavation. The final dimensions of the feature were 66 cm (north-south) by 56 cm (east-west). Despite bioturbation, the feature maintained a consistent shape.

Feature fill consisted of 7.5 YR 2.5/2 (very dark brown) to 7.5 YR 2.5/1 (black) charcoal-rich sediments with substantial mottling from rodent and root disturbance, particularly in the northern half of the feature. The surrounding sediment matrix consisted of 7.5 YR 4/6 (strong brown) compact sands. Macrobotanical analysis revealed charred mesquite remains and radiocarbon analysis on these remains produced calibrated dates of 520–380 B.C. (94.2% probability) and 540–530 B.C. (1.2% probability) (Figure 10). These dates suggest that Feature 3 was used during the Late Archaic period prior to the use of Feature 4, and the features are not contemporaneous despite their proximity and matching depth. Based on the depth, consistency, and composition of the feature fill, Feature 3 likely functioned as a hearth.

![Figure 10 - Calibrated two-sigma date range of Feature 3 at LA 15901; 540–530 B.C. (1.2% probability); 520–380 B.C. (94.2% probability)]](image)
**Feature 3**

**Hearth**

LA 15901

**GRID:** N 505.22, E 492.27  
**UTM:** N 3632170, E 608100

<table>
<thead>
<tr>
<th>PLAN VIEW SHAPE</th>
<th>OVOID</th>
<th>PROFILE SHAPE</th>
<th>BASIN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLANVIEW DIMENSIONS (cm)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE-EXCAVATION: 60 (N-S) x 44 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST-EXCAVATION: 66 (N-S) x 56 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOP ELEVATION:** 99.59  
**BOTTOM ELEVATION:** 99.39  
**PROFILE THICKNESS:** 20 cm

**ASSOCIATED FS#s:** 4, 9, 10  
**SAMPLES COLLECTED:** FLotation, Charcoal

**ASSOCIATED TUs/Mechanical Scrapes:** MS 1  
**PHOTO NUMBERS:** GM1 (121, 124, 127, 140-142)

**DATE EXCAVATED:** 03 June 2016  
**EXCAVATOR(s):** Greg Mastroiopietro, Jessica Alden
Feature 4

Feature 4 was originally identified as a charcoal stain within the northern highway right-of-way. It was initially exposed in the southern wall of MS 1 within a large east-west trending dune and a large strong brown (7.5 YR 4/6) aeolian sand stratum. The feature was partially truncated by the backhoe and first appeared as basin-shaped in profile, measuring 60 cm in length by 30 cm in height. It was only partially definable and appeared damaged by bioturbation.

After the profile was drawn and photographed, overburden sediments were removed but not screened until approximately 10 cm above the features. The remaining 10 cm of overburden was removed by careful hand shovel scraping and troweling and screened through 1/8-inch wire mesh. At 99.95 m local elevation, a small, circular patch of dense charcoal staining appeared. This was likely the result of a rodent burrow that had carried charcoal upward from the feature. The top of the feature was delineated at 99.63 m elevation. It appeared as ovoid in shape and measured 42 cm in length by 30 cm in width. After pre-excavation cleaning, mapping, and photography, Feature 4 was excavated by trowel, and a one gallon flotation sample was collected from the remainder of the feature (i.e., the half that remained intact after backhoe scraping). During feature excavation, it became clear that the feature had been heavily impacted by bioturbation, resulting in very dark brown (7.5 YR 2.5/2) feature fill mottled with areas of black (7.5 YR 2.5/1) sediment. Despite these impacts, the feature retained its basin shape and was clearly cultural in origin. Following complete excavation, Feature 4 measured 46 cm in length, 33 cm in width, and 16 cm in thickness, with beginning and ending elevations of 99.63 and 99.47 m, respectively.

Macrobotanical analysis revealed charred mesquite remains and non-cultural legume seeds while radiocarbon analysis on charcoal collected from the feature fill produced calibrated dates of 390–350 B.C. (31.3% probability) and 320–200 B.C. (64.1% probability) (Figure 11). These dates suggest that the feature was utilized in the Late Archaic period approximately 400 years after the use of Feature 3.

![Calibrated two-sigma date range of Feature 4 at LA 15901](image)

**Figure 11 –** Calibrated two-sigma date range of Feature 4 at LA 15901; 390–350 B.C. (31.3% probability); 320–200 B.C. (64.1% probability)
**Feature 4**

**Hearth**

<table>
<thead>
<tr>
<th>Grid:</th>
<th>UTM:</th>
<th>Plan View Shape:</th>
<th>Profile Shape:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N 504.55, E 492.58</td>
<td>N 3632170, E 608101</td>
<td>Ovoid</td>
<td>Basin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planview Dimensions (cm)</th>
<th>Top Elevation:</th>
<th>Bottom Elevation:</th>
<th>Profile Thickness:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Evacuation: 42 (N-S) x 30 (E-W)</td>
<td>99.63</td>
<td>99.47</td>
<td>16 cm</td>
</tr>
<tr>
<td>Post-Evacuation: 46 (N-S) x 33 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Evacuation**

- Mottled Sediment
- Dark Charcoal Staining
- Feature Fill

**Profile**

- Mechanically Scraped Surface (Elev. 100.27)
- Feature Fill: 7.5 YR 2.5/1 black
- Feature Fill: 7.5 YR 2.5/2 very dark brown
- Aeolian sand: 7.5 YR 4/6 strong brown

**Post-Evacuation**

- Roots

**Associated FS#s:** 3  
**Samples Collected:** Flotation, Charcoal  
**Associated TUs/Mechanical Scrapes:** MS 1  
**Photo Numbers:** GM1 (109-110, 114-116, 121, 124, 127)  
**Date Excavated:** 03 June 2016  
**Excavator(s):** Jessica Alden
Feature 5

Feature 5 was located on the northern side of US 82 partially within the right-of-way immediately south of the fence line. It was first identified as a charcoal stain on the southeast-facing wall of MS 1. It appeared in profile at local elevation 100.31, approximately 1.2 meters below the top of a shinnery oak-covered dune. The entire mechanically scraped wall, from modern ground surface to feature, was photographed and illustrated before excavation. Sediments immediately surrounding the feature were discolored, and a very well-defined, natural stratigraphic change was evident (see stratum II in Figure 12) east of the feature. The stratigraphic change was determined to be a lens of sterile sediment brought in by a high-energy flood episode. Stratigraphic evidence of the flood event was not identified in other portions of the site. In planview, only the south half of the feature was exposed, as the north half was covered by the intact portion of the shinnery oak-covered dune.

Prior to excavation, the feature measured 18 cm (northwest-southeast) by 45 cm (northeast-southwest). A rodent burrow cut through the bottom of the northern portion of the feature, and two large shinnery oak roots were encountered in the center. The proximity of the feature to the right-of-way fence prevented mechanical excavations from fully exposing the feature. Hand excavation therefore extended into the trench wall to fully expose Feature 5. A one-gallon sample of feature fill was collected from each half of the feature for flotation analysis. Upon completion of excavation, the feature measured 46 cm (northwest-southeast) by 33 cm (northeast-southwest) by 16 cm in depth.

The hearth itself had very dark grey (7.5 YR 3/1) charcoal-rich fill, which easily transitioned into mottled sediment. Radiocarbon dates and macrobotanical samples were not obtained for this feature as the testing and data recovery plan proposed to obtain dates from only a sample of features. The feature’s age and possible association with Features 3 and 4 remains unknown. The shape, depth, consistency, and composition of the feature fill suggest that Feature 5 functioned as a hearth.
**LA 15901**

**FEATURE 5**

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 504.09, E 481.06</th>
<th>UTM: N 3632164, E 608091</th>
<th>Plan View Shape: Circular</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planview Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 99.74</strong></td>
<td><strong>Bottom Elevation: 99.40</strong></td>
<td><strong>Profile Thickness: 16 cm</strong></td>
</tr>
<tr>
<td>Pre-Excavation: 18 (NW-SE) x 45 (NE-SW)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 46 (NW-SE) x 33 (NE-SW)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Excavation**

**Profile**

- Overburden
- Feature Extends
- Smear
- Charcoal Flecking
- Dark Charcoal

- Roots
- Mottled Areas
- Unexcavated

- I - Aeolian Sand; 7.5 YR 5/4 brown
- II - Fine-grained sand, possibly alluvial deposit; 5 YR 5/6 yellowish red
- III - Medium to fine-grained sand; 7.5 YR 5/4 brown
- IV - Feature Fill; 7.5 YR 2.5/2 very dark brown
- V - Feature Fill; 7.5 YR 2.5/1 black

**Post-Excavation**

**Samples Collected:** Flotation, Charcoal

**Associated FS#:** 6, 7, 8

**Associated TUs/Mechanical Scrapes:** MS 1

**Date Excavated:** 03 June 2016

**Excavator(s):** Greg Mastropietro
Figure 12 – MS 1 north wall and Feature 5 profile
<table>
<thead>
<tr>
<th>Feature No.</th>
<th>Grid Location</th>
<th>UTM Location (NAD83 13N)</th>
<th>Feature Type</th>
<th>Depth to Top of Feature (cm bgs)</th>
<th>Planview Shape</th>
<th>Planview Dimensions (cm)</th>
<th>Profile Shape</th>
<th>Profile Thickness (cm)</th>
<th>Samples &amp; Artifacts Collected</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>N 505.22 E 492.27</td>
<td>N 3632170 E 608100</td>
<td>Hearth</td>
<td>Mechanically scraped surface ~100 cm bgs</td>
<td>Ovoid</td>
<td>66 (N-S) by 56 (E-W)</td>
<td>Basin</td>
<td>20</td>
<td>Flotation; Charcoal</td>
<td>Hearth with black, charcoal-rich sediments; mottled due to rodent and root disturbance; no burned caliche observed; charred mesquite; no artifacts; approximately 10 cm northwest of Feature 4; radiocarbon dates of 540–380 B.C.</td>
</tr>
<tr>
<td>4</td>
<td>N 504.55 E 492.58</td>
<td>N 3632170 E 608101</td>
<td>Hearth</td>
<td>Mechanically scraped surface ~100 cm bgs</td>
<td>Ovoid</td>
<td>46 (N-S) by 33 (E-W)</td>
<td>Basin</td>
<td>16</td>
<td>Flotation; Charcoal</td>
<td>Hearth with black, charcoal-rich sediments, but not as dense as Feature 3; very mottled due to rodent and root disturbance; no burned caliche observed; charred mesquite and uncharred legume seeds; no artifacts; approximately 10 cm southeast of Feature 3; radiocarbon dates of 390–200 B.C.</td>
</tr>
<tr>
<td>5</td>
<td>N 504.09 E 481.06</td>
<td>N 3632164 E 608091</td>
<td>Hearth</td>
<td>Mechanically scraped surface ~120 cm bgs</td>
<td>Circular</td>
<td>46 (NW-SE) by 33 (NE-SW)</td>
<td>Basin</td>
<td>16</td>
<td>Flotation; Charcoal</td>
<td>Hearth with black, charcoal-rich sediments; some mottling due to rodent and root disturbance; no burned caliche observed; no artifacts; one fragmented small sandstone groundstone tool was recovered during shovel scraping approximately 5 m south of the feature.</td>
</tr>
</tbody>
</table>
Artifacts

Three lithic tools were recovered from LA 15901 during data recovery investigations, including one biface, one projectile point, and one groundstone tool fragment. The biface and projectile point were each recovered from TU 1, while the groundstone tool fragment was encountered 5 m east of Feature 5 during excavation of MS 1. No flaked-stone debitage, ceramics, or other artifacts were encountered or collected during testing/data recovery activities at LA 15901.

The biface was manufactured from semi-translucent red chert, and likely functioned as a side scraper with both lateral edges exhibiting parallel bifacial pressure flaking (Figure 13). It is a mid- to late-stage non-cortical biface measuring 35.18 by 25.28 by 7.91 mm.

![Figure 13 – Bifacially worked red chert side scraper](image)

The projectile point is likely a variant of the Pueblo Side-notched point type dating from A.D. 1150–1500 (Justice 2002:298) (Figure 14). It measured 14.9 by 10.6 by 2.0 mm and appears to have been manufactured from a small, tan chert flake exhibiting a limited degree of flake-scarring on its interior surface.

![Figure 14 – Tan chert projectile point (probable Pueblo Side-notched variant with concave base)](image)

The groundstone tool was broken into two small fragments of reddish-brown sandstone, representing the medial portion of the original tool (Figure 15). The object was lightly and unifacially ground on one flat surface exhibiting minor striations. It likely functioned as either a one-hand mano or multipurpose grinding tool measuring 73.1 by 36.9 by 16.2 mm.
Site Synthesis

The testing and data recovery plan outlined various research domains to help guide investigations at LA 15901. These domains inquired about the cultural/temporal affiliation of the site, its occupational history, and subsistence strategies. To address the various questions proposed under these domains, we acquired radiocarbon dates from two of the three features (Feature 3 and Feature 4). These radiocarbon assays returned calibrated dates of 520–380 B.C. (94.2%) and 540–530 B.C. (1.2%) for Feature 3, and 390–350 B.C. (31.3%) and 320–200 B.C. (64.1%) for Feature 4. Although Feature 3 and Feature 4 were located at the same elevation, and within close proximity to each other (Figure 16), they appear to have been utilized at different times based on the radiocarbon dates. The probable Pueblo Side-notched point, recovered from TU 1 and discovered at a similar depth in close proximity to these features, is not contemporaneous with either feature. The point was likely displaced from its original location by rodent activity, and shares overlapping dates with the two brownware sherds recorded on the site surface during survey. The radiocarbon dates, Pueblo Side-notched point, and brownware sherds suggest that the LA 15901 site area was continuously used over generations from the Late Archaic through the Late Formative periods. Likely, the area contained a stable surface throughout this duration. This would account for the similar depth at which the features and artifacts were encountered. Post-occupational processes such as alluviation and aeolian sand deposition later buried these deposits.
Other research domains focus on site feature function as well as subsistence activities. The three features excavated during this investigation, along with the two burned-caliche concentration features identified during survey, were likely used for food processing. This would be consistent with the groundstone tool fragment recovered near Feature 5, which attests to resource processing. Additionally, macrobotanical analysis of fill from Features 3 and 4 revealed charred mesquite wood from both features and non-cultural legume seeds from Feature 4. Based on the feature functions, feature dates, and presence of Formative-period artifacts, it is likely that the site was visited seasonally over generations to acquire and process various resources. However, evidence of which resources were acquired and processed was not readily apparent from the available data. All recovered lithic raw materials could be locally acquired from residual gravels throughout the Mescalero Plain, and no non-local lithic raw materials were recovered. This small sample therefore precludes broader inferences regarding mobility and interregional cultural interactions such as trade or exchange.

Our final research domain proposed to analyze post-occupational effects on features. At LA 15901, no features were observed on the surface of the site within the APE. However, three features were encountered in MS 1 over 1.0 m below modern ground surface. This suggests that the absence of surface artifacts or features is not an accurate indicator of feature presence, let alone feature size and
morphology. Furthermore, post-occupational sediment deposition appears to protect features from adverse impacts such as erosion, deflation, and other disturbances. Finally, the presence of these buried features is a strong indicator that additional subsurface deposits are likely present but buried in other portions of the site.

**Site Specific Questions**

In addition to the broader research domains discussed above, two site-specific research questions were asked:

1) Two ceramics were identified on the surface of the site. Are these associated with a specific Formative occupation, or are they incidental deposits? (*Research Domain 1*)

2) Two features were identified on the surface of the site, both of which were outside the APE. Are intact features present within the APE? If so, what types of features are present? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? (*Research Domains 1, 2, 3, 4, and 6*)

No ceramics were recovered during the current investigation. However, one probable Pueblo Side-notched projectile point was encountered. The projectile point dates to the Late Formative period (A.D. 1150–1500) and is generally contemporaneous with the undifferentiated brownware sherds identified at LA 15901 during survey. The point was likely displaced from its original location by rodent activity.

Three intact subsurface features were identified within the project APE over 1.0 m below modern ground surface. Two of these features (Features 3 and 4) date to the Late Archaic period, although they do not appear to have been contemporaneously utilized. The third feature (Feature 5) has not been dated, but likely post-dates the other features given its higher stratigraphic depth. As stated above, the site appears to have been repeatedly utilized as resource procurement and processing encampment throughout the Archaic, Early Formative, and Late Formative periods. The portion of the site investigated during testing and data recovery activities is too narrow to allow for a robust examination of intra-site structure, and additional investigations outside of the US 82 right-of-way would be necessary to develop a more complete picture layout as it might relate to the various occupations that occurred at LA 15901.

Macrobotanical analysis of the flotation sample revealed evidence of charred mesquite in Features 3 and 4 as well as un-charred (non-cultural) legume seeds in Feature 4. Based on this information, behavioral inferences are difficult beyond the fact that mesquite wood was utilized for fuel.

**Final Recommendations**

LA 15091 was previously determined eligible for listing in the NRHP for its information potential. Two features and one artifact concentration were recorded during the pedestrian survey as being outside the APE. No surface artifacts or features were located within the APE for the proposed undertaking. Test unit excavation and mechanical scraping were undertaken to determine whether any features were present, or had the potential to be present, within the APE. Three of the four hand-excavated test units (TUs 2, 3, and 4) were entirely sterile, lacking features, artifacts, charcoal staining or flecking, or burned
caliche. One test unit (TU 1) contained a biface and a complete projectile point. Mechanical scraping of the southern portion of the right-of-way exposed neither cultural horizon nor features. Scraping in the northern portion of the right-of-way revealed a cultural horizon containing three thermal features and a small fragmented groundstone tool.

The information potential of the portion of the site within the APE has been fully recovered according to the methods proposed in the testing and data recovery plan as well as the standards outlined in NMAC 4.10.16.12. However, the site extends both north and south of the APE, where two surface features, one artifact concentration, and numerous surface artifacts are present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain eligible. The APE defined for the current undertaking at this site is limited to within the existing US 82 right-of-way, and it is anticipated that any remaining deposits that contribute to the site’s information potential are located outside the APE. It is therefore recommended that all ground-disturbing activities, construction equipment, and personnel be confined to within the existing right-of-way, and that the portions of the site outside the APE be avoided by all activities associated with the undertaking. However, if any intact cultural deposits not identified in this study are uncovered during construction, work should cease immediately and NMDOT, BLM, and SHPO should be notified.
LA 17041

General Site Summary

The following is a general site summary. It is based on the most recent update of the site (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 17041 is a large prehistoric artifact scatter with 18 fire-related features, located on a west-sloping terrace overlooking Bear Grass Draw to the west within an undulating, mesquite dominated, parabolic and coppice dune environment (Figures 17 and 18). The majority of the surface cultural material and features are exposed within interdunal deflated basins and erosional blowouts, with some artifacts and features eroding out of the sides and tops of dunes. The site has been partially disturbed by a buried utility line and an overhead electrical transmission line, both of which parallel the highway in the southern portion of the site.

LA 17041 is located on the northeastern end of a cluster of four sites investigated during this undertaking, which also includes LA 118318, LA 120949 and LA 120950 (see Figures 2 and 19). These four sites have been separated by modern impacts with LA 17041 located less than 15 meters east of LA 120950, separated by a bladed two track. LA 120949 is approximately 80 meters west of LA 120950, disconnected by a low-lying deflated area that has been heavily impacted by oil and gas exploration. LA 118318 is located south of US 82 and parallels all three of the sites (LA 17041, 120949 and 120950) on US 82’s north side. It is likely these sites represent continuous land-use over an extended period of time within the larger cultural landscape made up of over a dozen nearby sites that surround the Bear Grass Draw area.

Over 1,000 artifacts were observed on the surface of LA 17041. The burned caliche and the lithic artifacts suggested that plant-processing activities likely occurred on site. Furthermore, the amount of flaked-stone debitage and variety of raw material types suggested that lithic reduction was also a prominent activity at LA 17041. The site was therefore interpreted as having functioned as a temporary or repeatedly used encampment focused on resource procurement, processing, and lithic reduction.

Excavation Results

During the current testing and data recovery project, portions of LA 17041 falling within the project APE were excavated. At LA 17041, the APE extends 10 to 20 ft beyond the northern right-of-way fence. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, feature excavations, and artifacts, are described below. See Figure 20 for the specific locations of these activities.
Figure 17 – LA 17041, view to the northwest

Figure 18 – LA 17041, view to the southwest, AC 1 in the foreground
Figure 19 – Map showing proximity of LAs 17041, 118318, 120949, and 120950
Figure 20 – LA 17041 planview map
Surface Collection

Prior to any subsurface testing, all artifacts located on the ground surface of the site within the APE were systematically flagged and collected. These artifacts were point provenienced by GPS and assigned UTM coordinates and individual FS numbers. When appropriate, groups of surface artifacts were collected under the same FS number when located within an area measuring less than 10 cm², or within a similar context (e.g., microdebitage from an isolated ant mound). The distribution and density of surface artifacts guided the subsequent placement of test units, and comprise a spatial and artifactual data set that more broadly informs on patterns of cultural activity along Bear Grass Draw. A total of 19 artifacts were collected from the surface of the site. This assemblage includes 14 pieces of flaked-stone debitage, two ceramics, two groundstone tool fragments, and one projectile point (Figure 21). Artifacts recovered from the surface represent approximately 35 percent of the overall assemblage recovered from LA 17041.

![Figure 21 – Possible reworked and re-sharpened Tularosa Corner-notched projectile point (100 B.C. to A.D. 900) (Justice 2002:216–226) from surface of LA 17041](image)

Test Unit Excavations

Three 1-by-1-m test units were excavated at LA 17041 within the APE. Summary data on test unit location, depth, sediment matrix, feature identification, and recovered artifacts is presented in Table 5. To increase the probability of finding subsurface cultural material, test units were placed specifically in areas with high surface artifact density or burned caliche. Test units extended between 30 cm and 62 cm in depth. Units were terminated as sterile sediments were encountered. A total of 27 artifacts were collected during test unit excavation, all typically from within the first two levels of the units; however, TU 3 contained artifacts into Level 4. No features were identified within any of the test units.
### Table 5 – Summary of Test Units Excavated at LA 17041

<table>
<thead>
<tr>
<th>TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifacts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 990 E 1138.5</td>
<td>1 x 1</td>
<td>42</td>
<td>4</td>
<td>N/A</td>
<td>9 pieces of flaked stone</td>
<td>Placed on the southern edge of a mesquite-anchored coppice dune at AC 1 near the eastern end of the site; dune is situated outside of the US 82 right-of-way but within the APE; TU 1 was placed in this location due to the presence of surface artifacts and to explore the depth of the dune and the potential for subsurface cultural deposits; 4 total levels were excavated, with all artifacts coming from Levels 1 and 2; unit was terminated after 2 sterile levels and the presence of caliche.</td>
</tr>
<tr>
<td>2</td>
<td>N 990 E 1130</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>N/A</td>
<td>4 pieces of flaked stone and 1 ceramic</td>
<td>Placed near AC 1, at the eastern end of the site outside of the US 82 right-of-way but within the APE; TU 2 was placed in this location to explore the potential for subsurface cultural deposits; unit was terminated after 3 levels due to the absence of an A horizon and the presence of caliche.</td>
</tr>
<tr>
<td>3</td>
<td>N 989 E 1036</td>
<td>1 x 1</td>
<td>62</td>
<td>4</td>
<td>N/A</td>
<td>8 pieces of flaked stone and 5 ceramics</td>
<td>Placed on the southern edge of a mesquite-anchored coppice dune near the western end of the site. The dune is situated outside of the US 82 right-of-way but within the APE; TU 3 was placed in this location due to the presence of surface artifacts and burned caliche, and to explore the depth of the dune and the potential for subsurface cultural deposits; unit was terminated after 4 levels when disturbance from a buried utility line was encountered.</td>
</tr>
</tbody>
</table>
Mechanical Excavations

Mechanical scraping at LA 17041 occurred within the US 82 right-of-way, as designated by the testing and data recovery plan. The scraped areas both measured 2.5 m (north-south) by 24 m (east-west) and averaged 150 cm in depth. This area exhibited potential disturbances from previous roadway maintenance and construction activities; with buried utilities being located immediately north of the right-of-way fence. The first 20-25 cm of MS 1 contained a layer of loose aeolian sand (10 YR 5/6) overlying an inconsistent A horizon that varied in presence and depth throughout. This prehistoric A horizon was consistent in composition to the A horizon observed at LA 118318; however, it was absent in MS 2 (Figure 22). Both scrapes had an approximately 80-cm-thick layer of reddish, compact paleosol below the loose aeolian sand and/or A horizon. This paleosol layer rested on caliche bedrock. Two thermal features (Features 19 and 20) were encountered in MS 1 near the interface of the paleosol. Table 6 provides detailed information on the mechanical work completed.

Figure 22 – MS 2 north wall profile
Table 6 – Detailed Summary of Mechanical Scrapes at LA 17041

<table>
<thead>
<tr>
<th>Mechanical Excavation</th>
<th>Location</th>
<th>Size</th>
<th>Dimensions</th>
<th>Features Encountered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 1</td>
<td>Western portion of site within right-of-way</td>
<td>60 m²</td>
<td>2.5 m (N-S) by 24 m (E-W)</td>
<td>Features 19 and 20</td>
</tr>
<tr>
<td>MS 2</td>
<td>Eastern portion of site within right-of-way</td>
<td>60 m²</td>
<td>2.5 m (N-S) by 24 m (E-W)</td>
<td>None</td>
</tr>
</tbody>
</table>

**Feature Excavations**

Two newly identified thermal features were encountered during mechanical scraping at LA 17041. A previously identified artifact concentration (AC 1) and feature remnant encountered during survey were located outside of the APE for this undertaking and were not investigated. Table 7 presents summary data on the features subjected to data recovery investigations. A total of eight artifacts were collected during feature excavations. Feature Nos. 1–18 are located outside of the APE for this project and are not discussed further in this document.
Feature 19

Feature 19 was a circular charcoal stain located within the US 82 right-of-way just south of the fence line and 5 m north of the highway. The feature was discovered in the north wall of MS 1 about 20 cm west of Feature 20. The feature exhibited leaching and mottling from bioturbation. Approximately 30 cm of overburden was covering the surface of the feature.

Prior to excavation, the feature measured 55 cm (north-south) by 70 cm (east-west) and had a top elevation of 199.97. The overburden sediment was removed with a shovel and the feature was excavated by trowel without bisection, as the profile was visible in the wall of MS 1. In profile, the feature was basin shaped with a maximum depth of 22 cm. Two gallon-sized bags of feature fill were collected for flotation and the remaining sediment was screened through 1/8-inch wire mesh. Post-exavation measurements were 40 cm (north-south) by 50 cm (east-west) with a bottom elevation of 199.75.

Feature fill appeared as a dark brown (7.5 YR 3/4) stain with charcoal flecking throughout its matrix. No artifacts were discovered within the fill although five ceramics and three pieces of flaked-stone debitage were recovered from the feature overburden less than 10 cm below modern ground surface. A radiocarbon assay of charcoal collected from the feature fill dated the feature between A.D. 780–790 (5.5% probability), A.D. 800–850 (11.3% probability), and A.D. 860–980 (78.6% probability) (Figure 23). Macrobotanical analysis of the flotation sample indicated charred goosefoot seeds and mesquite were present within the sample matrix. Based on this analysis, Feature 19 is interpreted to be a prehistoric hearth most likely dating between A.D. 860 and A.D. 980.

*Figure 23 – Calibrated two-sigma date range of Feature 19 at LA 17041; A.D. 780–790 (5.5% probability); A.D. 800–850 (11.3% probability); A.D. 860–980 (78.6% probability)*
FEATURE 19
Hearth

**LA 17041**

**GRID:** N 986.28, E 1040.8  
**UTM:** N 3631852, E 588383

<table>
<thead>
<tr>
<th>PLAN VIEW DIMENSIONS (cm)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRE-EXCAVATION:</strong> 55 (N-S) x 70 (E-W)</td>
<td></td>
</tr>
<tr>
<td><strong>POST-EXCAVATION:</strong> 40 (N-S) x 50 (E-W)</td>
<td></td>
</tr>
</tbody>
</table>

| **PLAN VIEW SHAPE:** CIRCULAR |  |
| **PROFILE SHAPE:** BASIN |  |

| **TOP ELEVATION:** 199.97 |  |
| **BOTTOM ELEVATION:** 199.75 |  |
| **PROFILE THICKNESS:** 22 cm |  |

**ASSOCIATED FS#s:** 23  
**SAMPLES COLLECTED:** FLATON, CHARCOAL, FLAKED STONE, CERAMIC

**ASSOCIATED TUS/Mechanical Scrapes:** MS 1  
**PHOTO NUMBERS:** PMX 1 (2017-2020)

**DATE EXCAVATED:** 8 July 2016  
**EXCAVATOR(s):** JOSHUA VALLEJOS
Feature 20

Feature 20 was a charcoal stain encountered at the western end of MS 1. It was found in the northern wall of the scrape/trench just south of the right-of-way fence line and 5 m north of the roadway prism. The feature was discovered about 20 cm east of Feature 19. The southeast portion of Feature 20 was damaged by mechanical excavation. The feature exhibited leaching and mottling from bioturbation. Approximately 30 cm of overburden was covering the surface of the feature.

In planview, it appeared as a black ovoid stain with charcoal flecking throughout its matrix. Prior to excavation, the feature measured 30 cm (north-south) by 30 cm (east-west) and had a top elevation of 199.96. The overburden sediment was removed with a shovel and the feature was excavated by trowel without bisection, as the feature had already been disturbed by mechanical excavation. Two gallon-sized bags were collected for flotation and the remaining sediment was screened through 1/8-inch wire mesh. Post-excavation measurements were 40 cm (north-south) by 40 cm (east-west) with a bottom elevation of 199.81.

The feature fill was a dark (7.5 YR 2.5/1) and charcoal-rich sand. No artifacts were discovered. A radiocarbon assay of charcoal collected from the feature fill dated the feature between A.D. 780–790 (1.7% probability), A.D. 810–840 (1.9% probability), and A.D. 860–1000 (91.8% probability) (Figure 24). Macrobotanical analysis of the flotation sample indicated charred goosefoot seeds, yucca caudex, and mesquite were present within the sample matrix. Based on this analysis, Feature 20 is interpreted to be a prehistoric hearth most likely dating between A.D. 860–1000.

Figure 24 – Calibrated two-sigma date range of Feature 20 at LA 17041; A.D. 780–790 (1.7% probability); A.D. 810–840 (1.9% probability); A.D. 860–1000 (91.8% probability)
### Feature 20

**Hearth**

<table>
<thead>
<tr>
<th>Grid:</th>
<th>UTM:</th>
<th>Plan View Shape:</th>
<th>Profile Shape:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N 986.03, E 1041.43</td>
<td>N 3631852, E 588384</td>
<td>Ovoid</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Plan View Dimensions (cm):**

- **Pre-Excavation:** 30 (N-S) x 30 (E-W)
- **Post-Excavation:** 40 (N-S) x 40 (E-W)

**Top Elevation:** 199.96

**Bottom Elevation:** 199.81

**Profile Thickness:** N/A

**Associated FS#s:** 24

**Associated TUs/Mechanical Scrapes:** MS 1

**Date Excavated:** 8 July 2016

**Samples Collected:** Flotation, Charcoal

**Excavator(s):** Joshua Vallejos, Steven Gilbert

**Photo Numbers:** PMX 1 (2021-2024)
Table 7 – Summary of Features Excavated at LA 17041

<table>
<thead>
<tr>
<th>Feature No.</th>
<th>Grid Location</th>
<th>UTM Location (NAD83 13N)</th>
<th>Feature Type</th>
<th>Depth to Top of Feature (cm bgs)</th>
<th>Planview Shape</th>
<th>Planview Dimensions (cm)</th>
<th>Profile Shape</th>
<th>Profile Thickness (cm)</th>
<th>Artifacts/Samples Collected</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>N 986.28 E 1040.8</td>
<td>N 3631852 E 588383</td>
<td>Hearth</td>
<td>30</td>
<td>Circular</td>
<td>40 (N-S) by 50 (E-W)</td>
<td>Basin</td>
<td>22</td>
<td>Flotation; Charcoal; Artifacts from overburden</td>
<td>Hearth with charcoal-rich sediments; no burned caliche observed; artifacts collected from overburden; macrobotanical analysis indicated charred goosefoot seeds and mesquite; radiocarbon dates between A.D. 780 and 980.</td>
</tr>
<tr>
<td>20</td>
<td>N 986.03 E 1041.43</td>
<td>N 3631852 E 588384</td>
<td>Hearth</td>
<td>30</td>
<td>Ovoid</td>
<td>40 (N-S) by 40 (E-W)</td>
<td>N/A</td>
<td>N/A</td>
<td>Flotation; Charcoal</td>
<td>Hearth with charcoal-rich sediments; no burned caliche observed; no artifacts; macrobotanical analysis indicated charred goosefoot seeds, yucca caudex, and mesquite; radiocarbon dates between A.D. 780 and 1000.</td>
</tr>
</tbody>
</table>
**Artifacts**

A total of 54 artifacts were recovered from LA 17041 during data recovery investigations, including 38 pieces of flaked-stone debitage, 13 ceramics, two groundstone tools, and one projectile point. Approximately 35 percent (n=19) of these artifacts were collected from the surface of the site within the APE, indicating that the majority of artifacts at LA 17041 are buried. Raw material types among the debitage include chert (n=26), chalcedony (n=3), quartzite (n=4), rhyolite (n=4), and basalt (n=1). Chert is clearly the dominant material type, with colors including tan (n=7), orange (n=4), light gray (n=3) gray (n=4), brown (n=3), white (n=1), black (n=2), pink (n=1), and red (n=1). Ceramic artifacts observed include El Paso Brownware (A.D. 400–1450) and Jornada Brownware (A.D. 520–1400) sherd. Tools include two indeterminate sandstone groundstone fragments and one projectile point. The projectile point was determined to most likely be a reworked and re-sharpened Tularosa Corner-notched projectile point (100 B.C. to A.D. 900) (Justice 2002:216-226) produced from chert.

**Site Synthesis**

The Research Design section of this report outlined several research domains and questions to help guide the investigations. Two of these domains inquire about the cultural/temporal affiliation of the site and its occupational history. To address the various questions proposed under these domains, we acquired radiocarbon dates from two of the features (Feature 19 and Feature 20). The radiocarbon assay for Feature 19 returned dates ranging from A.D. 780 to 980, while Feature 20 ranged from A.D. 780 to 1000. These overlapping dates suggest that the two features are contemporaneous. These dates also overlap with the later portion of the production period of Tularosa Corner-notched projectile points (100 B.C. to A.D. 900). The 13 ceramics are El Paso and Jornada brownwares, which also date to this general time frame. With the possible exception of the Tularosa Corner-notched projectile point, there is no indication of Archaic period habitation within the portion of the site that falls within the APE. However, it is possible that Archaic features and artifacts are present outside the investigated area.

Other research domains focus on site and feature function as well as subsistence activities. The only features identified at LA 17041 (Features 19 and 20) were thermal features likely utilized for food processing. This is consistent with the groundstone tools located on the site, which attest to resource processing. Additionally, macrobotanical analysis of fill from Features 19 and 20 revealed charred goosefoot seeds and mesquite wood from both features and yucca caudex from Feature 20. Based on the feature functions, feature dates, and artifact assemblage, it is likely that the site was visited seasonally throughout at least the Early Formative period (A.D. 500–1100) to acquire and process various resources. However, direct evidence of which resources were acquired and processed, beyond goosefoot and yucca, is not readily apparent from the available data.

All recovered lithic raw materials could be locally acquired from residual gravels throughout the Mescalero Plain. Other nearby sources include gravels along the Pecos River. No non-local lithic raw materials were recovered. The sample of lithic artifacts recovered from LA 17041 therefore precludes broader inferences regarding mobility and interregional cultural interactions such as trade or exchange. A total of 13 ceramics were recovered from the site, including five El Paso Brownware and eight Jornada Brownware sherd. Ceramic analysis (see Chapter 8) suggests that occupants of the site maintained
social ties to other groups in the Sierra Blanca and Guadalupe Mountains, where primary clay and other mineral sources are located.

Our final research domain proposed to analyze post-depositional effects on features. At LA 17041, no features were observed on the surface of the site within the APE. Two features were encountered in mechanical scrapes, both well preserved. This suggests that absence of surface manifestations is not an accurate indicator of subsurface feature presence, let alone feature size and morphology. Additionally, the presence of overburden sediment may provide a protective element for the features as both Features 19 and 20 were discovered in good condition. Finally, the presence of these buried features is a strong indicator that additional subsurface deposits are likely present but buried in unexcavated portions of the site.

Site Specific Questions

In addition to the broader research domains discussed above, data was also collected to address the following site-specific research questions:

1) A Tularosa Corner-notched point was observed during the most recent site update. Where is the raw material source for this point, and how may this inform on mobility or exchange? (Research Domains 1 and 5)

2) A total of 18 features were identified on the site, all of which are outside the project APE. Are intact features present within the APE? If so, what types of features are present? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? (Research Domains 1, 2, 3, 4, and 6)

3) LA 17041 is located within a cluster of sites situated along the terraces and uplands east of Bear Grass Draw. Although LA 17041 has been designated as a separate site for management purposes, these sites may together represent a single site with multiple components or activity areas. Based on similarities in the artifact and feature assemblage, along with geomorphological data, is LA 17041 a separate site, or part of a larger site that includes LA 118318, LA 120949, and 120950? (Research Domains 1, 2, 3, 4, 5, and 6)

The Tularosa Corner-notched point was made from a light-brown chert with tan inclusions. Although chert occurs naturally in the area, it is possible that certain types of cherts were brought to the site from sources in west Texas or west of the Pecos River. It is currently unclear whether such materials were curated by the occupants of LA 17041, or traded into the area. This style of projectile point was made from 100 B.C. to A.D. 900, which is also consistent with the site’s ceramic assemblage and radiocarbon dates obtained from Features 19 and 20.

Two intact subsurface features were identified within the project APE at a depth of 30 cm below the modern ground surface. The features both date the Early Formative period and have overlapping dates with a maximum range from A.D. 780 to 1000. As stated above, the site appears to have been repeatedly utilized as resource procurement and processing encampment throughout the Early Formative period. The portion of the site investigated during testing and data recovery activities is too narrow to allow for a
robust examination of intra-site structure, although this is addressed in some respects below as it pertains to the site’s relationship to adjacent sites LA 118318, LA 120949, and 120950.

Features 19 and 20 were located within a meter of each other, both at a depth of 30 cm, and both had radiocarbon dates within a significantly overlapping range (A.D. 780–1000). As such, the possibility of the features being functionally related was explored. Macrobotanical analysis of the flotation sample revealed evidence of charred goosefoot seeds and mesquite in Features 19 and 20 as well as yucca caudex in Feature 20. Feature 19 is slightly larger than Feature 20 and contained five brownware sherds and five pieces of flaked stone within the feature overburden. Feature 20 was slightly smaller than Feature 19 and no artifacts were found in association with the feature. Based on this limited information, behavioral inferences are difficult beyond the fact that mesquite wood was utilized for fuel.

As mentioned earlier, LA 17041 is part of a cluster of four sites (along with 118318, 120949, and 120950) whose boundaries are defined by modern impacts such as roads or oil and gas activity. Based on the overall artifact and feature distribution, the four sites appear to represent logistical camps repeatedly utilized for resource procurement and processing throughout several generations. Within the APE however, LA 118318, on the south side of US 82, exhibited a higher density of features and a wider variety of artifacts than did the sites on the north side of the road. In general, the features excavated from all of the sites are consistent, with the majority being hearths of similar sizes and with similar macrobotanical remains. However, most of the features on the north side of the road date to the Early Formative period with the westernmost features (from LA 120949) dating to the Archaic and very Early Formative periods. In contrast, five out of six dated features from LA 118318 date to the Late Formative period, with only one dating to the Early Formative. While all of the sites are located among mesquite-stabilized coppice dunes, features were typically found at a deeper level on the south side of the road (0–100 cm bgs) versus the north (2–50 cm bgs). Also, the percentage of groundstone within the LA 118318 assemblage was much higher than the sites on the north side of US 82 and the ceramic analysis indicated LA 118318 was likely used as a residential base that included a wider range of activities than the other sites (see Chapter 8).

Based on investigation of the current APE, LA 17041, along with the other sites in the Bear Grass Draw cluster, served as a location of resource procurement and processing repeatedly occupied for varying lengths of time throughout multiple generations. It is also possible that LA 17041 and the other sites on the north side of US 82 may have been used as more temporary logistical locations whereas the artifact and feature assemblage of LA 118318, on the south side of the road, is more consistent with longer-term occupations. Alternatively, the entire cluster of sites may represent the same logistical behavior with LA 118318 occupying the more central portion of the behavior location while the sites on the north side of the road represent the outer periphery. However, additional investigation of the site areas beyond the current APE would be needed before this can be definitively stated. For instance, 18 features and nearly 1,000 artifacts were identified from surface survey of LA 17041 while only two feature and 54 artifacts were located within the APE. The other sites also have a substantial amount of resources located outside the current APE. These additional resources could affect the final interpretation of the site cluster.
Final Recommendations

LA 17041 was previously determined eligible for listing in the NRHP for its information potential. In total, 19 surface artifacts were located within the APE for the proposed undertaking. Test unit excavation and mechanical scrapes were undertaken to determine whether any features were present within the APE, or if there was potential for additional features based on stratigraphy, buried artifacts, or other subsurface cultural deposits. All three hand-excavated test units had artifacts within; however, none contained features, charcoal staining, charcoal flecking, or burned caliche. Mechanical scraping exposed two features (Features 19 and 20) within MS 1.

The information potential of the portion of the site within the APE has been fully recovered according to methods proposed in the Testing and Data Recovery Plan as well as the guidelines in NMAC 4.10.16.12. However, the site extends to the north of the APE, where intact features and artifacts are present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain eligible. The portions of the site outside the APE should therefore be avoided by all activities associated with the undertaking. All remaining intact deposits are at least 5 m beyond the APE, with the vast majority of the site being located over 100 m north of the APE. Temporary protective fencing is therefore not warranted. However, if any intact cultural deposits not identified in this study are uncovered during construction, work should cease immediately and NMDOT, BLM and SHPO should be notified.
LA 83680

General Site Summary

The following is a general site summary. It is based on the most recent update of the site (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 83680 is an extensive prehistoric artifact scatter containing nine surface fire-related features. The site is located in the eastern portion of the project area approximately one-tenth of a mile west of LA 137120 (see Figure 3). It has been partially disturbed by construction of the highway, as well as an overhead electrical transmission line that parallels the northern side of the highway. Several associated utility poles are located within the site boundary. The site extends across both sides of US 82, with the majority of cultural material distributed across an elongated east-to-west swath on the northern side of the highway. LA 83680 spreads over a northwest-sloping dunal landscape, with most of the artifacts exposed in erosional blowouts between the shinnery oak-stabilized parabolic dunes and mesquite-anchored coppice dunes (Figures 25 and 26). The nine fire-related features consisted of burned-caliche concentrations of varying size. Seven of the nine features (Features 1–6 and Feature 9) were located on the north side of the US 82 right-of-way fence, and three of these (Features 3, 6, and 9) were located within the APE of the current undertaking. Features 7 and 8 were located on the south side of the highway, 30 m south of the right-of-way fence and outside the APE. In addition to the features, two artifact concentrations were defined in the APE; AC 1 surrounded Feature 6 (Figure 25) and AC 2 surrounded Feature 3. Feature 6 was a large (6.3 by 7.2 m) concentration of approximately 100 burned caliche fragments. Fourteen fragments were embedded in the south-facing slope of a dune approximately 40 cm above the surface of an erosional blowout, and a dark charcoal stain measuring approximately 15 cm in depth associated with the feature was observed during survey. Feature 6 was argued to be the most intact thermal feature identified during surface survey for the proposed undertaking.

A total of 98 artifacts were observed on the surface of the site, including 77 pieces of flaked-stone debitage, 17 lithic tools, and four ceramics. The ceramic artifacts consisted of two undifferentiated brownware sherds, one El Paso Brownware sherd, and one indeterminate black-on-white sherd. The tool assemblage consisted of 12 cores/core fragments, one mano fragment, one slab metate fragment, one hammerstone, one combination tool, and one edge-modified flake. Observed raw material types of the flaked-stone debitage included various colors of chert, chalcedony, quartzite, rhyolite, silicified wood, and siltstone.

Based on the presence of the El Paso Brownware and indeterminate black-on-white sherds, the site was assigned an Early to Late Formative (A.D. 500–1450) cultural/temporal affiliation (Lawrence et al. 2015). Additionally, in 2002 a radiocarbon assay was conducted on a charcoal sample taken from formerly extant Feature 7 during monitoring for pipeline construction (Straight 2002). This feature was not revisited during the current investigation. The assay produced a date-range of A.D. 540–880, placing the feature in the Early Formative sequence. An interpretation of the surface assemblage indicated that the site likely functioned as a temporary or repeatedly used camp focused on resource procurement and processing.
Figure 25 – LA 83680, view to the east-southeast with AC 1 denoted by pin flags and Feature 6 in foreground

Figure 26 – LA 83680, view to the west-northwest
Figure 27 – LA 83680 planview map (western portion)
Figure 28 – LA 83680 planview map (eastern portion)
Figure 29 – Planview map of Feature 6 area
Excavation Results

During the current testing and data recovery project, portions of LA 83680 falling within the project APE were excavated. At LA 83680, the APE extends 10 to 30 ft beyond the northern right-of-way fence, and 10 ft beyond the southern right-of-way fence. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, feature excavations, and artifacts, are described below. See Figures 27–29 for the specific locations of these activities.

Surface Collection

Prior to any subsurface testing, all artifacts located on the ground surface of the site within the APE were systematically flagged and collected. These artifacts were point provenienced by GPS and assigned UTM coordinates and individual FS numbers. When appropriate, groups of surface artifacts were collected under the same FS number when located within an area measuring less than 10 cm², or within a similar context (e.g., microdebitage from an isolated ant mound). The distribution and density of surface artifacts guided the subsequent placement of test units, and comprise a spatial and artifactual data set that more broadly informs on patterns of cultural activity throughout this present dunal environment.

A total of 212 artifacts were collected from the surface of LA 83680 within or adjacent to the APE. The portion of the site within the APE on the southern side of the highway yielded no surface artifacts. The surface assemblage consisted of flaked-stonedebitage (n=165), ceramics (n=34), groundstone (n=6), two hammerstones, two bifaces, one scraper, one manuport, and one projectile point (Figure 30). The projectile point was discovered and collected outside the APE adjacent to the eastern extent of the site, northeast of Feature 3 and AC 2. The point has similar characteristics as a Temporal type projectile point. This type is named for the Temporal site near Tularosa, NM. Temporal points have a primary date range of A.D. 400–900, and appear in the archaeological record no later than A.D. 1200 (Justice 2002:256), which falls predominately in the Early Formative period.

Figure 30 – Temporal projectile point from surface of LA 83680
Test Unit Excavations

Five 1-by-1-m and one 1-by-3-m test units were excavated within the project APE at LA 83680 (Table 8). All test units but one (TU 5) were excavated north of the right-of-way fence within the APE. The site is located within a mesquite and shinnery oak dunal landscape where dunes range in height from 3 to 6 m. Nearly all artifacts and features were exposed within erosional blowouts between the dunes. Five of the six test units were placed on top of surface features within the APE to determine if the features were cultural and contained intact subsurface deposits. One unit (TU 4) was placed in an elevated deflation basin to test the geomorphology of the dunal landscape. Test units extended between 10 cm and 58 cm in depth. Units were terminated as sterile sediments were exposed, typically when the compact, carbonate rich, sterile paleosol was encountered.

Mechanical Excavations

After hand excavation of test units, mechanical trenching and scraping occurred across the site within the APE. Five trenches and two mechanical scrapes (MS 1 and MS 2) were strategically placed to explore the geomorphology and stratigraphy of the landform and to test for subsurface cultural deposits in high probability locales (e.g., in and around Feature 6 and AC 1). Table 9 provides detailed information on each of the mechanical trenches and scrapes.

Trenches ranged from 7 to 50 m in length and averaged 2.5 m in width. The depth of the trenches and scrapes varied according to the thickness of overlying dunal sediments and depth of the paleosol. Trench 1 was placed in the eastern extent of the site to examine the stratigraphy of a large parabolic dune (Figure 31). Due to the size and depth of the dune, the trench was divided into two trenches—Trench 1A and Trench 1B—to help expedite the process. Trench 5, a 20 m (east-west) by 2.5 m (north-south) trench was placed in the east-central portion of the site to test the area between Features 6 and 9 and to look for additional intact cultural deposits within the highway right-of-way. The trench was excavated from east to west, and the first 15 meters of the trench were sterile, consisting of a massive stratum of aeolian sand that transitioned into a buried A horizon with the paleosol beneath. The westernmost 5 m of the trench exposed charcoal-mottled sediments, a charcoal-rich rodent run, and a large (10 cm) piece of burned caliche at approximately 1.0 m below the top of the dune. Additional fragments of burned caliche were also noted in this portion of the trench. This suggests that bioturbation may have occurred to a thermal feature in the general vicinity of the trench, although no features were found during investigations of the area.

MS 1 and MS 2 were placed parallel to each other within the high probability locale around Feature 6 and AC 1. MS 1 was confined to a portion of a large east-west oriented parabolic dune within the highway right-of-way (Figure 32), while MS 2 was north of and adjacent to MS 1, almost entirely north of the right-of-way fence but within the APE. MS 2 removed a large dune overlying Feature 6 to expose the horizontal extent of the feature (Figure 33). Trenches and scrapes were terminated between 1.0 and 2.5 m below the tops of dunes after exposing the paleosol, which was often present below a buried A horizon containing cultural deposits.
Table 8 – Summary of Test Units Excavated at LA 83680

<table>
<thead>
<tr>
<th>TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifact Count</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 499 E 483</td>
<td>1 x 1</td>
<td>40</td>
<td>4</td>
<td>N/A</td>
<td>10 pieces of flaked stone and 1 scraper</td>
<td>TU 1 was placed 3 m north of the northern right-of-way fence within the APE and approximately 50 m west of F6 in a slightly deflated area, immediately west of a large parabolic dune to explore the stratigraphy of the west-central portion of the site within the APE and test for subsurface cultural deposits; 10 pieces of flaked stone and 1 scraper were recovered from the first two levels; the following two levels were sterile; unit was terminated at Level 4 after encountering paleosol with abundant calcium carbonate.</td>
</tr>
<tr>
<td>2</td>
<td>N 499 E 516.5</td>
<td>1 x 3</td>
<td>10</td>
<td>1</td>
<td>TU 2A, 2B, 2C; Feature 10, Feature 11</td>
<td>10 pieces of flaked stone, 4 ceramics, and 2 groundstone</td>
<td>TU 2 was placed at the northern terminus of an east-west oriented dune, 10 m east of Feature 6, on the edge of a deflation basin containing the highest density of surface artifacts on site; this 1-by-3-m unit was placed to investigate two possible charcoal stains associated with groundstone and other artifacts; unit was excavated north to south in 1-by-1-m subunits; Level 1 exposed 2 thermal features (Features 10 and 11); unit was terminated after features were excavated as they were situated at the interface between the buried A horizon and paleosol.</td>
</tr>
<tr>
<td>3</td>
<td>N 501 E 632.5</td>
<td>1 x 1</td>
<td>58</td>
<td>5</td>
<td>Feature 9</td>
<td>3 pieces of flaked stone</td>
<td>TU 3 was placed in a blowout situated between an east-west oriented parabolic dune, a northeast-southwest parabolic dune, and a mesquite-anchored coppice dune; unit was placed over a portion of Feature 9 (burned-caliche concentration) to test for any associated intact subsurface cultural deposits; unit was excavated to a depth of 58 cm bgs with no evidence of subsurface feature fill; 3 pieces of flaked stone were recovered from the first 2 levels; unit was terminated at Level 5 after two sterile levels and it was determined that no feature fill was present.</td>
</tr>
<tr>
<td>TU No.</td>
<td>Grid Location</td>
<td>Size (m)</td>
<td>Depth (cm bgs)</td>
<td>No. of Levels</td>
<td>Associated TUs/Features</td>
<td>Artifact Count</td>
<td>Comments</td>
</tr>
<tr>
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<td>----------</td>
</tr>
<tr>
<td>4</td>
<td>N 503 E 685</td>
<td>1 x 1</td>
<td>20</td>
<td>2</td>
<td>Feature 3</td>
<td>1 piece of flaked stone and 1 ceramic</td>
<td>TU 4 was placed within a deflation basin surrounded by shinnery oak-covered parabolic dunes, north of the right-of-way fence within the APE, adjacent to the eastern extent of the site; during survey Feature 3 (burned-caliche concentration) was recorded within this same deflation basin, however, Feature 3 is located predominately north of the APE; unit was placed to test the geomorphology of the deflation basin and assess the presence of associated subsurface cultural deposits; 1 ceramic, 1 flake, and several pieces of burned caliche were encountered immediately below ground surface; unit was terminated after Level 2 exposed a dense calcium carbonate deposit within the paleosol.</td>
</tr>
<tr>
<td>5</td>
<td>N 491.6 E 502.3</td>
<td>1x1</td>
<td>43</td>
<td>4</td>
<td>Feature 12</td>
<td>14 pieces of flaked stone</td>
<td>TU 5 was placed over a burned-caliche concentration (Feature 12), situated on the south-facing slope of an east-west oriented parabolic dune within the northern US 82 right-of-way; unit was placed to determine if Feature 12 contained intact subsurface deposits; after shallow trowel excavations, it was evident that the feature contained no fill and consisted of burned caliche and 14 pieces of flaked stone; dark patches of sediment originally thought to be feature fill were ephemeral, likely representing decaying roots and organic material; unit was terminated after 2 sterile levels were excavated.</td>
</tr>
<tr>
<td>6</td>
<td>N 500.9 E 348.2</td>
<td>1x1</td>
<td>10</td>
<td>1</td>
<td>Feature 13</td>
<td>2 pieces of flaked stone</td>
<td>TU 6 was located within a disturbed area at the western extent of the site, north of the right-of-way fence within the APE, in what appears to be an old access road-cut or pipeline scar; Feature 13 (burned-caliche concentration) is located south of this cut on a mechanically formed, elevated bench; unit was placed to determine if the feature contained associated subsurface deposits; unit was terminated after a single level encountered the compact sterile paleosol with no evidence of feature fill; the artifacts and burned caliche associated with Feature 13 and TU 6 were likely redeposited at this location as a result of mechanical disturbance.</td>
</tr>
<tr>
<td>Mechanical Excavation</td>
<td>Location</td>
<td>Size</td>
<td>Dimensions</td>
<td>Features Encountered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trench 1A</td>
<td>Eastern portion of site within northern right-of-way</td>
<td>42.5 m²</td>
<td>2.5 m (N-S) 17 m (E-W)</td>
<td>Features 14–16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trench 1B</td>
<td>Eastern portion of site within northern right-of-way</td>
<td>17.5 m²</td>
<td>2.5 m (N-S) 7 m (E-W)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trench 2</td>
<td>Eastern portion of site north of right-of-way fence</td>
<td>80 m²</td>
<td>2.5 m (N-S) 32 m (E-W)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trench 3</td>
<td>Western portion of site north of right-of-way fence</td>
<td>25 m²</td>
<td>2.5 m (N-S) 10 m (E-W)</td>
<td>Feature 17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trench 4</td>
<td>Eastern portion of site within southern right-of-way</td>
<td>25 m²</td>
<td>2.5 m (N-S) 10 m (E-W)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trench 5</td>
<td>Eastern portion of site within northern right-of-way</td>
<td>50 m²</td>
<td>2.5 m (N-S) 20 m (E-W)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS 1</td>
<td>Central portion of site within right-of-way</td>
<td>190 m²</td>
<td>7 m (N-S) by 30 m (E-W)</td>
<td>Features 18–20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS 2</td>
<td>Central portion of site both sides of right-of-way fence</td>
<td>130 m²</td>
<td>7 m (N-S) by 30 m (E-W)</td>
<td>Features 21–24</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Figure 31 – Trench 1A north wall profile
Figure 32 – MS 1 east wall profile
Figure 33 – MS 2 north wall profile

I - 10 YR 5/6 strong brown; loosely consolidated laminated aeolian sand

II - 10 YR 5/6 strong brown; moderately to loosely consolidated sand w/ abundant organics and roots

III - 10 YR 4/4 brown; moderately consolidated sand w/ large shin-oak root inclusions

IV - 5 YR 4/6 yellowish red; highly consolidated sand w/ sparse carbonate inclusions

Unexcavated
**Feature Excavations**

A total of 18 features were excavated at LA 83680, all on the northern side of US 82. Table 10 provides detailed information on each of the features. All of the excavated features were located within the project APE and consisted of hearths (n=6), burned-caliche concentrations (n=5), decaying organics (n=3), possible poorly preserved hearths (n=2), a rodent run, and a root burn. Features 1–9 were previously identified on the surface and recorded during survey for the proposed undertaking. Three of those features (Features 3, 6, and 9) fell within the APE and were tested and excavated during the current investigation. The remaining six features (Features 1, 2, 4, 5, 7, and 8), fell outside the APE and were not treated. Fifteen of the features (Features 10–24) were newly discovered. Four of these (Features 10–13) were discovered during surface collection while the remaining eleven features were exposed and excavated during mechanical trenching and scraping of the APE.

Two patterns were observed during excavation of features at LA 83680 which will influence the site synthesis and site-specific research questions:

1) The majority of cultural features were located at the interface of the buried A horizon and paleosol. A number of the hearths appear to have been excavated into the paleosol during their original creation.

2) Hearth features were frequently discovered in close proximity to each other. For example, Features 10 and 11 were found less than 150 cm apart from each other at approximately the same elevation. Likewise, Features 19 and 20 were also found in close proximity.

**Feature 3**

Feature 3 is a burned-caliche concentration located within a deflation basin on the northern side of US 82 beyond the right-of-way fence. The feature was initially thought to be within the current APE; however, upon further investigation it was determined to be fully outside of the APE and was therefore not excavated. TU 4 was placed south of Feature 3 to test the geomorphology of the deflation basin and assess the presence of associated subsurface cultural deposits. No subsurface feature manifestations related to Feature 3 were encountered.
Feature 6

Feature 6 was a large burned-caliche concentration eroding out of the south and northeast edge of a large east-west oriented dune north of US 82 beyond the right-of-way fence, and was the most extensive feature excavated at the site. It was originally recorded during the pedestrian survey as a large (6.3 by 7.2 m) concentration of approximately 100 burned-caliche fragments many of which are embedded in the south- and east-facing slopes of a large east-west oriented dune approximately 40 cm above the surface of an erosional blowout. During survey, a dark charcoal stain measuring approximately 15 cm in depth was observed in association with the burned caliche. The eastern and southeastern extents of the feature were covered in a layer of sediment, suggesting high potential for intact subsurface deposits.

Prior to any subsurface testing, photographic documentation occurred and detailed planview drawings were made. The majority of the burned caliche was eroding downslope out of the side of the dune into an artifact rich deflation basin recorded as AC 1. Two densely concentrated intact locales were designated as Features 6A and 6B. Feature 6A was eroding out of the southern portion of the dune. Prior to excavation, it measured 150 cm (north-south) by 125 cm (east-west) and was composed of 50 pieces of densely concentrated burned caliche. Feature 6B was located 1.5 m northeast of 6A and was eroding out of the eastern edge of the same dune. Prior to excavation, it measured 150 cm (north-south) by 225 cm (east-west) and was composed of 45 pieces of densely concentrated burned caliche. The Feature 6A area exhibited more densely concentrated burned caliche than Feature 6B, and a small amount of burned caliche was observed between the two. Seven pieces of flaked-stone debitage and two ceramics were collected from within or near the margins of Feature 6. Some light sediment staining existed on the surface, but the origin of the staining was unclear.

A hand-trench was excavated at the base of the dune between Features 6A and 6B to expose a sediment profile. The trench measured 2.6 m (northeast-southwest) by 1.1 m (northwest-southeast) by 50 cm in depth. No subsurface feature fill was exposed within the trench profile, and the burned caliche was only one course thick. All sediment was screened through a 1/8-inch mesh screen. Seven pieces of flaked-stone debitage and two sherds were collected from the ground surface near Features 6A and 6B, while two sherds and one biface were recovered during screening of the hand trench. Only two stratigraphic layers were observed in the profile. The first layer was a 5 YR 4/6 yellowish red fine-grained sand overlying a 2.5 YR 4/4 reddish brown fine-grained sand. Each layer exhibited abundant roots and rootlets.

An additional exploratory hand trench was placed at the southern portion of the dune approximately 1.5 m west of Feature 6A. The trench measured 1 m in length by 30 cm in width by 7 cm in depth. It was excavated by shovel and sediment was screened with 1/8-inch wire mesh. No charcoal staining, artifacts, or burned caliche were encountered.
FEATURE 6
BURNED-CALCITE CONCENTRATION

GRID: N 501.67, E 511.05
UTM: N 3631407, E 604287
PLAN VIEW SHAPE: IRREGULAR
PROFILE SHAPE: BASIN (FEATURE 6B)

PLAN VIEW DIMENSIONS (CM)
PRE-EXCAVATION: 630 (N-S) x 720 (E-W)
POST-EXCAVATION: N/A

TOP ELEVATION: 98.58 (FEATURE 6B)
BOTTOM ELEVATION: 98.46 (FEATURE 6B)
PROFILE THICKNESS: 12 CM (FEATURE 6B)

ASSOCIATED FS#’S: 24-26, 84
ASSOCIATED TUS/Mechanical Scrapes: MS 2
DATE EXCAVATED: 2 JUNE 2016

SAMPLES COLLECTED: Flaked stone, Ceramics
PHOTO NUMBERS: GM 1 (40-50, 95-108)
EXCAVATOR(S): Greg Mastropietro, Joshua Vallejos
Feature 6B

Upon completion of hand excavation and documentation it appeared that most of the Feature 6 fill had eroded away. However, because of the feature’s originally documented size, the overlying dune was mechanically scraped via MS 2 to investigate the possibility of intact deposits protected within the dune’s interior. Scraping revealed that Feature 6A appeared to have no depth. However, Feature 6B extended into the dune for approximately 60 to 75 cm. Feature 6B was then fully exposed by hand, mapped, photographed, and excavated.

In planview prior to being bisected, Feature 6B measured 90 by 75 cm and was composed of 54 pieces of burned caliche. The feature was bisected on an east-west axis, starting with the south half. A small portion of the feature showed staining once profiled (7.5 YR 2/1 black charcoal rich fine-grained sand with a surrounding matrix of 10 YR 4/4 brown moderately consolidated sand). Upon excavating all of Feature 6B, a small depression of feature fill was identified measuring 38 cm (north-south) by 32 cm (east-west) with 20 pieces of burned caliche. The depression was slightly irregular but basin shaped and 12 cm deep at most.

Radiocarbon assays from Feature 6B indicate that it dated between A.D. 260–270 (1.1% probability), A.D. 330–470 (85.8% probability), and A.D. 490–530 (8.5% probability), suggesting that the feature was most likely utilized towards the end of the Late Archaic period (Figure 34). Macrobotanical analysis of Feature 6B fill showed only burned mesquite wood. While the sheer size of the feature suggests that it might have been a roasting pit, a lack of feature fill, shape, and depth make this hypothesis hard to test. As such, Feature 6 is interpreted as a concentrated burned-caliche dump, likely related to the nearby hearth features (i.e., Features 10, 11, 18–22). The staining could be residue from those features that was redeposited by the site’s occupants to the Feature 6B location along with the burned caliche.

![Graph](image)

*Figure 34 – Calibrated two-sigma date range of Feature 6B at LA 83680; A.D. 260–270 (1.1% probability); A.D. 330–470 (85.8% probability); A.D. 490–530 (8.5% probability)*
**Feature 6b**

**Burned-Caliche Concentration**

<table>
<thead>
<tr>
<th>Grid: N 501.67, E 511.05</th>
<th>UTM: N 3631407, E 604287</th>
<th>Plan View Shape: Irregular</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planview Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 98.58</strong></td>
<td><strong>Bottom Elevation: 98.46</strong></td>
<td><strong>Profile Thickness: 12 cm</strong></td>
</tr>
<tr>
<td>Pre-Evacuation: 90 (N-S) x 75 (E-W)</td>
<td>Pre-Evacuation:</td>
<td>9 more pieces of BC scattered to the north</td>
<td></td>
</tr>
<tr>
<td>Post-Evacuation: 38 (N-S) x 32 (E-W)</td>
<td>Profile:</td>
<td>0</td>
<td>50 cm</td>
</tr>
</tbody>
</table>

**Associated FS#s:** 105

**Samples Collected:** Flotation, Charcoal

**Associated TUs/Mechanical Scrapes:** MS 2

**Photo Numbers:** GM 1 (415-417, 424-430)

**Date Excavated:** 10 July 2016

**Excavator(s):** Darryl, Del Frate, Ethan Kalosky, Joshua Vallejos
Feature 9

Feature 9 was a burned-caliche concentration located within a parabolic dune blow-out immediately north of the US 82 right-of-way fence. It consisted of approximately 100 pieces of burned caliche ranging from 1 to 10 cm in length. No staining was present on the surface, but sediment accumulation around bunch grasses indicated that subsurface deposits could exist. Surface artifacts associated with Feature 9 included one groundstone fragment, one biface, and one hammerstone.

The feature measured 2.8 m (east-west) by 2.0 m (north-south) with a top elevation of 101.35. TU 3 was placed over the southwestern portion of Feature 9 and bisected the feature on a north-south axis, starting with the west half. Burned caliche-containing areas to the north, northeast, and east of TU 3 were then tested for subsurface cultural deposits with shovel test probes (STPs).

Burned caliche was present within the first four levels (0 to 40 cm) of each STP and TU 3 and one ceramic was found within STP 1; however, none of the shovel test probes contained feature fill or any stained sediment or charcoal. Similarly, the profile of TU 3 did not reveal any subsurface deposits. If Feature 9 did contain cultural fill, it appears as if its exposure in the blowout resulted in the deflation of the feature.
**Feature 9**

*Burned-caliche Concentration*

<table>
<thead>
<tr>
<th>Grid: N 501, E 632.5</th>
<th>UTM: N 3631380, E 604405</th>
<th>Plan View Shape: Irregular</th>
<th>Profile Shape: No Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planview Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 101.35</strong></td>
<td><strong>Bottom Elevation: N/A</strong></td>
<td><strong>Profile Thickness: N/A</strong></td>
</tr>
<tr>
<td>Pre-Evacuation: 200 (N-S) x 280 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Evacuation: N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LA 83680**

- Associated FS#: 73, 74, 75, 81, 82, 83
- Samples Collected: Flaked Stone, Groundstone, Ceramic
- Associated TUs/Mechanical Scrapes: TU 3
- Photo Numbers: GM 1 (67-74)
- Date Excavated: 23 May 2016
- Excavator(s): Greg Mastropietro, Jessica Alden

[Diagram of Feature 9 showing groundstone (FS 73), hammerstone (FS 75), and burned caliche]
Feature 10

Feature 10 was originally identified as a circular sediment stain located on the northern edge of a parabolic dune. It was encountered within TU 2C, which was placed immediately beyond the northern right-of-way fence. Feature 10 had experienced a moderate degree of disturbance and exhibited an amorphous shape at its southwestern end.

The feature was discovered at an elevation of 98.36 during the hand excavation of TU 2C and measured 60 cm (north-south) by 70 cm (east-west) prior to excavation. It was bisected by trowel on an east-west axis, starting with the northern half. The northern half was screened through 1/8-inch wire mesh, a charcoal sample was collected, and all remaining sediment in the southern half of the feature was bagged for laboratory analysis. Post excavation, the feature measured 65 cm (north-south) by 55 cm (east-west) and had a maximum thickness of 19 cm (bottom elevation 98.17).

Feature fill varied from 5 YR 2.5/1 black to 5 YR 3/3 dark reddish brown fine-grained sand, and the surrounding matrix was 2.5 YR 4/6 red slightly compact, fine-grained sand. One piece of flaked-stone microdebitage was found during screening of the feature fill. A radiocarbon assay on charcoal recovered from the feature fill produced a date range of A.D. 420–560 (Figure 35) and macrobotanical analysis of the feature fill revealed yucca caudex, goosefoot, mesquite, and a small quantity of saltbush. Based on this information, Feature 10 was interpreted as a hearth that was used sometime near the transition from the Late Archaic period to the Early Formative period.

![Figure 35 – Calibrated two-sigma date range of Feature 10 at LA 83680; A.D. 420–560 (95.4% probability)](image-url)
**Feature 10**

**Hearth**

<table>
<thead>
<tr>
<th>Feature 10</th>
<th>UTM: N 3631405, E 604292</th>
<th>Plan View Shape: Ovoid</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid: N 499.45, E 516.79</td>
<td>Planview Dimensions (cm)</td>
<td>Top Elevation: 98.36</td>
<td>Bottom Elevation: 98.17</td>
</tr>
<tr>
<td>Pre-Excavation: 60 (N-S) x 70 (E-W)</td>
<td></td>
<td>Profile Thickness: 19 cm</td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 65 (N-S) x 55 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Excavation**

- Bioturbation
- Dense Charcoal Staining

**Profile**

- TU2a, Level 1: Elev. 98.36
- TU2c, Level 1: Elev. 98.17
- I - Dark, charcoal rich feature fill; 5 YR 2.5/1 black sandy loam
- II - Feature fill; 5 YR 3/3 dark reddish brown sandy loam
- III - Paleosol: 5 YR 4/6 yellowish red sandy loam

**Post-Excavation**

- Bioturbation
- Roots

**Associated FS#s:** 58, 59, 61, 62

**Samples Collected:** Flotation, Charcoal, Micro Debitage

**Associated TUs/Mechanical Scrapes:** TU 2c

**Photo Numbers:** GM1 (11,12 14–22)

**Date Excavated:** 20 May 2016

**Excavator(s):** Darryl Del Frate, Jessica Alden
Feature 11

Feature 11 was originally identified as a dark, circular charcoal stain. It was encountered just below the surface of TU 2A on the northern side of US 82 beyond the right-of-way fence. Surficial staining was noticed between two pieces of groundstone during surface collection. This was the primary reason TU 2 was placed in its chosen location. In planview, the feature appeared in good condition with very little bioturbation.

Prior to excavation, the feature measured 53 cm (north-south) by 48 cm (east-west) with a top elevation of 98.32. The feature was excavated by trowel and bisected on a north-south axis, starting with the west half. Two quart-sized bags of sediment and two small bags of charcoal were collected from each half of the feature. The remaining fill was screened through 1/8-inch wire mesh. In order to better assess the shape and extent of the profile, a small section of sterile sediment was excavated on both the northern and southern ends of the feature. This allowed the excavators to capture the integrity of the feature walls in both photographs and illustrations. Following excavation, the feature measured 52 cm (north-south) by 50 cm (east-west) with a maximum thickness of 26 cm (bottom elevation 98.06).

Feature 11 had excellent preservation, and was nearly entirely filled with dark black, charcoal-stained sediments. No artifacts were encountered in the feature fill. A radiocarbon analysis provided a date range of A.D. 430–490 (10.6% probability) and A.D. 530–640 (84.8% probability) (Figure 36). Macrobotanical analysis of the feature fill revealed yucca caudex, mesquite, and a small quantity of cholla. Based on this information, Feature 11 was interpreted as a hearth that was used sometime near the transition from the Late Archaic period to the Early Formative period. This feature is located approximately 1.25 m north of Feature 10 which yielded a similar date range.

![Figure 36 – Calibrated two-sigma date range of Feature 11 at LA 83680; A.D. 430–490 (10.6% probability); A.D. 530–640 (84.8% probability)](image-url)
LA 83680

**Feature 11**

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 501.52, E 517.05</th>
<th>UTM: N 3631406, E 604292</th>
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</thead>
<tbody>
<tr>
<td><strong>Plan View Shape:</strong> Circular</td>
<td><strong>Profile Shape:</strong> Basin</td>
</tr>
<tr>
<td><strong>Planview Dimensions (cm)</strong></td>
<td><strong>Top Elevation:</strong> 98.32</td>
</tr>
<tr>
<td>Pre-Excavation: 53 (N-S) x 48 (E-W)</td>
<td>Bottom Elevation: 98.06</td>
</tr>
<tr>
<td>Post-Excavation: 52 (N-S) x 50 (E-W)</td>
<td>Profile Thickness: 26 cm</td>
</tr>
</tbody>
</table>

**Pre-Excavation**

- Mottled Area
- Feature Fill
- Bioturbation

**Profile**

- Mottled Area
- TU2a, Level 1; Elev. 98.32
- Unexcavated
- Elev. 98.06

I - Dark, charcoal rich feature fill; 5 YR 2.5/1 black sandy loam
II - Mottled sub-strat of feature; 7.5 YR 5/6 strong brown; consolidated sandy loam

**Post-Excavation**

- Bioturbation

**Associated FS#s:** 64-67

**Samples Collected:** Flotation, charcoal

**Associated TUs/Mechanical Scrapes:** TU 2a

**Photo Numbers:** GM1 (23, 24-39)

**Date Excavated:** 21 May 2016

**Excavator(s):** Jessica Alden, Darryl Del Frate
Feature 12

Feature 12 was an oval-shaped, burned-caliche concentration with surface staining located in the northern US 82 right-of-way. The concentration rested on the south facing slope of an east-west oriented parabolic dune. The feature appeared to be in a blow-out, but this area of the right-of-way was highly disturbed by traffic and highway maintenance. Therefore, the perceived blow-out may have been the result of modern disturbance. No artifacts were noted in or around the feature. TU 5 was placed over Feature 12 to determine if subsurface deposits were present.

Prior to excavation, Feature 12 measured 1.15 m (east-west) by 1 m (north-south) with a top elevation of 98.62 and consisted of approximately 60 pieces of burned caliche. The feature was excavated by trowel and screened through 1/8-inch mesh. Level 1 contained 12 pieces of flaked-stone debitage while Level 2 contained two pieces. However, no feature fill or definitively stained sediment was present below the surface, and the feature clearly had no integrity remaining. TU 5 was excavated in four levels and was terminated when caliche bedrock was encountered.

The unit contained 5 to 35 percent caliche gravel and had dark patches of sediment throughout. The latter were ephemeral and were attributable to decaying roots and organic material. If Feature 12 did contain cultural fill, it appears as if its exposure to disturbance and erosion resulted in the deflation of the feature.
**Feature 12**

**Burned-caliche Concentration**

<table>
<thead>
<tr>
<th>Grid: N 491.6, E 502.3</th>
<th>UTM: N 3631400, E 604276</th>
<th>Plan View Shape: Ovoid</th>
<th>Profile Shape: No Depth</th>
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<tbody>
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<td>Top Elevation: 98.62</td>
<td>Bottom Elevation: N/A</td>
<td>Profile Thickness: N/A</td>
</tr>
<tr>
<td>Pre-Evacuation: 100 (N-S) x 115 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Evacuation: N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Associated FS#s:** 69, 70  
**Samples Collected:** Flaked Stone  
**Associated TUs/Mechanical Scrapes:** TU 5  
**Photo Numbers:** GM 1 (56-57)  
**Date Excavated:** 22 May 2016  
**Excavator(s):** Darryl Del Frate, Jessica Alden
Feature 13

Feature 13 was a burned-caliche concentration located near the western extent of LA 83680 on the north-facing slope of an east-west oriented parabolic dune approximately 5 m north of the US 82 right-of-way fence. The feature was discovered during surface collection in a mechanically disturbed area. This disturbance has resulted in a high degree of erosion and the area now resembles a dry, shallow wash. Staining was not evident at the surface of the feature and it was possible that it was a push-pile produced by heavy machinery. One piece of flaked-stonedebitage and one unworked, conglomerate manuport were collected from its surface. No other artifacts were noted within close proximity of the feature; however, a few artifacts were observed within the dry wash outside the APE.

Prior to excavation, the feature was composed of approximately 50 small pieces of burned caliche. It measured 120 cm (north-south) by 110 cm (east-west) and was situated at an elevation of 93.58. TU 6 was placed over the feature, which was bisected on an east-west axis beginning with the northern half. The profile exhibited a homogenous stratum of compact 2.5 YR 4/8 red paleosol. TU 6 was terminated after Level 1 due to the lack of feature fill and the presence of the paleosol.

This feature could have been completely deflated with no remaining integrity of shape or fill. Alternatively, as mentioned above, the feature could have been the result of a push pile associated with mechanical disturbances to the area.
**FEATURE 13**

Burned-caliche Concentration

**GRID:** N 500.9, E 348.2
**UTM:** N 3631445, E 604128

**PLAN VIEW SHAPE:** IRREGULAR
**PROFILE SHAPE:** NO DEPTH

**TOP ELEVATION:** 93.58
**BOTTOM ELEVATION:** N/A

**PRE-EXCAVATION:** 120 (N-S) x 110 (E-W)
**POST-EXCAVATION:** N/A

**ASSOCIATED FS#s:** 79

**SAMPLES COLLECTED:** Flaked Stone, Manuport

**ASSOCIATED TUs/Mechanical Scrapses:** TU 6

**PHOTO NUMBERS:** GM 1 (77-81)

**DATE EXCAVATED:** 24 May 2016

**EXCAVATOR(s):** Greg Mastropietro, Joshua Vallejos
Features 14, 15, and 16

Features 14, 15, and 16 were sediment stains discovered at the bottom of Trench 1A at approximately 2.3 m below the apex of the parabolic dune above. The features are located north of the US 82 right-of-way within the far eastern extent of LA 83680. They measured between 10 cm and 17 cm in diameter and were in close proximity to one another, ranging from 45 cm to 2 m apart in horizontal distance. Together, these three features formed a slight semicircle. This pattern was thought to represent a possible series of post molds. Initially, all three features appeared to have very light charcoal flecking.

Each stain was bisected on an east-west axis, starting with the southern half. Excavation revealed that the stains were very ephemeral and shallow, extending only 2 to 4 cm in depth. Features 14 and 15 entirely lacked profiles and appeared homogeneous with the surrounding sediment matrix. Feature 16 was clearly a decaying root, as a round root segment coated in calcium carbonate was observed in the center of the profile. For each feature, sediment samples were collected in two bags, one from the northern half of the feature and one from the southern half.

Feature fill and the surrounding sterile matrix were both a 5 YR 4/6 yellowish red fine-grained sand, and any charcoal-like flecking was attributed to decaying plant matter. All three features were determined to be decaying roots occurring in a coincidental pattern, rather than cultural features.

Feature 17

Feature 17 was a small sediment stain whose profile appeared in the eastern wall of Trench 3, an east-west oriented trench on the northern side of US 82 approximately 5 m north of the right-of-way fence. The stain appeared mottled and had been impacted bioturbation.

The oval-shaped stain measured 30 cm by 20 cm with a top elevation of 95.04 and a bottom elevation of 94.82. The feature was excavated by trowel from the profile of the trench. All feature fill was collected for analysis although, based on the level of disturbance and feature sampling preferences, the fill was not selected for radiocarbon or macrobotanical analysis. Following excavation, the feature measured 31 cm by 22 cm, and extended 15 cm into the trench wall.

Feature fill sediments were a 2.5 YR 3/3 dark reddish brown sand with a surrounding matrix of 2.5 YR 4/6 red sand. It is unclear what this feature represents. If it functioned as a hearth or cultural feature, it was poorly preserved, heavily disturbed, and lacked integrity. It is more likely that Feature 17 resulted from decaying organic matter.
FEATURE 17
POSSIBLE POORLY PRESERVED HEARTH

GRID: N 500.56, E 394.37
UTM: N 3631434, E 604173
PLAN VIEW SHAPE: OVOID
PROFILE SHAPE: BASIN

PLANVIEW DIMENSIONS (CM)

PRE-EXCAVATION: 30 (WIDE/N-S) X 20 (TALL)
POST-EXCAVATION: 31 (WIDE/N-S) X 15 (DEEP/E-W)

TOP ELEVATION: 95.04
BOTTOM ELEVATION: 94.82
PROFILE THICKNESS: 22 CM

ASSOCIATED FS#s: 90
SAMPLES COLLECTED: FLotation

ASSOCIATED TUS/MECHANICAL SCRAPES: TRENCH 3
PHOTO NUMBERS: GM 1 (239-242)

DATE EXCAVATED: 17 JUNE 2016
EXCAVATOR(s): JESSICA ALDEN
Feature 18

Feature 18 was a basin-shaped hearth located in the western wall of MS 1, south of the US 82 right-of-way fence. It was located at the interface between the A horizon and the red paleosol. The stain exhibited bioturbation around its exterior, as well as smearing and leaching at its base. Nonetheless, a basin shape was distinguishable, charcoal was visible in the profile, and the fill appeared as a dark black (7.5 YR 2.5/1) charcoal-filled stain.

Prior to excavation, the feature appeared as a mottled, oval-shaped stain measuring 25 cm by 15 cm, situated at an elevation of 98.57. The feature was partially excavated in profile, but these excavations ceased after it was found that the feature extended more than 25 cm into the mechanically scraped wall, a horizontal distance greater than anticipated. The feature fill from the profile excavation was collected in two one-gallon bags for flotation. However, the fill was not selected for radiocarbon or macrobotanical analysis as the testing and data recovery plan proposed to analyze only a sample of excavated features.

To fully excavate the remainder of the feature, 1.58 m of overburden was mechanically removed. An additional 20 cm was removed by shovel scraping and screened through 1/8-inch wire mesh. The plan view of the feature was defined approximately 4 cm above the initial expression observed in the wall of MS 1. The remainder of the planview indicated that the feature was circular, measuring 48 cm by 48 cm. A new datum was placed and the remaining western portion of feature was excavated. No flotation samples were collected from the western half of the feature as most of the fill had been collected during the profile excavation. However, a charcoal sample was collected. Following excavation, the feature measured 45 cm (east-west) by 67 cm (north-south) with a maximum thickness of 15 cm (bottom elevation 98.42). One flake was found at the bottom of Feature 18. Based on the size of the feature and associated deposits, Feature 18 was interpreted to have functioned as a prehistoric hearth.
**Feature 18**

**Hearth**

Grid: N 494.88, E 519.17  
UTM: N 3631399, E 604293  
Plan View Shape: **Circular**  
Profile Shape: **Basin**

<table>
<thead>
<tr>
<th>Planview Dimensions (cm)</th>
<th>Top Elevation: 98.57</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Excavation: 48 (N-S) x 48 (E-W)</td>
<td>Bottom Elevation: 98.42</td>
</tr>
<tr>
<td>Post-Excavation: 67 (N-S) x 45 (E-W)</td>
<td>Profile Thickness: 15 cm</td>
</tr>
</tbody>
</table>

**Associated FS#s:** 91, 99, 100, 101  
**Samples Collected:** Flotation, Charcoal, Flaked Stone

**Associated TUs/Mechanical Scrapes:** MS 1  
**Photo Numbers:** GM 1 (253-254, 258-259, 276-277, 281-285)

**Date Excavated:** 18 June 2016  
**Excavator(s):** Jessica Alden
Feature 19

Feature 19 was an ovoid stain discovered south of the US 82 right-of-way fence in MS 1 at the interface of a thick A horizon and the paleosol. The feature was located 1.5 m north of Feature 20. Both features were found in an area with a high degree of charcoal smearing resulting from bioturbation and aeolian dispersion of sediments. A 4-by-4-m area was shovel scraped around Features 19 and 20 in order to define the feature boundaries and distinguish general smear from feature staining.

Prior to excavation, Feature 19 measured 50 cm (east-west) by 40 cm (north-south) with a top elevation of 98.59. The feature was bisected by trowel, starting with the south half. Two one-gallon bags of sediment were collected for flotation. Four quart-sized flotation samples were collected from the northern half, as well as a charcoal sample. Following excavation, the feature measured 43 cm (north-south) by 50 cm (east-west) with a maximum thickness of 13 cm (bottom elevation 98.46).

The feature was basin-shaped in profile with sediment smearing at the top and edges. Feature fill sediments had a Munsell designation of 5 YR 2/1 black with yellowish red mottling. A radiocarbon assay on charcoal recovered from the feature fill returned dates of A.D. 680–780 (61.3% probability) and A.D. 790–880 (34.1% probability) (Figure 37). Macrobotanical analysis of the feature fill revealed the presence of mesquite wood and non-cultural dropseed grass seeds. The feature was likely used as a hearth during the Early Formative period.

*Figure 37 – Calibrated two-sigma date range of Feature 19 at LA 83680; A.D. 680–780 (61.3% probability); A.D. 790–880 (34.1% probability)*
FEATURE 19

Hearth

LA 83680

Grid: N 494.21, E 511.08
UTM: N 3631401, E 604285
Plan View Shape: Ovoid
Profile Shape: Basin

Plan View Dimensions (cm)
Pre-Evacuation: 40 (N-S) x 50 (E-W)
Post-Evacuation: 43 (N-S) x 50 (E-W)

Top Elevation: 98.59
Bottom Elevation: 98.46
Profile Thickness: 13 cm

Pre-Evacuation

Mottled Area
Dark Charcoal Staining
Mottled Feature Fill

Profile

Dark Charcoal Staining
Mottled Feature Fill

Unexcavated

I - Dark Feature Fill; 5 YR 2/1 black
II - Mottled Feature Fill;
5 YR 4/6 yellowish red

Elev. 98.46

Post-Evacuation

Elev. 98.46

Samples Collected: Flotation, Charcoal

Photo Numbers: GM 1 (260-263, 270-271, 274-275)

Excavator(s): Jessica Alden

Associated FS#: 94, 95, 96, 97
Associated TUs/Mechanical Scrapes: MS 1
Date Excavated: 18 June 2016
Feature 20

Feature 20 was a circular/rectangular charcoal stain discovered during mechanical scraping (MS 1) of a large east-west trending dune within the US 82 right-of-way. Feature 20 was located about 1.5 m south of Feature 19, both of which were located at the bottom of the A horizon and top of the paleosol. Both features were found in an area with a high degree of charcoal smearing, resulting from bioturbation and aeolian dispersion of sediments. A 4-by-4-m area was shovel scraped in order to define the feature boundaries and distinguish smear from feature staining.

Feature 20 was defined at an elevation of 98.56 and measured 45 cm (north-south) by 50 cm (east-west). It was bisected by trowel on an east-west axis, starting with the southern half. Heavy bioturbation made the western portion of the feature difficult to define, as a large portion of it had been removed by a rodent burrow. Due to heavy disturbance, no feature fill was collected from the southern half. However, sediment was screened through 1/8-inch wire mesh and charcoal was collected from the screen. Two one-gallon bags of sediment were collected from the northern half for flotation. Following excavation, the feature measured 52 cm (north-south) by 50 cm (east-west) with a maximum thickness of 33 cm (bottom elevation 98.23).

Although the feature was heavily disturbed, portions of it were still well-defined, especially in the central portion. A radiocarbon assay produced a date range of A.D. 410–550 (Figure 38) and macrobotanical analysis of feature fill revealed goosefoot, dropseed grass, yucca caudex, javelina bush, and mesquite. Based on this information and the general size and shape of Feature 20, it is interpreted to have been used as a hearth during late in the Archaic period or the initial portion of the Early Formative period.

Figure 38 – Calibrated two-sigma date range of Feature 20 at LA 83680; A.D. 410–550 (95.4% probability)
# Feature 20

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 492.79, E 510.97</th>
<th>UTM: N 3631399, E 604285</th>
<th>Plan View Shape: Circular/Rectangular</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plan View Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 98.56</strong></td>
<td><strong>Bottom Elevation: 98.23</strong></td>
<td><strong>Profile Thickness: 33 cm</strong></td>
</tr>
<tr>
<td>Pre-Excavation: 45 (N-S) x 50 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 52 (N-S) x 50 (E-W)</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Associated FS#s:** 98  
**Associated TUs/Mechanical Scrapes:** MS 1  
**Date Excavated:** 19 June 2016  
**Samples Collected:** Flotation, Charcoal  
**Photo Numbers:** GM 1 (272-273, 278-280, 286-295)  
**Excavator(s):** Greg Mastroietro

[Images of pre-excavation, profile, and post-excavation views with annotations]
Feature 21

Feature 21 was an irregularly-shaped, charcoal-rich stain discovered in MS 1. The feature was located on the northern side of US 82, approximately 1 m north of the right-of-way fence. It was encountered 1.5 m below the surface of a large east-west oriented parabolic dune. The profile was somewhat basin-shaped with rodent/root disturbance extending through the center of the feature.

Prior to excavation, the feature measured 31 cm (north-south) by 21 cm (east-west) with a top elevation of 98.58. It was bisected by trowel on a north-south axis, beginning with the western half. A one-gallon bag of sediment was collected from both halves of the feature for flotation although the sediments were not chosen for radiocarbon or macrobotanical analysis due to the level of disturbance and sampling preferences. Post-excavation measurements were 30 cm (north-south) by 25 cm (east-west) with a maximum thickness of 9 cm (bottom elevation 98.49).

Overall, the feature was amorphous and irregularly-shaped, which was not consistent with the majority of hearth features encountered at LA 83680. The feature fill was extremely dark with oxidation and mottling at the bottom and large chunks of charcoal located on both sides of the feature. The feature fill had a Munsell designation of 5 YR 2.5/1 black, mottled with the surrounding sterile matrix of 5 YR 4/6 yellowish red. Based on the density of the charcoal rich sediment, the oxidized/mottled bottom, and the subtle/amorphous edges that made the feature irregular in shape, Feature 21 may have been a charcoal dump or an irregularly-shaped hearth that has been heavily impacted by bioturbation.
**FEATURE 21**

**POSSIBLE POORLY PRESERVED HEARTH**

<table>
<thead>
<tr>
<th>Grid: N 496.88, E 521.06</th>
<th>UTM: N 3631401, E 604295</th>
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</thead>
<tbody>
<tr>
<td><strong>Plan View Dimensions (cm)</strong></td>
<td><strong>Profile Shape: Basin</strong></td>
</tr>
<tr>
<td><strong>Pre-Excavation:</strong> 31 (N-S) x 21 (E-W)</td>
<td><strong>Post-Excavation:</strong> 30 (N-S) x 25 (E-W)</td>
</tr>
<tr>
<td><strong>Top Elevation:</strong> 98.58</td>
<td><strong>Profile Thickness:</strong> 9 cm</td>
</tr>
<tr>
<td><strong>Bottom Elevation:</strong> 98.49</td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Excavation**

![Pre-Excavation Image]

**Profile**

![Profile Image]

**Post-Excavation**

![Post-Excavation Image]

**Associated FS#s:** 102

**Samples Collected:** Flotation

**Associated TUs/Mechanical Scrapes:** MS 2

**Photo Numbers:** GM 1 (393-394, 396-399)

**Date Excavated:** 10 July 2016

**Excavator(s):** Jessica Alden
Feature 22

Feature 22 was an oval-shaped stain located within the south-central portion of MS 2. The feature was located on the northern side of US 82, immediately north of the right-of-way fence. This area was approximately 5 m south of AC 1, the location of highest feature and artifact density encountered within the project corridor. The feature was encountered about 1.5 m below the surface of a large east-west oriented parabolic dune. The profile was basin-shaped with dark consistent fill and a large rodent burrow extending through its center.

Prior to excavation, Feature 22 measured 43 cm (east-west) by 40 cm (north-south) with a top elevation of 98.51. The feature was bisected by a trowel on an east-west axis, beginning with the southern half. Four one-gallon bags of sediment were collected—two bags from each half of the feature. However, based on the level of disturbance within the feature and sampling preferences, no macrobotanical or radiocarbon analysis was conducted. Following excavation, the feature measured 35 cm (north-south) by 46 cm (east-west) with a maximum thickness of 30 cm (bottom elevation 98.21).

Sediments had a Munsell designation of 5 YR 2.5/1 black, mottled with the surrounding sterile matrix of 5 YR 1/6 yellowish red. One piece of flaked-stone debitage was collected from the bottom of the feature and one piece of burned caliche was noted in the screen. Based on the depth, oxidation, consistency of fill, density of charcoal, and shape, Feature 22 is interpreted to have been used as a hearth with minor impacts from bioturbation.
| Feature 22 |  
|-----------------|-----------------|-----------------|-----------------|
| **Hearth**      | **LA 83680**    | **GRID**: N 495.85, E 513.5 | **UTM**: N 3631402, E 604288 |
| **Plan View Dimensions (cm)** | **Profile Thickness**: 30 cm | **Top Elevation**: 98.51 | **Bottom Elevation**: 98.21 |
| **Pre-Excavation**: 40 (N-S) x 43 (E-W) | **Plan View Shape**: **Ovoid** | **Profile Shape**: **Basin** |
| **Post-Excavation**: 35 (N-S) x 46 (E-W) |                              |

**Associated FS#s**: 104  
**Samples Collected**: Flotation, Flaked Stone  
**Associated TUs/Mechanical Scrapes**: MS 2  
**Photo Numbers**: GM 1 (400-401, 409-411, 422-423)  
**Date Excavated**: 10 July 2016  
**Excavator(s)**: Jessica Alden
Feature 23

Feature 23 was a small irregularly shaped charcoal stain located within the southeastern portion of MS 2. The feature was encountered approximately 3 m south of AC 1 and 1.5 m below the surface of a large east-west oriented parabolic dune. The profile was basin-shaped with a large rodent burrow extending to the poorly defined eastern edges of the feature.

Prior to excavation, Feature 23 measured 26 cm in diameter. The feature was bisected by trowel on a north-south axis, beginning with the west half. Dark mottled feature fill was collected for flotation although the sample was not processed due to sampling preferences and the level of feature disturbance. Following excavation, the feature measured 26 cm (east-west) by 20 cm (north-south) with a maximum thickness of 7 cm.

Sediments had a Munsell designation of 5 YR 2.5/1 black, mottled with the surrounding sterile matrix of 5 YR 4/6 yellowish red. Based on the small size of the feature and degree of bioturbation, Feature 23 was interpreted as a rodent burrow/den. Feature fill likely originated from other nearby thermal features and was deposited in this location either by rodent burrowing or in-filling of abandoned rodent burrows.

Feature 24

Feature 24 was a small, oval-shaped charcoal stain located within the eastern portion of MS 2, approximately 1 m south of AC 1. The feature was encountered at approximately 1.5 m below the surface of a large east-west oriented parabolic dune.

The feature was bisected by trowel on a northeast-southwest axis, beginning with the southeastern half. Sediment from this half was collected for flotation although the sample was not processed due to the interpretation that the feature was the result of a root burn. Feature 24 measured 27 cm (east-west) by 15 cm (north-south) with a maximum thickness of 15 cm.

Sediments were 5 YR 2.5/1 black, mottled with the surrounding sterile matrix of 5 YR 4/6 yellowish red. The profile was irregular in shape, lacking any characteristics (oxidation, basin or bell-shaped profile, etc.) of a cultural thermal feature. It was determined that the feature resulted from two natural root burns.
### Table 10 – Summary of Features Excavated at LA 83680

<table>
<thead>
<tr>
<th>Feature No.</th>
<th>Grid Location</th>
<th>UTM Location (NAD83 13N)</th>
<th>Feature Type</th>
<th>Depth to Top of Feature (cm bgs)</th>
<th>Planview Shape</th>
<th>Planview Dimensions (cm)</th>
<th>Profile Shape</th>
<th>Profile Thickness (cm)</th>
<th>Artifacts &amp; Samples Collected</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>N 503 E 685</td>
<td>N 3631370 E 604457</td>
<td>Burned-caliche conc.</td>
<td>Surficial; no depth</td>
<td>Irregular</td>
<td>Undefined</td>
<td>Surficial; no depth</td>
<td>Surficial; no depth</td>
<td>None</td>
<td>Feature 3 was originally recorded during survey as a burned-caliche concentration; it is situated in a deflation basin on the eastern extent of the site; the burned-caliche concentration was poorly defined and extremely diffuse; majority of burned caliche is scattered north of the APE; TU 4 was placed to test the geomorphology of the deflation basin and assess the presence of associated subsurface cultural deposits; 1 ceramic, 1 flake, and several pieces of burned caliche were encountered immediately below ground surface; no subsurface feature deposits were present; unit was terminated after Level 2 exposed a dense calcium carbonate deposit within the paleosol.</td>
</tr>
<tr>
<td>6</td>
<td>N 501.67 E 511.05</td>
<td>N 3631407 E 604287</td>
<td>Burned-caliche conc.</td>
<td>Located in the side of a dune ~130 cm below the crest</td>
<td>Irregular</td>
<td>630 (N-S) by 720 (E-W)</td>
<td>Basin</td>
<td>12</td>
<td>Flotation; Charcoal; 7 pieces of flaked stone, 4 ceramics, and 1 biface</td>
<td>Feature 6 was originally recorded during survey as an extensive burned-caliche concentration eroding out of the side-slope of a large dune; mostly surficial in nature and possibly a burned-caliche dump; 7 pieces of flaked stone and two ceramics were recovered from the surface of the feature; a small portion of feature (Feature 6B) contained an irregular, slightly basin-shaped depression under the burned caliche; matrix was a black, charcoal-rich fine-grained sand; radiocarbon date of A.D. 260–530; macrobotanical remains of mesquite.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgg)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts &amp; Samples Collected</td>
<td>Comments</td>
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<tr>
<td>9</td>
<td>N 501 E 632.5</td>
<td>N 3631380 E 604405</td>
<td>Burned-caliche conc.</td>
<td>Surficial; no depth</td>
<td>Irregular</td>
<td>~200 (N-S) by 280 (E-W)</td>
<td>Surficial; no depth</td>
<td>Surficial; no depth</td>
<td>9 pieces of flaked stone, 1 biface, 1 hammerstone, 1 groundstone, and 1 ceramic</td>
<td>Feature 9 was originally recorded during survey as a burned-caliche concentration located within a blowout; TU 3 was placed over southwestern portion to test for subsurface deposits; none existed; three shovel test pits were placed within the concentration with the same outcome; any fill associated with Feature 9 appears to have been entirely deflated, leaving only burned caliche and artifacts.</td>
</tr>
<tr>
<td>10</td>
<td>N 499.45 E 516.79</td>
<td>N 3631405 E 604292</td>
<td>Hearth</td>
<td>14</td>
<td>Ovoid</td>
<td>65 (N-S) by 55 (E-W)</td>
<td>Basin</td>
<td>19</td>
<td>Flotation; Charcoal; 1 piece of micro-debitage</td>
<td>Feature 10 was hearth with patches of black, charcoal-rich sediments; heavy rodent and root disturbance; portions of feature had well defined mottled boundary; one piece of micro-debitage was recovered in screened sediment; radiocarbon date of A.D. 420–560; macrobotanical remains of goosefoot, yucca caudex, mesquite, and saltbush.</td>
</tr>
<tr>
<td>11</td>
<td>N 501.52 E 517.05</td>
<td>N 3631406 E 604292</td>
<td>Hearth</td>
<td>11</td>
<td>Circular</td>
<td>52 (N-S) by 50 (E-W)</td>
<td>Basin</td>
<td>26</td>
<td>Flotation; Charcoal</td>
<td>Feature 11 was a well-preserved hearth with minor bioturbation; sediment was a dense, black, charcoal-rich matrix; boundaries were well defined with slightly oxidized mottling; F11 was one of the best-preserved features excavated during testing and data recovery along US 82; radiocarbon date of A.D. 430–640; macrobotanical remains of yucca caudex, cholla, and mesquite.</td>
</tr>
<tr>
<td>12</td>
<td>N 491.6 E 502.3</td>
<td>N 3631400 E 604276</td>
<td>Burned-caliche conc.</td>
<td>Surficial; no depth</td>
<td>Ovoid</td>
<td>100 (N-S) by 115 (E-W)</td>
<td>Surficial; no depth</td>
<td>Surficial; no depth</td>
<td>14 pieces of flaked stone</td>
<td>Feature 12 was a burned-caliche concentration located within the northern US 82 right-of-way, on the south-facing slope of an east-west oriented parabolic dune; TU 5 was placed over the feature to test for subsurface deposits; 12 flakes were recovered from Level 1; no staining or feature fill was present; excavation of the feature was terminated after Level 4 due to lack of any intact subsurface deposits and two sterile levels.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts &amp; Samples Collected</td>
<td>Comments</td>
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<tr>
<td>13</td>
<td>N 500.9 E 348.2</td>
<td>N 3631445 E 604128</td>
<td>Burned-caliche conc.</td>
<td>Surficial; no depth</td>
<td>Irregular</td>
<td>120 (N-S) by 110 (E-W)</td>
<td>Surficial; no depth</td>
<td>Surficial; no depth</td>
<td>1 piece of flaked stone and 1 manoport</td>
<td>Feature 13 was a burned-caliche concentration located within a disturbed area on the western extent of the site, north of the right-of-way within the APE, in what appears to be an old access road-cut or pipeline scar; the feature is located south of this cut on a mechanically formed elevated bench; TU6 was placed to determine if the feature contained associated subsurface deposits; unit was terminated after a single level encountered the compact sterile paleosol with no evidence of feature fill; the artifacts and burned caliche associated with F13 and TU 6 were likely redeposited at this location as a result of mechanical disturbance.</td>
</tr>
<tr>
<td>14</td>
<td>N 493 E 670</td>
<td>N 3631363 E 604440</td>
<td>Decaying organics</td>
<td>115</td>
<td>Circular</td>
<td>10 cm diameter</td>
<td>Basin</td>
<td>4</td>
<td>Flotation</td>
<td>Feature 14 was a small, ephemeral sediment stain discovered in Trench 1; the feature forms a semi-circle with Features 15 and 16; originally thought to possibly be post-holes; feature was shallow, contained light charcoal fleckling, and had poorly defined boundaries; appears to be a root-burn along with decaying organics.</td>
</tr>
<tr>
<td>15</td>
<td>N 492 E 671</td>
<td>N 3631364 E 604440</td>
<td>Decaying organics</td>
<td>115</td>
<td>Circular</td>
<td>15 (N-S) by 12 (E-W)</td>
<td>Basin</td>
<td>2</td>
<td>Flotation</td>
<td>Feature 15 was a small, 2-cm deep ephemeral sediment stain discovered in Trench 1; the feature forms a semi-circle with Features 14 and 16, originally thought to possibly be post-holes; sediment consists of decaying organics with light charcoal flecking; most likely decaying root.</td>
</tr>
<tr>
<td>16</td>
<td>N 493 E 673</td>
<td>N 3631363 E 604443</td>
<td>Decaying organics</td>
<td>115</td>
<td>Ovoid</td>
<td>15 (N-S) by 17 (E-W)</td>
<td>Basin</td>
<td>13</td>
<td>Flotation</td>
<td>Feature 16 was a small sediment stain, discovered in Trench 1; the feature forms a semi-circle with Features 14 and 15, originally thought to be possible sub-features (post-holes) of a larger cultural manifestation; however, excavation of the feature revealed a decaying root covered with calcium carbonate.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
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<tr>
<td>17</td>
<td>N 500.56 E 394.37</td>
<td>N 3631434 E 604173</td>
<td>Possible poorly preserved hearth</td>
<td>55</td>
<td>Ovoid</td>
<td>15 (N-S) by 31 (E-W)</td>
<td>Basin</td>
<td>22</td>
<td>Flotation</td>
<td>Feature 17 was a sediment stain discovered in the west-facing wall of Trench 3; profile was well defined; however, the eastern half of feature was poorly preserved, having been heavily disturbed by bioturbation; light charcoal staining throughout; it is likely that the feature resulted from decaying organic matter.</td>
</tr>
<tr>
<td>18</td>
<td>N 494.88 E 519.17</td>
<td>N 3631399 E 604293</td>
<td>Hearth</td>
<td>185</td>
<td>Circular</td>
<td>67 (N-S) by 45 (E-W)</td>
<td>Basin</td>
<td>15</td>
<td>Flotation; Charcoal; 1 piece of flaked stone</td>
<td>Feature 18 was a circular hearth discovered in the north central portion of MS 1, within the US 82 right-of-way; it was well-preserved with black, charcoal-rich sediment throughout; two rodent runs are present in feature; medium to low bioturbation and root disturbance; 1 flake was recovered from the bottom of the feature.</td>
</tr>
<tr>
<td>19</td>
<td>N 494.21 E 511.08</td>
<td>N 3631401 E 604285</td>
<td>Hearth</td>
<td>&gt; 100</td>
<td>Ovoid</td>
<td>43 (N-S) by 50 (E-W)</td>
<td>Basin</td>
<td>13</td>
<td>Flotation; Charcoal</td>
<td>Feature 19 was an ovoid hearth discovered in the northwestern portion of MS 1 approximately 1 m north of Feature 20, within the US 82 right-of-way; fill consisted of dense charcoal, mottled with a yellowish-red fine-grained sand; good preservation; rodent run, bioturbation and root disturbance; radiocarbon date of A.D. 680–880; macrobotanical remains of mesquite and non-cultural dropseed grass seeds.</td>
</tr>
<tr>
<td>20</td>
<td>N 492.79 E 510.97</td>
<td>N 3631399 E 604285</td>
<td>Hearth</td>
<td>&gt;100</td>
<td>Circular/rectangular</td>
<td>52 (N-S) by 50 (E-W)</td>
<td>Basin</td>
<td>33</td>
<td>Flotation; Charcoal</td>
<td>Feature 20 was a hearth discovered in the northwestern portion of MS 1 approximately 1 m south of Feature 19, within the US 82 right-of-way; heavy disturbance by bioturbation, roots and a rodent burrow that removed a large portion of the feature's western half; better-preserved portions of the feature were dense with charcoal and charcoal-stained sediments with lightly oxidized and mottled boundaries; radiocarbon date A.D. 410–550; macrobotanical remains of goosefoot, dropseed grass, yucca caudex, javelina bush, and mesquite.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts &amp; Samples Collected</td>
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<tr>
<td>21</td>
<td>N 496.88 E 521.06</td>
<td>N 3631401 E 604295</td>
<td>Possible poorly preserved hearth</td>
<td>150</td>
<td>Irregular</td>
<td>30 (N-S) by 25 (E-W)</td>
<td>Basin</td>
<td>9</td>
<td>Flotation</td>
<td>Feature 21 was a possible poorly preserved hearth discovered in the southeastern portion of MS 2, approximately 1 m north of the US 82 right-of-way within the APE; large, thick chunks of charcoal present; middle of feature contained sterile sediment with dense charcoal-rich fill on either side; poorly defined boundaries with little if any oxidation; may be a root burn, or charcoal dump, or poorly preserved thermal feature that has been heavily impacted by bioturbation.</td>
</tr>
<tr>
<td>22</td>
<td>N 495.85 E 513.50</td>
<td>N 3631402 E 604288</td>
<td>Hearth</td>
<td>150</td>
<td>Ovoid</td>
<td>35 (N-S) by 46 (E-W)</td>
<td>Basin</td>
<td>30</td>
<td>Flotation; 1 piece of flaked stone</td>
<td>Feature 22 was an ovoid hearth discovered in the north-central portion of MS 1, immediately south of the US 82 right-of-way fence; profile was a deep basin shape with very dark homogenous charcoal-stained sediment; dense charcoal flecking; very well preserved with low bioturbation; well-defined oxidized and mottled boundaries; 1 flake was recovered from the bottom of the feature.</td>
</tr>
<tr>
<td>23</td>
<td>N 496.93 E 517.98</td>
<td>N 3631402 E 604292</td>
<td>Rodent run</td>
<td>150</td>
<td>Irregular</td>
<td>20 (N-S) by 26 (E-W)</td>
<td>Basin</td>
<td>7</td>
<td>Flotation</td>
<td>Feature 23 was discovered in the southeastern portion of MS 2, approximately 1 m north of the US 82 right-of-way within the APE; feature was shallow and poorly defined with large chunks of charcoal present; feature continued to the northeast and became evident it was a rodent run; fill was likely brought in from one of the nearby cultural features or root burns.</td>
</tr>
<tr>
<td>24</td>
<td>N 499 E 522.05</td>
<td>N 3631403 E 604297</td>
<td>Root burn</td>
<td>150</td>
<td>Ovoid</td>
<td>15 (N-S) by 27 (E-W)</td>
<td>Irregular</td>
<td>15</td>
<td>Flotation</td>
<td>Feature 24 was discovered in eastern portion of MS 2; profile revealed two portions of a root burn extending in opposite directions; excavation of feature was terminated after it was determined that feature was natural.</td>
</tr>
</tbody>
</table>
Artifacts

A total of 278 artifacts were recovered from LA 83680 during data recovery investigations. This sample includes 219 pieces of flaked-stone debitage, 42 ceramics, eight groundstone tools, three bifaces, two scrapers, two hammerstones, one projectile point, and one manuport. Approximately 76 percent (n=212) of these artifacts were collected from the surface of the site within the APE. The remaining 66 artifacts (24%) were recovered from test unit and feature excavations. Raw material types among the debitage include chert (n=122), quartzite (n=58), chalcedony (n=30), rhyolite (n=6), and basalt (n=3). Chert is clearly the dominant material type, and the most prevalent colors are tan (n=34), light gray (n=20), white (n=18), black (n=11), brown (n=11), orange (n=9), and red (n=9).

The projectile point is consistent with a Temporal point (A.D. 400 to 900) produced from chert. The point was complete and measured 23 by 13 by 4 mm (see Figure 30). The three bifaces were produced from chert and exhibited no cortex. The hammerstones were composed of quartzite and chert and exhibited 51 to 100 percent cortex. Both scrapers were made from chert, one with over 50 percent cortex and one without cortex. All eight groundstone fragments were made from sandstone and ranged from 13 to 94 mm in maximum dimension (see Figure 39 for an example of groundstone). The manuport is not culturally modified, but is a non-local conglomerate material that was transported to this location by the site’s occupants.

Ceramic artifacts observed include one Chupadero black-on-white sherd, 20 El Paso Brownware sherds, and 21 Jornada Brownware sherds.
Site Synthesis

The Research Design section of this report outlined several research domains and questions to help guide the investigations. Two of these domains inquire about the cultural/temporal affiliation of the site and its occupational history. To address the various questions proposed under these domains, we acquired radiocarbon dates from five of the features (Feature 6B, Feature 10, Feature 11, Feature 19, and Feature 20) with the following dates:

- Feature 6B ranged from A.D. 260–270 (1.1%), A.D. 330–470 (85.8%) and A.D. 490–530 (8.5%)
- Feature 10 ranged from A.D. 420–560
- Feature 11 ranged from A.D. 430–490 (10.6%) and A.D. 530–640 (84.8%)
- Feature 19 ranged from A.D. 680–780 (61.3%) and A.D. 790–880 (34.1%)
- Feature 20 ranged from A.D. 410–550

All five features subject to radiocarbon dating were in a 10-m diameter area within the densest surface expression of the site (AC 1). It is important to note that within such a small area, there are hearth features that span a time frame of up to 620 years; A.D. 260 to 880. However, based on the assay percentages, the time span was more likely from A.D. 330 to 780, which places the site within the Late Archaic to Early Formative period. The Temporal projectile point, discovered from the eastern extent of the site, also falls within this time frame (A.D. 400 to 900).

The presence of 41 brownware sherds also adds evidence of Early Formative occupation use. However, based on temper coarseness, the El Paso Brownware ceramics date to the later portion of the Early Formative and may not be from the same site occupation as the features (see Chapter 8). A single Chupadero Black-on-white sherd was also noted within the APE. If additional Chupadero sherds or other evidence of a Late Formative occupation exist outside the APE, then multiple components may exist at the site. Based on the radiocarbon dates of five features, the presence of a Temporal projectile point, and the ceramic assemblage, LA 83680 appears to have been continuously used over generations from the Late Archaic well into the Early Formative and possibly the Late Formative periods. Likely, the area contained a stable surface of exposed paleosol throughout this duration. This would account for the similar depth at which the features and artifacts were encountered. Post-occupational processes such as sheet wash and aeolian sand deposition later buried these deposits.

Other research domains focus on site and feature function as well as subsistence activities. Cultural features identified at LA 83680 were thermal features consisting of hearths and burned-caliche concentrations, likely utilized for food processing. The eight groundstone tools, three bifaces, two scrapers, one projectile point, and two hammerstones attest to the resource processing function of the site. Additionally, macrobotanical analysis of fill from Features 10, 11, 19, and 20 revealed charred goosefoot, yucca caudex, cholla, javelina bush, and mesquite. Based on the feature functions, feature dates, and artifact assemblage, it is likely that the site was visited seasonally over generations to acquire and process various resources.

All recovered lithic raw materials could be locally acquired from residual gravels throughout the Mescalero Plain. Other nearby sources include gravels along the Pecos River. No non-local lithic raw materials were recovered. The sample of lithic artifacts recovered from LA 83680 therefore precludes...
broader inferences regarding mobility and interregional cultural interactions such as trade or exchange. A total of 42 ceramics were recovered from the site, including one Chupadero Black-on-white, 20 El Paso Brownware, and 21 Jornada Brownware sherds. Ceramic analysis suggests that occupants of the site maintained social ties to other groups in the Capitan, Sierra Blanca, and Sacramento Mountains, where primary clay and other mineral sources are located.

Our final research domain proposed to analyze post-depositional effects on features. Eighteen features were identified and excavated at LA 83680 within the APE. Out of the eighteen features, seven were discovered on the modern ground surface, while the remaining eleven features were buried and exposed during mechanical scraping. Thirteen of the identified features were determined to be cultural, while five appeared natural in origin. Feature depth does not appear to have influenced preservation. The most well preserved feature was Feature 11, discovered on the modern ground surface as a light charcoal stain, with the top of the feature located immediately below modern ground surface.

Site Specific Questions

In addition to the broader research domains discussed above, data was also collected to address the following site-specific research questions:

1) Four ceramics were identified on the surface of the site. Are these associated with a specific Formative occupation, or are they incidental deposits? (Research Domain 1)

2) A total of nine features were identified on the site, three of which are located within the project APE. What types of features are present? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? (Research Domains 1, 2, 3, 4, and 6)

A total of 42 ceramics were recovered from the site including 21 Jornada Brownware sherds, 20 El Paso Brownware sherds, and a single Chupadero Black-on-white sherd. Analysis of the El Paso Brownware temper size suggests this assemblage was produced in the later portion of the Early Formative period. Analysis of the Jornada assemblage did not provide a more specific temporal range beyond the overall production period for this type (A.D. 520-1400) and the single Chupadero sherd could indicate a Late Formative Component.

A total of 18 features were excavated at LA 83680, including hearths (n=6), burned-caliche concentrations (n=5), decaying organics (n=3), possible poorly preserved hearths (n=2), a rodent run, and a root burn. As mentioned above, the five features subjected to radiocarbon dating span a time frame from A.D. 330 to 780, which places the site within the Late Archaic to Early Formative period. Macrobotanical analysis from these same five features revealed evidence of charred mesquite in all features; cholla wood in Feature 11; yucca caudex in Features 10, 11, and 20; and goosefoot in Features 10 and 20. Based on this information, it is likely that the site was visited seasonally over generations to acquire and process various resources.
Final Recommendations

LA 83680 was previously determined eligible for listing in the NRHP for its information potential. Out of the nine features and two artifact concentrations recorded during the pedestrian survey, only three features and portions of the artifact concentrations fell inside the APE for the current undertaking. Test unit excavation and mechanical scraping were conducted to explore and define features and develop a better understanding of the geomorphology of the portion of the site that falls within the project’s APE. All six of the hand-excavated test units were positive, containing either artifacts, features, or both. Eighteen features were excavated. Of these, thirteen were cultural and five were natural. Fifteen of the features were newly discovered during either surface collection or through mechanical scraping and trenching.

The information potential of the portion of the site within the APE has been fully recovered according to methods proposed in the Testing and Data Recovery Plan as well as the guidelines in NMAC 4.10.16.12. However, the site extends to the north and south of the APE, where features and artifacts are present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain eligible. The portions of the site outside the APE should therefore be avoided by all activities associated with the undertaking. All remaining intact deposits are at least 4 m beyond the APE, therefore temporary protective fencing is not warranted. If any intact cultural deposits not identified in this study are uncovered during construction, work should cease immediately and NMDOT, BLM and SHPO should be notified.
LA 89659

General Site Summary

The following is a general site summary. It is based on the most recent update of the site (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 89659 is a medium-sized artifact scatter containing eight fire-related features and extending across both sides of US 82 (Figures 40 and 41). The site is located immediately west of the intersection of US 82 and NM 529 and is approximately two-tenths of a mile east of LA 137120 (see Figure 3). It has been partially disturbed by a well pad access road extending north, off of the highway. The site occupies an active dunal environment, with most of the cultural material observed in erosional blowouts between the shinnery oak-covered parabolic dunes. The eight fire-related features consisted of six burned-caliche scatters of various sizes, one large charcoal stain, and one small ash stain. Features 6 and 7 were the only features located in the APE for the proposed undertaking and were located north of the US 82 right-of-way fence. South of the highway, the APE was defined by the existing right-of-way. However, this portion of the site has been entirely disturbed by modern impacts related to construction and maintenance of the highway. North of US 82, the APE extends 40 ft north of the right-of-way fence in the western portion of the site, and 90 ft north of the right-or-way fence in the eastern portion of the site. The remaining features were located north of the APE or south of the US 82 right-of-way fence and APE. Although the site has been heavily impacted by natural processes and modern activities, especially within the US 82 right-of-way, LA 89659 retained some integrity with a potential for subsurface cultural deposits protected within the dunes on site.

A total of 110 artifacts were observed on the surface of the site during the most recent site update (Lawrence et al. 2015). The burned caliche and lithic artifacts suggested that plant-processing activities likely occurred on site. Furthermore, the amount of flaked-stone debitage and variety of raw material types suggested that lithic reduction was also a prominent activity at LA 89659. The site was therefore interpreted as having functioned as a temporary or repeatedly used encampment focused on resource procurement, processing, and lithic reduction.

Excavation Results

During the current testing and data recovery project, portions of LA 89659 falling within the project APE were excavated. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, feature excavations, and artifacts, are described below. See Figure 42 for the specific locations of these activities.
Figure 40 – LA 89659, view to the east, NM 529 intersection is visible to the right

Figure 41 – LA 89659, view to the southeast, disturbed area visible to the left
Figure 42 – LA 89659 planview map
### Table 11 – Summary of Test Units Excavated at LA 89659

<table>
<thead>
<tr>
<th>TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifacts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 510 E 508.5</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed in the northeast portion of LA 89659 within the APE near the top of a dune adjacent to a blowout to investigate the depth of subsurface deposits; sediments were sterile and no artifacts were recovered; unit was terminated after 3 levels.</td>
</tr>
<tr>
<td>2</td>
<td>N 498 E 529</td>
<td>1 x 1</td>
<td>23</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed in the eastern portion of the site southwest of Feature 6 on the side of a dune to explore presence of subsurface deposits within the dune; sediments were sterile and no artifacts were recovered; unit was terminated after 3 levels.</td>
</tr>
<tr>
<td>3</td>
<td>N 496 E 537</td>
<td>1 x 1</td>
<td>40</td>
<td>4</td>
<td>N/A</td>
<td>None</td>
<td>Placed on the west side of a dune south of Feature 6 in an area with surface artifacts to explore potential for subsurface artifacts and deposits, as well as the extent of Feature 6; sediments were sterile and no artifacts were recovered; unit was terminated after 4 levels.</td>
</tr>
<tr>
<td>4</td>
<td>N 510 E 531</td>
<td>1 x 1</td>
<td>60</td>
<td>6</td>
<td>N/A</td>
<td>None</td>
<td>Placed on the side of a dune adjacent to a blowout near Feature 6 and to explore potential of subsurface deposits; sediments were sterile and no artifacts were recovered; unit was terminated after 6 levels.</td>
</tr>
<tr>
<td>5</td>
<td>N 491 E 513</td>
<td>1 x 1</td>
<td>58</td>
<td>6</td>
<td>N/A</td>
<td>None</td>
<td>Placed in an area with artifacts and burned caliche (Feature 7) in order to explore potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 6 levels.</td>
</tr>
<tr>
<td>6</td>
<td>N 500 E 484</td>
<td>1 x 1</td>
<td>28</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed in an area with artifacts and burned caliche to explore potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 3 levels.</td>
</tr>
<tr>
<td>7</td>
<td>N 497.5 E 488.5</td>
<td>1 x 1</td>
<td>33</td>
<td>4</td>
<td>N/A</td>
<td>None</td>
<td>Placed in an area with artifacts to explore potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 4 levels.</td>
</tr>
<tr>
<td>8</td>
<td>N 489 E 492</td>
<td>1 x 1</td>
<td>86</td>
<td>9</td>
<td>N/A</td>
<td>1 piece of flaked stone</td>
<td>Placed in an area with artifacts to explore potential for additional subsurface artifacts and features; one piece of flaked stone encountered in Level 2; excavation continued for 7 additional sterile levels to explore the stratigraphy of the site.</td>
</tr>
<tr>
<td>9</td>
<td>N 504 E 420</td>
<td>1 x 1</td>
<td>46</td>
<td>4</td>
<td>N/A</td>
<td>None</td>
<td>Placed in an area with artifacts and burned caliche to explore the potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 4 levels.</td>
</tr>
<tr>
<td>10</td>
<td>N 497 E 449</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed in the northwest portion of LA 89659 in an area with burned caliche to explore potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 3 levels.</td>
</tr>
</tbody>
</table>
**Surface Collection**

Prior to any subsurface testing, all artifacts located on the ground surface of the site within the APE were systematically flagged and collected. These artifacts were point provenienced by GPS and assigned UTM coordinates and individual FS numbers. When appropriate, groups of surface artifacts were collected under the same FS number when located within an area measuring less than 10 cm², or within a similar context (e.g., microdebitage from an isolated ant mound). The distribution and density of surface artifacts helped guide the subsequent placement of test units. A total of 48 artifacts were collected from the surface of LA 89659 within or adjacent to the APE. This assemblage consisted of 45 pieces of flaked-stone debitage, two cores, and one Chupadero Black-on-white sherd.

**Test Unit Excavations**

Ten 1-by-1-m test units were excavated within the project APE at LA 89659. Summary data on test unit location, depth, sediment matrix, feature identification, and recovered artifacts is presented in Table 11. These units were placed at varying elevations atop, along the edges or near the base of parabolic dunes. To further increase the probability of finding subsurface cultural material, test units were also placed specifically in areas with high surface artifact density or burned caliche. Test units extended between 23 cm and 86 cm in depth. Units were terminated as sterile sediments were encountered. A single artifact (flaked-stone debitage) was collected during test unit excavation, from Level 2 within TU 8. No features were identified.

**Mechanical Excavations**

After hand-excavated test units were completed, mechanical trenching within the project APE took place. Four trenches were completed at LA 89659 (Figure 43). The trenches were all approximately 10 m in length and 2.5 m wide. The deepest trench went to a depth of 2.5 m bgs. One thermal feature was discovered during mechanical trenching (Feature No. 9 in Trench 1), approximately 1.8 m bgs (Figure 44). Table 12 provides detailed information on each of the mechanical trenches.

<table>
<thead>
<tr>
<th>Mechanical Excavation</th>
<th>Location</th>
<th>Size</th>
<th>Dimensions</th>
<th>Features Encountered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench 1</td>
<td>Eastern portion of site north of the right-of-way fence</td>
<td>25 m²</td>
<td>2.5 m (N-S) 10 m (E-W)</td>
<td>Feature 9</td>
</tr>
<tr>
<td>Trench 2</td>
<td>Central portion of site within northern right-of-way</td>
<td>25 m²</td>
<td>2.5 m (N-S) 10 m (E-W)</td>
<td>None</td>
</tr>
<tr>
<td>Trench 3</td>
<td>Western portion of site both sides of right-of-way fence</td>
<td>25 m²</td>
<td>10 m (N-S) 2.5 m (E-W)</td>
<td>None</td>
</tr>
<tr>
<td>Trench 4</td>
<td>Western portion of site within southern right-of-way</td>
<td>25 m²</td>
<td>2.5 m (N-S) 10 m (E-W)</td>
<td>None</td>
</tr>
</tbody>
</table>
Feature Excavations

One thermal feature was discovered at LA 89659. Feature 9 was exposed during mechanical trenching (Trench 1) and was excavated fully. Features 6 and 7, previously recorded during surface survey, were located within the APE and were also assessed. Both Features 6 and 7 were documented during survey as loose clusters of burned caliche. Upon investigation during the current excavation, neither location met the BLM criteria for defining a feature. As a result, TUs were excavated adjacent to the locations of burned caliche to see if subsurface feature evidence was present. Table 13 provides detailed information on all excavations associated with Features 6, 7 and 9.

Of the other six features at LA 89659, five are south of the APE and the US 82 right-of-way fence (Features 1-5) and one is located north of the APE (Feature 8). These six features were not treated during testing and data recovery.
Figure 44 – Trench 1 north wall profile

I - 7.5 YR 5/6 strong brown; dry loose fine-grain sand
II - 7.5 YR 6/6 reddish yellow; semi-compact fine-grain sand
III - 5 YR 5/6 yellowish red; very compact fine-grain sand (paleosol)
IV - Caliche
Feature 9

Feature 9 was an ovoid charcoal stain that was discovered in the north wall of Trench 1 located within the APE, but outside of the US 82 right-of-way to the north. Approximately 1.8 m of overburden was covering the surface of the feature. The feature had several rodent or root runs within the matrix, therefore its condition was noted as fair.

Feature 9 measured 33 cm wide by 26 cm tall in profile prior to excavation and had a top elevation of 97.38. Given the depths involved, the overburden was not removed to expose the top of the feature; instead, the feature was excavated horizontally into the side of the trench wall with a trowel. No bisection was necessary, as the profile was already visible in the trench wall. Three 1-gallon bags were collected for flotation and the remaining sediment was screened through 1/8-inch wire mesh. Post-excavation it was determined that Feature 9 extended 34 cm into the trench wall.

In profile the feature appeared as a black (5 YR 2.5/2) ovoid stain with compacted sediments, minimal charcoal flecking and heavy mottling. No artifacts or burned caliche were discovered. Radiocarbon analysis indicate that the feature fill dates to the A.D. 660–770 time period (Figure 45). The only culturally modified plant material identified during macrobotanical analysis was burned mesquite wood. Based on the general shape and size of Feature 9, as well as the presence of burned mesquite, the feature was most likely the remains of a hearth.

![Figure 45 – Calibrated two-sigma date range of Feature 9 at LA 89659; A.D. 660–770 (95.4% probability)](image-url)
FEATURE 9
Hearth

LA 89659

GRID: N 506.24, E 513.55
UTM: N 3631220, E 605159

PLAN VIEW SHAPE: OVOID
PROFILE SHAPE: BASIN

PLANVIEW DIMENSIONS (cm)

PRE-EXCAVATION: 33 (WIDE) x 26 (TALL)
POST-EXCAVATION: 34 (N-S) x 33 (E-W)

TOP ELEVATION: 97.38
BOTTOM ELEVATION: 97.12
PROFILE THICKNESS: 26 CM

Bioturbation
Root
Elev. 97.12

Unexcavated
I - Feature Fill; 5 YR 2.5/2 dark reddish brown
II - Surrounding Matrix; 7.5 YR 6/6 reddish yellow
III - Paleosol; 5 YR 5/6 yellowish red

Pre-Exc/Profile

Post-Excavation

ASSOCIATED FS#s: 28
ASSOCIATED TUs/MECHANICAL SCRAPES: TRENCH 1
DATE EXCAVATED: 4 JUNE 2016
EXCAVATOR(s): GREG MASTROPietro, JESSICA ALDen

SAMPLES COLLECTED: Flotation
PHOTO NUMBERS: GM 1 (154-163)
## Table 13 – Summary of Features Excavated at LA 89659

<table>
<thead>
<tr>
<th>Feature No.</th>
<th>Grid Location</th>
<th>UTM Location (NAD83 13N)</th>
<th>Feature Type</th>
<th>Depth to Top of Feature (cm bgs)</th>
<th>Planview Shape</th>
<th>Planview Dimensions (cm)</th>
<th>Profile Shape</th>
<th>Profile Thickness (cm)</th>
<th>Artifacts/Samples Collected</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>n/a</td>
<td>N 3631217 E 605178</td>
<td>Burned-caliche scatter</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>This feature was not excavated as it was a diffuse scatter of burned caliche that did not meet the BLM criteria for a feature; TU 2 was placed nearby; no subsurface evidence of the feature was encountered.</td>
</tr>
<tr>
<td>7</td>
<td>n/a</td>
<td>N 3631207 E 605159</td>
<td>Burned-caliche scatter</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>This feature was not excavated as it was a diffuse scatter of burned caliche that did not meet the BLM criteria for a feature; TU 5 was placed nearby; no subsurface evidence of the feature was encountered.</td>
</tr>
<tr>
<td>9</td>
<td>N 506.24 E 513.55</td>
<td>N 3631220 E 605159</td>
<td>Hearth</td>
<td>180</td>
<td>Ovoid</td>
<td>34 (N-S) by 33 (E-W)</td>
<td>Basin</td>
<td>26</td>
<td>Flotation</td>
<td>Hearth with charcoal-rich sediments; mottled due to rodent disturbance; no burned caliche observed; no artifacts; radiocarbon date A.D. 660–770; macrobotanical remains of mesquite.</td>
</tr>
</tbody>
</table>
**Artifacts**

A total of 49 artifacts were recovered from LA 89659 during data recovery investigations. All artifacts came from the surface context but for one piece of debitage found in TU 8, Level 2. This sample includes 46 pieces of flaked-stone debitage, two cores, and a single Chupadero Black-on-white sherd. Raw material types among the debitage include chert (n=38), chalcedony (n=3), quartzite (n=3), and rhyolite (n=2). Both cores were made from chert.

**Site Synthesis**

The Research Design section of this report outlined several research domains and question to help guide the investigations. Two of these domains inquire about the cultural/temporal affiliation of the site and its occupational history. To address the various questions proposed under these domains, we acquired radiocarbon dates from the single feature (Feature 9) and reviewed available information from the artifact assemblage. The radiocarbon date for Feature 9 ranged from A.D. 660 to 770, placing the site within the Early Formative period. The only temporally diagnostic artifact was the Chupadero sherd, indicating the possibility of a Late Formative component. Additionally, previous investigations noted an Archaic (Bajada) projectile point. Given the inconsistency between a diagnostic ceramic dating no earlier than A.D. 1050, a feature dating to the seventh or eighth centuries, and a pre-ceramic projectile point, this location was most likely used on multiple occasions over a long period of time. Investigation of the site beyond the current project APE could provide additional information concerning the site’s occupational history.

Other research domains focus on site and feature function as well as subsistence activities. The only feature identified at LA 89659 is a thermal feature that was likely utilized for food processing. Most likely the site was visited seasonally to acquire and process resources such as agave, mesquite, and shinnery oak acorns. While the macrobotanical analysis from Feature 9 did not reveal evidence of these resources (aside from mesquite wood), additional features are located outside of the APE and may provide additional information on site and feature function and subsistence activities.

All recovered lithic raw materials could be locally acquired from residual gravels throughout the Mescalero Plain. No non-local lithic raw materials were recovered. The sample of lithic artifacts recovered from LA 89659 therefore precludes broader inferences regarding mobility and interregional cultural interactions such as trade or exchange. A single Chupadero Black-on-white sherd was recovered from the site. Although this sherd was not selected for Neutron Activation Analysis (NAA), NAA from all five Chupadero sherds from other sites in the project area indicated a production location in the Capitan Mountains to the northwest of the current project area.

Our final research domain proposed to analyze post-depositional effects on features. At LA 89659, no features were observed on the surface of the site within the APE, only a few burned-caliche scatters that did not fit the BLM feature definitions and showed no subsurface feature characteristics. However, one thermal feature was encountered in a mechanical trench; Feature 9 sediments were located beneath a large parabolic dune at a depth of 1.8 m bgs. This suggests that absence of surface manifestations is not an accurate indicator of feature presence, let alone feature size and morphology. Additionally, the presence of overburden sediment may provide a protective element for the features as Feature 9 was
discovered in good condition. Finally, the presence of this buried feature may indicate that additional subsurface deposits are present but buried in other, unexcavated, portions of the site.

**Site Specific Questions**

In addition to the broader research domains discussed above, data was also collected to address the following site-specific research questions:

1) Six ceramics were identified on the surface of the site during survey. Are these associated with a specific Formative occupation, or are they incidental deposits unrelated to an earlier occupation? *(Research Domain 1)*

2) A possible Early to Middle Archaic Bajada projectile point was previously identified on the surface of the site. Does this imply evidence of an early Archaic or Paleoindian occupation, or is it an incidental deposit? Where is the raw material source for this point, and how may this inform on mobility or exchange? *(Research Domains 1 and 5)*

3) No features were identified on the surface of LA 89659. Are intact features present within the project APE? If so, what types of features are present? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? *(Research Domains 1, 2, 3, 4, and 6)*

The only ceramic located during the current investigation was a single Chupadero Black-on-white sherd found during surface collection of the site. While it is difficult to determine if a Late Formative component exists based on a single sherd, the production span of Chupadero pottery (A.D. 1050–1550) is not consistent with the radiocarbon date from Feature 9 (A.D. 660–770) or the possible Bajada point that was noted during previous investigations but not recovered during the current effort.

The possible Bajada projectile point identified during survey was outside the APE and was not relocated during the excavation. No other evidence of Archaic or Paleoindian occupation was found. However, much of the site lies outside of the project APE and was not investigated. It is possible that additional Archaic and/or Paleoindian deposits are present in other portions of the site.

The only feature identified during excavation was Feature 9. As described above, Feature 9 was interpreted to be a hearth with evidence of mesquite wood in the feature fill and a radiocarbon date of A.D. 660–770. The feature was found during mechanical trenching of the site at a depth of 1.8 m bgs.

**Final Recommendations**

LA 89659 was previously determined eligible for listing in the NRHP for its information potential. In total, 51 surface artifacts were located within APE for the proposed undertaking. Test unit excavation and mechanical trenching were undertaken to determine whether any features were present, or had the potential to be present within the APE. Nine of the ten hand-excavated test units were entirely sterile, containing neither features, artifacts, charcoal staining, charcoal flecking, nor burned caliche. One test unit (TU 8) contained a single piece of flaked stone within Level 2, 6-16 cm below ground surface. Mechanical trenching exposed one feature (Feature 9) within Trench 1.
The information potential of the portion of the site within the APE has been fully recovered according to methods proposed in the Testing and Data Recovery Plan as well as *NMAC 4.10.16.12*. However, the site extends to the north and south of the APE, where features and artifacts are present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain *eligible*. The portions of the site outside the APE should therefore be avoided by all activities associated with this undertaking. All remaining intact deposits are at least 6 m beyond the APE, therefore temporary protective fencing is not warranted. If any intact cultural deposits not identified in this study are uncovered during construction, work should cease immediately and NMDOT, BLM and SHPO should be notified.
LA 104182

General Site Summary

The following site summary is based on the most recent update of the site (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 104182 is a small prehistoric flaked-stone artifact scatter with one fire-related feature. The site is located on both sides of US 82 and is the easternmost site in the project area. It is situated approximately 1.5 miles east of LA 15901 (see Figure 4) and occupies a landscape of low, shinnery oak-covered parabolic dunes ranging from 1 to 2 m in height (Figures 46 and 47). The dunes are interspersed with erosional blowouts, and the single fire-related feature was located within one of these blowouts outside the APE approximately 70 m south of US 82. The feature consisted of a 1-m-diameter light gray charcoal stain with four burned caliche fragments in its vicinity.

A total of 63 artifacts were observed on the surface of the site during survey for the proposed undertaking, most of which were located in AC 1 approximately 50 m south of the right-of-way fence. This assemblage consisted of 61 pieces of flaked-stone debitage, one tan chert multidirectional core, and one gray/tan chert expedient scraping tool. Among the flaked-stone debitage, raw materials included chert and chalcedony of various colors, quartzite, siltstone, silicified wood, and obsidian. Due to the lack of diagnostic artifacts, the site was assigned an Unknown Aboriginal (9500 B.C. to present) cultural/temporal affiliation. LA 104182 likely functioned as a logistical resource procurement and processing locale.

Excavation Results

During the current testing and data recovery project, portions of LA 104182 falling within the project APE were excavated. As the 20-ft construction buffer was located entirely within the existing right-of-way, the full width of the right-of-way, fence line to fence line, was considered the APE within this site. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, feature excavations, and artifacts are described below. See Figure 48 for the specific locations of these activities.

Surface Collection

No artifacts were observed on the surface of the site within the APE for the testing and data recovery project. This is partially due to the density of vegetation, particularly shinnery oak, which severely limits surface visibility within the APE. All previously identified artifacts are located outside the APE within erosional blowouts that generally lack vegetation relative to other portions of the site area.
**Figure 46** – LA 104182, view to the south-southwest

**Figure 47** – LA 104182, view to the south
Figure 48 – LA 104182 planview map
Table 14 – Summary of Test Units Excavated at LA 104182

<table>
<thead>
<tr>
<th>TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifacts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 499 E 511</td>
<td>1 x 1</td>
<td>86</td>
<td>9</td>
<td>N/A</td>
<td>None</td>
<td>Placed within southern US 82 right-of-way near far eastern edge of the site to explore area’s potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; 9 levels were excavated to assess the stratigraphy of the site.</td>
</tr>
<tr>
<td>2</td>
<td>N 499 E 495</td>
<td>1 x 1</td>
<td>39</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed within southern US 82 right-of-way between TU’s 1 and 3 to assess area’s potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 3 levels.</td>
</tr>
<tr>
<td>3</td>
<td>N 501 E 482</td>
<td>1 x 1</td>
<td>27</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed within southern US 82 right-of-way between TU’s 2 and 4 to explore area’s potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 3 levels.</td>
</tr>
<tr>
<td>4</td>
<td>N 538 E 496</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed within northern US 82 right-of-way to explore the potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 3 levels.</td>
</tr>
</tbody>
</table>
**Test Unit Excavations**

Four 1-by-1-m test units were excavated within the project APE at LA 104182. Summary data on test unit location, depth, and sediment matrix are presented in Table 14. All test units were placed within the US 82 right-of-way, three on the southern side of the highway and one on the northern side. Shinnery oak inhibited surface visibility to such an extent that test units could not be placed based on surface artifact density or the surficial expression of features. Therefore, the units were placed at varying elevations atop or along the edges of parabolic dunes. Test units extended between 27 cm and 86 cm in depth. No features or artifacts were encountered during test unit excavation. The units were terminated at varying depths based on geomorphological settings and presence of sterile sediments. These sediments consisted entirely of historic to recent aeolian sand deposits, and hand-excavation of the test units could not extend deep enough to encounter potential buried cultural horizons below the aeolian deposits.

**Mechanical Excavations**

Mechanical scraping at LA 104812 occurred in both the northern and southern portions of the US 82 right-of-way, as proposed in the testing and data recovery plan. Due to the thickness of historic to recent aeolian sand deposits, hand-excavated test units did not extend deep enough to encounter a buried cultural horizon. Therefore, extensive mechanical scraping was determined to be a more practical means for excavating the site and assessing its potential for subsurface cultural deposits.

In the southern portion of the right-of-way, mechanical scraping (MS 1) proceeded from east to west. The scrape truncated a large east-west oriented parabolic dune containing up to 3 m of historic to recent aeolian sand deposits. Within the first 6 m (east-west) of the scrape, excavation extended to a depth of 3.5 m. No caliche was encountered. However, the scrape exposed a sterile reddish paleosol at a depth of approximately 1.5 m bgs. Mechanical excavation then terminated at 1.5 m bgs for the remainder of the scrape at the level of transition from aeolian sand to the compact reddish paleosol observed in the northern mechanical scrape (Figure 49). A basin metate was encountered at this level towards the center of the site at a depth of 1.4 m bgs. The portion of the landform in which this artifact was found contained shallower aeolian deposits than surrounding areas, and the stratigraphic change from aeolian sand to the paleosol was encountered approximately 1.4 m bgs. The metate was likely deposited in a cultural horizon that once existed at contact with the paleosol. This horizon may have since eroded or deflated, and associated cultural sediments are not visible in profile. Farther to the west, the landform was continuously scraped to 1.75 m bgs over a distance of 10 m. No additional subsurface cultural deposits or artifacts were encountered. Following this, mechanical scraping occurred in several alternating segments, with each segment measuring approximately 8 m (north-south) by 3 m (east-west). No additional deposits or materials were encountered in this portion of the site.

Within the northern portion of the right-of-way, mechanical scraping (MS 2) occurred in alternating segments, with each segment measuring approximately 6 m (north-south) by 3 m (east-west). These segments truncated an east-west oriented parabolic dune measuring approximately 2 m in height. Approximately half of the dune was mechanically excavated to a depth of 2.5 m below the upper surface of the dune. The dune contained 1.5 to 2 m of historic to recent aeolian sand deposits, and a reddish
compact paleosol (characteristic throughout the Mescalero Sands) appeared around this depth. No artifacts or features were encountered during mechanical excavation north of the highway.

Figure 49 – MS 1 north wall profile

Feature Excavations

No newly identified features were encountered during testing and mechanical scraping at LA 104182. All previously identified features were encountered during survey outside of the project APE.

Artifacts

One artifact was recovered from LA 104182 during data recovery investigations. This artifact was a sandstone basin metate discovered at the bottom of MS 1 approximately 1.5 meters below modern ground surface (Figure 50). It likely rested on the cultural horizon just above the paleosol. The metate fragment measures 22.4 by 13.9 by 1.9 cm. It is bifacially ground, and the primary grinding surface is concave and basin-shaped. This surface is somewhat weathered. It is dimpled, but does not exhibit any polishing or striations. It is unclear whether the dimpling is the result of intentional rejuvenation pecking or natural weathering. The opposing side has a convex angular shape. One portion of this surface appears to be intentionally shaped to create a flat base that would support the object. A substantial amount of caliche is present on the basal surface of the artifact, suggesting that it has remained relatively stable since its initial deposition. The metate is broken through its center, forming two refitting fragments, and the terminal edges are rounded but highly friable.
Site Synthesis

The testing and data recovery plan outlined several site-specific research domains and questions to help guide the investigations, including the cultural/temporal affiliation of the site, occupational history, site function, etc. However, due to the paucity of artifacts and features discovered in the right-of-way, none of the research domains or site specific question could be addressed. However, the site may contain intact subsurface deposits outside of the APE. The research domains and questions outlined in the testing and data recovery plan should therefore continue to serve as viable avenues for any future investigations that may occur at LA 104182. While overall research domains are not addressed, some site-specific research questions are considered below.

Site Specific Questions

The Research Design section of this document provides a complete discussion of the research themes common to all sites in the project area. In addition to these broader research questions, data was collected in an attempt to address the following site-specific research questions:

1) No temporally diagnostic artifacts were identified on the surface of the site. What period or periods does this site date to? (Research Domain 1)

2) No ceramics were observed at LA 104182. Are ceramics present? If so, what period or periods are they affiliated with, and how may such types inform on both technological organization and subsistence practices? (Research Domains 1, 2, 4 and 5)
3) One feature was identified at LA 104182 outside the project APE. Are intact features present within the project APE? If so, what types of features are present? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? (Research Domains 1, 2, 3, 4, and 6)

Neither temporally diagnostic artifacts, ceramics, nor features were found in the APE. As such, a specific temporal affiliation cannot be assigned to the site based on information recovered from the project APE. The lone artifact found during excavation, a metate fragment, generally associates the site with a Formative occupation and suggests resource processing occurred. Additionally, since a metate is a relatively difficult artifact to transport and it was found 1.5 m bgs, it is likely that additional deposits are present within the site outside of the APE and buried beneath historic to recent aeolian sand deposits. Due to the depth of overlying aeolian sand deposits, hand-excavated test units were not a productive means of identifying or exposing buried cultural deposits. The sterile paleosol was encountered at an average of 1.5 m bgs, but no overlying A horizon was present. This suggests that at LA 104182, an A horizon either did not develop, or was removed by erosion prior to the deposition of more recent aeolian sands. Future excavations in the vicinity of LA 104182 should therefore focus on examining local geomorphology and stratigraphy through limited mechanical trenching prior to any hand excavation in order to more efficiently identify the depths of potential cultural horizons.

**Final Recommendations**

LA 104182 was previously determined eligible for listing in the NRHP for its information potential. However, the site’s single feature (identified during survey) and all observed surface artifacts are located outside the US 82 right-of-way and project APE for the proposed undertaking. Test unit excavation and mechanical scraping were undertaken to determine whether any features were present, or had the potential to be present, within the APE. Four hand-excavated test units were entirely sterile, containing neither features nor artifacts. Mechanical scraping also failed to reveal the presence of any features. However, a basin metate was discovered approximately 1.5 m below ground surface in MS 1 at contact with a buried paleosol. Although no features were identified in direct association with this artifact.

The information potential of the portion of the site within the APE has been fully recovered according to methods proposed in the Testing and Data Recovery Plan as well as the standards outlined in NMAC 4.10.16.12. However, the site extends both north and south of the APE, where one feature and numerous surface artifacts are present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain *eligible*. All remaining intact deposits are located beyond the US 82 right-of-way fence. The project APE does not extend outside of the right-of-way in this area, therefore temporary protective fencing is not warranted. If any intact cultural deposits not identified in this study are uncovered during construction, work should cease immediately and NMDOT, BLM, and SHPO should be notified.
LA 118318

General Site Summary

The following is a general site summary. It is based on the most recent update of the site surface (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 118318 is a large extensive prehistoric artifact scatter containing 13 surface fire-related features. The site is part of the larger cultural complex along Bear Grass Draw which includes over a dozen nearby sites with four of them being subject to investigation during this project. In addition to LA 118318, which is located south of the highway, these include LA 17041, LA 120949 and LA 120950, all of which are located north of the highway (see Figures 2 and 19). LA 118318 occupies a broad dunal landform that gently slopes down towards Bear Grass Draw 470 m to the west (Figure 51). The mesquite-anchored coppice dunes measure 1 to 5 m in height, with a variety of features located in erosional blowouts between the dunes, or elevated above the blowouts within the dunes themselves (Figure 52). Of the 13 identified features, six (Features 1, 2, 3, 9, 10, and 13) were medium to large burned-caliche concentrations without associated surface staining, six (Features 4–8 and Feature 11) were medium to large burned-caliche concentrations with charcoal/ash staining, and one (Feature 12) was a small charcoal/ash stain with no associated caliche.

The site was originally estimated to contain over 1,000 artifacts; approximately 25 percent were analyzed in the field during the survey phase of the current project. The analyzed assemblage (n=236) included 53 ceramics, 34 flaked and groundstone tools, and 149 pieces of flaked-stone debitage. Ceramic types consisted of undifferentiated brownware (n=17), Chupadero plain undecorated (n=10), El Paso Brownware (n=9), Jornada Brownware (n=9), indeterminate black-on-white (n=4), Chupadero Black-on-white (n=3), and plain grayware (n=1). A variety of lithic tools were present, including manos, cores, hammerstones/abraders, one metate fragment, one chopper, and one Tularosa Corner-notched projectile point fragment (100 B.C. to A.D. 900). Flaked-stone debitage was dominated by chert, quartzite, and siltstone. No artifacts were identified within the existing highway right-of-way. Based on these artifact types, LA 118318 was assigned a Late Archaic to Late Formative (100 B.C. to A.D. 1450) cultural/temporal affiliation.

Excavation Results

During the current testing and data recovery project, portions of LA 118318 falling within the project APE were excavated. The APE for this site extends 15 to 45 ft south of the existing right-of-way fence. Numerous disturbances are present in the APE, including a buried utility line south of the right-of-way fence, a two-track access road paralleling the southern side of the fence, and a north-south oriented bladed road leading to a well pad immediately south of the site. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, and feature excavations, and artifacts are described below. See Figures 53–59 for the specific locations of these activities.
Figure 51 – LA 118318 overview, view to the west-southwest (Feature 6 area to the left)

Figure 52 – LA 118318 overview, view to the southwest (Feature 6 surface collection)
Figure 53 – LA 118318 planview map (western portion)
Figure 54 – LA 118318 planview map (eastern portion)
Figure 55 – Planview map of Feature 6 area
Figure 56 – Planview map of MS 1 and MS 2 area
Figure 57 – Surface artifact density map (western portion of site)
Figure 58 – Surface artifact density map (Feature 6 area)
Figure 59 – Surface artifact density map (eastern portion of site)
Surface Collection

Prior to any subsurface testing, all surface artifacts within the APE were flagged and collected. Artifacts were collected across a 1-by-1-m surface grid established via total station, and assigned individual FS numbers based on designated grid coordinates. All surface-collected artifacts were located south of the right-of-way fence within the APE, and no artifacts were observed or collected from within the right-of-way. Over 1,000 surface artifacts were collected, the majority of which consisted of flaked-stone debitage. The following flaked-stone and groundstone counts represent the approximately 50-percent sample that was analyzed. A total of 117 pieces of flaked-stone debitage, 50 ceramics, 81 pieces of groundstone, three cores, three scrapers, two retouched flakes, one biface fragment, and one hammerstone were collected. Most surface-collected artifacts were located in the vicinity of Feature 6. However, artifacts were also collected in higher densities in the far eastern and western portions of the site. See Figures 57–59 for maps depicting surface artifact density.

Test Unit Excavations

Twenty-four test units were excavated within the project APE at LA 118318 (Table 15). These units consisted of 23 1-by-1 m units and one 3-by-3 m unit. Fourteen of the 1-by-1 units were excavated to form a cruciform hand trench (Figures 60–62) with six north-south oriented units and eight east-west oriented units. All test units were excavated south of the right-of-way fence within the APE.

The entirety of LA 118318 is south of the highway and spreads over 460 m, parallel to US 82 within a dense dunal landscape where dunes range in height from 1 to 5 m. All units were placed on top of previously identified surface features that fell within or near the APE to explore the potential for intact subsurface deposits, or over the top of newly discovered features identified during surface collection. The units within the cruciform were placed not only to explore subsurface deposits within Feature 6, but also to test the geomorphology of the landform. All 24 units were positive yielding hundreds of artifacts. Cultural materials recovered include: flaked-stone debitage, flaked-stone tools including one projectile point from TU 4, ceramics, groundstone, and shell fragments. Test units extended between 3 cm and 36 cm in depth. Units were terminated as sterile sediments were exposed. The sterile sediment encountered was dominated by compact, carbonate rich, eroded paleosol.

Figure 60 – Post excavation of cruciform hand trench (view to the south)
Figure 61 – Cruciform hand trench planview

Figure 62 – Cruciform hand trench, west wall profile
(includes profile of TU 10, located 1 m north and 3 m west of TU 5)
### Table 15 – Summary of Test Units Excavated at LA 118318

<table>
<thead>
<tr>
<th>TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifacts and Samples</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 944 E 923</td>
<td>1 x 1</td>
<td>36</td>
<td>4</td>
<td>TU 2 and Feature 6</td>
<td>101 pieces of flaked stone, 10 ceramics, 1 piece of groundstone, and 2 charcoal samples</td>
<td>Placed on the northern side of a series of large coppice dunes beyond the right-of-way fence within the APE; unit was part of a north-south oriented 6-by-1-m hand trench placed within Feature 6, a large stain and artifact cluster identified during survey; TU 1 was the southern-most 1-by-1-m test unit in the trench; trench was placed to investigate Feature 6 and to gain a better understanding of the stratigraphy of this portion of the site; unit contained abundant artifacts and burned caliche; terminated after 4 levels when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>2</td>
<td>N 945 E 923</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>TU 1, TU 3, Feature 6</td>
<td>83 pieces of flaked stone, 4 ceramics, and 2 seeds</td>
<td>Placed immediately north of TU 1, in north-south oriented hand trench; unit contained a variety of artifacts and abundant burned caliche; terminated after three levels when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>3</td>
<td>N 946 E 923</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>TU 2, TU 4, TU 9, Feature 6, Feature 15</td>
<td>50 pieces of flaked stone, 1 ceramic, and 2 pieces of groundstone</td>
<td>Placed immediately north of TU 2 in north-south oriented hand trench; sediment stain was encountered in the eastern portion of this unit but was determined to be smear from Feature 15, a charcoal stain located in TU 9; unit contained abundant artifacts and burned caliche; terminated after 3 levels when large, non-cultural caliche cobbles were encountered.</td>
</tr>
<tr>
<td>4</td>
<td>N 947 E 923</td>
<td>1 x 1</td>
<td>23</td>
<td>3</td>
<td>TU 3, TU 5, TU 11, TU 22, Feature 6</td>
<td>21 pieces of flaked stone, 1 projectile point, and 2 ceramics</td>
<td>Placed immediately north of TU 3 in north-south oriented hand trench; unit contained abundant artifacts and burned caliche; terminated after 3 levels when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>5</td>
<td>N 948 E 923</td>
<td>1 x 1</td>
<td>23</td>
<td>2</td>
<td>TU 4, TU 6, Feature 6</td>
<td>15 pieces of flaked stone, 1 ceramic, and 1 piece of groundstone</td>
<td>Placed immediately north of TU 4 in north-south oriented hand trench; TU 5 was the northern-most 1-by-1-m test unit excavated in the trench; unit contained artifacts and burned caliche; terminated after 2 levels when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>6</td>
<td>N 949 E 923</td>
<td>1 x 1</td>
<td>N/A</td>
<td>N/A</td>
<td>TU 5, Feature 6</td>
<td>1 piece of flaked stone from surface</td>
<td>TU 6 was not excavated; unit was intended to be the northern-most unit in the north-south oriented hand trench to view stratigraphy across Feature 6; however, the unit was not excavated as TU 10 and TU 15 (located 3 meters and 2.5 meters west of TU 6 respectively) offered a substitute window into the stratigraphy of the feature.</td>
</tr>
<tr>
<td>TU No.</td>
<td>Grid Location</td>
<td>Size (m)</td>
<td>Depth (cm bgs)</td>
<td>No. of Levels</td>
<td>Associated TUs/Features</td>
<td>Artifacts and Samples</td>
<td>Comments</td>
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<tr>
<td>7</td>
<td>N 946 E 908</td>
<td>1 x 1</td>
<td>20</td>
<td>2</td>
<td>Feature 6, Feature 14</td>
<td>3 pieces of flaked stone, 1 core tool, and 1 ceramic</td>
<td>Placed on the northern side of a large coppice dune south of the US 82 right-of-way fence within the APE; unit explored Feature 14 (surficial charcoal stain) within the broader Feature 6 area; feature was exposed in Level 1; following excavation of Feature 14, unit continued for 2 more levels and terminated when caliche bedrock was approached.</td>
</tr>
<tr>
<td>8</td>
<td>N 947.5 E 910</td>
<td>1 x 1</td>
<td>10</td>
<td>1</td>
<td>N/A</td>
<td>7 pieces of flaked stone</td>
<td>Placed at western surface extent of Feature 6 in an area with stained sediment to determine if staining represented an intact feature; no feature was encountered, but a charcoal-filled rodent run was observed; unit was terminated after the rodent disturbance was uncovered.</td>
</tr>
<tr>
<td>9</td>
<td>N 946 E 924</td>
<td>1 x 1</td>
<td>10</td>
<td>1</td>
<td>TU 3, TU 11, Feature 6, Feature 15</td>
<td>44 pieces of flaked stone, 3 ceramics, and 2 pieces of groundstone</td>
<td>Placed immediately east of TU 3 to uncover the eastern half of Feature 15, a thermal feature; feature was found to be surrounded by smear and much smaller than anticipated; unit was terminated after the feature excavation, as cultural material was unlikely to be present below.</td>
</tr>
<tr>
<td>10</td>
<td>N 949 E 920</td>
<td>1 x 1</td>
<td>45</td>
<td>4</td>
<td>TU 15, Feature 6, Feature 16</td>
<td>24 pieces of flaked stone, 1 ceramic, 1 bone, and 1 shell</td>
<td>Placed 1 m north and 3 m west of TU 5; unit was situated over Feature 16 to investigate the feature and the immediate area; Feature 16 (charcoal stain) was defined in Level 1 and completely excavated; unit continued for 3 additional levels, and stratigraphic information was used for the profile of the N-S section of the hand trench in place of TU 6.</td>
</tr>
<tr>
<td>11</td>
<td>N 947 E 924</td>
<td>1 x 1</td>
<td>20</td>
<td>2</td>
<td>TU 4, TU 9, Feature 6</td>
<td>32 pieces of flaked stone, 2 ceramics, and 1 piece of groundstone</td>
<td>Placed immediately east of TU 4 as part of an 8-by-1-m east-west oriented hand-trench perpendicular to the trench formed by TUs 1–5; trench was designed to examine stratigraphy of Feature 6 and provide horizontal and vertical control for artifact collection within the area; unit investigated staining that initially appeared in TUs 3 and 9; staining was found to be smear from Feature 15, a thermal feature located in TU 9; TU 11 terminated after 2 levels when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>12</td>
<td>N 950 E 934</td>
<td>1 x 1</td>
<td>3</td>
<td>1</td>
<td>Feature 6, Feature 17</td>
<td>12 pieces of flaked stone, 2 ceramics, and 1 piece of groundstone</td>
<td>Placed on the northwest trending slope of a coppice dune and near the eastern edge of the Feature 6 area to expose Feature 17 (charcoal stain); feature was exposed and defined in Level 1; unit was terminated after excavation of feature as cultural deposits were unlikely in deeper levels.</td>
</tr>
<tr>
<td>TU No.</td>
<td>Grid Location</td>
<td>Size (m)</td>
<td>Depth (cm bgs)</td>
<td>No. of Levels</td>
<td>Associated TUs/Features</td>
<td>Artifacts and Samples</td>
<td>Comments</td>
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<tr>
<td>13</td>
<td>N 948E 876</td>
<td>1 x 1</td>
<td>4</td>
<td>1</td>
<td>TU 14, TU 16, TU 17, Feature 4, Feature 18</td>
<td>4 pieces of flaked stone, 1 ceramic, and 1 piece of groundstone</td>
<td>Placed on the northern side of a coppice dune west of Feature 6 to investigate Feature 18 (sediment stain); TUs 14, 16, and 17 were placed adjacent to TU 13 to capture the full extent of the stain; shovel scraping revealed that staining was most likely A horizon sediments rather than a distinctive feature; no feature fill was present; TU 13 was terminated after 1 level.</td>
</tr>
<tr>
<td>14</td>
<td>N 948E 877</td>
<td>1 x 1</td>
<td>6</td>
<td>1</td>
<td>TU 13, TU 16, TU 17, Feature 4, Feature 18</td>
<td>10 pieces of flaked stone and 1 ceramic</td>
<td>Placed immediately east of TU 13 to capture the full extent of Feature 18; feature was determined to be A horizon sediments; no feature fill was present; TU 14 was terminated after 1 level.</td>
</tr>
<tr>
<td>15</td>
<td>N 949.5E 920.5</td>
<td>1 x 1</td>
<td>35</td>
<td>3</td>
<td>TU 10, Feature 6, Feature 16</td>
<td>2 pieces of flaked stone</td>
<td>Placed 50 cm offset to the northeast from TU 10 to expose a pile of seemingly stacked caliche cobbles in corner of TU 10 below Feature 16; cobbles were determined to be natural disarticulated and eroded caliche; unit was terminated after 3 levels.</td>
</tr>
<tr>
<td>16</td>
<td>N 947E 877</td>
<td>1 x 1</td>
<td>15</td>
<td>1</td>
<td>TU 13, TU 14, TU 17, Feature 4, Feature 18</td>
<td>7 pieces of flaked stone and 4 ceramics</td>
<td>Placed immediately south of TU 14 to capture the full extent of Feature 18; feature was determined to be A horizon; no feature fill present; TU 16 was terminated after 1 level.</td>
</tr>
<tr>
<td>17</td>
<td>N 947E 876</td>
<td>1 x 1</td>
<td>23</td>
<td>2</td>
<td>TU 13, TU 14, TU 16, Feature 4, Feature 18</td>
<td>29 pieces of flaked stone and 4 ceramics</td>
<td>Placed immediately west of TU 16 to capture the full extent of Feature 18; feature was determined to be A horizon; no feature fill was present; TU 17 was excavated 1 level deeper than TUs 13, 14, and 16 in order to better assess stratigraphy of the area.</td>
</tr>
<tr>
<td>18</td>
<td>N 944E 898</td>
<td>3 x 3</td>
<td>19</td>
<td>1</td>
<td>Feature 23 and 23-A</td>
<td>206 pieces of flaked stone, 17 ceramics, 10 pieces of groundstone, and 2 shell fragments</td>
<td>Placed on northern slope of coppice dune south of US 82 right-of-way fence within the APE to investigate large area of charcoal staining near a distinctive stratigraphic change exposed in MS 3; stain was originally thought to be a large feature, but as excavation continued the stratigraphic change was found to be a disturbance in the A horizon by a nearby buried pipeline; one thermal feature (Feature 23) was encountered in Level 1, accompanied by a small disturbance/sub-feature; both were excavated, and the unit was terminated afterward.</td>
</tr>
<tr>
<td>TU No.</td>
<td>Grid Location</td>
<td>Size (m)</td>
<td>Depth (cm bgs)</td>
<td>No. of Levels</td>
<td>Associated TUs/Features</td>
<td>Artifacts and Samples</td>
<td>Comments</td>
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<tr>
<td>19</td>
<td>N 947 E 925</td>
<td>1 x 1</td>
<td>18</td>
<td>2</td>
<td>TU 11, TU 20, Feature 6, Feature 22</td>
<td>48 pieces of flaked stone, 4 ceramics, and 6 pieces of groundstone</td>
<td>Placed immediately east of TU 11 as part of an 8-by-1-m east-west oriented exploratory trench through Feature 6; Feature 22 (thermal feature) was encountered in Level 1; TU 20 was placed to the east to capture the full extent of the feature; unit contained a variety of artifacts and abundant burned caliche; terminated after 2 levels following feature excavation when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>20</td>
<td>N 947 E 926</td>
<td>1 x 1</td>
<td>26</td>
<td>2</td>
<td>TU 19, TU 22, Feature 6, Feature 22</td>
<td>3 pieces of flaked stone, 1 ceramic, and 3 pieces of groundstone</td>
<td>Placed immediately east of TU 19 as part of an 8-by-1-m east-west oriented exploratory trench through Feature 6; Feature 22 was fully exposed in first level of TU 20; unit contained a variety of artifacts and abundant burned caliche; terminated after 2 levels following feature excavation when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>21</td>
<td>N 947 E 922</td>
<td>1 x 1</td>
<td>27</td>
<td>3</td>
<td>TU 4, TU 23, Feature 6</td>
<td>25 pieces of flaked stone, 6 ceramics, and 1 piece of groundstone</td>
<td>Placed immediately west of TU 4 as part of an 8-by-1-m east-west oriented exploratory trench through Feature 6; unit had abundant artifacts and burned caliche; terminated after 3 levels when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>22</td>
<td>N 947 E 927</td>
<td>1 x 1</td>
<td>25</td>
<td>3</td>
<td>TU 20, Feature 6</td>
<td>61 pieces of flaked stone, 4 ceramics, and 2 pieces of groundstone</td>
<td>Placed immediately east of TU 20 as part of an 8-by-1-m east-west oriented exploratory trench through Feature 6; TU 22 was the easternmost unit in the trench; unit contained abundant artifacts and burned caliche; terminated after 3 levels when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>23</td>
<td>N 947 E 921</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>TU 21, TU 24, Feature 6</td>
<td>12 pieces of flaked stone and 3 ceramics</td>
<td>Placed immediately west of TU 21 as part of an 8-by-1-m east-west oriented exploratory trench through Feature 6; The unit contained 15 artifacts and abundant burned caliche; was terminated after 3 levels when caliche bedrock was encountered.</td>
</tr>
<tr>
<td>24</td>
<td>N 947 E 920</td>
<td>1 x 1</td>
<td>27</td>
<td>2</td>
<td>TU 23, Feature 6</td>
<td>2 pieces of flaked stone, 1 ceramic, and 1 piece of groundstone</td>
<td>Placed immediately west of TU 23 as part of an 8-by-1-m east-west oriented exploratory trench through Feature 6; TU 24 was the western most unit in the trench; unit contained 11 artifacts and abundant burned caliche; terminated after 2 levels when caliche bedrock was encountered.</td>
</tr>
</tbody>
</table>
**Mechanical Excavations**

After hand-excavated test units were completed, mechanical scraping occurred across LA 118318 within the APE. Four mechanical scrapes (MS 1 through 4) were strategically placed to explore the geomorphology and stratigraphy of the landform and to test for subsurface cultural deposits in high probability locales (e.g., in and around Features 5 and 6). Table 16 provides detailed information on each of the mechanical scrapes.

MS 1 and MS 2 were placed on the northeastern extent of the site to explore a series of large coppice dunes (see Figures 56, 59, and 63). MS 1 had a maximum dimension of 14-by-8 m and exposed four thermal features (Features 24–27). MS 2 is roughly 8-by-8 m and uncovered one thermal feature (Feature 28). MS 3 was placed near the center of the site within or just beyond Features 4, 5, and 6. This scrape was meant to investigate the depth and subsurface deposits in areas adjacent to Features 4, 5 and 6, the features themselves, and the west-facing slope of the site’s landform. MS 3 was the most extensive mechanical scrape performed on LA 118318 and extended for 52-m (east-west) by 6-m (north-south) at its widest (see Figures 55 and 58). MS 3 truncated the northern portion of Features 5 and 6 and exposed five sub-features (Features 20, 21, 23, 30 and 31.) MS 4 was placed in the northwestern portion of the site (see Figures 53 and 57) in an area of moderate surface artifact density. The scrape measured 27 m (east-west) by 5 m (north-south) and exposed one feature (Feature 29).

Mechanical scrapes ranged in depth between 20 cm and 2 m. The broad depth range is due to the fact that some portions of scrapes were located on deflated surfaces, while others removed tall coppice dunes. Termination of all scrapes was based on either the presence of sterile paleosol, often present below a buried A horizon, or a caliche subsoil.

**Table 16 – Detailed Summary of Mechanical Scrapes at LA 118318**

<table>
<thead>
<tr>
<th>Mechanical Excavation</th>
<th>Location</th>
<th>Size</th>
<th>Dimensions</th>
<th>Features Encountered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 1</td>
<td>Eastern portion of site both sides of right-of-way fence</td>
<td>86 m²</td>
<td>14 m (N-S) by 8 m (E-W)</td>
<td>Features 24-27</td>
</tr>
<tr>
<td>MS 2</td>
<td>Eastern portion of site south of right-of-way fence</td>
<td>64 m²</td>
<td>8 m (N-S) by 8 m (E-W)</td>
<td>Feature 28</td>
</tr>
<tr>
<td>MS 3</td>
<td>Central portion of site south of right-of-way fence</td>
<td>290 m²</td>
<td>6 m (N-S) by 52 m (E-W)</td>
<td>Features 20, 21, 23, 30, and 31</td>
</tr>
<tr>
<td>MS 4</td>
<td>Western portion of site south of right-of-way fence</td>
<td>118 m²</td>
<td>4 m (N-S) by 27 m (E-W)</td>
<td>Feature 29</td>
</tr>
</tbody>
</table>
Figure 63 – MS 1 west wall profile
Feature Excavations

Twenty-two features were excavated at LA 118318. One feature (Feature 12) was located within the US 82 right-of-way and the remaining features were situated south of the right-of-way fence within the project APE. Features consisted of large amorphous charcoal/sediment stains with a variety of associated artifacts and burned caliche. Table 17 provides detailed information on each of the features.

Thirteen features (Features 1–13) were previously identified on the surface and recorded. Four of those features (Feature 4, 5, 6 and 12) fell within or adjacent to the project APE and were mitigated during the present undertaking. The remaining nine features (Features 1, 2, 3, 7–11, and 13), fell outside of the APE and were not treated. Eighteen of the features excavated at LA 118318 were newly discovered and were labeled in sequential order after the previously identified feature (i.e., Features 14–31). Features were identified during surface collection, within test excavation units, and during mechanical scraping.

Twelve of the thirteen previously recorded features are large amorphous sediment and charcoal stained locales associated with dense artifact concentrations. These amorphous features manifest themselves within deflated blow-outs in between coppice dunes. Portions of Features 4, 5, and 6 were tested during this investigation to better understand the nature and function of these features. Feature 6 was the largest of the three features tested and was originally recorded as a possible midden. The cruciform hand trench and subsequent scraping of Features 5 and 6 revealed that much of the sediment stain that makes up these large features is in fact an exposed, originally buried Loco Hills soil A horizon. All cultural features treated within the APE were located within this A horizon, which was in fact the living surface during the site’s original occupation. The mottling of cultural material and features (e.g., artifacts, burned caliche and charcoal feature fill) within the A horizon accounts for the large amorphous previously recorded features. Much of the living surface of LA 118318 outside of the APE is still buried under a thin layer of aeolian sand deposits or beneath large coppice dunes.

Similar to other sites in the project area (e.g., LA 15901 and LA 83680), many features were located in close proximity to each other. Three hearth features (Features 25, 26 and 27) were located within 5 to 15 cm of each other (see Figures 67–69). Radiocarbon dates for these features indicate that they are contemporaneous suggesting interrelatedness, perhaps serving different food-processing functions. However, it is also possible that paired features reflect repurposing or reuse of features at seasonal or generational intervals.

The following feature summaries include full descriptions of investigated features that were considered cultural in origin (Features 14, 16, 17, 20–23, and 25–31).
Feature 14

Feature 14 was a charcoal stain discovered on the surface of LA 118318 barely visible beneath the thin layer of aeolian sand. It was observed eroding out of the north side of a coppice dune located on the south side of US 82 beyond the right-of-way fence. The feature appeared round but somewhat amorphous. A 1-by-1-m test unit (TU 7) was placed over the feature to better define its planview morphology. The surface of the stain had a Munsell of 7.5 YR 3/2 dark brown with a surrounding matrix of 7.5 YR 4/4 brown. Four pieces of burned caliche, a core, and one Chupadero Black-on-white jar sherd were found on the feature surface. Damage from rodent burrows and root disturbance, which created deep pockets of mottled fill, were present throughout the feature.

Feature 14 measured 45 cm (north-south) by 30 cm (east-west) with a top elevation of 199.19. A 1-by-1 m test unit (TU 7) was placed over the feature and, at 28 cm below datum, it had a defined ovoid shape with some evident mottling and smearing from disturbance. The feature was bisected by trowel on its north-south axis and a flotation sample was collected from each half. Any remaining sediment was screened with 1/8-inch wire mesh. Post-excavation measurements were 50 cm (north-south) by 45 cm (east-west) with a bottom elevation of 199.10.

Feature fill was variable and ranged between 7.5 YR 3/2 dark brown and 7.5 YR 2.5/1 black with a marked oxidation at the feature bottom and surrounding areas. Three artifacts (two flakes, one faunal) were discovered in the screening process. Radiocarbon analysis indicted the feature dates to A.D. 1020–1160 (Figure 64) and macrobotanical analysis revealed burned mesquite but no other plant remains. The overall shape, density of charcoal, and associated artifacts suggest that the feature was used as a hearth.

Figure 64 – Calibrated two-sigma date range of Feature 14 at LA 118318; A.D. 1020–1160 (95.4% probability)
**FEATURE 14**

**HEARTH**

**LA 118318**

<table>
<thead>
<tr>
<th>Grid: N946, E908</th>
<th>UTM: N3631814, E588250</th>
<th><strong>PLAN VIEW SHAPE:</strong> OVOID</th>
<th><strong>PROFILE SHAPE:</strong> BASIN</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>PLANVIEW DIMENSIONS (cm)</strong></th>
<th><strong>TOP ELEVATION:</strong> 199.19</th>
<th><strong>BOTTOM ELEVATION:</strong> 199.10</th>
<th><strong>PROFILE THICKNESS:</strong> 9 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-EXCAVATION: 45 (N-S) x 30 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST-EXCAVATION: 50 (N-S) x 45 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PRE-EXCAVATION**

![Pre-Excavation Image]

**PROFILE**

![Profile Image]

**POST-EXCAVATION**

![Post-Excavation Image]

**ASSOCIATED FS#s:** 4, 5, 7, 26

**SAMPLES COLLECTED:** Flotation, Charcoal, Flaked stone, Faunal

**ASSOCIATED TUs/Mechanical Scrapes:** TU 7

**PHOTO NUMBERS:** HPL 1 (257-265)

**DATE EXCAVATED:** 15 June 2016

**EXCAVATOR(s):** Jessica Alden
Feature 16

Feature 16 was a small circular dark charcoal stain located on the south side of US 82 beyond the southern right-of-way fence. It was discovered in TU 10 and exposed after removing the thin layer aeolian sediment. A high degree of disturbance and smearing was noted throughout the feature.

Prior to excavation, the feature measured 54 cm (north-south) by 44 cm (east-west) and was located at an elevation of 199.4. The feature was bisected on a north-south axis, starting with the east side. The profile revealed that the dark sediment was concentrated on the northern extent of the feature and measured about 25 cm in length. All fill was collected for flotation along with a charcoal sample. However, based on the level of disturbance, the sample was not selected for radiocarbon dating or macrobotanical analysis. Post-excaetion measurements of Feature 16 were 42 cm (north-south) by 42 cm (east-west) with an elevation of 199.33.

The feature fill consisted of a 10 YR 4/4 dark yellowish brown fill with charcoal flecks up to 1 cm in length. The surrounding matrix consisted of a much lighter gray, compact sediment. While several artifacts were found within the TU in the level above the feature, including flaked-stone debitage, one Jornada Brownware sherd, and one burned bone, only one Jornada brownware bowl sherd was encountered within the feature fill. The size, shape, and density of fill material indicate that Feature 16 was a cultural feature, although it rested very close to the caliche bedrock and might not have had much depth to begin with. It is possible that Feature 16 was an expediently made hearth.
# Feature 16

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 949, E 920</th>
<th>UTM: N 3631817, E 588262</th>
<th>Plan View Shape: Circular</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planview Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 199.40</strong></td>
<td><strong>Bottom Elevation: 199.33</strong></td>
<td><strong>Profile Thickness: 7 cm</strong></td>
</tr>
<tr>
<td>Pre-Excavation: 54 (N-S) x 44 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 42 (N-S) x 42 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Associated FS#:** 159

**Associated TUs/Mechanical Scrapes:** TU 10

**Date Excavated:** 17 June 2016

**Samples Collected:** Flotation, Charcoal, Flaked Stone, Ceramic

**Photo Numbers:** PMX 1 (1913-1916)

**Excavator(s):** Steven Gilbert
Feature 17

Feature 17 was identified as a circular-shaped charcoal stain located within a dense artifact scatter on the southern side of US 82 beyond the right-of-way fence. The feature was initially observed between two dunes during surface collection and the plan view fully exposed after the top aeolian sediment was removed. A 1-by-1-m test unit (TU 12) was placed over the feature to better define its planview morphology. Excavation revealed that feature fill had been disturbed by at least three rodent burrows.

The feature initially presented as a 35 cm by 20 cm stain, although pre-excavation cleaning of loose overburden revealed an 80 cm (north-south) by 50 cm (east-west) stained area with a top elevation of 199.57. The feature was bisected on an east-west axis, starting with the north half. While two samples of sediment from this section were collected for flotation, additional radiocarbon or macrobotanical analysis was not conducted based on the overall sampling methodology for this project. The south half of the feature was screened through 1/8-inch wire mesh and post-excavation measurements were 47 cm by 45 cm with a final elevation of 199.45

The feature fill exhibited a dark brown (7.5 YR 3/3), charcoal-rich quality and one piece of flaked stone was encountered in the screen. Despite the high degree of disturbance, the profile shape, feature location, density of charcoal, and associated artifacts indicate that Feature 17 was a hearth feature.
**Feature 17**

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 950, E 934</th>
<th>UTM: N 3631818, E 588276</th>
<th>Plan View Shape: Circular</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planview Dimensions (cm)</td>
<td>Top Elevation: 199.57</td>
<td>Bottom Elevation: 199.45</td>
<td>Profile Thickness: 12 cm</td>
</tr>
<tr>
<td>Pre-Excavation: 80 (N-S) x 50 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 47 (N-S) x 45 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Associated FS#s:** 197

**Samples Collected:** Flotation, Flaked stone

**Associated TUs/MECHANICAL SCRAPES:** TU 12

**Photo Numbers:** PMX 1 (1919-1926)

**Date Excavated:** 17 June 2016

**Excavator(s):** Joshua Vallejos
Feature 20

Feature 20 was a circular-shaped sediment stain located on the north-facing slope of a large coppice dune and on the south side of US 82 beyond the right-of-way fence. The feature was discovered within MS 3 and did not appear as distinct as other features excavated at LA 118318. Some mottling and caliche pebbles were evident on the northeast edge of the feature prior to excavation, but charcoal, as well as rodent and root disturbance, was still evident throughout the fill.

Pre-excavation measurements for Feature 20 were 60 cm (north-south) by 50 cm (east-west). The feature was bisected on an east-west axis, starting with the north half. A half-gallon bag of feature fill was collected from the south half for flotation along with a small sample of charcoal and two pieces of flaked-stone debitage. Due to the level of disturbance throughout the feature, a flotation sample was not collected from the north half and radiocarbon or macrobotanical analysis was not conducted on the feature fill. Post-excavation measurements were 45 cm (north-south) by 47 cm (east-west) with a profile thickness of 15 cm.

Excavation revealed more mottling within the feature fill than was evident from the plan view with a Munsell designation of 5 YR 3/3 dark reddish brown and a surrounding matrix of 5 YR 4/6 yellowish red. There did not appear to be a defined profile and dark-colored sediment was only observed in two patchy areas. Feature 20 could have been a hearth feature; however, poor preservation and disturbance have rendered it unrecognizable. There is also the possibility that it was a rodent burrow or secondary deposit, as indicated by the mottling and randomly distributed dark-colored areas. Overall this feature has very little integrity and it cannot definitively be called cultural in origin.
**Feature 20**

*Possible Poorly Preserved Hearth*

**LA 118318**

**GRID:** N 946.70, E 918.73  
**UTM:** N 3631814, E 588260

<table>
<thead>
<tr>
<th>PLAN VIEW DIMENSIONS (cm)</th>
<th>TOP ELEVATION: 199.37</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRE-EXCAVATION:</strong> 60 (N-S) x 50 (E-W)</td>
<td></td>
</tr>
<tr>
<td><strong>POST-EXCAVATION:</strong> 45 (N-S) x 47 (E-W)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROFILE SHAPE: UNDEFINED</th>
<th>PROFILE THICKNESS: 15 cm</th>
</tr>
</thead>
</table>

**Pre-Excavation**

![Pre-Excavation Image]

**Profile**

![Profile Image]

**Post-Excavation**

![Post-Excavation Image]

**Associated FS#:** 374, 375, 376

**Samples Collected:** Flotation, Charcoal, Flaked Stone

**Associated TUs/Mechanical Scrapes:** MS 3

**Date Excavated:** 5 July 2016

**Excavator(s):** Jessica Alden
Feature 21

Feature 21 was an irregular-shaped charcoal stain discovered within MS 3. It was located on the western extent of Feature 6 and about 2.5 m west of Feature 20. Feature 21 was defined by shovel scraping, and initially appeared as a dense patch of charcoal-stained sediment at the transitional interface of the bottom of the A horizon and the top of the caliche-filled paleosol. Disturbances included two rodent burrows evident within the feature fill.

Pre-excision feature measurements were 50 cm (north-south) by 40 cm (east-west) and the initial elevation was 199.32. The feature was bisected by trowel on an east-west axis, starting with the north half. Almost all the feature fill was collected as a flotation sample and the remaining sediment was screened through 1/8-inch wire mesh. Post-excision measurements were 40 cm (north-south) by 34 cm (east-west) with a final elevation of 199.22.

Feature fill consisted of a dry matrix with a Munsell designation of 7.5 YR 4/6 yellowish red with high caliche pebble and gravel inclusions. No artifacts were observed but the profile did reveal a dense patch of charcoal-stained sediment in the central portion of the feature. However, with so much charcoal-stained sediment within the larger manifestation of Feature 6, the small area of Feature 21 might represent a secondary deposit of feature fill from a nearby feature brought in by wind activity and bioturbation. At best, Feature 21 may have been a charcoal dump location or thermal feature that has been heavily impacted with poor preservation.
## Feature 21
### Possible Poorly Preserved Hearth

<table>
<thead>
<tr>
<th>Grid: N 947.37, E 915.74</th>
<th>UTM: N 3631815, E 588257</th>
<th>Plan View Shape: Irregular</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLAN VIEW DIMENSIONS (cm)</strong></td>
<td><strong>TOP ELEVATION: 199.32</strong></td>
<td><strong>BOTTOM ELEVATION: 199.22</strong></td>
<td><strong>PROFILE THICKNESS: 10 cm</strong></td>
</tr>
<tr>
<td>Pre-Excavation: 50 (N-S) x 40 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 40 (N-S) x 34 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Excavation**

- Root
- Mottled Feature Fill

**Profile**

- Elev. 199.22
- Unexcavated
- I - Feature Fill: 7.5 YR 3/2 dark brown
- II - Mottled Area: 5 YR 4/6 yellowish red

**Post-Excavation**

- Rodent Run

**Associated FS#s:** 377, 378

**Samples Collected:** Flotation

**Associated TUs/Mechanical Scrapes:** MS 3


**Excavator(s):** Greg Mastropietro

**Date Excavated:** 5 July 2016
Feature 22

Feature 22 was a circular charcoal stain located on the south side of US 82 beyond the right-of-way fence. It was exposed in Level 1 of TU 19 and extended into TU 20 to the east. The feature appeared to be in excellent condition with little to no disturbance. The top of the feature appeared to have minimal root and rodent disturbance, especially in the center.

The pre-excavation planview measurements were 60 cm (north-south) by 55 cm (east-west) with an elevation 199.52. The feature was bisected on an east-west axis, starting with the north half. Large pieces of burned caliche and abundant charcoal were encountered in this half, particularly at the top. Over 100 pieces of burned caliche were encountered, which were left in place for photographs. Two one-gallon flotation samples were taken from the north half. Post-exavation measurements were 50 cm (north-south) by 56 cm (east-west) with a bottom elevation of 199.35 cm.

Upon profiling the feature, two stratigraphic layers were identified. The first was a dark, charcoal-rich feature fill observed in the planview with a Munsell designation of 5 YR 3/2 dark reddish brown. The second layer was a 2.5 YR 4/3 reddish brown semi-compact sandy loam with abundant caliche. Numerous artifacts were found within the TUs in the levels above the feature—including flaked-stone debitage, groundstone, two El Paso Brownware sherds and three Jornada Brownware sherds—although none were located within the feature fill. Radiocarbon analysis indicated that the feature dated to A.D. 780–970 (Figure 65) and macrobotanical remains included goosefoot seeds and mesquite.

Feature 22 contained up to 100 pieces of burned caliche, making it unique among the other features excavated at LA 118318, which contained little or no burned caliche. It is unclear if the burned caliche deposits were the result of the feature being constructed on top of the soft, easily-fragmented caliche bedrock or if they were intentionally placed within the basin-shaped thermal feature. Based on this analysis, Feature 22 was interpreted to be a hearth dating to the Early Formative period.

![Figure 65 – Calibrated two-sigma date range of Feature 22 at LA 118318; A.D. 780–970 (95.4% probability)](image-url)
**Feature 22**

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 947, E 925</th>
<th>UTM: N 3631815, E 588267</th>
<th>Plan View Shape: Circular</th>
<th>Profile Shape: Basin</th>
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</thead>
<tbody>
<tr>
<td><strong>Planview Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 199.52</strong></td>
<td><strong>Bottom Elevation: 199.35</strong></td>
<td><strong>Profile Thickness: 17 cm</strong></td>
</tr>
<tr>
<td>Pre-Evacuation: 60 (N-S) x 55 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Evacuation: 50 (N-S) x 56 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Evacuation**

**Profile**

- Mottled Feature Fill
- Dark Charcoal Staining
- Burned Caliche

**Post-Evacuation**

**Samples Collected:** Flotation, charcoal

**Associated FS#’s:** 373, 380

**Associated TUs/Mechanical Scraps:** TU 19, TU 20

**Date Excavated:** 6 July 2016

**Excavator(s):** Joshua Vallesjos, Darryl Del Frate

Feature 23

Feature 23 was a dark stain located on the north-facing slope of a coppice dune. It rested on the southern side of US 82, beyond the right-of-way fence and within TU 18 at the western edge of Feature 6. The top of the feature appeared to be in relatively good condition with only a few mottled patches.

The feature measured 65 cm (east-west) by 50 cm (north-south) in planview and had a top elevation of 199.10. The feature was bisected by trowel on an east-west axis and a 1-gallon bag of sediment and a small bag of charcoal were collected for laboratory testing. Sediment that was not collected was screened through 1/8-inch wire mesh. Post-extraction measurements were 41 cm (east-west) by 45 cm (north-south) with a bottom elevation of 198.985.

Numerous artifacts were found within TU 18 in the level above the feature, including groundstone, flaked-stonedebitage, shell, seeds, and several ceramics. On the feature surface was charcoal flecking and a small flake. The feature fill had a Munsell designation of 7.5 YR 2.5/3 very dark brown with a surrounding matrix of 7.5 YR 3/3 dark brown (A horizon). Charcoal was denser in the center of the feature, while the edges were smeared and difficult to define. The feature profile was basin-shaped with subtle edges while the bottom exhibited traces of mottling and oxidation. Radiocarbon analysis of Feature 23 indicated that the feature dates to A.D. 1030–1160 (Figure 66), and macrobotanical remains included goosefoot seeds and mesquite.

After excavation of the south half of Feature 23, a small charcoal stain was discovered immediately to the southwest. It measured 25 cm in diameter with a top elevation of 198.95. This small sub-feature (Feature 23A) was excavated and found to have a similar depth of Feature 23. The immediate area around the Feature 23A was shovel scraped, but no extension of the feature was observed. Due to the shape of the planview and profile, amount of charcoal, burned caliche, and flaked-stone debitage within the fill, Feature 23 likely represents a subtle or disturbed hearth with a small charcoal dump off to its side (Feature 23A).

![Graph](image_url)

*Figure 66 – Calibrated two-sigma date range of Feature 23 at LA 118318; A.D. 1030–1160 (95.4% probability)*
**Feature 23**

**Hearth**

**Grid:** N 945.17, E 899.04  
**UTM:** N 3631813, E 588241  
**Plan View Shape:** Ovoid  
**Profile Shape:** Basin

<table>
<thead>
<tr>
<th>Plan View Dimensions (cm)</th>
<th>Top Elevation: 199.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Excavation: 50 (N-S) x 65 (E-W)</td>
<td>Bottom Elevation: 198.985</td>
</tr>
<tr>
<td>Post-Excavation: 45 (N-S) x 41 (E-W)</td>
<td>Profile Thickness: 11.5 cm</td>
</tr>
</tbody>
</table>

**Pre-Excavation**

- Dark Charcoal Staining
- Mottled Feature Fill
- Burned Caliche
- Flaked Stone Charcoal (FS 390)

**Profile**

- Burned Caliche
- Elev. 198.985
- Unexcavated
- I - Feature Fill: 7.5 YR 2.5/3 very dark brown
- II - Mottled Feature Fill: 7.5 YR 3/3 dark brown

**Post-Excavation**

**Associated FS#s:** 390, 391, 392

**Samples Collected:** Flotation, Charcoal, Flaked Stone

**Associated TUs/Mechanical Scrapes:** TU 18

**Photo Numbers:** GM 1 (299-304)

**Date Excavated:** 5 July 2016

**Excavator(s):** Greg Mastropietro, Jessica Alden
Features 25, 26, and 27

Features 25, 26, and 27 were three thermal features identified on the northern portion of MS 1 as a single, large, dense charcoal smear (Figures 67–69). The smear was located on the south side of US 82 beyond the right-of-way fence and at the eastern end of LA 118318.

A 5-by-5 m area was pedestalled for hand excavation. The pedestal was shovel scraped to expose a 2 m by 2 m highly-smeared, ephemeral stain with large pieces of charcoal throughout. Because the edges of the features could not be determined, the entire stain was bisected on an east-west axis with a small hand-trench measuring 200 cm by 10 cm. The hand-trench exposed the profile of two thermal features, Features 25 and 26. They were located only 15 cm apart from each other with Feature 25 resting to the east of Feature 26. Feature 25 had much denser and darker feature fill than Feature 26 with more distinct feature boundaries. Feature 26 appeared as a basin shape in profile with smearing at the top which was most likely the result of the large amount of root and rodent disturbance. The southern halves of both features were excavated first. All feature fill from the southern halves was screened through a 1/8-inch wire mesh. No artifacts were present in the screen, but charcoal was collected. The northern halves were excavated and collected in two 1-gallon bags for flotation. Fill from Feature 25 had a Munsell designation of 7.5 YR 2.5/2 very dark brown while Feature 26 fill had a Munsell designation of 7.5 YR 2.5/3 very dark brown. Following excavation, Feature 25 measured 63 cm (north-south) by 60 cm (east-west) in planview with a maximum depth of 19 cm, while Feature 26 measured 55 cm by 55 cm in planview and extended to a depth of 10 cm.

Feature 27 was identified after Feature 25 and Feature 26 were excavated as another dense charcoal stain 5 cm south of Feature 26. The staining was originally believed to be smear from Features 25 and 26 due to their proximity and the abundance of smear surrounding those features during their initial exposure. To test the smear for intact profile, it was bisected with a trowel on an east-west axis beginning with the south half. The bisection exposed a basin-shaped profile, whose boundary was difficult to define due to heavy bioturbation and root activity. The feature fill consisted of a fine-grained, charcoal-stained sand with a Munsell designation of 7.5 YR 2.5/2 very dark brown. Only a charcoal sample from the screen was collected from the south half due to disturbance and inconsistency of the fill. The north half of the feature consisted of dense, dark charcoal-stained sediment with an oxidized/mottled boundary that confirmed Feature 27 was indeed a cultural feature. Features 25 and 27 had the same density of charcoal. Two 1-gallon bags of feature fill were collected from the north half for macrobotanical analysis.

The proximity of Features 25, 26 and 27 is striking, but the function of the three thermal features is unclear. All three features have a similar date range (A.D. 1030–1200 for Feature 25 and A.D. 1020–1160 for Features 26 and 27 [Figure 70]). Given that these features are contemporaneous, it is possible that Features 25 and 27 functioned as hearths and Feature 26 as a charcoal dump. Feature 26 has a lower concentration of charcoal and is less defined than Feature 25 and 27 and therefore thought to have a different function. If Feature 26 was a hearth, then it was poorly preserved in comparison to Features 25 and 27, which both had fairly dense and consistent charcoal.

Macrobotanical analysis of fill from the three features encountered goosefoot seeds in Features 25 and 26, purslane seeds and mesquite wood in Features 25 and 27, and saltbush wood in Feature 27. The proximity of these features and consistency of plant species found in their flotations indicates that they were all used for processing weedy annuals.
**Figure 67** – Pre-excavation of Features 25–27 at LA 118318, view to the south

**Figure 68** – Post-excavation of Features 25–27 at LA 118318, view to the south
**Figure 69 – Illustration of Features 25–27 at LA 118318 (pre-excavation)**

**Figure 70 – Calibrated two-sigma date range of Features 25–27 at LA 118318;**
Feature 25: A.D. 1030–1200 (94.0% probability); Feature 26: 1020–1160 (95.4% probability); Feature 27: A.D. 1020–1160 (95.4% probability)
**Feature 25**

**Hearth**

**LA 118318**

<table>
<thead>
<tr>
<th>Grid: N 956.86, E 1078.55</th>
<th>UTM: N 3631821, E 588420</th>
<th>Plan View Shape: Circular</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
</table>

**Planview Dimensions (cm)**

- Pre-Excavation: 50 (N-S) x 40 (E-W)
- Post-Excavation: 63 (N-S) x 60 (E-W)

**Profile**

- Top Elevation: 199.57
- Bottom Elevation: 199.38
- Profile Thickness: 19 cm

**Samples Collected:** Flotation, Charcoal

**Associated FS#:** 401, 403

**Associated TUs/Mechanical Scraps:** MS 1

**Date Excavated:** 7 July 2016

**Excavator(s):** Greg Mastropietro

**Notes:**

- Feature Fill: 7.5 YR 2.5/2 very dark brown
- Buried A Horizon: 7.5 YR 4/4 brown
- Mottled Area: 7.5 YR 4/4 reddish brown
**FEATURE 26**

*Hearth*

**LA 118318**

<table>
<thead>
<tr>
<th>GRID: N 957.03, E 1077.85</th>
<th>UTM: N 3631821, E 588420</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN VIEW SHAPE: CIRCULAR</td>
<td>PROFILE SHAPE: BASIN</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN VIEW DIMENSIONS (cm)</td>
<td></td>
</tr>
<tr>
<td>PRE-EXCAVATION: 45 (N-S) x 55 (E-W)</td>
<td></td>
</tr>
<tr>
<td>POST-EXCAVATION: 55 (N-S) x 55 (E-W)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP ELEVATION: 199.57</td>
<td>BOTTOM ELEVATION: 199.47</td>
</tr>
<tr>
<td></td>
<td>PROFILE THICKNESS: 10 CM</td>
</tr>
</tbody>
</table>

**ASSOCIATED FS#s:** 402, 404

**ASSOCIATED TUs/Mechanical Scrapes:** MS 1

**DATE EXCAVED:** 8 JULY 2016

**SAMPLES COLLECTED:** Flotation, Charcoal

**PHOTO NUMBERS:** GM 1 (328-329, 339-340, 343-346, 348-349)

**EXCAVATOR(s):** Jessica Alden
**FEATURE 27**

**Hearth**

**GRID:** N 956.32, E 1077.63  
**UTM:** N 3631820, E 588419

**PLAN VIEW SHAPE:** Ovoid  
**PROFILE SHAPE:** Basin

<table>
<thead>
<tr>
<th>PLANVIEW DIMENSIONS (cm)</th>
<th>TOP ELEVATION: 199.57</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Excavation: 30 (N-S) x 40 (E-W)</td>
<td>Bottom Elevation: 199.40</td>
</tr>
<tr>
<td>Post-Excavation: 60 (N-S) x 70 (E-W)</td>
<td>Profile Thickness: 17 cm</td>
</tr>
</tbody>
</table>

**Pre-Excavation**
- Dark Charcoal Stain
- Faint Smear

**Profile**
- Bioturbation
- Root
- Feature Fill: 7.5 YR 2.5/2 very dark brown
- Mottled Area: 7.5 YR 4/4 brown

**Post-Excavation**
- Root
- Elev. 199.40

**ASSOCIATED FS##s:** 414, 415  
**SAMPLES COLLECTED:** Flotation, Charcoal

**ASSOCIATED TUS/MECHANICAL SCRAPES:** MS 1  
**PHOTO NUMBERS:** GM 1 (328-329, 350-351, 358-364)

**DATE EXCAVATED:** 8 July 2016  
**EXCAVATOR(s):** Greg Mastroietro
Feature 28

Feature 28, initially identified as a mottled charcoal stain, was ovoid and basin-shaped. It was discovered in MS 2 located on the southern side of US 82, beyond the right-of-way fence within the northeastern extent of the site. Portions of the feature were highly disturbed from roots and rodent burrows.

The pre-excavation stain measured 43 cm (north-south) by 37 cm (east-west) with an elevation of 199.53. The stain was heavily mottled at the surface, similar to what was encountered at the bottom of the feature. Feature 28 was bisected on an east-west axis. A one-gallon bag of feature fill was collected from each half of the feature for flotation. The profile was basin-shaped and very mottled. Portions of the feature were well defined with dense charcoal flecking and charcoal stained sediment. Final measurements were 42 cm (north-south) by 33 cm (east-west) with a bottom elevation of 199.43. Considering the somewhat shallow depth of the feature, it was likely clipped by the backhoe during mechanical scraping and may have originally been much deeper.

Feature fill had a Munsell designation of 2.5 YR 2.5/1 black, mottled with the surrounding sterile matrix of 5YR 4/3 reddish brown. The dark charcoal-stained sediment patches, basin-shape, and mottled matrix indicate that Feature 28 was cultural and likely functioned as a hearth.
### Feature 28

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 947.93, E 1040.83</th>
<th>UTM: N 3631813, E 588382</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plan View Dimensions (cm)</strong></td>
<td></td>
</tr>
<tr>
<td>Pre-Excavation: 43 (N-S) × 37 (E-W)</td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 42 (N-S) × 33 (E-W)</td>
<td></td>
</tr>
<tr>
<td><strong>Profile Shape: Basin</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Top Elevation: 199.53</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bottom Elevation: 199.43</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Profile Thickness: 10 cm</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Associated FS#s: 416**

**Samples Collected: Flotation**

**Associated TUs/Mechanical Scrapes: MS 2**

**Date Excavated: 7 July 2016**

**Excavator(s): Jessica Alden**

**Photo Numbers:** GM 1 (352-353, 356-367, 365-366)
Feature 29

Feature 29, a circular depression with a distinct horizontal sediment change, was identified in the central portion of MS 4 at the far western edge of LA 118318. The scrape and feature were located down slope and west of the site ‘core’ on a lower ancestral terrace of Bear Grass Draw. The feature rested on a slightly elevated bed of caliche relative to caliche exposed east and west of the feature within the scrape. Small roots and insect cases were present but the feature was otherwise undisturbed.

Prior to excavation, Feature 29 measured 1.5 m in diameter with an elevation of 189.25. Overlying sediment was a laminated, wind-deposited aeolian sand displaying no presence of A horizon or paleosol. The feature was bisected along an east-west axis which when exposed appeared almost perfectly circular in planview and basin-shaped, though shallow in profile. Post-excavation measurements were 1.5 m in diameter with an elevation of 189.12.

Fill was consolidated brown sand with small pieces of charcoal present throughout. Three pieces of burned caliche were noted in the west half of the feature but no artifacts were recovered. The function of Feature 29 is unclear. The lack of any intentional shaping appears to indicate that the feature is a natural depression likely created by water erosion. However, the presence of charcoal, charcoal-dense sediments, and its proximity to one of the largest known sites along Bear Grass Draw suggest cultural use, or at least a randomly preserved sample of cultural sediment. The natural depression may have served as water catchment device, also called a Tinaja, or a naturally occurring depression advantageously used for storage. No charcoal or flotation samples were collected from Feature 29 as the depression appeared natural, and feature fill appeared to be the result of slope wash deposition.
**Feature 29**

**Depression**

**LA 118318**

**Grid:** N 930.27, E 633.42  
**UTM:** N 3631804, E 587975  
**Plan View Shape:** Circular  
**Profile Shape:** Basin

**Planview Dimensions (cm):**
- **Pre-Excavation:** 150 (N-S) x 150 (E-W)
- **Post-Excavation:** 150 (N-S) x 150 (E-W)

**Top Elevation:** 189.25  
**Bottom Elevation:** 189.12  
**Profile Thickness:** 13 cm

**Associated FS#:** 418  
**Samples Collected:** Flotation, Charcoal

**Associated TUs/Mechanical Scrapes:** MS 4  
**Photo Numbers:** PMX 1 (2025-2037)

**Date Excavated:** 9 July 2016  
**Excavator(s):** Ethan Kalosky, Steven Gilbert, Joshua Vallejos
Feature 30

Feature 30 was a dark, shallow charcoal stain resting directly on caliche bedrock. It was discovered during mechanical scraping of Feature 6, approximately 1 m north of TUs 19 and 20. The top of the feature would have rested 25 cm below modern ground surface prior to the mechanical scrape. The feature itself measured approximately 45 cm in diameter, and contained both large and small pieces of burned caliche. All feature fill was collected in a 1-gallon bag although the sample was not selected for macrobotanical analysis. The feature fill had a Munsell designation of 5 YR 3/2 dark reddish brown mottled with 2.5 YR 4/3 reddish brown paleosol above caliche bedrock. Sediments were a semi-compact sandy loam with abundant caliche. The shallow nature of Feature 30 was similar to Feature 22, which also rested on caliche bedrock. The feature’s planview morphology was severely disturbed by scraping and no relevant profile could be discerned. As a result, no planview or profile drawings were made in the field. Several of these types of features were found throughout the site, and are suspected to be expediently used hearths.
### Feature 30

**LA 118318**

**Planview Dimensions (cm):**
- Pre-Excavation: 45 (N-S) x 45 (E-W)
- Post-Excavation: 45 (N-S) x 45 (E-W)

**Top Elevation:** 199.30

**Bottom Elevation:** 199.23

**Profile Thickness:** 7 cm

**Grid:** N 948.8, E 925.6

**UTM:** N 3631816, E 588267

**Plan View Shape:** Circular

**Profile Shape:** Basin

**Associated FS#s:** 419

**Samples Collected:** Flotation

**Associated TUs/Mechanical Scrapes:** MS 3

**Photo Numbers:** SG 1 (2602-2605)

**Date Excavated:** 9 July 2016

**Excavator(s):** Ethan Kalosky, Steven Gilbert
Feature 31

Feature 31 was a circular stain located on the south side of US 82 beyond the right-of-way fence. The feature was discovered during mechanical scraping of Feature 6 (MS 3) and was situated within the northeastern portion of the scraped area, immediately southwest of the cruciform hand trench and approximately 25 cm below the modern ground surface.

Feature 31 measured 45 cm in diameter with a thickness of 15 cm. The feature was bisected by trowel on an east-west axis with the southern half excavated first to expose the profile. The profile was basin-shaped and well-preserved with strongly mottled boundaries, light oxidation, and only minor root and bioturbation disturbances. Two 1-gallon bags of sediment were collected from the feature although the sample was not selected for macrobotanical analysis.

No artifacts were noted within the feature fill or surrounding sediments, although surface artifacts were present within this location. The feature fill had a Munsell designation of 10 YR 3/2 very dark grayish brown, mottled with the surrounding A horizon matrix of 7.5 YR 4/4 brown. Burned caliche was present throughout the feature, and the bottom appeared to be lined with the fire-altered rock. Whether the bottom of the feature was culturally lined or it was the opportunistic use of the already existing caliche bedrock landform is unclear. However, based on depth of caliche bedrock, the latter is more probable. Based on this analysis, the feature was likely used as a hearth.
**Feature 31**

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 945.27, E 921.6</th>
<th>UTM: N 3631813, E 588263</th>
<th>Plan View Shape: Circular</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planview Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 199.55</strong></td>
<td><strong>Bottom Elevation: 199.40</strong></td>
<td><strong>Profile Thickness: 15 cm</strong></td>
</tr>
<tr>
<td>Pre-Excavation: 45 (N-S) x 45 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 45 (N-S) x 45 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Excavation**

**Profile**

- Feature Fill
- Bioturbation
- Elev. 199.55
- Unexcavated
- Elev. 199.40

**Post-Excavation**

- Burned Caliche

**Associated FS#s:** 420

**Samples Collected:** Flotation

**Associated TUs/Mechanical Scraps:** MS 3

**Photo Numbers:** PMX 1 (2038-2043)

**Date Excavated:** 9 July 2016

**Excavator(s):** Steven Gilbert, Joshua Vallejos
**Non-Cultural or Unexcavated Features**

The following section includes descriptions of features that were determined to be natural in origin (Features 4–6, 12, 15, 18, and 24) and Feature 19, which was located outside of the current APE but a charcoal sample was collected at the request of the BLM.

**Features 4, 5, and 6**

As noted previously, Features 4, 5, and 6 were large sediment stains observed during survey (Figures 71–73), and were thought to be midden features due to dispersed charcoal and abundance of artifacts. However, as soon as excavation of these features began, it became clear that the dark sediment stains were an exposed A horizon that contained smaller, more discrete cultural features (i.e., Features 14–23, 30, and 31).

*Figure 71 – Feature 4 at LA 118318, view to the south*
Figure 72 – Feature 5 at LA 118318, view to the north

Figure 73 – Feature 6 at LA 118318, view to the north
Feature 12

Feature 12 was a charcoal stain recorded during the project's survey. The feature initially appeared as charcoal-rich, stained sediment eroding out of the western side of a parabolic dune within the southern US 82 right-of-way. During the current data recovery, Feature 12 was excavated by shovel. When the top sediment was removed, it became evident that the staining could be attributed to the A horizon present across the majority of the site, and the charcoal flecking was actually small pieces of decaying root originating from a shinnery oak (Figure 74). This same pattern of shinnery oak decay was observed on the southern side of the dune and in the east-facing profile of MS 1 immediately east of Feature 12.

Feature 15

Feature 15 was located on the south side of US 82 beyond the right-of-way fence and within the large-stained area defined as Feature 6. The feature initially presented as a light stain in the northeast portion of TU 3 and appeared to extend northeastward beyond the TU boundaries. Rodent disturbance was apparent throughout the feature.

In planview, the feature measured about 47 cm (north-south) by 42 cm (east-west). Excavation of TUs 4, 9, and 11 was completed adjacent to TU 3 in order to expose Feature 15's northern and eastern extents. Sediments in these adjacent TU's exhibited amorphous, mottled staining unlike the dark, well-defined staining in TU 3. The feature was bisected by trowel on a north-south axis, starting with the west half. The dark, charcoal-rich fill from this area was collected for flotation. However, due to the extent of disturbance, radiocarbon and macrobotanical analysis were not conducted. The east half was not excavated as it was clear that the feature did not extend to the north or east (Figure 75). The cultural portion of the feature was in the far northern extent of the larger stain, and consisted of an 18 cm (north-south) by 17 (east-west) circular patch of sediment.

After the western fill had been removed, it became clear that the entirety of the stained area was not a thermal feature. Most of the stain’s extent seemed to be the result of bioturbation and smearing with only a small portion clearly defined. Four pieces of burned caliche and one flake were found associated with the cultural portion of the feature. The feature was originally thought to be a small storage pit due to its size, but after excavation it was interpreted as either a highly eroded and disturbed hearth or a natural feature.
Figure 74 – Feature 12 at LA 118318, view to the east

Figure 75 – Feature 15 at LA 118318, view to the east
Feature 18

Feature 18 was an exposed patch of A horizon originally identified as an irregularly shaped charcoal stain within TUs 13, 14, 16, and 17. It was located south of US 82 beyond the right-of-way fence on the southern face of a south-sloping dune. The feature was approximately one meter south of the access road running parallel to the site but does not seem to have been damaged by it. The immediate area is of moderate artifact density and subtle sediment staining. During the project’s survey, this area was designated as Feature 4. After further investigation of Feature 4, a small, seemingly dense patch of charcoal was observed. It was designated as Feature 18, and was tentatively classified as a thermal feature with charcoal flecking.

Feature 18 measured 90 cm (northeast-southwest) by 65 cm (northwest-southeast) with a top elevation of 198.00 prior to excavation. TU 13 was placed over Feature 18 and excavated expose the plan view. Staining was more extensive than expected and three additional units (TU 14, 16, and 17) were opened and shovel scraped adjacent to TU 13. The feature was then bisected on a northwest-southeast axis, starting with the northwest half. Excavation of this section revealed that the feature had very little depth, 10 cm at most. There was neither definition around the edges or in the profile, nor charcoal flecking (Figure 76). Any flecking observed in planview can be attributed to decaying plant matter. Although two gallon-sized bags of sediment were collected for flotation, no additional analysis was conducted due to the overall sampling methodology for this project.

While the feature showed extensive disturbance from rodents and roots, feature fill had a Munsell designation of 5 YR 4/4 reddish brown with a surrounding matrix of 2.5 YR 4/6 red. Numerous artifacts were found within the TU’s in the levels above the feature, including flaked-stone debitage, groundstone, one El Paso Brownware sherd and one Jornada Brownware sherd. Associated with the feature fill were two flakes, one Jornada Brownware bowl sherd, one El Paso brownware bowl sherd, and one groundstone fragment. Feature 18 was initially misidentified as a charcoal stain due to its color, perceived charcoal flecking, and location within Feature 4. After excavation, it became clear the staining was due to exposed A horizon surrounded by a layer of aeolian sediment.

Feature 19

Feature 19 is a small, circular charcoal stain (Figure 77). It is located south of US 82 beyond the right-of-way fence and just outside of the construction limits of LA 118318. The 25-cm diameter stain is a sub-feature of Feature 5, which was an extension of the exposed A horizon in the north central portion of the site. This feature was not excavated. However, at the request of BLM, the feature was trowel probed, and a charcoal sample was collected for possible dating in case the feature is inadvertently destroyed or removed during construction.
Figure 76 – Feature 18 at LA 118318, view to the south

Figure 77 – Feature 19 at LA 118318, view to the south
Feature 24

Feature 24 was an oval-shaped secondary deposit of charcoal whose profile was discovered in the wall of the pedestaled area on which Features 25, 26, and 27 sat. Feature 24 was located in MS 1 and just beyond the US 82 southern right-of-way fence. A large rodent burrow was present in the center of the feature.

Prior to excavation, Feature 24 measured 30 cm by 16 cm with a top elevation of 199. The feature was excavated from the profile by trowel; however, when the profile was excavated sediment staining appeared inconsistent and ephemeral (Figure 78). In order to capture the boundaries of the stain, the overburden above the profile expression was removed by shovel. After 10 cm of overburden was removed a “Y-shaped” charcoal stain appeared to the northeast of F24 at the exact angle of the root/rodent disturbance seen in the profile. Post-excavation measurements were 27 cm by 16 cm with a depth of 13 cm into the wall.

Feature fill had a Munsell designation of 5 YR 3/3 dark reddish brown with a mottled surrounding matrix of 7.5 YR 4/4 brown and 2.5 YR 4/4 reddish brown. It is suspected that rodents or roots brought charcoal to this area from Feature 25, 26, and 27. Feature 24 was most likely a secondary deposit of charcoal resulting from rodent and root activity disturbing nearby features, i.e., Features 25, 26, and 27.

Figure 78 – Feature 24 at LA 118318, view to the northwest
Table 17 – Summary of Features Excavated at LA 118318

<table>
<thead>
<tr>
<th>Feature No.</th>
<th>Grid Location</th>
<th>UTM Location (NAD83 13N)</th>
<th>Feature Type</th>
<th>Depth to Top of Feature (cm bgs)</th>
<th>Planview Shape</th>
<th>Planview Dimensions (cm)</th>
<th>Profile Shape</th>
<th>Profile Thickness (cm)</th>
<th>Artifacts/Samples Collected</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>N/A</td>
<td>N 3631816 E 588217</td>
<td>Mottled A horizon w/ cultural material</td>
<td>Surface</td>
<td>Ovoid</td>
<td>260 (N-S) by 750 (E-W)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Feature 4 was originally recorded as a charcoal stain containing artifacts and burned caliche; after testing, it became evident that Feature 4 was an exposed A horizon mottled with cultural material; 1 feature (Feature 18) was encountered within Feature 4.</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>N 3631809 E 588232</td>
<td>Mottled A horizon w/ cultural material</td>
<td>Surface</td>
<td>Ovoid</td>
<td>900 diameter</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Like Feature 4, Feature 5 was originally recorded as a charcoal stain containing artifacts and burned caliche; after testing, it became evident that Feature 5 was an exposed A horizon mottled with cultural material; 1 charcoal stain feature (Feature 19) was encountered within Feature 5.</td>
</tr>
<tr>
<td>6</td>
<td>N/A</td>
<td>N 3631808 E 588260</td>
<td>Mottled A horizon w/ cultural material</td>
<td>Surface</td>
<td>Amorphous</td>
<td>1600 (N-S) by 4200 (E-W)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Feature 6 was originally recorded as a large charcoal stain containing hundreds of artifacts and burned caliche; after testing, it became evident that Feature 6 was an exposed A horizon mottled with cultural material; 10 thermal features (Features 14–17, 20–23, 30, and 31) were discovered within Feature 6.</td>
</tr>
<tr>
<td>12</td>
<td>N 957.31 E 1071.79</td>
<td>N 3631821 E 588414</td>
<td>Decaying root</td>
<td>15</td>
<td>N/A</td>
<td>Undefined</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>Feature 12 was originally recorded during survey, located on the northwestern extent of the site on the south side of US 82 within the southern right-of-way; initially the feature appeared to have a large amount of charcoal and some stained sediment; once excavated it became evident that the staining was an A horizon and the “charcoal” was a result of a massive decaying root.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts/ Samples Collected</td>
<td>Comments</td>
</tr>
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<td>------------------------</td>
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<td>----------</td>
</tr>
<tr>
<td>14</td>
<td>N 946 E 908</td>
<td>N 3631814 E 588250</td>
<td>Hearth</td>
<td>5</td>
<td>Ovoid</td>
<td>50 (N-S) by 45 (E-W)</td>
<td>Basin</td>
<td>9</td>
<td>Flotation; Charcoal; 2 pieces of flaked stone; 1 faunal</td>
<td>Discovered in the north central portion of the site within originally recorded Feature 6; feature was fully exposed within Level 1 of TU 7; charcoal mottled sediment fill with heavy bioturbation disturbance; undisturbed portions of boundary were well defined and oxidized; macrobotanical remains of mesquite; radiocarbon date A.D. 1020–1160.</td>
</tr>
<tr>
<td>15</td>
<td>N 946 E 923</td>
<td>N 3631814 E 588266</td>
<td>Poorly preserved thermal feature or natural</td>
<td>10</td>
<td>Amorphous</td>
<td>17 N-S) by 18 (E-W)</td>
<td>Irregular</td>
<td>No depth</td>
<td>Flotation; 44 pieces of flaked stone; 2 pieces of groundstone</td>
<td>Discovered in the north central portion of site within Feature 6; poorly defined charcoal stain that never materialized into an intact feature; small and shallow charcoal mottled depression; either a poorly preserved cultural pit or more likely, stained sediment/smear from nearby hearth features.</td>
</tr>
<tr>
<td>16</td>
<td>N 949 E 920</td>
<td>N 3631817 E 588262</td>
<td>Hearth</td>
<td>3</td>
<td>Circular</td>
<td>42 cm diameter</td>
<td>Basin</td>
<td>7</td>
<td>Flotation; Charcoal; 10 pieces of flaked stone; 2 ceramics; 1 faunal</td>
<td>Sub feature of previously defined Feature 6, located within north central portion of site; shallow hearth with charcoal mottled sediment; mild bioturbation present.</td>
</tr>
<tr>
<td>17</td>
<td>N 950 E 934</td>
<td>N 3631818 E 588276</td>
<td>Hearth</td>
<td>3</td>
<td>Circular</td>
<td>47 (N-S) by 45 (E-W)</td>
<td>Basin</td>
<td>12</td>
<td>Flotation; 1 piece of flaked stone</td>
<td>Sub feature of Feature 6, situated in the far northeastern corner of Feature 6 within north central portion of site; feature was exposed just below the surface of TU 12; charcoal mottled sediment with heavy bioturbation in the form of five rodent runs cutting through the feature.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts/ Samples Collected</td>
<td>Comments</td>
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<tr>
<td>18</td>
<td>N 948 E 876</td>
<td>N 3631816 E 588219</td>
<td>Decaying organics/ A horizon</td>
<td>Surficial; no depth</td>
<td>Amorphous</td>
<td>Undefined</td>
<td>Surficial; no depth</td>
<td>Surficial; no depth</td>
<td>Flotation; 2 pieces of flaked stone; 2 ceramics; and 1 piece of groundstone</td>
<td>Feature 18 was identified as a possible sediment/charcoal stain sub feature within previously recorded Feature 4; after excavation of a 2x2 m unit which was placed over the possible feature, it became evident that the feature was an exposed A horizon lacking any charcoal flecking or staining.</td>
</tr>
<tr>
<td>19</td>
<td>N 945 E 889</td>
<td>N 3631812 E 588230</td>
<td>Charcoal Stain</td>
<td>Surface</td>
<td>Circular</td>
<td>25 cm diameter</td>
<td>No profile</td>
<td>No profile</td>
<td>Charcoal</td>
<td>Feature 19 is a small yet dense charcoal stain located beyond the APE within the north central portion of the site; feature is a sub feature of the previously recorded Feature 5; at the request of BLM, a charcoal sample was collected from the thermal feature in the off chance the feature got destroyed or removed as a result of its proximity to the construction zone; feature was not excavated.</td>
</tr>
<tr>
<td>20</td>
<td>N 946.70 E 918.73</td>
<td>N 3631814 E 588260</td>
<td>Poorly preserved thermal feature or natural</td>
<td>MS 3 ~20 cm bgs</td>
<td>Circular</td>
<td>45 (N-S) by 47 (E-W)</td>
<td>No profile visible</td>
<td>15</td>
<td>Flotation; Charcoal; 2 pieces of flaked stone</td>
<td>Poorly preserved charcoal stain discovered in the east central portion of MS 3 and is a sub feature of previously identified Feature 6; a few pieces of burned caliche and two flakes were present within the feature; two dense patches of charcoal rich sediment were noted within the feature; heavy bioturbation present; little integrity left; no defined profile; may be a very disturbed thermal feature or the result of rodent burrowing.</td>
</tr>
<tr>
<td>21</td>
<td>N 947.37 E 915.74</td>
<td>N 3631815 E 588257</td>
<td>Poorly preserved thermal feature or natural</td>
<td>MS 3 ~20 cm bgs</td>
<td>Irregular</td>
<td>40 (N-S) by 34 (E-W)</td>
<td>Basin</td>
<td>11</td>
<td>Flotation</td>
<td>Discovered in the east central portion of MS 3 within the previously identified Feature 6 at the interface of a buried A horizon and paleosol; heavy bioturbation with two rodent runs cutting through the thermal feature; poorly preserved.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts/ Samples Collected</td>
<td>Comments</td>
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<tr>
<td>22</td>
<td>N 947 E 925</td>
<td>N 3631815 E 588267</td>
<td>Hearth</td>
<td>4</td>
<td>Circular</td>
<td>50 (N-S) by 56 (E-W)</td>
<td>Basin</td>
<td>17</td>
<td>Flotation; Charcoal</td>
<td>Feature 22 is a sub feature of Feature 6 discovered in TU 19, which was a test unit associated with the hand trench; well preserved with little disturbance; burned caliche throughout feature consisting of over 100 pieces mostly 0-5 cm in max dimension; one of three thermal features exhibiting this trait found during this project; macrobotanical remains of goosefoot and mesquite; radiocarbon date A.D. 780–970.</td>
</tr>
<tr>
<td>23</td>
<td>N 945.17 E 899.04</td>
<td>N 3631813 E 588241</td>
<td>Hearth</td>
<td>28</td>
<td>Ovoid</td>
<td>45 (N-S) by 41 (E-W)</td>
<td>Basin</td>
<td>11.5</td>
<td>Flotation; Charcoal; 1 piece of flaked stone</td>
<td>Discovered in TU 18 on the eastern edge of Feature 6; charcoal flecking and one flake on surface of feature; poorly defined subtle boundaries; very light mottling on bottom; two piece of burned caliche noted; feature may represent a charcoal dump or more likely, a briefly used hearth; macrobotanical remains of goosefoot and mesquite; radiocarbon date A.D. 1030–1160.</td>
</tr>
<tr>
<td>24</td>
<td>N 955.73 E 1075.84</td>
<td>N 3631820 E 588417</td>
<td>Rodent burrow</td>
<td>1 ~100 cm bgs</td>
<td>Ovoid</td>
<td>27 (N-S) by 16 (E-W)</td>
<td>Basin</td>
<td>13</td>
<td>Flotation</td>
<td>Discovered in the southeast-facing wall of MS 1 within the northeastern corner of the site; large rodent and root disturbance; excavation revealed a “Y-shape”; appears feature fill was most likely brought to this location from nearby thermal Features 25–27 via root and rodent disturbances.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts/Samples Collected</td>
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<tr>
<td>25</td>
<td>N 956.86</td>
<td>E 1078.55</td>
<td>Hearth</td>
<td>MS 1 ~100 cm bgs</td>
<td>Circular</td>
<td>63 (N-S) by 60 (E-W)</td>
<td>Basin</td>
<td>19</td>
<td>Flotation; Charcoal</td>
<td>Discovered in MS 1, within the northeastern portion of the site below a large coppice dune; one of three features in very close proximity to each other (F25–27); dense charcoal-rich feature fill; dense charcoal and black charcoal-stained sediment; well oxidized, mottled boundaries; most well defined and charcoal rich feature of the three; heavy bioturbation disturbances through center and bottom of feature; macrobotanical remains of goosefoot, purslane, and mesquite; radiocarbon date A.D. 1030–1200.</td>
</tr>
<tr>
<td>26</td>
<td>N 957.03</td>
<td>E 1077.85</td>
<td>Hearth</td>
<td>MS 1 ~100 cm bgs</td>
<td>Circular</td>
<td>55 (N-S) by 55 (E-W)</td>
<td>Basin</td>
<td>10</td>
<td>Flotation; Charcoal</td>
<td>Discovered in MS 1, within the northeastern portion of the site below a large coppice dune; one of three features in very close proximity to each other (F25–27); medium to poor preservation; not as charcoal rich as Feature 25; boundaries were not well defined; heavy rodent and bioturbation; macrobotanical remains of goosefoot; radiocarbon date A.D. 1020–1160.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts/Samples Collected</td>
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</tr>
<tr>
<td>27</td>
<td>N 956.32</td>
<td>E 1077.63</td>
<td>Hearth</td>
<td>MS 1 ~100 cm bgs</td>
<td>Ovoid</td>
<td>60 (N-S) by 70 (E-W)</td>
<td>Basin</td>
<td>17</td>
<td>Flotation; Charcoal</td>
<td>Discovered in MS 1, within the northeastern portion of the site below a large coppice dune; one of three features in very close proximity to each other (F25–27); southern half of feature was poorly preserved having been heavily disturbed by bioturbation, roots and rodent run, making the profile difficult to define; the northern half however, was well preserved with thick dense charcoal and black charcoal-stained sediment; fill was not as dense as Feature 25; boundaries were somewhat well defined with light mottling and minor oxidation; no burned caliche present in or around the three features; macrobotanical remains of purslane, saltbush, and mesquite; radiocarbon date A.D. 1020–1160.</td>
</tr>
<tr>
<td>28</td>
<td>N 947.93</td>
<td>E 1040.83</td>
<td>Hearth</td>
<td>MS 2 ~100 cm bgs</td>
<td>Ovoid</td>
<td>42 (N-S) by 33 (E-W)</td>
<td>Basin</td>
<td>10</td>
<td>Flotation</td>
<td>Discovered in MS 2, within the northeastern portion of the site; charcoal rich densely mottled sediment; root and rodent disturbance; scraping appears to have removed a portion of the feature, resulting in a shallow depth.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Artifacts/ Samples Collected</td>
<td>Comments</td>
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</tr>
<tr>
<td>29</td>
<td>N 930.27 E 633.42</td>
<td>N 3631804 E 587975</td>
<td>Depression</td>
<td>MS 4 ~40-50 cm bgs</td>
<td>Circular</td>
<td>150 diameter</td>
<td>Basin</td>
<td>13</td>
<td>Flotation; Charcoal</td>
<td>Discovered in MS 4, within the northwestern portion of the site; extremely well defined, perfectly circular feature; The shallow depression rested on, or was partially excavated into, a slightly elevated bed of caliche bedrock that is higher relative to the caliche in the rest of the scrape; feature fill is consolidated brown sand; no A horizon or paleosol present; light charcoal flecking, presumably washed in from nearby thermal features or root burns; no cut marks were noted in bedrock; no artifacts or burned caliche; based on the karst topography of the region, the feature may be an undulating bedrock area of settling water similar to a Tinaja.</td>
</tr>
<tr>
<td>30</td>
<td>N 948.8 E 925.6</td>
<td>N 3631816 E 588267</td>
<td>Hearth</td>
<td>MS 3 ~25 cm bgs</td>
<td>Circular</td>
<td>45 diameter</td>
<td>Basin</td>
<td>7</td>
<td>Flotation</td>
<td>Discovered in northeastern portion of MS 3 just northeast of the cruciform hand trench; Feature 30 is a sub feature of Feature 6; charcoal mottled sediment with some burned caliche present; scraping appears to have removed a portion of the feature, resulting in a shallow depth.</td>
</tr>
<tr>
<td>31</td>
<td>N 945.27 E 921.6</td>
<td>N 3631813 E 588263</td>
<td>Hearth</td>
<td>MS 3 ~25 cm bgs</td>
<td>Circular</td>
<td>45 diameter</td>
<td>Basin</td>
<td>15</td>
<td>Flotation</td>
<td>Discovered in northeastern portion of MS 3 just southwest of the cruciform hand trench; Feature 30 is a sub feature of Feature 6; well preserved with dark charcoal-stained sediment; burned caliche present throughout feature; burned caliche lines the bottom; whether or not the caliche was put there or it's caliche bedrock is unclear; minor root and bioturbation disturbance; similar to Feature 22.</td>
</tr>
</tbody>
</table>
Artifacts

A total of 2,074 artifacts were recovered from LA 118318 during data recovery investigations. An approximately 50-percent sample of the collected flaked-stone and groundstone assemblage was analyzed. Examined artifacts include 909 pieces of flaked-stone debitage, 135 ceramics, 114 groundstone tools, three cores, three scrapers, two retouched flakes, one projectile point, one biface fragment, one hammerstone, three shell fragments, and two pieces of burned bone. Approximately 22 percent (n=258) of these artifacts were collected from the surface of the site within the APE. The remaining 916 artifacts were recovered from test unit and feature excavations, indicating that the majority of artifacts at LA 118318 are buried. Raw material types among the debitage include chert (n=717), quartzite (n=112), chalcedony (n=55), rhyolite (n=21), limestone (n=1), petrified wood (n=1), and obsidian (n=2). Chert is clearly the dominant material type, and the most prevalent colors are tan (n=211), brown (n=123), gray (n=110), red (n=83), and white (n=64). Ceramic artifacts observed include Jornada Brownware (n=70), El Paso Brownware (n=50), Chupadero Black-on-white (n=10), Jornada Plain Slipped Red (n=4), and Plain Red (n=1). The projectile point is a proximal fragment of indeterminate type that has been heavily reworked (Figure 79). It was encountered in TU 4 at 23 cm bgs.

Groundstone tools include two complete manos, 17 mano fragments, 80 indeterminate groundstone fragments, one metate fragment, two abrader fragments, one complete polishing stone, and 11 tabular tools. The two complete manos were composed of quartzite and igneous rock with heavy use wear from grinding. The only other complete groundstone tool was a quartzite polishing stone. The remaining groundstone fragments were igneous rock, sandstone, quartzite, limestone, or rhyolite. Altogether, groundstone artifacts ranged from 21 to 142 mm in maximum dimension.

![Figure 79 – Indeterminate projectile point fragment from TU 4 at LA 118318](image_url)
Site Synthesis

The Research Design section of this report outlined several research domains and questions to help guide the investigations. Two of these domains inquire about the cultural/temporal affiliation of the site and its occupational history. Of the features tested at LA 118318, radiocarbon analysis conducted from several of the features at the site indicated very similar date ranges. Three of the six analyzed features dated between A.D. 1020–1160 (Features 14, 26, and 27), two dated between A.D. 1030–1200 (Features 23 and 25), and one dated to A.D. 780–970 (Feature 22). These dates suggest some use within the Early Formative period, but a more frequent or intensive use during the Late Formative period. Seriation of ceramic types confirm these dates, with predominate ceramic types being Jornada Brownware, El Paso Brownware, and Chupadero Black-on-white, all of which fit into the Early Formative to Late Formative periods. The Tularosa Corner-notched (100 B.C. to A.D. 900) projectile point observed on survey also supports this occupational range and presents the possibility of an Archaic occupation as well. This projectile point was located outside of the APE to the south and was not relocated during testing and data recovery.

Other research domains focus on site and feature function as well as subsistence activities. Most features encountered at LA 118318 were thermal. There were 11 definitive hearths, three poorly preserved thermal features (potentially non-cultural), and a naturally occurring depression possibly used as a Tinaja. Flotation analysis encountered small quantities of goosefoot (*Chenopodium* sp.) and purslane (*Portulaca* sp.) seeds. These seeds are noted in ethnographic studies of Native American groups in the U.S. Southwest in the 1930s as being parched and made into a gruel (Castetter 1935). Some species of chenopodium, such as quinoa, have been domesticated in other geographic areas, but varieties in Southeast New Mexico are strictly of the wild variety. The wood assemblage from the hearths was found to contain mostly mesquite with one piece of saltbush encountered in Feature 27. It is interesting to note the absence of mesquite pods, acorns, and cacti in the tested features. Given the absence of domesticates, intensive occupation of the site would suggest at least some usage of these plant materials.

Only five faunal remains were encountered during excavation of features and TU’s. Three pieces of shell where encountered in TUs and two pieces of burned bone were located with Feature 14 and Feature 16. The bone fragments were likely from small rodents but the fragments were too small to identify further. Similarly, the shells were from freshwater mollusks likely from the Pecos or a tributary.

Nearly all recovered lithic raw materials could be locally acquired from residual gravels throughout the Mescalero Plain. Other nearby sources include gravels along the Pecos River. The only non-local lithic raw material recovered from the site is obsidian, and only two obsidian flakes were identified. The closest source of obsidian is in the gravels of the Rio Grande 200 miles to the west, and obsidian nodules may have been obtained via trade with groups occupying that region. A total of 135 ceramics were recovered from the site, including 10 Chupadero Black-on-white, 50 El Paso Brownware, 70 Jornada Brownware, four Jornada Plain Slipped Red sherds, and one indeterminate Plain Red sherd. Ceramic analysis (see Chapter 8) suggests that occupants of the site maintained social ties to other groups in the Capitan, Sierra Blanca, Sacramento, and Guadalupe Mountains, where primary clay and other mineral sources are located.
Our final research domain proposed to analyze post-depositional effects on features. Many of the thermal features were in good to fair condition, but did not display the degree of integrity as other sites in the project area, such as LA 83680. The features in the site “core” (i.e., the areas of Feature 4, 5, and 6) were encountered under a thin layer of aeolian sand at the interface of the A horizon and paleosol, a pattern observed throughout sites in the project area. Portions of the site core are deflated, with intermittently exposed prehistoric A horizon. The lack of depth in this area resulted in a lower degree of preservation of hearth features. Additionally, the mottling of A horizon and feature fill made some feature boundaries difficult to distinguish (Features 15, 20, and 21). However, other features, such as Feature 14 and 23, were located at the toe of coppice and parabolic dunes to the south. These features generally showed a higher degree of integrity than those closer to the right-of-way fence. The terminus of the coppice dune helped to preserve these features. On the east side of the site, there were more and larger dunes. Features in this area (Features 25, 26, 27, and 28) were encountered over one meter below modern ground surface and displayed high integrity. In general, features exposed on the surface of the site exhibited less integrity as they had been exposed to disturbances such as natural aeolian deflation.

**Site Specific Questions**

In addition to the broader research domains discussed above, data was also collected to address the following site-specific research questions:

1) A Tularosa Corner-notched point (100 B.C. to A.D. 900) was identified on the surface of the site. Does this imply evidence of an early Archaic or Paleoindian occupation, or is it an incidental deposit? Where is the raw material source for this point, and how may this inform on mobility or exchange? *(Research Domains 1 and 5)*

2) LA 118318 is a large site with several large midden-like features. Are habitation or other domestic structures present at this site? *(Research Domains 2, 3, and 6)*

3) What types of features are present? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? *(Research Domains 1, 2, 3, 4, and 6)*

4) LA 118318 is located within a cluster of three other sites situated along the terraces and uplands east of Bear Grass Draw. Although LA 118318 has been designated as a separate site for management purposes, these four sites may together represent a single site with multiple components or activity areas. Based on similarities in the artifact and feature assemblage, along with geomorphological data, is LA 118318 a separate site, or part of a larger site that includes LA 17041, LA 120949, and 120950? *(Research Domains 1, 2, 3, 4, 5, and 6)*

One Tularosa Corner-notched point was noted within the site but outside of the project APE during survey. This point style was made over an extensive time period dating from the Archaic through most of the Early Formative period. While most of the dated features were later than this, at least one (Feature 22) dated to the Early Formative. This is also consistent with the ceramic assemblage which generally dated to the late portion of the Early Formative and the early portion of the Late Formative.
(see Chapter 8). No indication of Archaic-period remains were found although much of the site is outside of the APE and it is possible that the point is associated with Archaic materials in that area.

The indeterminate projectile point was made from white chert. Although chert occurs naturally in the area as small cobbles in a variety of colors, it is possible that certain types of chert were brought to the site from sources in west Texas or west of the Pecos River. It is currently unclear whether such materials were directly collected by the occupants of LA 1118318, or traded into the area.

The second question deals with the function of what appeared to be large midden-like features. These features were identified as Features 4, 5, and 6. These features were large amorphous sediment and charcoal-stained locales associated with dense artifact concentrations located in deflated blow-outs in between coppice dunes. Excavation of these features revealed that much of the sediment stain was in fact an exposed, originally buried Loco Hills soil A horizon, which was the living surface during the site’s original occupation. The mottling of cultural material and features (e.g., artifacts, burned caliche and charcoal feature fill) within the A horizon accounted for the large amorphous previously recorded features. Much of the living surface of LA 118318 outside of the APE is still buried under a thin layer of aeolian sand deposits or beneath large coppice dunes.

The other features encountered at LA 118318 were thermal. As described above, there were 11 definitive hearths, three poorly preserved thermal features (potentially non-cultural), and a naturally occurring depression possibly used as a Tinaja. Six of the features were subject to radiocarbon dates with five of them dating to the Late Formative period and one dating to the Early Formative. Also described above, archaeobotanical analysis indicated processing of a limited amount of non-domesticated resources, although only a sample of features were tested and a small percentage of the site was excavated.

As mentioned earlier, LA 118318 is part of a cluster of four sites (along with 17041, 120949, and 120950) that have been separated by modern impacts such as roads or oil and gas activity. Based on the overall artifact and feature distribution, the four sites appear to represent logistical camps repeatedly utilized for resource procurement and processing throughout several generations. Within the APE however, LA 118318, on the south side of US 82, exhibited a higher density of features and a wider variety of artifacts than did the sites on the north side of the road. In general, the features excavated from all of the sites are consistent, with the majority being hearths of similar sizes and with similar macrobotanical remains. However, most of the features on the north side of the road date to the Early Formative period with the western most features of LA 120949 dating to the Archaic and very Early Formative periods. In contrast, five out of six dated features from LA 118318 date to the Late Formative period, with only one dating to the Early Formative.

While all of the sites are located among mesquite-stabilized coppice dunes, features were typically found at a deeper level on the south side of the road (0–100 cm bgs) versus the north (2–50 cm bgs). Also, the percentage of groundstone within the LA 118318 assemblage was much higher than the sites on the north side of US 82 and the ceramic analysis indicated LA 118318 was likely used as a logistical camp that included a wider range of activities than the other sites (see Chapter 8).

Based on investigation of the current APE, all four sites likely served as locations of resource procurement and processing repeatedly occupied for varying lengths of time throughout multiple
generations. It is also possible that the sites on the north side of US 82 (LA 17041, 120949, and 120950) were used as temporary logistical locations. The artifact and feature assemblage of LA 118318, on the south side of the road, is more consistent with a longer-term occupation. Alternatively, the entire cluster of sites may represent the same logistical behavior with LA 118318 occupying the more central portion of the behavior location while the sites on the north side of the road represent the outer periphery. However, additional investigation of the site areas beyond the current APE would be needed before this can be definitively stated. For instance, 18 features and nearly 1,000 artifacts were identified from surface survey of LA 17041 while only two features and 54 artifacts from that site were located within the APE. Similarly, LA 118318 has an extensive amount of exposed A horizon/features and artifacts that extend beyond the APE and were not investigated as part of the current effort. These additional resources could affect the final interpretation of this site cluster.

Final Recommendations

LA 118318 was previously determined eligible for listing in the NRHP for its information potential. Out of the thirteen features recorded during the pedestrian survey, four features fell inside or within close proximity to the APE. Eighteen features were newly discovered during either surface collection, within test units or through mechanical scraping. Test unit excavation and mechanical scraping were undertaken to explore and define features and develop a better understanding of the geomorphology of the portion of the site that falls within the project's area of potential effect. All twenty-four of the hand-excavated test units were positive, containing either artifacts, features, or both. Twenty-two features were excavated within the APE. Out of the 22 features, seven were identified on the surface of the site and the remaining were exposed during subsurface excavation. Fourteen features were cultural, and eight were determined to be natural in origin.

The information potential of the portion of the site within the APE has been fully recovered according to methods proposed in the Testing and Data Recovery Plan as well as the standards outlined in NMAC 4.10.16.12. However, the site extends south of the APE where features and numerous surface artifacts are present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain eligible. The portions of the site outside the APE should be avoided by all activities associated with this undertaking. Due to the close proximity of features to the project APE, temporary protective fencing should be installed in the areas of Features 3, 4, 5, and 6 prior to construction in order to guard against inadvertent trespass. If intact cultural deposits are encountered during construction, activities in or near those deposits should cease and NMDOT, BLM, and SHPO should be notified.
LA 120949

General Site Summary

The following site summary is based on the most recent update of the site surface (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 120949 is a Late Formative period artifact scatter with six fire-related features located on the northern side of US 82, bordering the right-of-way fence line directly across from the western portion of LA 118318. The site is located on a gradual west sloping terrace, overlooking Bear Grass Draw, within a larger undulating dunal environment (Figures 80 and 81). Numerous disturbances are present across the site, including several buried pipelines, and an overhead electrical transmission line that parallels the right-of-way fence. Mesquite-anchored coppice dunes measure 1 to 3 m in height, with a variety of features located in erosional blowouts between the dunes, or elevated above the blowouts within the dunes themselves. LA 120949 is a part of the larger cultural complex surrounding Bear Grass Draw which includes over a dozen nearby sites with four of them (LA 17041, 118318, 129049, and 120950) being subject to investigation during this project (see Figures 2 and 19). This cluster of sites has been separated by modern impacts including US 82, bladed two tracks, power lines, subsurface utility lines, and low-lying deflated areas heavily impacted by oil and gas exploration with pipelines and well pads. It is likely these sites represent continuous land use over an extended period of time within the larger cultural landscape along Bear Grass Draw.

Hundreds of artifacts were observed on the surface of the site during this update. The burned caliche and lithic artifacts suggested that plant-processing activities likely occurred on site. Furthermore, the large amount of flaked-stone debitage and variety of raw material types suggested that lithic reduction was also a prominent activity at LA 120949. The site is therefore interpreted as having functioned as a temporary or repeatedly used encampment focused on resource procurement, processing, and lithic reduction.

Excavation Results

During the current testing and data recovery project, portions of LA 120949 falling within the project APE were excavated. The APE for this site extends 15 to 40 ft north of the northern highway right-of-way fence. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, feature excavations, and artifacts, are described below. See Figures 82–84 for the specific locations of these activities.
Figure 80 – LA 120949, view to the west

Figure 81 – LA 120949, view to the east
Figure 82 – LA 120949 planview map (western portion)
Figure 83 – LA 120949 planview map (eastern portion)
Figure 84 – Planview map of MS 1 area
**Surface Collection**

Prior to any subsurface testing, all artifacts located on the ground surface of the site and within the APE were systematically flagged and collected. Surface artifacts were point provenienced by GPS and assigned UTM coordinates and individual FS numbers. When appropriate, groups of surface artifacts were collected under the same FS number when located within an area measuring less than 10 cm², or within a similar context (e.g., microdebitage from an isolated ant mound). A total of 159 artifacts were collected from the surface of LA 120949 within or adjacent to the APE. This assemblage consisted of flaked-stone debitage (n=122), ceramics (n=15), groundstone (n=17), two cores, two hammerstones, and one scraper.

**Test Unit Excavations**

A total of eight 1-by-1-m test units and one 2-by-2-m test unit (TU 9) were excavated at LA 120949 within the project APE. Summary data on test unit location, depth, sediment matrix, feature identification, and recovered artifacts is presented in Table 18. To increase the probability of finding subsurface cultural material, test units were placed specifically in areas with high surface artifact density or burned caliche. Test units extended between 10 cm and 48 cm in depth. Sediment deposits within the site were typically very shallow, and included a loose aeolian layer above a compact paleosol layer, on top of caliche bedrock (Figure 85). Units were terminated as sterile sediments were encountered throughout each unit. A total of 271 artifacts were collected during test unit excavation, all typically from within the first two levels of the units. Two features (Features 7 and 8) were identified within the test units.

**Mechanical Excavations**

After hand-excavated test units were completed, mechanical scraping within the project area took place. One 2.5 m (north-south) by 30 m (east-west) mechanical scraping area (MS 1) was conducted in the western portion of LA 120949. This scrape was placed in the area with the highest density of surface artifacts within the APE. No cultural materials were encountered within the scrape. Soils within MS 1 were consistent with those observed in the test units described above.
### Table 18 – Summary of Test Units Excavated at LA 120949

<table>
<thead>
<tr>
<th>TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifacts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 991 E 845</td>
<td>1 x 1</td>
<td>48</td>
<td>3</td>
<td>N/A</td>
<td>None</td>
<td>Placed near eastern edge of site in an area with artifacts to explore potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 3 levels.</td>
</tr>
<tr>
<td>2</td>
<td>N 979 E 663</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>N/A</td>
<td>2 pieces of flaked stone and 1 groundstone</td>
<td>Placed in south-central portion of site in an area with artifacts and burned caliche to explore potential for additional subsurface artifacts and features; artifacts found in Levels 1 and 2; excavation continued for 1 additional sterile level until a caliche layer was encountered.</td>
</tr>
<tr>
<td>3</td>
<td>N 975 E 624</td>
<td>1 x 1</td>
<td>38</td>
<td>3</td>
<td>Feature 7; TUs 9a, 9b and 9c</td>
<td>35 pieces of flaked stone, 1 core, 1 groundstone, and 6 ceramics</td>
<td>Placed in western portion of site in an area with artifacts and burned caliche to explore potential for additional subsurface artifacts and features; one feature (Feature 7) was exposed and excavated; artifacts found in Levels 1 and 2; excavation continued for 1 additional sterile level; 3 additional 1x1 m units were placed adjacent to TU 3 to expose the entirety of Feature 7 (TU 9a to the west, TU 9b to the northwest, and TU 9c to the north); this 2x2 m configuration is referred to as TU 9, with TU 3 being the southeastern 1x1 m unit.</td>
</tr>
<tr>
<td>4</td>
<td>N 971.5 E 617</td>
<td>1 x 1</td>
<td>30</td>
<td>3</td>
<td>N/A</td>
<td>13 pieces of flaked stone, 1 groundstone, 1 ceramic, 1 core, and 1 hammerstone</td>
<td>Placed in western portion of site on the southern edge of a coppice dune field to explore potential for subsurface artifacts and features; artifacts came from Level 1; excavation continued for 2 additional sterile levels until a caliche layer was encountered.</td>
</tr>
<tr>
<td>TU No.</td>
<td>Grid Location</td>
<td>Size (m)</td>
<td>Depth (cm bgs)</td>
<td>No. of Levels</td>
<td>Associated TUs/Features</td>
<td>Artifacts</td>
<td>Comments</td>
</tr>
<tr>
<td>-------</td>
<td>---------------</td>
<td>----------</td>
<td>----------------</td>
<td>---------------</td>
<td>-------------------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>5</td>
<td>N 968.5 E 606.5</td>
<td>1 x 1</td>
<td>35</td>
<td>3</td>
<td>N/A</td>
<td>27 pieces of flaked stone, 4 ceramics, and 1 groundstone</td>
<td>Placed in western portion of site in an area with artifacts and burned caliche to explore potential for additional subsurface artifacts and features; artifacts came from Level 1; excavation continued for 2 additional sterile levels.</td>
</tr>
<tr>
<td>6</td>
<td>N 978 E 635</td>
<td>1 x 1</td>
<td>22</td>
<td>3</td>
<td>TU 7; Feature 8</td>
<td>20 pieces of flaked stone, 3 ceramics, and 1 groundstone</td>
<td>Placed in western portion of site in an area with very dense artifact concentration with some burned caliche to explore potential for subsurface artifacts and features; Feature 8 encountered in NW corner; artifacts came from Levels 1 and 2; excavation continued for 1 additional sterile level.</td>
</tr>
<tr>
<td>7</td>
<td>N 978.5 E 634.5</td>
<td>1 x 1</td>
<td>22</td>
<td>3</td>
<td>TU 6; Feature 8</td>
<td>21 pieces of flaked stone, 3 pieces of bone, and 2 ceramics</td>
<td>Placed adjacent to TU 6 to fully capture Feature 8; artifacts came from Levels 1 and 2; excavation continued for 1 additional sterile level.</td>
</tr>
<tr>
<td>8</td>
<td>N 989 E 775</td>
<td>1 x 1</td>
<td>10</td>
<td>1</td>
<td>N/A</td>
<td>None</td>
<td>Placed in eastern portion of site in an area with burned caliche to explore potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 1 level upon reaching caliche bedrock.</td>
</tr>
<tr>
<td>9a</td>
<td>N 975 E 623</td>
<td>1 x 1</td>
<td>18</td>
<td>1</td>
<td>TU 3; Feature 7</td>
<td>44 pieces of flaked stone, 1 core, 7 ceramics, and 2 groundstone</td>
<td>Placed adjacent to TU 3 to fully expose Feature 7; unit was terminated after Level 1 as feature was exposed.</td>
</tr>
<tr>
<td>9b</td>
<td>N 976 E 623</td>
<td>1 x 1</td>
<td>18</td>
<td>1</td>
<td>TU 3; Feature 7</td>
<td>60 pieces of flaked stone, 10 ceramics, and 5 groundstone</td>
<td>Placed adjacent to TU 3 to fully expose Feature 7; unit was terminated after Level 1 as feature was exposed.</td>
</tr>
<tr>
<td>9c</td>
<td>N 976 E 624</td>
<td>1 x 1</td>
<td>18</td>
<td>1</td>
<td>TU 3; Feature 7</td>
<td>25 pieces of flaked stone, 7 ceramics, 1 scraper, and 1 groundstone</td>
<td>Placed adjacent to TU 3 to fully expose Feature 7; unit was terminated after Level 1 as feature was exposed.</td>
</tr>
</tbody>
</table>
Feature Excavations

Two newly identified features (Features 7 and 8) were encountered within TUs at LA 120949. Features 1 through 6, burned-caliche and artifact concentrations that were encountered on the surface during survey, were located outside of the APE for this undertaking and were not investigated. Table 19 presents summary data on the features subjected to data recovery investigations. A total of 46 artifacts were collected during feature excavations.
Feature 7

Feature 7 was a circular stain located north of the US 82 right-of-way within the APE. The feature was discovered at the base of Level 1 within TU 3. TUs 9A–9c were set up adjacent to TU 3 in order to expose the entirety of the stain and surrounding areas. Two rodent burrows were identified in the north and northeast portions of the feature and root disturbance was noted near the bottom of the feature.

Prior to excavation, the feature measured 120 cm (north-south) by 125 cm (east-west) and had a top elevation of 189.76. The feature was bisected on an east-west axis with a trowel with the southern half being removed first. It appeared basin shaped in profile with a thickness of 25 cm. Three gallon-sized bags of feature fill were collected for flotation and the remaining sediment was screened through 1/8-inch wire mesh. Post-excavation measurements were 125 cm (north-south) by 130 cm (east-west) with a bottom elevation of 189.47. A portion of the feature extended deeper to an elevation of 189.36. This pocket of disturbance was believed to be caused by rodent activity.

Feature fill was heavily mottled and appeared as a distinct yellowish-red (5 YR 4/6) stain with charcoal flecking in variable densities throughout its matrix. Sixteen pieces of flaked stone were discovered within the feature, including chert, chalcedony and quartzite of various colors. A radiocarbon assay of charcoal recovered from the feature fill dated the feature to A.D. 400–540 (Figure 86). Macrobotanical analysis of the flotation sample indicated burned mesquite wood was present within the sample matrix. Based on the size of the feature, the yellowish matrix, and the artifact density, Feature 7 is interpreted to be a prehistoric storage pit that was likely filled in with sediments and cultural materials from natural erosional processes.

Figure 86 – Calibrated two-sigma date range of Feature 7 at LA 120949; A.D. 400–540 (95.4% probability)
**LA 120949**

**FEATURE 7**  
*Storage Pit*

<table>
<thead>
<tr>
<th>GRID: N 975, E 624</th>
<th>UTM: N 3631849, E 587967</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLAN VIEW SHAPE:</strong> CIRCULAR</td>
<td><strong>PROFILE SHAPE:</strong> BASIN</td>
</tr>
<tr>
<td><strong>PLANVIEW DIMENSIONS (cm)</strong></td>
<td><strong>TOP ELEVATION:</strong> 189.72</td>
</tr>
<tr>
<td>Pre-Excavation: 120 (N-S) x 125 (E-W)</td>
<td>Bottom Elevation: 189.47</td>
</tr>
<tr>
<td>Post-Excavation: 125 (N-S) x 130 (E-W)</td>
<td>Profile Thickness: 25 cm</td>
</tr>
</tbody>
</table>

**Pre-Excavation**

**Profile**

1. Mottled Feature fill: 5 YR 4/6 yellowish red semi-compact sand w/ grey tint
2. 2.5 YR 4/6 red loose to semi-compact sand
3. 2.5 YR 4/8 red very compact sand

**Post-Excavation**

**Samples Collected:** Flotation, Charcoal, Flaked Stone

**Associated FS#s:** 89, 92, 94, 95

**Associated TUs/Mechanical Scrapes:** TU 3, TU 9

**Date Excavated:** 16 June 2016

**Photo Numbers:** GM1 (180-183, 201-204, 212-216, 222-224, 229-231, 235-238)

**Excavator(s):** Darrell Del Frate
Feature 8

Feature 8 was located immediately north of the APE, north of the right-of-way fence line. It was initially found in the northwest quadrant of TU 6. The test unit was placed adjacent to the northern edge of the APE in an area that exhibited high artifact and burned caliche density. TU 7 was placed off of the TU 6 northwest quadrant in such a way as to fully expose the stain. Approximately 2 cm of aeolian overburden was covering the surface of the feature. The feature exhibited strong integrity despite being so close to the modern ground surface. A sandstone metate fragment was collected on the surface immediately west of the feature and six pieces of burned caliche were located on the aeolian surface directly above.

In planview, it appeared as a black ovoid stain with charcoal flecking throughout its matrix. Prior to excavation, the feature measured 50 cm (north-south) by 50 cm (east-west) and had a top elevation of 190.13. The small aeolian overburden sediment was removed with a shovel and the feature was excavated by trowel. It was bisected east-to-west with the north half being excavated with a trowel. It appeared basin shaped in profile with a maximum thickness of 18 cm. Three gallon-sized bags of feature fill were collected for flotation and the remaining sediment was screened through 1/8-inch wire mesh. Post-excavation measurements were 50 cm (north-south) by 50 cm (east-west) with a bottom elevation of 189.95.

The feature fill was a dark brown (7.5 YR 3/2) and charcoal-rich sand. No artifacts were discovered within the feature fill; however, unburned goosefoot seeds of unknown age were collected. At the same depth and immediately adjacent to the feature, 30 artifacts were found including two brownware sherds, three unidentifiable faunal fragments, and 25 pieces of flaked-stone debitage including chert, chalcedony, quartzite and rhyolite of various colors. Radiocarbon assays dated the feature between 540–390 B.C. (Figure 87). Macrobotanical analysis of the flotation sample indicated burned mesquite was present within the sample matrix. Based on this analysis, Feature 8 is interpreted to be a prehistoric hearth.

![Graph](image)

*Figure 87 – Calibrated two-sigma date range of Feature 8 at LA 120949; 540–390 B.C. (95.4% probability)*
**Feature 8**

*Hearth*

<table>
<thead>
<tr>
<th>Grid: N 978.87, E 634.2</th>
<th>UTM: N 3631853, E 587978</th>
<th>Plan View Shape: Ovoid</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plan View Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 190.13</strong></td>
<td><strong>Bottom Elevation: 189.95</strong></td>
<td><strong>Profile Thickness: 18 cm</strong></td>
</tr>
<tr>
<td>Pre-Excavation: 50 (N-S) x 50 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 50 (N-S) x 50 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Excavation**

**Profile**

**Post-Excavation**

Associated FS#s: 86

Associated TUs/Mechanical Scrapes: TU 6, TU 7

Date Excavated: 6 June 2016

Samples Collected: Flotation, Seed

Photo Numbers: GM 1 (194-197, 207-211, 217-219)

Excavator(s): Greg Mastroiopetro
Table 19 – Summary of Features Excavated at LA 120949

<table>
<thead>
<tr>
<th>Feature No.</th>
<th>Grid Location</th>
<th>UTM Location (NAD83 13N)</th>
<th>Feature Type</th>
<th>Depth to Top of Feature (cm bgs)</th>
<th>Planview Shape</th>
<th>Planview Dimensions (cm)</th>
<th>Profile Shape</th>
<th>Profile Thickness (cm)</th>
<th>Artifacts/Samples Collected</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>N 975 E 624</td>
<td>N 3631849 E 587967</td>
<td>Storage Pit</td>
<td>19</td>
<td>Circular</td>
<td>125 (N-S) by 130 (E-W)</td>
<td>Basin</td>
<td>25–40</td>
<td>Flotation; Charcoal; 16 pieces of flaked stone recovered throughout feature; feature fill was slightly stained and heavily mottled with charcoal flecking; macrobotanical analysis indicated burned mesquite; radiocarbon dates between A.D. 400–540.</td>
<td>Potential storage pit; encountered at base of Level 1 in TU 3; 16 pieces of flaked stone recovered throughout feature; feature fill was slightly stained and heavily mottled with charcoal flecking; macrobotanical analysis indicated burned mesquite; radiocarbon dates between A.D. 400–540.</td>
</tr>
<tr>
<td>8</td>
<td>N 978.87 E 634.2</td>
<td>N 3631853 E 587978</td>
<td>Hearth</td>
<td>2</td>
<td>Ovoid</td>
<td>50 (N-S) by 50 (E-W)</td>
<td>Basin</td>
<td>18</td>
<td>Flotation; 1 seed; 3 faunal fragments, 2 sherds, 25 pieces of flaked stone</td>
<td>Hearth with charcoal-rich sediment; no burned caliche observed; artifacts were immediately adjacent to feature; macrobotanical analysis indicated burned mesquite; radiocarbon dates between 540–390 B.C.</td>
</tr>
</tbody>
</table>
Artifacts

A total of 476 artifacts were recovered from LA 120949 during data recovery investigations. This sample includes 383 pieces of flaked-stonedebitage, seven flaked-stone tools, 26 groundstone tools, 57 ceramics, and three faunal fragments. Approximately 33 percent (n=159) of these artifacts were collected from the surface of the site within the APE. This indicates the majority (n=317; 67%) of artifacts at LA 120949 are from a buried context. Raw material types among the debitage include chert (n=272), quartzite (n=66), chalcedony (n=32), rhyolite (n=12), and petrified wood (n=1). Flaked-stone tools include three cores, two hammerstones, a biface, and a scraper. The groundstone assemblage is composed of four manos, one metate, and 21 indeterminate groundstone fragments. Ceramic artifacts observed include El Paso Brownware (N=44; 77%), Jornada Brownware (n=8, 14%), and Chupadero Black-on-white (n=5, 9%).

Site Synthesis

The Research Design section of this report outlined several research domains and questions to help guide the investigations. Two of these domains inquire about the cultural/temporal affiliation of the site and its occupational history. To address the various questions proposed under these domains, we acquired radiocarbon dates from two of the features (Feature 7 and Feature 8). The radiocarbon assay for Feature 7 returned dates ranging from A.D. 400 to 540, while Feature 8 ranged from 540 to 390 B.C. These non-overlapping dates suggest that the two features are not contemporaneous. Additionally, the ceramic assemblage is indicative of multiple components dating to the Early Formative and Late Formative periods (see Chapter 8 for additional details).

Other research domains focus on site and feature function as well as subsistence activities. One feature identified at LA 120949 (Feature 8) was a thermal feature likely utilized for food processing. This would be consistent with the groundstone tools located on the site. Additionally, macrobotanical analysis of fill from Feature 8 revealed charred mesquite wood and unburned goosefoot seeds. Feature 7 however, exhibited substantial differences from Feature 8, as described below in Site Specific Questions, and was interpreted as a storage feature. Based on the feature functions, feature dates, and the artifact assemblage, it is likely that the site was visited seasonally from the Archaic period through the Late Formative period to acquire and process various resources. However, direct evidence of which resources were acquired was not found.

All recovered lithic raw materials could be locally acquired from residual gravels throughout the Mescalero Plain. Other nearby sources include gravels along the Pecos River. No non-local lithic raw materials were recovered. The sample of lithic artifacts recovered from LA 120949 therefore precludes broader inferences regarding mobility and interregional cultural interactions such as trade or exchange. A total of 57 ceramics were recovered from the site, including five Chupadero Black-on-white, 44 El Paso Brownware, and eight Jornada Brownware sherds. Ceramic analysis (see Chapter 8) suggests that occupants of the site maintained social ties to other groups in the Capitan, Sierra Blanca, Sacramento Mountains, as well as the western Jornada or Highland Mogollon region, where primary clay and other mineral sources are located.
Our final research domain proposed to analyze post-depositional effects on features. At LA 120949, no features were observed on the surface of the site within the APE. Two features were encountered during the excavation, both being well preserved. This suggests that absence of surface manifestations is not an accurate indicator of feature presence, let alone feature size and morphology. Additionally, the presence of overburden sediment may provide a protective element for the features. Finally, the presence of these buried features is a strong indicator that additional subsurface deposits are likely present but buried in other, unexcavated, portions of the site outside the project APE.

Site Specific Questions

The Research Design section of this document provides a complete discussion of the research themes common to all sites in the project area. In addition to these broader research questions, data was collected to address the following site-specific research questions:

1) LA 120949 is a large site with several features. Are intact features present within the APE? If so, what types of features are present? Are habitation or other domestic structures present at this site? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? (Research Domains 1, 2, 3, 4, and 6)

2) LA 120949 is located within a cluster of three other sites situated along the terraces and uplands east of Bear Grass Draw. Although LA 120949 has been designated as a separate site for management purposes, these four sites may together represent a single site with multiple components or activity areas. Based on similarities in the artifact and feature assemblage, along with geomorphological data, is LA 120949 a separate site, or part of a larger site that includes LA 17041, LA 118318, and LA 120950? (Research Domains 1, 2, 3, 4, 5, and 6)

LA 120949 has two distinct features within the project APE. Feature 7 was located at a depth of 19 cm bgs while Feature 8 was located at 2 cm bgs. Feature 7 had several pieces of flaked stone located within the feature fill while Feature 8 had flaked stone, faunal material, and ceramics located adjacent to the feature but outside of the feature fill. Feature fill for Feature 7 was yellowish-red while Feature 8 fill was dark brown and sandy. Feature 7 dated to A.D. 400–540 while Feature 8 dated to 540–390 B.C. Additionally, Feature 7 was three times the size of Feature 8. Based on these differences in depth, feature fill, associated artifacts, and size, the features are unrelated and served different functions. The larger Feature 7 is interpreted as an Early Formative period storage pit that may have filled in with sediments and cultural materials from natural erosional processes while Feature 8 was a likely hearth dating to the Archaic period.

As mentioned earlier, LA 120949 is part of a cluster of four sites (along with 17041, 120950, and 118318) that have been separated by modern impacts such as roads or oil and gas activity. Based on the overall artifact and feature distribution, the four sites appear to represent logistical camps repeatedly utilized for resource procurement and processing throughout several generations. Within the APE however, LA 118318, on the south side of US 82, exhibited a higher density of features and a wider variety of artifacts than did the sites on the north side of the road. In general, the features excavated from all of the sites are consistent, with the majority being hearths of similar sizes and with similar macrobotanical remains.
However, most of the features on the north side of the road date to the Early Formative period with the western most features of LA 120949 dating to the Archaic and very Early Formative periods. In contrast, five out of six dated features from LA 118318 date to the Late Formative period, with only one dating to the Early Formative. While all of the sites are located among mesquite-stabilized coppice dunes, features were typically found at a deeper level on the south side of the road (0–100 cm bgs) versus the north (2–50 cm bgs). Also, the percentage of groundstone within the LA 118318 assemblage was much higher than the sites on the north side of US 82 and the ceramic analysis indicated LA 118318 was likely used as a logistical camp that included a wider range of activities than the other sites (see Chapter 8).

Based on investigation of the current APE, all four sites likely served as locations of resource procurement and processing repeatedly occupied for varying lengths of time throughout multiple generations. It is also possible that LA 120949 and the other sites on the north side of US 82 may have been used as more temporary logistical locations whereas the artifact and feature assemblage of LA 118318, on the south side of the road, is more consistent with longer-term occupations. Alternatively, the entire cluster of sites may represent the same logistical behavior with LA 118318 occupying the more central portion of the behavior location while the sites on the north side of the road represent the outer periphery. However, additional investigation of the site areas beyond the current APE would be needed before this can be definitively stated. For instance, 18 features and nearly 1,000 artifacts were identified from surface survey of LA 17041 (to the east of LA 120949) while only two features and 54 artifacts from that site were located within the APE. The other sites also have a substantial amount of resources located outside the current APE. These additional resources could affect the final interpretation of this site cluster.

**Final Recommendations**

LA 120949 was previously determined eligible for listing in the NRHP for its information potential. A total of 476 artifacts were located within the project APE. Test unit excavation and mechanical scraping were undertaken to determine whether any features were present, or had the potential to be present within the APE. All but two hand-excavated test units had artifacts within them. Two features were also identified through excavation.

The information potential of the portion of the site within the APE has been fully recovered according to methods proposed in the Testing and Data Recovery Plan as well as the guidelines in NMAC 4.10.16.12. However, the site extends to the north of the APE, where features and artifacts are present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain eligible. The portions of the site outside the APE should therefore be avoided by all activities associated with this undertaking. Due to the close proximity of Feature 7 and Feature 8 to the project APE, temporary protective fencing should be installed in this area to guard against inadvertent trespass beyond the APE that could impact undocumented features. If any intact cultural deposits not identified in this study are uncovered during construction, work should cease immediately and NMDOT, BLM and SHPO should be notified.
LA 120950

General Site Summary

The following is a general site summary. It is based on the most recent update of the site (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 120950 is a small Late Formative (A.D. 1100–1450) artifact scatter located north of US 82. The southern boundary of the site borders the highway right-of-way fence and is located across the highway from LA 118318 (see Figures 2 and 19). The site is situated on a gradual west-sloping terrace overlooking Bear Grass Draw within a coppice dune environment (Figure 88). Artifacts are being exposed by erosional processes and are largely located within interdunal basins and blowouts, with approximately half of the artifacts eroding out of the sides of mesquite-anchored coppice dunes.

LA 120950 has been updated three times since its original recording in 1998 by the Eastern New Mexico University Agency for Conservation Archaeology (NMCRI8 86710). During earlier site visits, three features were observed and recorded. However, the most recent surface investigation conducted by WSP identified only one feature on the surface of the site. Whether natural processes or recent land development displaced and destroyed the other two features is unclear. The site has been heavily impacted by recent development. US 82 forms the southern boundary of the site. On the east, the site is bounded by an access road that curves past the northern boundary of the site, and terminates into a well pad that separates LA 120950 from LA 120949 to the west. A possible old buried utility line and an overhead electrical transmission line extend through the southern portion of the site, paralleling the right-of-way fence. A small burned-caliche scatter was observed within the project APE and was mapped as a feature remnant. A total of 29 artifacts were recorded during the most recent site visit of LA 120950. This assemblage included three ceramics (two Chupadero Black-on-white and one plain grayware), four stone tools (one indeterminate groundstone fragment, one mano fragment, one chert biface, and one hammerstone) and 22 pieces of flaked-stone debitage. Lithic raw material types consisted of chert, quartzite, rhyolite, and silicified wood.

Excavation Results

During the current testing and data recovery project, portions of LA 120950 falling within the project APE were excavated. The APE extends approximately 20 ft north of the northern right-of-way fence. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, feature excavations, and artifacts, are described below. See Figure 89 for the specific locations of these activities.

Surface Collection

Prior to any subsurface testing, all artifacts located on the ground surface of the site within the construction buffer were systematically flagged and collected. These artifacts were point provenienced by GPS and assigned UTM coordinates and individual FS numbers. When appropriate, groups of surface artifacts were collected under the same FS number when located within an area measuring less than 10 cm², or within a
similar context (e.g., microdebitage from an isolated ant mound). The distribution and density of surface artifacts guided the subsequent placement of test units, and comprise a spatial and artifactual data set that more broadly informs on patterns of cultural activity along Bear Grass Draw. A total of 80 artifacts were collected from the surface of the site. This assemblage includes 56 pieces of flaked-stonedebitage, 11 ceramics, eight groundstone tools, and five flaked-stone tools. Artifacts recovered from the surface represent approximately 21 percent of the overall assemblage recovered from LA 120950.

**Test Unit Excavations**

Five 1-by-1-m test units were excavated at LA 120950 within the project APE. Summary data on test unit location, depth, sediment matrix, feature identification, and recovered artifacts is presented in Table 20. To increase the probability of finding subsurface cultural material, test units were placed specifically in areas with high surface artifact density or burned caliche. Test units extended between 40 cm and 72 cm in depth, with the exception of TU 5 which was excavated to a depth of 6 cm to expose Feature 2. Units were typically terminated as sterile sediments or bedrock were encountered and no artifacts or features were identified. A total of 299 artifacts were collected during test unit excavation, all typically from within the first two levels of the units. A portion of a thermal feature (Feature 2) representing a possible disarticulated hearth, was identified in TU 2, and TU 5 was placed northeast of TU 2 to fully expose the feature.

![Figure 88 – LA 120950, view to the west-southwest](image)
Table 20 – Summary of Test Units Excavated at LA 120950

<table>
<thead>
<tr>
<th>TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifacts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 989 E 987</td>
<td>1 x 1</td>
<td>40</td>
<td>4</td>
<td>N/A</td>
<td>107 pieces of flaked stone, 3 ceramics, 1 groundstone, and 1 piece of shell</td>
<td>Placed beyond the right-of-way fence within the APE; this location was within a blowout between coppice dunes that contained multiple artifacts and several pieces of burned caliche; the unit was placed in this location to determine the presence of subsurface cultural deposits; the first 2 levels contained a large quantity and variety of artifacts; however, the last 2 levels were sterile sediment and the unit was terminated.</td>
</tr>
<tr>
<td>2</td>
<td>N 990 E 973.5</td>
<td>1 x 1</td>
<td>41</td>
<td>5</td>
<td>TU 5; Feature 2</td>
<td>29 pieces of flaked stone and 2 ceramics</td>
<td>Placed beyond the right-of-way fence within the APE in a deflated area near several pieces of burned caliche to investigate presence of subsurface deposits and the depth of the landform; artifacts were encountered in 4 levels, but the final level was sterile; Feature 2 was partially exposed in the profile of this unit, and TU 5 was placed over the northeastern corner of the unit to capture the full expression of the feature; TU 2 was continued and terminated when caliche bedrock was uncovered.</td>
</tr>
<tr>
<td>3</td>
<td>N 992.5 E 976</td>
<td>1 x 1</td>
<td>72</td>
<td>8</td>
<td>N/A</td>
<td>55 pieces of flaked stone and 5 ceramics</td>
<td>Placed beyond the right-of-way fence within the APE at the southern terminus of a large coppice dune; the purpose of the unit was to expose subsurface cultural deposits and assess the depth of this area of the site (Figure 90); excavation yielded 8 positive levels, but was terminated when caliche bedrock was approached.</td>
</tr>
<tr>
<td>4</td>
<td>N 991 E 982</td>
<td>1 x 1</td>
<td>68</td>
<td>7</td>
<td>N/A</td>
<td>93 pieces of flaked stone and 1 projectile point</td>
<td>Placed beyond the right-of-way fence within the APE; this location was within a blowout between coppice dunes that contained multiple artifacts; the unit was placed in this location to expose subsurface cultural deposits; TU 4 had 6 positive levels; unit was terminated at Level 7 when caliche bedrock was exposed.</td>
</tr>
<tr>
<td>5</td>
<td>N 990.5 E 974</td>
<td>1 x 1</td>
<td>6</td>
<td>1</td>
<td>TU 2; Feature 2</td>
<td>9 pieces of flaked stone and 2 ceramics</td>
<td>TU 5 was placed over the northeastern corner of TU 2 to capture the full expression of Feature 2; the unit was excavated a total of 6 cm and the surface of the feature was exposed; Feature 2 was fully excavated to its base; however, the remainder of TU 5 was terminated upon exposing the top of the feature; 11 artifacts were encountered in Level 1.</td>
</tr>
</tbody>
</table>
Figure 90 – Test Unit 3 north wall profile

I - 5 YR 5/4 reddish brown; fine-grain sand
II - Caliche lens; intermixed with Strat I soils
III - 7.5 YR 3/4 dark brown; fine-grain sand w/ abundant roots (A horizon)
IV - 7.5 YR 4/4 brown; fine-grain sand
Mechanical Excavations

Mechanical scraping at LA 120950 occurred on the northern side of the US 82 right-of-way fence within the APE, as designated by the testing and data recovery plan. The scraped area measured 1.5 m (north-south) by 30 m (east-west) and ranged between 50 and 150 cm in depth. It was placed against the southern toe of a series of large coppice dunes. This area exhibited potential disturbance from an old buried utility line. The first 5 cm of the mechanical scrape contained a thin layer of aeolian sand overlying an inconsistent A horizon that varied in presence and depth throughout the length of the scrape. This prehistoric A horizon was consistent in composition to the A horizon observed at LA 118318. It was thicker and more intact near the toe of the coppice dune, but was absent in the southern half of the scrape. Portions of this stratum were likely disturbed or removed by the buried utility line. An 80-cm-thick layer of reddish, compact paleosol was present below the A horizon and rested on caliche bedrock. Three thermal features (Features 3, 4, and 5) were encountered in the scraped area near the interface of the A horizon and paleosol. One El Paso Brown jar sherd was found within the scrape.

Portions of the site immediately east and west of the scraped area could not be mechanically excavated due to the presence of buried utility lines.

Feature Excavations

The burned-caliche scatter that was identified as a feature remnant during survey was not given a feature number because it did not meet BLM criteria for a feature. However, TU 1 was placed in the area of this burned-caliche scatter to explore the potential for any associated subsurface features. No features were encountered within the unit or during mechanical scraping of this portion of the site. The burned caliche was likely redeposited by construction of the buried utility line.

Four newly identified thermal features were encountered during testing and mechanical scraping at LA 120950. Three of the new features were uncovered during the mechanical scraping and one was encountered in Test Units 2 and 5. The single previously identified feature encountered during survey (Feature 1) was located outside of the APE for this undertaking and was not investigated. Table 21 presents summary data on the features subjected to data recovery investigations.
Feature 2

Feature 2 was an oval shaped charcoal stain located within the APE north of the US 82 right-of-way fence. This subtle feature was first encountered in the northeastern corner of TU 2 approximately 6 cm below ground surface. To fully expose the feature in planview, a second unit (TU 5) was placed to the northeast of TU 2, and the corners of the units overlapped by 50 cm. TU 5 was excavated to a depth of 6 cm bmgs in order to fully expose the boundaries of Feature 2. Rodent and root disturbance were evident on the feature surface.

Prior to excavation, the feature measured 35 cm (north-south) by 55 cm (east-west) in planview with a top elevation of 199.84. The feature was bisected by trowel along its east-west axis and the southern half of the feature was removed first. Three pieces of flaked-stone debitage were recovered from the south half of the feature. After excavation, the feature measured 33 cm (north-south) by 46 cm (east-west), and 20 cm in depth (bottom elevation 199.64).

Feature fill exhibited dark brown (7.5 YR 2.5/2) sediments with charcoal flecking throughout. Feature fill was very mottled and rodent and root disturbance were evident throughout. Feature 2 may be the poorly preserved remains of a hearth. Alternatively, it may be a secondary deposit from a larger feature nearby but outside the APE. Charcoal and flotation samples were not collected due to the high degree of rodent and root disturbance in the feature fill.
FEATURE 2

LA 120950

Grid: N 990.5, E 974
UTM: N 3631857, E 588318

Plan View Shape: Ovoid
Profile Shape: Basin

Plan View Dimensions (cm): Pre-Excavation: 35 (N-S) x 55 (E-W)
Post-Excavation: 33 (N-S) x 46 (E-W)

Top Elevation: 199.84
Bottom Elevation: 199.64
Profile Thickness: 20 cm

Pre-Excavation

Profile

Post-Excavation

Associated FS#: 94
Samples Collected: Flaked Stone
Associated TUs/Mechanical Scrapes: TU 2, TU 5
Photo Numbers: PMX 1 (1870-1875)
Date Excavated: 22 May 2016
Excavator(s): Josh Valles
Feature 3

Feature 3 was encountered at the eastern end of MS 1. It was found in the northern wall of the scrape and at the southern toe of a 2-m-tall coppice dune within the APE, approximately 2.5 m north of the US 82 right-of-way fence and 5 m north of the roadway prism. The feature was below an area of surficial disturbance that is likely related to nearby utility installations. An A horizon was observed in other portions of the mechanical scrape but was not apparent in the immediate area of Feature 3. The disturbance likely has removed substantial portions of the A horizon. Ten cm of overburden covered the feature, protecting it from damage by the disturbance. The southern terminus of the feature was partially truncated by the backhoe, but the majority remained intact. Apart from this mechanical disturbance, the feature appeared to have been partially impacted by mesquite roots. However, overall, Feature 3 was very well preserved and had little mottling within the fill itself.

Prior to excavation, Feature 3 measured 35 cm (north-south) by 47 cm (east-west), and 30 cm in depth (top elevation 199.93). It was excavated by trowel from the profile, and fill was collected in a one gallon bag for flotation. Post-excavation measurements were 30 cm (north-south) by 32 cm (east-west) with a maximum thickness of 20 cm (bottom elevation 199.73).

Feature fill consisted of 5 YR 2.5/1 and 5 YR 2.5/2 black sediments with a surrounding matrix of 5 YR 4/6 yellowish red. A single flake was found in the screen. A radiocarbon assay of charcoal recovered from feature fill dated the feature to between A.D. 970–1050 (82.4% probability), A.D. 1090–1130 (10.4% probability), and A.D. 1140–1150 (2.6% probability) (Figure 91). Macrobotanical analysis of the flotation sample indicated charred goosefoot and mesquite were present within the sample matrix. Based on this analysis, Feature 3 is interpreted to be a prehistoric hearth most likely dating between A.D. 970 and 1050.

Figure 91 – Calibrated two-sigma date range of Feature 3 at LA 120950; A.D. 970–1050 (82.4% probability); A.D. 1090–1130 (10.4% probability); A.D. 1140–1150 (2.6% probability)
# Feature 3

**Hearth**

<table>
<thead>
<tr>
<th>Grid: N 990.64, E 999.51</th>
<th>UTM: N 3631856, E 588342</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plan View Shape:</strong> Ovoid</td>
<td></td>
</tr>
<tr>
<td><strong>Profile Shape:</strong> Basin</td>
<td></td>
</tr>
<tr>
<td><strong>Pre-Evacuation:</strong> 35 (N-S) x 47 (E-W)</td>
<td></td>
</tr>
<tr>
<td><strong>Post-Evacuation:</strong> 30 (N-S) x 32 (E-W)</td>
<td></td>
</tr>
<tr>
<td><strong>Top Elevation:</strong> 199.93</td>
<td></td>
</tr>
<tr>
<td><strong>Bottom Elevation:</strong> 199.73</td>
<td></td>
</tr>
<tr>
<td><strong>Profile Thickness:</strong> 20 cm</td>
<td></td>
</tr>
</tbody>
</table>

**Associated FS#:** 93

**Associated TUs/MECHANICAL SCRAPES:** MS 1

**Date Excavated:** 08 July 2016

**Samples Collected:** flotation, charcoal, flaked stone

**Photo Numbers:** GM1 (381-385)

**Excavator(s):** Jessica Alden, Greg Mastropietro, Ethan Kalosky
Feature 4

Feature 4 was a circular charcoal stain that was discovered in MS 1, north of the US 82 right-of-way fence. The feature was located below an abandoned utility disturbance, but was covered with enough sediment to protect it from damage. The feature was situated below the interface of the A horizon and underlying paleosol.

Prior to excavation, Feature 4 measured 47 cm (north-south) by 40 cm (east-west) with a top elevation of 199.77. The feature was bisected by trowel on an east-west axis, and a one-gallon bag of sediment was collected from the northern and southern halves for flotation. The profile of the feature was difficult to define because it was highly mottled and there was evident leaching and smearing along its edges and bottom. However, a subtle basin shape was discernible. Following excavation, the feature measured 58 cm (north-south) by 55 cm (east-west) and 20 cm in depth (199.57 bottom elevation).

Sediments were a very compact 5 YR 2.5/1 black, mottled with a surrounding matrix of 5 YR 4/6 yellowish red. No radiocarbon assay or flotation analysis was obtained for this feature. Based on the shape, mottling, and charcoal density, the feature is interpreted as a hearth disturbed by a substantial amount of leaching and root activity over time.
**Feature 4**

**Hearth**

**Grid:** N 988.82, E 994.85  
**UTM:** N 3631855, E 588338

**PLANE VIEW DIMENSIONS (cm)**

- **Pre-Excavation:** 47 (N-S) x 40 (E-W)
- **Post-Excavation:** 58 (N-S) x 55 (E-W)

**PLAN VIEW SHAPE:** Circular  
**PROFILE SHAPE:** Basin

**Top Elevation:** 199.77

**Bottom Elevation:** 199.57

**Profile Thickness:** 20 cm

**No Photo Taken of Profile**

**Profile**

- Unexcavated
- I - Mottled feature fill; 5 YR 2.5/1 black mottled w/ 5 YR 4/6 yellowish red
- II - Charcoal dense feature fill; 5 YR 2.5/1 black
- III - Paleosol; fine-grained sand, very compact; 5 YR 4/6 yellowish red

**Associated FS#s:** 89

**Associated TUs/Mechanical Scrapes:** MS 1

**Date Excavated:** 08 July 2016

**Samples Collected:** Flotation

**Photo Numbers:** GM1 (369-370, 376-377)

**Excavator(s):** Jessica Alden
Feature 5

Feature 5 was an ovoid, dense charcoal stain discovered in MS 1. The feature was encountered below an area of utility line disturbance. However, enough sediment covered the feature to protect it from impacts. Generally, the feature was well-preserved with only minor root and rodent disturbances.

Prior to excavation, Feature 5 measured 42 cm (north-south) by 51 cm (east-west) with a top elevation of 199.69. Upon discovery of the feature, mechanical excavation in the immediate vicinity ceased and a 1-by-2-m area was left pedestalled for further investigation. The feature was bisected by trowel on an east-west axis. Three one-gallon bags of sediment were collected, two from the northern half and one from the southern half, for flotation. Full excavation revealed the feature to measure 46 cm (north-south) by 43.5 cm (east-west) with a depth of 22 cm (bottom elevation of 199.47).

The feature fill was a charcoal-rich, semi-compact 7.5 YR 2.5/1 black sand surrounded by a matrix of fine-grained 5 YR 4/4 reddish brown sand. A few pieces of burned caliche were present within the feature fill, all less than 5 cm in maximum dimension, and one flake was found in the eastern wall at an elevation of about 199.64. The profile was basin shaped and the feature boundaries were well mottled with strong oxidation. The southern boundary was so highly oxidized that it initially appeared as a collared hearth. Radio carbon assays date the feature to A.D. 780–970 (Figure 92) and macrobotanical analysis of the flotation sample indicated goosefoot seeds, mesquite, saltbush, and possible cholla were present within the feature fill. Based on this analysis, Feature 5 is interpreted to be a prehistoric hearth most likely dating to the Early Formative period.

*Figure 92 – Calibrated two-sigma date range of Feature 5 at LA 120950; A.D. 780–970 (95.4% probability)*
FEATURE 5  
**Hearth**

**LA 120950**

<table>
<thead>
<tr>
<th>Grid: N 990.37, E 982.30</th>
<th>UTM: N 3631857, E 588326</th>
<th>Plan View Shape: Ovoid</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planview Dimensions (cm)</strong></td>
<td><strong>Top Elevation: 199.69</strong></td>
<td><strong>Bottom Elevation: 199.47</strong></td>
<td><strong>Profile Thickness: 22 cm</strong></td>
</tr>
<tr>
<td>Pre-Excavation: 42 (N-S) x 51 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Excavation: 46 (N-S) x 43.5 (E-W)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Excavation**

- Charcoal Flecking
- Dense Charcoal Staining

**Profile**

- Mechanically Scraped Surface (Elev. 199.69)
- Mottled Areas
- Charcoal (Elev. 199.47)
- Unexcavated

1. Feature fill; 7.5 YR 2.5/1 black
2. Charcoal dense feature fill; 7.5 YR 2.5/1 black
3. Paleosol; fine-grained sand, very compact; 5 YR 4/4 reddish brown

**Post-Excavation**

- Flaked stone (FS 92)
- X (Elev. 199.47)

**Associated FS#s:** 90, 92  
**Associated TUs/Mechanical Scrapes:** MS 1  
**Date Excavated:** 08 July 2016  
**Samples Collected:** Flotation, Charcoal, Flaked Stone  
**Excavator(s):** Greg Mastropietro  
**Photo Numbers:** GM1 (371-375, 378-380)
Table 21 – Summary of Features Excavated at LA 120950

<table>
<thead>
<tr>
<th>Feature No.</th>
<th>Grid Location</th>
<th>UTM Location (NAD83 13N)</th>
<th>Feature Type</th>
<th>Depth to Top of Feature (cm bgs)</th>
<th>Planview Shape</th>
<th>Planview Dimensions (cm)</th>
<th>Profile Shape</th>
<th>Profile Thickness (cm)</th>
<th>Samples &amp; Artifacts Collected</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>N 990.5 E 974.0</td>
<td>N 3631857 E 588318</td>
<td>Hearth</td>
<td>6</td>
<td>Ovoid</td>
<td>33 cm (N-S) by 46 cm (E-W)</td>
<td>Basin</td>
<td>12</td>
<td>3 pieces of flaked stone</td>
<td>Hearth with black, charcoal-rich sediments; feature appeared very disturbed by roots and rodents; could be a secondary deposit from a larger nearby feature; no flotation collected due to heavy disturbance and questionable context; no burned caliche; 3 pieces of flaked stone.</td>
</tr>
<tr>
<td>3</td>
<td>N 990.64 E 999.51</td>
<td>N 3631856 E 588342</td>
<td>Hearth</td>
<td>10</td>
<td>Ovoid</td>
<td>30 cm (N-S) by 32 cm (E-W)</td>
<td>Basin</td>
<td>20</td>
<td>Flotation; Charcoal; 1 piece of flaked stone</td>
<td>Hearth feature with black, very dense, charcoal-rich sediments; very little disturbance or mottling in the feature itself; the feature appeared immediately below the A horizon; 1 piece of flaked stone collected; radiocarbon date of A.D. 970–1150; macrobotanical analysis indicated charred goosefoot and mesquite.</td>
</tr>
<tr>
<td>Feature No.</td>
<td>Grid Location</td>
<td>UTM Location (NAD83 13N)</td>
<td>Feature Type</td>
<td>Depth to Top of Feature (cm bgs)</td>
<td>Planview Shape</td>
<td>Planview Dimensions (cm)</td>
<td>Profile Shape</td>
<td>Profile Thickness (cm)</td>
<td>Samples &amp; Artifacts Collected</td>
<td>Description</td>
</tr>
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<td>-------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4</td>
<td>N 988.82 E 994.85</td>
<td>N 3631855 E 588338</td>
<td>Hearth</td>
<td>Mechanically scraped surface ~50 cm bgs</td>
<td>Circular</td>
<td>58 cm (N-S) by 55 cm (E-W)</td>
<td>Basin</td>
<td>20</td>
<td>Flotation</td>
<td>Hearth feature with dark brown sediment and areas of denser charcoal-rich sediments; feature was highly mottled, extremely compact, and difficult to define; the feature was dug into the paleosol layer below the interface with the A horizon; no artifacts.</td>
</tr>
<tr>
<td>5</td>
<td>N 990.37 E 982.30</td>
<td>N 3631857 E 588326</td>
<td>Hearth</td>
<td>Mechanically scraped surface ~50 cm bgs</td>
<td>Ovoid</td>
<td>46 cm (N-S) by 43.5 cm (E-W)</td>
<td>Basin</td>
<td>22</td>
<td>Flotation; Charcoal; 1 piece of flaked stone</td>
<td>Hearth feature with black, very dense, charcoal-rich sediments; some minor disturbance from bioturbation; 1 piece of flaked stone found in situ western wall of the feature; radio- carbon date of A.D. 780–970; macrobotanical analysis indicated goosefoot seeds, mesquite, saltbush, and possible cholla.</td>
</tr>
</tbody>
</table>
Artifacts

A total of 385 artifacts were recovered from LA 120950 during data recovery investigations. This sample includes 345 pieces of flaked-stone debitage, 24 ceramics, nine groundstone tools, six flaked-stone tools, and one shell fragment. Approximately 21 percent (n=80) of these artifacts were collected from the surface of the site within the APE. Among the remaining 305 artifacts, most (n=299) were recovered from test unit excavations, five were recovered from features, and one from the mechanical scrape. This indicates that the majority of artifacts at LA 120950 are buried between 10 and 50 cm below modern ground surface. Raw material types among the debitage include chert (n=232), chalcedony (n=43), quartzite (n=34), rhyolite (n=25), basalt (n=8), quartz (n=1), limestone (n=1), and obsidian (n=1). Chert is clearly the dominant material type, and the most prevalent colors are white (n=100), tan (n=61), dark gray (n=29), light gray (n=29), and red (n=13). Ceramic artifacts observed include one Chupadero Black-on-white sherd, while all other ceramics consist of either El Paso Brownware (n=15), Jornada Brownware (n=7), or undifferentiated brownware (n=1). The shell fragment is likely from a freshwater mollusk of the Pecos River or a tributary.

Tools include one complete mano, four mano fragments, three indeterminate groundstone fragments, one polishing stone, three cores, one scraper, one projectile point, and one hammerstone. The projectile point was determined to most likely be a resharpened Tularosa Corner-notched point (100 B.C. to A.D. 900) produced from chert (Figure 93). The point is nearly complete and only missing one tang. The later portion of the date range associated with Tularosa Corner-notched points is consistent with the Early Formative radiocarbon date from Feature 5 (A.D. 780–970). The presence of this single artifact does not warrant a separate Late Archaic component, although it is possible that other Archaic deposits are present outside the project APE.

Figure 93 – Tularosa Corner-notched projectile point encountered at LA 120950
Site Synthesis

The Research Design section of this report outlined several research domains and questions to help guide the investigations. Two of these domains inquire about the cultural/temporal affiliation of the site and its occupational history. To address the various questions proposed under these domains at LA 120950, we acquired radiocarbon dates from two of the features (Feature 3 and Feature 5). The radiocarbon assay for Feature 3 returned dates ranging from A.D. 970 to 1150, while Feature 5 ranged from A.D. 780 to 970. These non-overlapping dates suggest that the two features are not contemporaneous, and that the site was likely utilized intermittently and repeatedly throughout the Early and Late Formative periods, rather than as a permanently occupied habitation site. A single Tularosa Corner-notched projectile point was found at LA 120950. The Feature 5 date corresponds with the later, Early Formative portion of this point type’s date range (100 B.C. to A.D. 900); however, a Late Archaic component cannot be ruled out. Ceramics are primarily El Paso Brownware, Jornada Brownware, or undifferentiated brownware. However, a single Chupadero Black-on-white bowl sherd was also found and provides further evidence of Late Formative occupation at the site.

Other research domains focus on site and feature function as well as subsistence activities. The only features identified at LA 120950 were thermal features likely utilized as hearths for food processing, although one feature (Feature 2) may be a secondary deposit. The variation in feature dates suggests that the site functioned as a temporary and repeatedly utilized encampment focused on the procurement and processing of resources along Bear Grass Draw. Our investigations did not uncover direct evidence of agricultural production and it is more likely the site was visited seasonally to acquire and process resources such as agave, mesquite, and shinnery oak acorns. The numerous groundstone tool fragments attest to the resource processing function of the site. The flotation analysis indicated that goosefoot seeds were present within the matrix of the tested features (Feature 3 and 5). According to Castetter (1935:16, 23, 30), goosefoot seeds can be parched, ground, and made into gruel, and goosefoot likely served as a staple food during the Formative period in this particular region. Additionally, the presence of a freshwater mollusk shell could indicate that this resource was also consumed on the site.

Nearly all recovered lithic raw materials could be locally acquired from residual gravels throughout the Mescalero Plain. Other nearby sources include gravels along the Pecos River. The only non-local lithic raw material recovered from the site is obsidian, and only one obsidian flake was identified. The closest source of obsidian is in the gravels of the Rio Grande 200 miles to the west, and obsidian nodules may have been obtained via trade with groups occupying that region. A total of 24 ceramics was recovered from the site, including seven Jornada Brownware sherds, 15 El Paso Brownware sherds, one undifferentiated Brownware sherd, and one Chupadero Black-on-white sherd. Ceramic analysis (see Chapter 8) suggests that occupants of the site maintained social ties to other groups in the Sierra Blanca and Capitan Mountains and the southern Tularosa Basin/Hueco Bolson area, where primary clay and other mineral sources are located.

Our final research domain proposed to analyze post-depositional effects on features. At LA 120950, no features were observed on the surface of the site within the APE. Four features were encountered in test unit excavations and mechanical scrapes and three of these features were well preserved. The dark, charcoal-rich sediments in Feature 2, however, did not appear in situ. We interpret this feature as a
secondary deposit resulting from substantial amounts of mesquite root growth and rodent burrows in this portion of the site, which may have displaced sediment from a nearby cultural feature outside the APE. This suggests that absence of surface manifestations is not an accurate indicator of feature presence, let alone feature size and morphology. Additionally, overburden sediment acts as a protective element for features, and several features were found in relatively good condition despite being disturbed by a potential buried utility line. However, the overburden can also provide opportunities for disturbances from plant roots and rodent activity as seen in Feature 2.

Site Specific Questions

The Research Design section of this document provides a complete discussion of the research themes common to all sites in the project area. In addition to these broader research questions, data was collected to address the following site-specific research questions:

1) Three ceramics were identified on the surface of the site during survey. Are these associated with a specific Formative occupation, or are they incidental deposits? (Research Domain 1)

2) One feature was identified at LA 120950 outside the project APE. Are intact features present within the APE? If so, what types of features are present? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? (Research Domains 1, 2, 3, 4, and 6)

3) LA 120950 is located within a cluster of three other sites situated along the terraces and uplands east of Bear Grass Draw. Although La 120950 has been designated as a separate site for management purposes, these four sites may together represent a single site within multiple components or activity areas. Based on similarities in the artifact and feature assemblage, along with geomorphological data, is LA 120950 a separate site, or part of a larger site that includes LA 17041, LA 118318, and LA 120949? (Research Domains 1, 2, 3, 4, 5, and 6)

While only three ceramics were located on the surface during the original survey, pre-excavation surface collection of the APE resulted in 11 sherds and an additional 13 were found during excavations. One Chupadero Black-on-white sherd was located on the surface of the site. The remaining ceramics were El Paso and Jornada Brownwares and one undifferentiated sherd. Both El Paso and Jornada Brownwares have a production span that extends from the Early to the Late Formative periods. However, analysis of the ceramic temper size dates the assemblage to the Early Formative period (see Chapter 8). This is consistent with radiocarbon dates from the features although the Chupadero sherd could indicate a later component.

Four features (labeled Features 2-5) were identified during the excavation. As described above, they were all interpreted as hearths, although Feature 2 is likely the secondary deposits of a hearth. Samples from both Features 3 and 5 were radiocarbon dated and subjected to macrobotanical analysis with both dating to the Early Formative period (though not to overlapping occupations) and both containing goosefoot seeds and mesquite.

As mentioned earlier, LA 120950 is part of a cluster of four sites (along with 17041, 118318, and 120949) that have been separated by modern impacts such as roads or oil and gas activity. Based on the overall
artifact and feature distribution, the four sites appear to represent logistical camps repeatedly utilized for resource procurement and processing throughout several generations. Within the APE however, LA 118318, on the south side of US 82, exhibited a higher density of features and a wider variety of artifacts than did the sites on the north side of the road. In general, the features excavated from all of the sites are consistent, with the majority being hearths of similar sizes and with similar macrobotanical remains. However, most of the features on the north side of the road date to the Early Formative period with the westernmost features (from LA 120949) dating to the Archaic and very Early Formative periods. In contrast, five out of six dated features from LA 118318 date to the Late Formative period, with only one dating to the Early Formative. While all of the sites are located among mesquite-stabilized coppice dunes, features were typically found at a deeper level on the south side of the road (0–100 cm bgs) versus the north (2–50 cm bgs). Also, the percentage of groundstone within the LA 118318 assemblage was much higher than the sites on the north side of US 82 and the ceramic analysis indicated LA 118318 was likely used as a logistical camp that included a wider range of activities than the other sites (see Chapter 8).

Based on investigation of the current APE, all four sites likely served as locations of resource procurement and processing repeatedly occupied for varying lengths of time throughout multiple generations. It is also possible that LA 120950 and the other sites on the north side of US 82 may have been used as more temporary logistical locations whereas the artifact and feature assemblage of LA 118318, on the south side of the road, is more consistent with longer-term occupations. Alternatively, the entire cluster of sites may represent the same logistical behavior with LA 118318 occupying the more central portion of the behavior location while the sites on the north side of the road represent the outer periphery. However, additional investigation of the site areas beyond the current APE would be needed before this can be definitively stated. For instance, 18 features and nearly 1,000 artifacts were identified from surface survey of LA 17041 (to the east of LA 120950) while only two features and 54 artifacts from that site were located within the APE. The other sites also have a substantial amount of resources located outside the current APE. These additional resources could affect the final interpretation of this site cluster.

**Final Recommendations**

LA 120950 was previously determined eligible for listing in the NRHP for its information potential. The site had one feature evident on the surface outside of the APE for the proposed undertaking. Test unit excavation and mechanical scraping were undertaken to determine whether any additional features were present, or had the potential to be present, within the APE. All five hand-excavated test units were positive, containing a variety of artifacts. One thermal feature (Feature 2) was encountered and excavated in TUs 2 and 5. Mechanical scraping exposed three additional newly defined thermal features.

The information potential of the portion of the site within the APE is fully recovered according to methods proposed in the Testing and Data Recovery Plan as well as the standards outlined in *NMAC 4.10.16.12*. However, the site continues north of the APE, where one feature and numerous surface artifacts are present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain *eligible*. All remaining intact deposits are at least 40 m beyond the APE, therefore temporary protective fencing is not warranted. If any intact cultural deposits not identified in this study are uncovered during construction, work should cease immediately and NMDOT, BLM, and SHPO should be notified.
LA 137120

**General Site Summary**

The following is a general site summary. It is based on the most recent update of the site (Lawrence et al. 2015) prior to the current testing and data recovery project and is provided as general context and background for the excavation activities.

LA 137120 is a small flaked-stone and burned-caliche scatter of Unknown Aboriginal (9500 B.C. to present) cultural/temporal affiliation. The site is located north of US 82 in an undulating, primarily parabolic dune environment between LA 89659 and LA 83680 (see Figure 3). The site has been heavily impacted by sheet wash, eolian activity, construction/maintenance of US 82 and oil and gas development with an old well-pad and new battery tank immediately north of the site (Figures 94 and 95).

A total of 36 artifacts were observed on the surface. Lithic material identified on site during the survey phase consisted of, from most to least predominant: chert, chalcedony and rhyolite. The burned caliche and flaked stone artifacts suggested that plant-processing activities likely occurred on site, and that thermal features may be buried. Furthermore, the amount of flaked-stone debitage and variety of raw material types suggested that lithic reduction was also a prominent activity at LA 137120. The site was therefore interpreted as having functioned as a temporary or repeatedly used encampment focused on resource procurement, processing, and lithic reduction.

**Excavation Results**

During the current testing and data recovery project, portions of LA 137120 falling within the project APE were excavated. At this site, the APE extended up to 30 ft beyond the northern highway right-of-way fence. The results of the excavation, including surface collection, test unit excavations, mechanical excavations, feature excavations, and artifacts, are described below. See Figure 96 for the specific locations of these activities.

**Surface Collection**

Prior to any subsurface testing, all artifacts located on the ground surface of the site within the APE were systematically flagged and collected. These artifacts were point provenienced by GPS and assigned UTM coordinates and individual FS numbers. When appropriate, groups of surface artifacts were collected under the same FS number when located within an area measuring less than 10 cm², or within a similar context (e.g., microdebitage from an isolated ant mound). Only four total artifacts were collected from the surface of the site. This assemblage consists entirely of flaked-stone debitage and represents the majority of the overall assemblage recovered from LA 137120 (six flakes total). Material types include three chert flakes and one chalcedony flake.
Figure 94 – LA 137120, view to the northwest

Figure 95 – LA 137120, view to the east-southeast (pin flags denote locations of burned caliche nodules)
### Table 22 – Summary of Trowel Probe and Test Units Excavated at LA 137120

<table>
<thead>
<tr>
<th>TP/TU No.</th>
<th>Grid Location</th>
<th>Size (m)</th>
<th>Depth (cm bgs)</th>
<th>No. of Levels</th>
<th>Associated TUs/Features</th>
<th>Artifacts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP 1</td>
<td>N 481 E 500</td>
<td>0.3 x 0.3</td>
<td>20</td>
<td>1</td>
<td>N/A</td>
<td>None</td>
<td>Trowel probe placed within the northern US 82 right-of-way around a small burned-caliche scatter to explore potential for subsurface artifacts and features; area was heavily deflated with a dense lens of unburned caliche exposed immediately below ground surface; sediments were sterile and no subsurface cultural materials were encountered; probe was terminated upon reaching caliche bedrock at 20 cm bgs.</td>
</tr>
<tr>
<td>TU 1</td>
<td>N 485 E 510</td>
<td>1 x 1</td>
<td>31</td>
<td>2</td>
<td>N/A</td>
<td>None</td>
<td>Placed in an area with burned caliche to explore potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 2 levels and reaching caliche bedrock.</td>
</tr>
<tr>
<td>TU 2</td>
<td>N 484 E 506</td>
<td>1 x 1</td>
<td>36</td>
<td>2</td>
<td>N/A</td>
<td>2 pieces of flaked stone</td>
<td>Placed in an area with burned caliche to explore potential for subsurface artifacts and features; 2 pieces of flaked stone found in Level 1; excavation continued for one additional sterile level; unit was terminated upon reaching caliche bedrock.</td>
</tr>
<tr>
<td>TU 3</td>
<td>N 484 E 501</td>
<td>1 x 1</td>
<td>28</td>
<td>2</td>
<td>N/A</td>
<td>None</td>
<td>Placed in an area with burned caliche to explore potential for subsurface artifacts and features; sediments were sterile and no artifacts were recovered; unit was terminated after 2 levels and reaching caliche bedrock.</td>
</tr>
</tbody>
</table>
Test Unit Excavations

A single trowel probe and three 1-by-1-m test units were excavated at LA 137120 within the project APE. Summary data on test unit location, depth, sediment matrix, feature identification, and recovered artifacts is presented in Table 22. To increase the probability of finding subsurface cultural material, test units were placed specifically in areas where artifacts and burned caliche were located. The trowel probe extended 20 cm in depth, whereas the test units extended between 28 and 36 cm in depth. Units were terminated as sterile sediments or bedrock were encountered. A total of two artifacts (one chert flake and one chalcedony flake) were collected during test unit excavation, both from TU 2, Level 1. No features were identified within any of the TUs.

Mechanical Excavations

After hand-excavated test units were completed, mechanical scraping of the project area took place. One trench and two scrapes were conducted at LA 137120. The trench was approximately 10 m in length, 2.5 m wide and went to a depth of 2.08 m bgs (Figure 97). Mechanical scraping focused on the remaining intact dunal areas within the APE. The scrapes were terminated between 0.85 m and 2.35 m bgs, depending on the size of the dune and depth of sterile sediment. One thermal feature was discovered during mechanical scraping (MS 2), approximately 1 m bgs. Table 23 provides detailed information on each of the mechanical trenches and scrapes.

Table 23 – Detailed Summary of Mechanical Scrapes and Trenches at LA 137120

<table>
<thead>
<tr>
<th>Mechanical Excavation</th>
<th>Location</th>
<th>Size</th>
<th>Dimensions</th>
<th>Features Encountered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench 1</td>
<td>Eastern portion of site both sides of right-of-way fence</td>
<td>25 m²</td>
<td>10 m (N-S) 2.5 m (E-W)</td>
<td>None</td>
</tr>
<tr>
<td>MS 1</td>
<td>Eastern portion of site within northern right-of-way</td>
<td>15 m²</td>
<td>3 m (N-S) by 5 m (E-W)</td>
<td>None</td>
</tr>
<tr>
<td>MS 2</td>
<td>Eastern portion of site within northern right-of-way</td>
<td>20 m²</td>
<td>5 m (N-S) by 4 m (E-W)</td>
<td>Feature 1</td>
</tr>
</tbody>
</table>
Figure 97 – LA 137120 Trench 1 west wall profile

I - 5 YR 5/6 yellowish red; loose fine-grain sand w/ abundant roots
II - 2.5 YR 6/6 light red; compact fine-grain sand
**Feature Excavations**

One thermal feature was discovered at LA 137120. Feature 1 was exposed during mechanical scraping. Table 24 provides additional detailed information on the feature.

**Feature 1**

Feature 1 was an ovoid charcoal stain located within the US 82 right-of-way, 5 m south of the northern right-of-way fence. This feature was encountered in the southeastern corner of MS 2 within a large dune, approximately 1 m below ground surface. The feature exhibited disturbance from bioturbation and roots. Prior to excavation, the feature measured 58 cm (north-south) by 50 cm (east-west) with a top elevation of 98.42. It was only slightly distinguishable from the surrounding sediment matrix by a light sediment stain. When the feature was bisected with a trowel, the feature fill became more distinguishable from the surrounding matrix. In profile, the feature was basin shaped with a maximum thickness of 20 cm. Three gallon-sized bags of feature fill were collected for flotation and the remaining sediment was screened through 1/8-inch wire mesh. Post-excavation measurements were 50 cm (north-south) by 40 cm (east-west) with a bottom elevation of 98.22.

Feature fill appeared in two distinct zones; Zone I was a dark reddish-brown sandy loam (5 YR 3/4) and Zone II was a dark reddish-brown sandy loam (5 YR 2.5/2). Zone I represents a less dark portion of the feature than Zone II, and may be the result of leaching into the nearby non-cultural sediments. The feature fill and surrounding matrix were very compact. The stain contained minimal to no charcoal flecking in its matrix and no artifacts were discovered.

Radiocarbon assays were not obtained due to a lack of suitable material for dating. Macrobotanical analysis of the flotation sample indicated no plant material, charred or otherwise, was present within the sample matrix. Based on the general size, configuration, and fill matrix, Feature 1 is interpreted to be a prehistoric hearth of an unknown age.
### Feature 1

**Hearth**

**LA 137120**

<table>
<thead>
<tr>
<th>Grid: N 477.28, E 519.74</th>
<th>UTM: N 3631295, E 604727</th>
<th>Plan View Shape: Ovoid</th>
<th>Profile Shape: Basin</th>
</tr>
</thead>
</table>

**Planview Dimensions (cm)**

<table>
<thead>
<tr>
<th>Pre-Excavation: 58 (N-S) x 50 (E-W)</th>
<th>Top Elevation: 98.42</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Post-Excavation: 50 (N-S) x 40 (E-W)</th>
<th>Bottom Elevation: 98.22</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Profile Thickness: 20 cm</th>
</tr>
</thead>
</table>

**Pre-Excavation**

**Profile**

- Root
- Faint Staining
- Root
- Elev. 98.22
- Unexcavated

1. Mottled Feature Fill: 5 YR 3/4 dark reddish brown
2. Feature Fill: 5 YR 2.5/2 dark reddish brown
3. Surrounding Matrix: 5 YR 4/6 yellowish red

**Post-Excavation**

**Sample Collection:** FLOTATION

**Associated FS##s:** 6

**Associated TUs/Mechanical Scrapes:** MS 2

**Date Excavated:** 3 June 2016

**Excavator(s):** Darryl DelFrates, Joshua Vallejos

**Photo Numbers:** PMX 1 (1902-1910)
Table 24 – Summary of Features Excavated at LA 137120

<table>
<thead>
<tr>
<th>Feature No.</th>
<th>Grid Location</th>
<th>UTM Location (NAD83 13N)</th>
<th>Feature Type</th>
<th>Depth to Top of Feature (cm bgs)</th>
<th>Planview Shape</th>
<th>Planview Dimensions (cm)</th>
<th>Profile Shape</th>
<th>Profile Thickness (cm)</th>
<th>Artifacts/Samples Collected</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N 477.28 E 519.74</td>
<td>N 3631295 E 604727</td>
<td>Hearth</td>
<td>Mechanically scraped surface ~100 cm bgs</td>
<td>Ovoid</td>
<td>50 (N-S) by 40 (E-W)</td>
<td>Basin</td>
<td>20</td>
<td>Flotation</td>
<td></td>
</tr>
</tbody>
</table>

Hearth with black sediments; no charcoal; no burned caliche observed; no artifacts; no macrobotanical remains.
Artifacts

Six pieces of flaked-stone debitage were the only artifacts recovered from LA 137120 during data recovery investigations, four from the surface and two from TU 2. Raw material types among the debitage include chert (n=4) and chalcedony (n=2). Colors consisted of white (n=3), light gray (n=1), brown (n=1), and red (n=1).

Site Synthesis

The Research Design section of this report outlined several research domains and questions to help guide the investigations. However, with only six flakes and a hearth with no dateable material or macrobotanical remains, addressing the overall research domains in a meaningful way is not feasible. Regardless, the site may contain intact subsurface deposits outside of the APE. The research domains and questions outlined in the testing and data recovery plan should therefore continue to serve as viable avenues for any future investigations that may occur at LA 137120. While overall research domains are not addressed, some site-specific research questions are considered below.

Site Specific Questions

The Research Design section of this document provides a complete discussion of the research themes common to all sites in the project area. In addition to these broader research questions, data will be collected to address the following site-specific research questions:

1) No temporally diagnostic artifacts were identified on the surface of the site. What period or periods does this site date to? (Research Domain 1)

2) No ceramics were observed at LA 137120. Are ceramics present? If so, what period or periods are they affiliated with, and how may such types inform on both technological organization and subsistence practices? (Research Domains 1, 2, 4 and 5)

3) No features were identified at LA 137120. Are intact features present within the project APE? If so, what types of features are present? What occupation or occupations are these features associated with, and how do they inform on site function and intra-site structure? Are macrobotanical or faunal remains present and how do these inform on subsistence strategies? (Research Domains 1, 2, 3, 4, and 6)

Neither temporally diagnostic artifacts, ceramics, nor dateable features were found at the site. As such, a specific temporal affiliation cannot be assigned to the site based on information recovered from the project APE. One feature was excavated. While the feature was interpreted to be a hearth based on general characteristics such as feature size, configuration, and fill, Feature 1 did not contain material suitable for radiocarbon dating and macrobotanical analysis did not reveal plant material.
Final Recommendations

LA 137120 was previously determined eligible for listing in the NRHP for its information potential. Only four surface artifacts were located within the project APE. Test unit excavation and mechanical scraping were undertaken to determine whether any features were present, or had the potential to be present within the APE. Two of the three hand-excavated test units were entirely sterile, containing neither features, artifacts, charcoal staining, charcoal flecking, nor burned caliche. One test unit (TU 2) was positive, containing two pieces of flaked stone within the first level below ground surface. Mechanical trenching exposed one thermal feature (Feature 1) and no other cultural material.

The information potential of the portion of the site within the APE has been fully recovered according to methods proposed in the Testing and Data Recovery Plan as well as the guidelines in NMAC 4.10.16.12. However, the site extends north of the APE, where features and artifacts may be present. The site therefore retains attributes that merit its inclusion in the NRHP and it should remain eligible. All remaining intact deposits are at least 5 m beyond the APE, therefore temporary protective fencing is not warranted. If any intact cultural deposits not identified in this study are uncovered during construction, work should cease immediately and NMDOT, BLM and SHPO should be notified.
CHAPTER 8: LABORATORY AND ANALYTICAL RESULTS

This chapter describes the results of the laboratory analysis performed for the current investigation including radiocarbon dating, ceramics, lithics, and the archaeobotanical analysis. The analysis results are presented in this chapter while considerations specific to the research design questions are provided in Chapter 9.

RADIOCARBON DATING

A total of 20 radiocarbon samples from seven of the nine sites (LA 15901, LA 17041, LA 83680, LA 89659, LA 118318, LA 120949, and LA 120950) were selected for analysis. Radiocarbon samples were processed by ICA and the results of this analysis are presented in Appendix A. Table 25 provides a summary of each feature that was analyzed, its conventional age, and its calibrated age. This information is used, in conjunction with other information such as the ceramic and lithic analysis, to address research questions pertaining to site chronology and occupational history as described in the next chapter.

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Feature No.</th>
<th>Conventional Age</th>
<th>Calibrated Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 15901</td>
<td>Feature 3</td>
<td>2360 +/- 30 BP</td>
<td>540–530 B.C. (1.2%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>520–380 B.C. (94.2%)</td>
</tr>
<tr>
<td>LA 15901</td>
<td>Feature 4</td>
<td>2250 +/- 30 BP</td>
<td>390–350 B.C. (31.3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>320–200 B.C. (64.1%)</td>
</tr>
<tr>
<td>LA 17041</td>
<td>Feature 19</td>
<td>1140 +/- 30 BP</td>
<td>A.D. 780–790 (5.5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A.D. 800–850 (11.3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A.D. 860–980 (78.6%)</td>
</tr>
<tr>
<td>LA 17041</td>
<td>Feature 20</td>
<td>1120 +/- 30 BP</td>
<td>A.D. 780–790 (1.7%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A.D. 810–840 (1.9%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A.D. 860–1000 (91.8%)</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 6B</td>
<td>1650 +/- 30 BP</td>
<td>A.D. 260–270 (1.1%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A.D. 330–470 (85.8%)</td>
</tr>
<tr>
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<td></td>
<td>A.D. 490–530 (8.5%)</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 10</td>
<td>1570 +/- 30 BP</td>
<td>A.D. 420–560</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 11</td>
<td>1500 +/- 30 BP</td>
<td>A.D. 430–490 (10.6%)</td>
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<td>A.D. 530–640 (84.8%)</td>
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<td>LA 83680</td>
<td>Feature 19</td>
<td>1240 +/- 30 BP</td>
<td>A.D. 680–780 (61.3%)</td>
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<td></td>
<td>A.D. 790–880 (34.1%)</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 20</td>
<td>1580 +/- 30 BP</td>
<td>A.D. 410–550</td>
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<td>LA 89659</td>
<td>Feature 9</td>
<td>1290 +/- 30 BP</td>
<td>A.D. 660–770</td>
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<tr>
<td>Site No.</td>
<td>Feature No.</td>
<td>Conventional Age</td>
<td>Calibrated Age</td>
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<tr>
<td>LA 118318</td>
<td>Feature 14</td>
<td>970 +/- 30 BP</td>
<td>A.D. 1020–1160</td>
</tr>
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<td>LA 118318</td>
<td>Feature 22</td>
<td>1150 +/- 30 BP</td>
<td>A.D. 780–970</td>
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<td>Feature 23</td>
<td>940 +/- 30 BP</td>
<td>A.D. 1030–1160</td>
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<td>Feature 25</td>
<td>910 +/- 30 BP</td>
<td>A.D. 1030–1200</td>
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<td>LA 118318</td>
<td>Feature 26</td>
<td>950 +/- 30 BP</td>
<td>A.D. 1020–1160</td>
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<td>Feature 27</td>
<td>960 +/- 30 BP</td>
<td>A.D. 1020–1160</td>
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<td>LA 120949</td>
<td>Feature 7</td>
<td>1600 +/- 30 BP</td>
<td>A.D. 400–540</td>
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<td>LA 120949</td>
<td>Feature 8</td>
<td>2370 +/- 30 BP</td>
<td>540–390 B.C.</td>
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<tr>
<td>LA 120950</td>
<td>Feature 3</td>
<td>1010 +/- 30 BP</td>
<td>A.D. 970–1050 (82.4%)</td>
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<td></td>
<td></td>
<td></td>
<td>A.D. 1090–1130 (10.4%)</td>
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<td></td>
<td></td>
<td></td>
<td>A.D. 1140–1150 (2.6%)</td>
</tr>
<tr>
<td>LA 120950</td>
<td>Feature 5</td>
<td>1150 +/- 30 BP</td>
<td>A.D. 780–970</td>
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CERAMICS

By Hannah V. Mattson

A total of 271 ceramic artifacts were recovered from six archaeological sites investigated during the US 82 data recovery project—LA 17041, LA 83680, LA 89659, LA 118318, LA 120949, and LA 120950. The majority of these were collected from surface contexts and from the complex of four adjacent sites located along Bear Grass Draw. The majority of the project assemblage is comprised of undecorated brownwares, particularly El Paso Brown and Jornada Brown. Chupadero Black-on-white and plain redwares comprise minor portions of the assemblage. Overall, the ceramics from the project are consistent with short-term residential or logistical use of the area during the Early Formative period (A.D. 500–1100) and the first half of the Late Formative period (A.D. 1100–1200). Jars and bowls are almost evenly represented, although vessel form could not be determined for many of the utility ware sherds due to their small sizes. This chapter summarizes the results of ceramic analysis, including the ceramic typology used, methods, and the characteristics of the assemblage for each site. Major research issues, outlined in the data recovery plan, are then discussed in detail. These include the interrelated topics of site chronology and function, subsistence, resource procurement (ceramic production), and trade. The latter two issues are discussed in conjunction with the results of supplementary compositional studies, including oxidation, petrographic, and neutron activation analyses.

Ceramic Typology

The definition of ceramic wares and types followed two major reference sources, including the field manual prepared by Dyer and Constan (2011) for the southern Pecos River Valley and the New Mexico Pottery Typology Project website sponsored by the Office of Archaeological Studies (Wilson 2017). These are compilations of information gathered from other primary sources, including Jelinek (1952, 1967), Kidder and Shepard (1936), Lehmer (1948), Mera (1931, 1935, 1943), and Warren (1982). Each ceramic type identified in the project assemblage is summarized individually below.

El Paso Brownware

A common type in the southeastern Jornada Mogollon region, El Paso Brown is a coarse utility ware lacking surface elaboration. The type was produced from A.D. 400 to 1450, but is particularly common before the twelfth century. El Paso Brown is defined by soft brown pastes, densely packed and large temper fragments, and no surface polishing. Aplastic material is angular and typically composed of crushed igneous rock, feldspar, quartz, limestone, and biotite mica. Surfaces are characterized by protruding temper, pitting, and striations, and vessel walls are fairly thick. Because of these attributes, El Paso sherds are often described as resembling asphalt. After A.D. 1050, vessel rims became less tapered and more flat, rounded, and everted (Miller 1995). In addition, temper and surface coarseness declined over time.

Jornada Brownware

Jornada Brown is another plain brownware common across the Jornada Mogollon region between A.D. 520 and 1400; it is particularly common from A.D. 900 to 1350. The type has light to dark brown paste
composed of high-iron clays and a fine temper that does not protrude through vessel surfaces. In addition, surfaces are well-smoothed to polished, resembling a coarser version of Alma Plain. Interior surfaces are often striated, and tempers are comprised of fine to medium-grained angular quartz, feldspar, and limestone. While seed jars and bowls are more common earlier in the sequence, large jars predominate in later contexts. Jars also have direct rims rather than the flared rims seen in El Paso Brown after A.D. 1050.

**Jornada Plain Slipped Red**

Following Wilson (2017) and Wimberly and Rodgers (1977), ceramics with red slip and both paste and temper resembling Jornada Brown were classified as Three Rivers Redware. All of the identified specimens from the project are undecorated, and were thus typed as Jornada Plain Slipped Red. Produced from A.D. 700 to 1350, this type may derive from earlier redware types common in the northern Mogollon region, such as San Francisco Red and Mogollon Red-on-brown. Bowls with slipped interiors are the most common forms.

**Chupadero Black-on-white**

The most common decorated type in the southeastern Jornada region is Chupadero Black-on-white, a mineral-painted whiteware produced in central and south-central New Mexico from A.D. 1050 to 1550. Pastes are light in color—generally white to light gray to blue-gray—and hard, and surfaces are either slipped with white or polished without slip. Interior surfaces are often striated. Temper is commonly composed of crushed sherd but can vary depending on the specific production area, including quartz, basalt, and other crushed igneous rock. Designs are executed in black to dark gray mineral paint and appear primarily on bowl interiors, though jar exteriors may also be painted. The decorative style is Dogoszhi-like, including hatched elements opposing bold, solid lines, similar to Reserve and Socorro Black-on-white.

**Site Assemblages**

Six sites yielded ceramics during the current investigation (Table 26). The assemblage from each of these is detailed below. A total of 228 ceramic sherds, 84 percent of all the ceramics recovered during the project, were collected from the cluster of four sites located along Bear Grass Draw (LA 17041, LA 118318, LA 120949, and LA 120950).
Table 26 – Ceramics from the US 82 Data Recovery Project, Summarized by Site

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>LA 17041</th>
<th>LA 83680</th>
<th>LA 89659</th>
<th>LA 118318</th>
<th>LA 120949</th>
<th>LA 120950</th>
<th>Total</th>
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<tbody>
<tr>
<td>Chupadero B/W</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>5</td>
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<td>18</td>
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<tr>
<td>El Paso Brown</td>
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<td>20</td>
<td>50</td>
<td>44</td>
<td>15</td>
<td>134</td>
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<td>Jornada Brown</td>
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<td>21</td>
<td>70</td>
<td>8</td>
<td>7</td>
<td>113</td>
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<td>Jornada Plain Slipped Red</td>
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<tr>
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<td>13</td>
<td>42</td>
<td>1</td>
<td>135</td>
<td>57</td>
<td>24</td>
<td>272</td>
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</table>

**LA 17041**

Thirteen ceramics—eight Jornada Brown and five El Paso Brown—were collected from LA 17041, an Early Formative period artifact scatter with 20 thermal features (Table 27). Fragments of a Jornada Brown jar and an El Paso Brown sherd of indeterminate form were collected from the surface. Six sherds were recovered from test units—one from Level 1 of TU 2 (Jornada Brown bowl), and two from Level 2 and three from Level 3 of TU 3 (two Jornada Brown jar sherds, one Jornada Brown bowl rim, and two El Paso Brown of indeterminate form). Feature 19, a possible hearth radiocarbon dated to A.D. 880–980, yielded five ceramic sherds from the feature overburden—two from Jornada Brown jars, one from a Jornada Brown bowl, and two from El Paso Brown jars. Previous investigations also noted Chupadero Plain and unidentified black-on-white at the site (Lawrence et al. 2015).

Table 27 – Ceramics from LA 17041

<table>
<thead>
<tr>
<th>Type and Form</th>
<th>Surface</th>
<th>Feature 19 Overburden</th>
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<td></td>
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<td>Level 1</td>
<td>Level 2</td>
<td>Level 3</td>
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<td>El Paso Brown</td>
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<td>Jar</td>
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<td>Unknown</td>
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<tr>
<td>Jar</td>
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<td>2</td>
<td>2</td>
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<tr>
<td>Total</td>
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<td>5</td>
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</table>
A total of 42 ceramics were recovered from LA 83680, a Formative period artifact scatter with 24 thermal features (Table 28). The site’s ceramic assemblage is almost evenly comprised of Jornada Brown (n=21) and El Paso Brown (n=20); only one decorated ware, Chupadero Black-on-white, was recovered. Thirty-four sherds were found on the surface of the site, including 18 El Paso Brown (11 jars, 1 bowl, and 6 unknown form), 15 Jornada Brown (6 bowls, 6 jars, and 3 unknown form), and one Chupadero Black-on-white bowl. Five sherds were collected from test units—one El Paso Brown (unknown form) in Level 1 of TU 4, three Jornada Brown jar fragments in Level 1 of TU 2A, and one Jornada Brown bowl sherd in Level 1 of TU 2B. Three sherds were found in feature contexts, including two in Feature 6 and one in Feature 9. Feature 6, a large burned-caliche concentration that may have served as a dump related to nearby hearths (i.e., Features 10, 11, 18–22), contained one Jornada Brown bowl fragment and one Jornada Brown sherd of unknown form. One El Paso Brown sherd of unknown form was collected from Shovel Test Pit 1 in Feature 9, a deflated burned-caliche concentration. Although neither of these features was directly dated, chronometric samples from nearby thermal features returned various date ranges between A.D. 330 and 880, the Early Formative period.

Table 28 – Ceramics from LA 83680

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<th>Fea. 6</th>
<th>Fea. 9</th>
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<th>TU 2A</th>
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<tr>
<td>Total</td>
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<td>3</td>
<td>1</td>
<td>42</td>
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</table>
**LA 89659**

One sherd, an undecorated Chupadero Plain white body fragment, was recovered from the surface of LA 89659, an artifact scatter with nine thermal features. One of these features (Feature 9) returned a chronometric date of A.D. 660 to 770. Previous investigations noted undifferentiated brownware and Jornada Brown on the site surface as well, along with an Archaic (Bajada) projectile point. Given the incongruity between a diagnostic ceramic dating no earlier than A.D. 1050, a feature dating to the seventh to eighth centuries, and a pre-ceramic projectile point, it is clear that the site locale was used on multiple occasions over a long period of time.

**LA 118318**

A total of 135 sherds was collected from LA 118318, the largest site investigated during the project (Table 29). The site is comprised of an extensive artifact scatter and 31 features, including hearths and exposed A horizon deposits. Samples from five features returned dates between A.D. 1020 and 1200 and one feature was dated between A.D. 780 and 900. The ceramic assemblage from the site is dominated by Jornada Brown (n=70, 51%) and El Paso Brown (n=50, 37%), followed by Chupadero Black-on-white (n=10, 13%) and Jornada Plain Slipped Red (n=4, 3%).

Fifty sherds were found on the surface of the site outside of feature contexts and test units, including five Chupadero Black-on white (three jars and two bowls), 25 El Paso Brown (eight jars, five bowls, and 12 unknown form), and 21 Jornada Brown (15 bowls, four jars, and one unknown form). Another 50 sherds were recovered from excavations in test units (TUs 2-5, 7, 10, 11, 13, and 17-24). These include four Jornada Plain Slipped Red, two Chupadero Black-on white, 14 El Paso Brown, and 30 Jornada Brown. The majority of these were found within the first level (0 to 10 cm bgs).

Ceramic artifacts were also found in association with Features 6, 15, 16, 17, and 18. Feature 6, an exposed A horizon with burned caliche containing several other features (Features 14-17, 20-23, 30, and 31), yielded 19 sherds—three Chupadero Black-on-white (two bowls and one jar), nine Jornada Brown (six bowls and three unknown form), six El Paso Brown (one bowl and five unknown form), and one unidentified Plain Redware (bowl). Feature 15, a possible poorly preserved hearth, contained three Jornada Brown bowl fragments. A probable hearth (Feature 16) included one Jornada Brown bowl sherd. Feature 17, another hearth, yielded two El Paso Brown jar sherds. Feature 18, an exposed portion of the A horizon, contained nine ceramic artifacts—three El Paso Brown (two jars and one unknown form) and six Jornada Brown (three bowls, one jar, and one unknown form).

The cluster of chronometric dates in the early part of the Late Formative period (Features 14, 23, 25, 26, and 27—see Table 25) are consistent with the first half of the production span of Chupadero Black-on-white. A portion of the utility wares are likely associated with an earlier Early Formative component, represented by the Feature 22 hearth. All of the redware, including an unidentified redware type representing a possible White Mountain Redware, and over half of the Chupadero Black-on-white recovered during the project were found at LA 118318. This suggests a greater intensity of occupation (or repeated occupations within the same period), one involving more serving vessels and trade with other regions.
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<td>El Paso Brown</td>
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<tr>
<td>Jornada Plain Slipped Red</td>
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<td>bowl</td>
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</tr>
<tr>
<td>Plain Red</td>
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</tr>
<tr>
<td>Total</td>
<td></td>
<td>50</td>
<td>10</td>
<td>9</td>
<td>3</td>
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<td>2</td>
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<td>1</td>
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<td>15</td>
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<td>4</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
**LA 120949**

LA 120949 is a multicomponent site with a Formative period artifact scatter and eight features, two of which date 900 years apart within the Late Archaic period. Fifty-seven ceramics were recovered from the site during the current investigation, including 15 from the surface, 40 from test units, and two from Feature 8 (Table 30). Overall, the assemblage is dominated by El Paso Brown (n=44, 77%), followed by Jornada Brown (n=8, 14%) and Chupadero Black-on-white (n=5, 9%). The surface assemblage includes one Chupadero Black-on-white bowl fragment, ten El Paso Brown (one bowl, two jars, and seven unknown form), and four Jornada Brown (three bowls and one jar). Ceramics were found in eight test units—TUs 3 through 7, 9a, 9b, and 9c. These include four Chupadero Black-on-white, 32 El Paso Brown, and four Jornada Brown. Feature 8, a pre-ceramic hearth dated between 540 and 390 B.C. (see Table 25), contained two El Paso Brown sherds of unknown form. The site locale was clearly used at least three separate times—twice in the Late Archaic, and at least once in the Late Formative period.

**Table 30 – Ceramics from LA 120949**

<table>
<thead>
<tr>
<th>Surface</th>
<th>Fea. 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TU 7</td>
<td>TU 3</td>
</tr>
<tr>
<td></td>
<td>Lev 2</td>
<td>Lev 1</td>
</tr>
<tr>
<td>Chupadero B/W</td>
<td>1</td>
<td>1</td>
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<tr>
<td>bowl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>jar</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>El Paso Brown</strong></td>
<td><strong>10</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>bowl</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>jar</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Jornada Brown</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>bowl</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>jar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>
LA 120950

Twenty-four ceramic sherds were collected from LA 120950 (Table 31), a small Late Formative artifact scatter associated with hearths and other thermal features. The ceramic assemblage is predominantly El Paso Brown (n=15), followed by Jornada Brown (n=7), undifferentiated brownware (n=1), and Chupadero Black-on-white (n=1). Eleven sherds were found on the surface, 12 were excavated from test units (TUs 1, 2, 3, and 5), and one was found in MS 1. No sherds were found in direct association with the features. The surface ceramic assemblage consists of six El Paso Brown (four jars and two unknown form), four Jornada Brown (three bowls and one jar), and one Chupadero Black-on-white bowl. Ceramics recovered from test units include eight El Paso Brown (three jars and five unknown form), three Jornada Brown (one jar and two unknown form), and one undifferentiated brownware. Feature 3, a hearth, was chronometrically dated between A.D. 970 and 1050 (see Table 25), thus slightly overlapping with the beginning of Chupadero Black-on-white production.

Table 31 – Ceramics from LA 120950

<table>
<thead>
<tr>
<th>Surface</th>
<th>TU 1</th>
<th>TU 2</th>
<th>TU 3</th>
<th>TU 5</th>
<th>MS 1</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lev 1</td>
<td>Lev 2</td>
<td>Lev 3</td>
<td>Lev 4</td>
<td>Lev 7</td>
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<td></td>
<td>1</td>
</tr>
<tr>
<td>bowl</td>
<td>1</td>
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<td></td>
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</tr>
<tr>
<td>El Paso Brown</td>
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<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>jar</td>
<td>4</td>
<td></td>
<td>1</td>
<td></td>
<td>2</td>
<td>1</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Jornada Brown</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bowl</td>
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</tr>
<tr>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Undifferentiated</td>
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<td>1</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
Chronology

The presence and relative frequency of different ceramic types is often one of the primary means by which sites may be assigned specific temporal affiliations. In some cases, distinct occupations can be identified through intra-site distributions of different ceramic types. Unfortunately, the long production spans of the most common types in the southern Jornada Mogollon region restrict the degree of chronological resolution possible. For example, the dominant types recovered during the project—El Paso Brown and Jornada Brown—were produced for almost one thousand years, encompassing both the Early and Late Formative periods. Thus, in the absence of other chronometric information, the presence of these types indicates only a ceramic period occupation. The most diagnostic type present is Chupadero Black-on-white, which still has a production range spanning five centuries, A.D. 1050 to 1550. However, in concert with radiocarbon dates and diagnostic projectile points, this temporal window may be reduced significantly.

While all six of the sites with ceramics included features that were chronometrically dated, not all of these dates are consistent with the production spans of the ceramic types identified. In particular, the presence of Chupadero Black-on-white, though sparse, indicates post-A.D. 1050 occupations at LA 83680, LA 89659, LA 120949, and LA 120950 that are not represented in dated features. Four sites contained Early Formative features dating before A.D. 900—LA 17041, LA 83680, LA 89659, and LA 118318. El Paso Brown and Jornada Brown sherds were found outside of feature contexts at three of these—LA 17041, LA 83680, and LA 118318. Based on presence/absence alone, it is not possible to determine if these artifacts are associated with the same early occupations associated with these features or with later (A.D. 1000–1400/1450) use of the site locale.

Much previous research has focused on improving the chronological resolution of Jornada utility ware using temporally sensitive morphological traits (Carmichael 1986b; Russell 2010; Seaman and Mills 1988; Speth and LeDuc 2007; Whalen 1978, 1993). By monitoring attributes such as rim shape, wall thickness, orifice diameter, and temper abundance, it is possible to microseriate these assemblages and establish a relative chronological order within a single type.

Carmichael (1983) proposed the Rim Sherd Index (RSI) to mathematically characterize rim thickness with respect to vessel thickness, where RSI = RTh/WTh (RTh = rim thickness and WTh = wall thickness). Tapered rims are those with RSI values less than 0.80, parallel rims have RSI values between 0.80 and 1.49, and bulbous rims have RSI values of 1.50 or higher (Russell 2010:22-23). Only one brownware rim was recovered—a Jornada Brown rim in the third level of TU 3 at LA 17041. Using Carmichael’s (1983) method, the RSI value of the sherd is 0.86 (rim thickness of 4.76 mm and wall thickness of 5.56 mm), corresponding with a parallel rim morphology. This is consistent with production in the late Mesilla or Doña Ana phases (A.D. 200–1000 and A.D. 1000–1275, respectively), or the late Early Formative to early Late Formative periods for the current study area. Combined with the radiocarbon date obtained from a hearth (A.D. 880–990) and the presence of a diagnostic projectile point (Tularosa Corner-notched, 100 B.C. to A.D. 900), it is likely that the sherd was produced during the Early Formative period and that the ceramics found at the site are associated with the same occupation as the use of the dated feature.

Another temporal trend in El Paso Brownware relates to the size and volume of temper. Noting that the size of temper particles decreases over time, Whalen (1996) proposed the use of the Temper Index (TI)
to characterize the distribution of various sizes of aplastic particles in ceramic paste. Calculating the TI first includes counting the number of temper particles of different size classes (separated by 0.39 mm increments) within a specific area of the paste. The proportion of the smallest temper size class is then divided by the sum of the proportions of the two largest temper sizes classes to arrive at a TI value. Thus, higher TI values equate with greater proportions of smaller to larger temper particles and can be used to indicate, along with other supporting evidence, relatively later temporal affiliations. Likewise, temper abundance, measured as the volume of the ceramic paste comprised by temper particles, appears to increase through time (Whalen 1994, 1996).

While measurement of individual temper particles was beyond the scope of the current analysis, based on microscopic examination of sherd cross-sections exposed in fresh breaks, temper was categorized into four size categories—very coarse, coarse, medium, and fine. Table 32 summarizes temper size category for El Paso Brown by site. Though sample sizes are small, El Paso Brown sherd from LA 17041 and LA 120950 have temper sizes consistent with the first half of the type’s production span, while those from LA 83680, LA 118318, and LA 120949 fall into the middle of the production range.

These results suggest that the brownware sherd from LA 17041 are likely associated with the Early Formative occupation of the site, as indicated by radiocarbon dates obtained from Features 19 and 20. As discussed above, this is also supported by the RSI value obtained from the site’s lone rim sherd. The dominance of coarse and medium-grained tempers in El Paso Brown sherd from LA 83680, and the fact that medium- and fine-grained tempers together characterize half of the El Paso Brown assemblage, supports the conclusion that the ceramics from the site may not be associated with the Early Formative occupation represented by Features 10, 11, 19, and 20. This is also supported by the presence of a Chupadero Black-on-white sherd on the surface. In the case of LA 118318, the temper sizes of the El Paso Brown assemblage are most consistent with the occupation (or repeated re-occupations) indicated by numerous features dating between A.D. 1000 and 1200. The LA 120949 El Paso Brown assemblage represents all of the temper size categories. Coarse- and medium-grained sherd comprise almost 80 percent of the assemblage, suggesting that the associated occupation likely occurred after A.D. 900. This is consistent with the presence of five Chupadero Black-on-white sherd on the site. Approximately 14 percent of the assemblage exhibits very coarse-grained temper, suggesting that there may be an earlier, pre-A.D. 1050 occupation represented as well. Finally, the El Paso Brown assemblage from LA 120950 contains disproportionately more very coarse and coarse tempers, indicating production in the early or middle portion of the type’s production span. This is consistent with the radiocarbon date of A.D. 970–1050 returned for Feature 3.
Table 32 – *Temper Size Categories of El Paso Brown, Summarized by Site  
(Note: No El Paso Brown sherds were recovered from LA 89659)

<table>
<thead>
<tr>
<th>Site</th>
<th>Very Coarse</th>
<th>Coarse</th>
<th>Medium</th>
<th>Fine</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 17041</td>
<td>4 (80%)</td>
<td>1 (20%)</td>
<td>--</td>
<td>--</td>
<td>5</td>
</tr>
<tr>
<td>LA 83680</td>
<td>--</td>
<td>9 (50%)</td>
<td>7 (39%)</td>
<td>2 (11%)</td>
<td>18</td>
</tr>
<tr>
<td>LA 118318</td>
<td>--</td>
<td>27 (54%)</td>
<td>21 (42%)</td>
<td>2 (4%)</td>
<td>50</td>
</tr>
<tr>
<td>LA 120949</td>
<td>6 (14%)</td>
<td>22 (50%)</td>
<td>13 (29%)</td>
<td>3 (7%)</td>
<td>44</td>
</tr>
<tr>
<td>LA 120950</td>
<td>4 (27%)</td>
<td>8 (53%)</td>
<td>3 (20%)</td>
<td>--</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>67</td>
<td>44</td>
<td>7</td>
<td>132</td>
</tr>
</tbody>
</table>

* Shaded boxes characterize the majority of the assemblage

Site Function

The forms and sizes of ceramic vessels represented in an assemblage can be used to infer the types of activities conducted at a site. Intensity and duration of occupation is associated with ratios of cooking to serving vessels, as well as with vessel size. Ceramic period sites with short-term or temporary occupations are likely to be dominated by utility vessels of transportable sizes. Particularly in the southern Jornada Mogollon region, where mobile adaptations were common, decorated wares typically comprise a minor proportion of ceramic assemblages, especially at smaller sites. As occupation intensity and duration increases, and mobility declines, the proportion of serving vessels and decorated wares also increase (e.g., Sebastian 1983).

The ceramic assemblages from sites dating between A.D. 800 and 1200 in the Ancestral Pueblo region of the northern Southwest with evidence for residential occupation tend to contain at least 20 to 30 percent decorated ware and about 70 to 80 percent utility ware (Mattson 2016; Sebastian 1983). Of the decorated ware, about half are often comprised of bowls. The sites with ceramics investigated during the current project all have assemblages dominated by utility ware (Table 33). LA 118318 is characterized by the lowest proportion of utility wares (or highest proportion of decorated wares) at 88 percent, followed by LA 120949 at 91 percent.
Table 33 – Summary of Utility and Decorated Wares by Site

<table>
<thead>
<tr>
<th>Site</th>
<th>Utility jars</th>
<th>Utility bowls</th>
<th>Utility indet. form</th>
<th>Decorated* bowls</th>
<th>Decorated jars</th>
<th>% Utility Ware</th>
<th>Utility jars: Decorated bowls</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 17041</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>--</td>
<td>--</td>
<td>100%</td>
<td>--</td>
</tr>
<tr>
<td>LA 83680</td>
<td>20</td>
<td>9</td>
<td>12</td>
<td>1</td>
<td>--</td>
<td>97%</td>
<td>20</td>
</tr>
<tr>
<td>LA 89659</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>LA 118318</td>
<td>31</td>
<td>49</td>
<td>39</td>
<td>9</td>
<td>6</td>
<td>88%</td>
<td>3.4</td>
</tr>
<tr>
<td>LA 120949</td>
<td>11</td>
<td>6</td>
<td>35</td>
<td>1</td>
<td>4</td>
<td>91%</td>
<td>11</td>
</tr>
<tr>
<td>LA 120950</td>
<td>10</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>--</td>
<td>95%</td>
<td>10</td>
</tr>
</tbody>
</table>

*Sherds with slip were considered decorated even if no paint was observed.

Likewise, residential sites tend to have lower ratios of cooking to serving vessels (generally between 2.0 and 8.0). Here, potential cooking vessels are identified as utility jars, and likely serving vessels as decorated (including slipped but not painted) bowls. It should be noted that vessel form could not be determined for many of the sherds recovered, so ratios were calculated only using tabulations of identifiable forms. As listed in Table 33, LA 118318 is consistent with residential expectations although the remaining sites have too few decorated-bowl sherds for meaningful comparison. Along with its overall lower percentage of decorated sherds, both bowls and jar, this suggests that the function of the site was different from the others in the project area. LA 118318 appears to represent a relatively intensive occupation of longer duration, perhaps serving as a base camp within a larger pattern of residential mobility. As noted by previous investigators, the ceramic assemblage from LA 118318 may represent a palimpsest, or repeated use over time. However, the relatively high percentage of decorated wares still suggests that the site was used as more than a temporary camp or resource collection/processing area.

Based on a consistent correlation between wall thickness and orifice diameter in El Paso Brown jars, Speth and LeDuc (2007) proposed the following equation to calculate orifice diameter using non-rim sherds: \( O = 1.4222 + 3.9828 \times W_{Th} \) (\( O \)=orifice diameter). While only one brownware rim sherd and no identifiable neck pieces from which orifice diameter could be measured directly were recovered during the project, Speth and LeDuc’s (2007) method was used to estimate El Paso jar orifice diameter using average wall thickness (Table 34).
Table 34 – Estimated Orifice Diameters of El Paso Brown Jars, Summarized by Site

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Mean Orifice Diameter</th>
<th>Orifice Diameter Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 17041</td>
<td>5</td>
<td>24.3</td>
</tr>
<tr>
<td>LA 83680</td>
<td>19</td>
<td>21.5</td>
</tr>
<tr>
<td>LA 118318</td>
<td>42</td>
<td>22.9</td>
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<tr>
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<tr>
<td>LA 120950</td>
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Calculated orifice diameters range from 14.1 to 29.8 cm, with an average of 22.9 cm. El Paso jars from LA 120949 and LA 83680 have the smallest mean diameters at 21.3 cm and 21.5 cm, and LA 17041 and LA 120950 have the largest mean diameters at 24.3 cm and 24.4 cm, respectively. When the entire project assemblage of El Paso jars is combined, the distribution is trimodal, displaying peaks at 17 to 18 cm (small), 22 to 23 cm (medium), and 29 cm (large) (Figure 98a). This pattern holds when probable jars (non-bowl, unknown forms) are included as well (Figure 98b). These results largely conform to Speth and LeDuc’s (2007) identification of a division between vessels with orifices equal to or less than 18 cm (“small”) and those with larger orifices (“large”).
Figure 98 (a-b) – Distribution of calculated orifice diameters of El Paso Brown jar sherds (top) and El Paso Brown jar and unidentifiable form sherds (bottom), all sites combined
While medium-sized jars are the most common size class at each of the sites, smaller sizes are underrepresented at LA 120950 and LA 83680, and larger sizes are lacking at all but LA 118318 (Figures 99 and 100). In other words, LA 118318 is the only site with all three size classes represented. This supports the interpretation that a wider range of activities may have been conducted at the site compared to the others in the project area. Likewise, the lack of variability in sizes represented at LA 120950 and LA 83680 may indicate a focus on a more limited set of activities, such as those related to collection or processing of specific resources.

**Figure 99 – Distribution of orifice diameters, El Paso Brown, LA 118318**
Figure 100 – Distributions of El Paso Brown orifice diameters for LA 120949, LA 120950, LA 17041, and LA 83680
Production, Interaction, and Exchange: Results of Compositional Analyses

To examine patterns of ceramic manufacture and trade in the project area, multifaceted compositional analyses were conducted on pottery samples from five sites (LA 17041, LA 83860, LA 118318, LA 120949, and LA 120950) with sufficiently large ceramic assemblages. As noted previously (see Methods), these include ceramic oxidation analysis (refiring to identify clay composition groups based on color), petrographic analysis (optical mineralogical analysis), and NAA (elemental identification using a reactor).

Oxidation Analysis

Forty-five samples were selected for oxidation analysis (Table 35). The majority of these are brown utility wares; 60 percent (n=27) were identified as Jornada Brown and 38 percent (n=17) were identified as El Paso Brown. In addition, one Jornada Plain Slipped Red was included. Bowl, jar, and unknown forms are all represented. Portions of ten of these brownware sherds were also submitted for petrographic analysis and NAA. Five Chupadero Black-on-white sherds, which represent imported wares, were submitted for NAA in addition to utility wares. Ideally, these analyses would focus on sherds from well-dated, intact contexts (i.e., chronometrically dated features). However, most features did not yield ceramics, did not yield ceramics of sufficient size, or were not a priority for chronometric dating due to their poor preservation or lack of definition. As a result, the selection of samples instead focused on sherd size and representation of both wares (El Paso and Jornada) and all contexts (surface, features, and test units). Fifty-one percent (n=23) of the sample is from surface contexts, 22 percent (n=10) is from test units, and 24 percent (n=11) is associated with features.

Based on the Munsell colors of ceramic pastes (clay) recorded after firing to the same high temperature (1000°C) in an oxidizing environment (electric kiln), the samples were divided into color groups after Mills (1987) and Windes (1977). In this system, there are seven possible color groups (Groups 1–7), each associated with a range of Munsell colors ranging from white/buff (Groups 1–3), yellowish-red (Groups 4–5), and red (Groups 6–7) (Table 36). The differences between the color groups relate directly to variation in the amount of iron oxides in the clays, thus roughly approximating differences in clay sources. In general, alluvial or residual clays—those obtained from secondary sources such as riverine and lacustrine sediments—fire to darker and redder colors than those obtained from primary geologic sources. Because brownware clays are from this context, they almost always fall into yellowish-red and red color groups (Groups 4-7).

The sample is dominated by Group 5 (64.4%), followed by Group 6 (28.9%); Groups 2 (2.2%) and 4 (4.4%) comprised only a minor portion (n=3) of the total. In fact, the one sherd firing to Group 2 (from Test Unit 9b of LA 120949) is likely a gray ware, misidentified as a brownware due to heavy caliche accumulation. Table 37 summarizes the results by site. Group 5 is the dominant color group represented at each site except LA 120949, where 50 percent of the samples refired to Group 6. LA 83680 and LA 118318 have similar proportions of Groups 5 (60–67%) and 6 (27–30%), while 80 percent or more of the samples from LA 17041 and LA 120950 refired to Group 6. The LA 83680 and LA 118318 samples both contained one sherd refiring to Group 4. While both Jornada Brown and El Paso Brown sherds refired to both Group 5 and 6 colors, a higher proportion of the Jornada Brown sample (71%) was placed in Group 5 than the El Paso Brown sample (53%). Based on Chi-Square analysis, however, these differences were not found to be statistically significant ($\chi^2 =1.981, \text{df} = 1, p=0.159$). The Jornada Plain Slipped Red from LA 118318 (recovered from Test Unit 18) also refired to Group 5.
Table 35 – Detailed Description and Results of Ceramic Oxidation Sample with Petrographic and NAA Group Assignments

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<th>General Context</th>
<th>Primary Temper</th>
<th>Secondary Temper</th>
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*Slip eroded from sherd; NAA indicates Three Rivers Redware designation

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<td>Buff</td>
<td>7.5YR (7/0-7/4)</td>
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<tr>
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<td>10R (6/3-6/8)</td>
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Differences in clay use between the sites do not appear to be solely a function of temporal affiliation, although the mixing of components in surficial contexts could also mask such differences if they existed. Overall, the results suggest that the two major alluvial clay types corresponding to Groups 5 and 6, which likely encompass many individual clay sources, were preferred for both Jornada and El Paso Brown from the ninth through twelfth centuries in the project area. Of the 11 Munsell colors included in these groups by Mills (1987) and Windes (1977), two are particularly common—5YR 5/8 in Group 5 and 2.5YR 5/8 in Group 6. That sherds refiring to these two specific colors were found at each of the five sites included, even though they were not contemporaneously occupied, suggests either that the same clay sources were used for local ceramic production over a long period of time or that similar trade relationships were maintained over generations. The red ware sample included in the analysis also refired to 5YR 5/8, suggesting that its production was tied to that of the utility brownwares. Interestingly, the greatest variety of Munsell colors is represented in the sample from LA 118318, consistent with the interpretation that this site represents a more intensive occupation, or series of occupations, than others in the project area.
Petrographic Analysis

Four main temper mineralogical groups were identified by petrographic analysis of 10 brownware sherds (Britton, Appendix B; Table 35). In general, the tempers were identified as granitic—containing more quartz—or syenetic—containing abundant feldspar. Group 1 consists of FS 84 from LA 83680 and is characterized by heavily weathered syenetic rock fragments. Group 2 is more granitic, containing both quartz and plagioclase feldspar, and includes only FS 91 from LA 120950. Additional aplastic materials identified in the sherd include biotite, hornblende, and crushed sherd. Group 3 contains six sherds: FS 160, FS 330, FS 371, and FS 389 from LA 118318; FS 21 from LA 17041; and FS 46 from LA 120949. While the tempers within this group are variable, they are all dominated by mono-crystals; when rock fragments are present, they are more granitic than syenetic. Britton (Appendix B) suggests the presence of two subgroups within Group 3—one comprised of FS 371 and FS 389, and the other including FS 21, FS 160, and FS 330. In addition, FS 46 is notable for its abundance of biotite. Group 4 contains two sherds, FS 1 from LA 17041 and FS 39 from LA 83680, and is distinguished by relatively unweathered fragments of felsic/quartz-rich igneous rock and mono-crystals.

Given the similarity in geology over much of southeastern New Mexico and southwestern Texas, Britton (Appendix B) points to the difficulty in distinguishing between source areas based on temper mineralogy alone. However, the results are not at odds with previous petrographic studies of brownwares from this portion of the state, which suggest a source in the Sierra Blanca region, located approximately 120 miles to the northwest of the project area (Hill 2009). Volcanic in origin, the Sierra Blanca range includes igneous materials such as monzonite (primarily plagioclase and alkali feldspar), andesite (plagioclase feldspar, pyroxene, and hornblende), basalt, and syenite.

Neutron Activation Analysis

The 15 sherds (six Jornada Brownware, five Chupadero Black-on-white, two El Paso Brownware, one Jornada Redware, and one Three Rivers Redware) submitted for NAA were matched to six ceramic paste reference groups, each of which corresponds to a specific production region (Ferguson and Glascock, Appendix C; Table 35; Figure 101). One sherd—FS 91 from LA 120950—was assigned to the El Paso Brown group produced in the southern Tularosa Basin/northern Hueco Bolson (Group 1033). Five sherds are associated with two Jornada Brown reference groups—FS 330 from LA 118318 and FS 21 from LA 17041 are associated with a production area in the Guadalupe Mountains (Group 71); and FS 58 from LA 120949, FS 84 from LA 83680, and FS 389 from LA 118318 are associated with a production area in the northern Sacramento Mountains/Capitan Mountains (Group 73). The composition of one sherd, FS 46 from LA 120949, is consistent with a diverse reference group located somewhere in the western Jornada or Highland Mogollon region (Group 13). One specimen, originally identified as Jornada Brown due to the lack of a red surface, was assigned to a Three Rivers Terracotta group produced in the Guadalupe Mountains (Group TRT2a).

Previous compositional analyses of Chupadero sherds from southeastern New Mexico and Texas demonstrate that there were two main production areas, both in central New Mexico—the Salinas District (Chupadero Mesa) and the Sierra Blanca/Capitan Mountain area (Creel et al. 2002). Each of the regions contains smaller ceramic production areas. Chupadero Black-on-white was recovered from five sites in the project area—LA 83659, LA 83680, LA 118318, LA 120949, and LA 120950. Of these, LA 118318 contained the highest frequency (n=10), followed by LA 120949 (n=5); the other three sites each
contained a single Chupadero Black-on-white sherd. All five Chupadero Black-on-white samples submitted for NAA correspond to a reference group associated with the Capitan Mountains (Group 1B). The analysts note that approximately 25 percent of the Chupadero sherds recovered from sites in southern New Mexico pre-dating A.D. 1300 can be tied to this same production area.

Summary

Six of the sites investigated along US 82 during the current project yielded ceramics. Undecorated brownwares comprise over 90 percent of all ceramics collected; of these, 54 percent are El Paso Brown and 46 percent are Jornada Brown. Chupadero Black-on-white is the only decorated type recovered, representing 7 percent of the entire project assemblage. While these types have long production ranges, the combination of radiocarbon dates and measures such as the Rim Sherd Index (RSI) and temper coarseness narrows these possible temporal affiliations considerably, sometimes suggesting the presence of additional site components.

- LA 17041 ceramics likely date to the Early Formative. This is consistent with radiocarbon dates from the site.
- LA 83680 El Paso Brownware ceramics likely date to the later portion of the Early Formative. This is somewhat later than radiocarbon dates from the site and inconsistent with the single Chupadero Black-on-white sherd. Multiple components may exist.
- LA 89659 ceramic is a lone Chupadero Black-on-white sherd (A.D. 1050 to 1550). This is not consistent with a radiocarbon date of A.D. 660 to 770 or with the Archaic projectile point found at the site. Multiple components may exist.
- LA 118318 ceramics date to late in the Early Formative period and the early portion of the Late Formative. This is consistent with radiocarbon dates from the site.
- LA 120949 ceramics indicate possible multiple components with pre-A.D. 1050 and post-A.D. 900 occupations. Additionally, a thermal feature returned a radiocarbon date between 540 and 390 B.C.
- LA 120950 brownware ceramics likely date to the Early Formative. This is consistent with radiocarbon dates from the site, but not with the Chupadero Black-on-white sherd. Multiple components may exist.

The ratios of utility to decorated vessels and utility jars to decorated bowls suggest that most of the sites were not occupied intensively or for long durations. Likewise, distributions of El Paso Brownware Jar orifice diameters indicate that a relatively limited range of activities was carried out at the sites. The exception to this is LA 118318, which has several size classes of vessels represented and ratios of utility jars and decorated bowls consistent with other Southwestern sites where residential occupation was documented.

Oxidation analysis indicates that two main clay types comprise the brownware across the project area. Within these two main clay types, LA 118318 displays the most variation in refired color, suggesting more intensive interaction with other groups involving ceramic trade. This is corroborated by the results of NAA, which identified four different production locales for sherds from the site, situated in the Guadalupe Mountains, the Capitan Mountains, and the northern Sacramento Mountains. Although not as fine-grained as NAA, petrographic analysis also suggests a northern Jornada Mogollon/Sierra Blanca origin for at least some of sherds sampled. The results of compositional analyses together suggest that the ceramics from the sites investigated were not locally produced and that the prehistoric residents of the project area had social ties with groups located up to 125 miles away.
Figure 101 – Ceramic production regions based on Neutron Activation Analysis
LITHICS

A total of 2,146 lithic artifacts were collected and analyzed from nine sites during testing and data recovery for the US 82 project. The majority of these artifacts were recovered from LA 118318 (n=1,827, 1,034 of which were sampled during analysis), followed by LA 120949 (n=417), LA 120950 (n=360), LA 83680 (n=237), LA 89659 (n=48), LA 17041 (n=41), LA 137120 (n=6), LA 15901 (n=3), and LA 104182 (n=1). Most of these artifacts were recovered from subsurface contexts, primarily test units. Chert is overwhelmingly the dominant raw material type among the debitage, while sandstone comprises the majority of groundstone tools recovered (Table 38). Quartzite and chalcedony are the other dominant raw material types, although they occur with much less frequency than chert. Rhyolite, basalt, obsidian, limestone, petrified wood, and quartz were also identified at some of the sites. All of these materials, with the exception of obsidian, are available across the surface of the Mescalero Plain as residual cobbles and gravels. Some are derived from Ogallala Formation deposits left behind by the eastern retreat of the Llano Estacado (Kremkau et al. 2013). Farther to the west along the Pecos River, numerous gravel deposits are present. These include abundant siliceous materials (e.g., chert, quartzite, and jasper) originating in the Sangre de Cristo Mountains, as well as materials added via tributaries in the Capitan and Sierra Blanca Mountains. Obsidian is the only non-local material identified during this investigation. Its closest source is in gravels along the Rio Grande valley 200 miles to the west.

Methods

Below is a description of the methods used for analysis of both the flaked-stone and groundstone artifacts.

Flaked Stone

Flaked-stone analysis was used to address a number of the research questions presented in the Research Design section of this report, most importantly the organization of lithic technology. Technological organization is usually studied as a dichotomy or continuum between assemblages that are either expedient or curated (Bamforth 1986; Binford 1979; Nelson 1991). Although individual artifacts and site assemblages often fall on a continuum between, rather than definitively within, one of these two categories, this basic dichotomy provides a useful heuristic tool to address technological organization. Curated tools are made in anticipation of future use and are therefore typically long-lasting, reliable, versatile, and require significant time investment. Expedient tools, on the other hand, are made as needed for a particular task and therefore require little investment and are usually discarded quickly (Nelson 1991). It is generally accepted that curated technologies are employed by more mobile groups, while expedient tools are more common among sedentary groups (Bamforth 1986). Parry and Kelley (1987) argue that a broad shift toward expedient tool technology occurred across the American Southwest as sedentism increased after the Archaic period and throughout the Formative. A number of patterns are common in lithic assemblages after this shift: (1) there is little attempt to control the form of cores or flakes; (2) there is no distinction between tools and debris (any flake is a potential tool); and (3) tools are either unmodified or expediently modified, with little expenditure in time or effort in their production (Parry and Kelly 1987:287–288). This analysis therefore attempted to identify changes in flaked-stone technology (expedient vs. curated) within and among sites. In other words, we expect to see a shift from curated to expedient technologies within the project area that parallels a shift from high-residential
mobility during the Archaic period to a greater degree of sedentism in the Formative period and, in particular, the Late Formative. We also expect to see differences between logistical sites and habitation sites, with the former exhibiting a more curated technology, and the latter having greater evidence for expedient technology. Lithic analysis was also used to attempt to address site function, intra-site organization, occupational history, settlement and mobility, and material acquisition and provenance.

Analysis was generally conducted within an “interpretation free” framework (Sullivan and Rozen 1985). This means that consistent and replicable attributes were recorded without making functional assumptions for each artifact, while functional interpretations were made on the assemblage as a whole. As a result, functional categories such as “core reduction flake” and “scraper” were not used, due to the difficulty in making such categories consistent. However, during the course of recording, it became clear that some functional attributes were needed in order to capture the variation within the assemblage. This follows Rozen’s (1984) distinction between intuitive and non-intuitive attributes. Some functional types such as “projectile points” are so intuitive they can be used without compromising the reliability of the data. The result was an analysis strategy that relied mostly on the recording of interpretation-free attributes, supplemented with a small number of functional categories that were reliably intuitive, such as projectile points.

Debitage attribute analysis has been used successfully to identify the technological strategies and past behaviors that produced an assemblage (Andrefsky 1998). Pieces of debitage were first sorted by material type and debitage type/completeness. The following attributes were then recorded: material type, completeness, dimensions, weight, cortex, platform type, platform metrics (width and thickness), platform preparation, and dorsal scar count. Metric dimensions included length, width, thickness, and weight for all complete flakes and maximum dimension and weight for all fragments and angular debris. Debitage dimensions and weight are highly replicable and have been shown to correlate with stage of reduction and reduction strategy (Andrefsky 1998). Length of complete flakes was defined as the dimension from proximal to distal margin regardless of whether it is the maximum dimension, and width is defined as the maximum measurement perpendicular to length. All measurements were taken in mm, while weight was recorded in grams (g), to the nearest tenth of a gram. Completeness categories include complete flake, proximal fragment, medial fragment, lateral fragment, distal fragment, unidentified fragment, and angular debris. During data manipulation, non-platform-bearing flakes (medial, lateral, distal fragments) were combined in an “other fragments” category, so that categories are consistent with those proposed by Sullivan and Rozen (1985).

For complete flakes, dorsal cortex was recorded in 25-percent intervals (0%, 1–25%, 26–50%, 51–75%, and 76–100%). Cortex was recorded on a presence/absence basis for fragments and angular debris, because the actual percentage of cortex on such pieces cannot be reliably determined. Platform type was recorded for all flakes retaining the point of impact (complete flakes and proximal fragments) using the following categories: single facet, multifacet, cortical, and crushed/collapsed. Any modification, preparation, or distinct characteristics of the platform (abrading, battering, lippling, flaking along the back of the platform, etc.) was also recorded. Platform metrics have been shown to be indicators of both the size and characteristics of the flake removed and the overall reduction strategy (Dibble et al. 2005). In addition, any distinctive characteristic of the flake (e.g., evidence of burning) were recorded in a “comments” field.
### Table 38 – Overview of Lithic Assemblages Collected during Testing and Data Recovery along US 82

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>LA 15901</th>
<th>LA 17041</th>
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<th>LA 104182</th>
<th>LA 118318*</th>
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## Artifact Types

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*Counts represent artifacts selected through sampling, not total assemblage size.
Cores were defined as non-tools with five or more flakes removed. Pieces with four or fewer intentional flake removals were classified as tested pieces. Core categories include bifacial, bipolar, unidirectional, bidirectional, or multidirectional (irregular). Parry and Kelly (1987) note that the characteristics of cores within an assemblage can provide information on the nature of technological organization.

Flaked-stone tools may be formal or expedient. Formal tools exhibit evidence of their initial shaping and are distinguished from informal tools, such as utilized flakes, on the basis of facial flake scars that cover a significant portion of an artifact surface. Examples of formal tool types include projectile points, bifaces, and unifaces. Bifaces were categorized into stages (Stage 1–5) on the basis of Callahan’s (1979) stage scheme, which models biface manufacture from initial core reduction to finished tool. Stage 1 bifaces are typically large, thick, exhibit little formality in shape, have few facets (6 to 10), and retain a substantial amount of cortex. Stage 2 bifaces are slightly smaller, have a greater number of facets (10 to 20), exhibit a lesser amount of cortex, and feature an irregular but slightly elongated shape. Cortex is absent in Stage 3 bifaces, which take on a semi-regular, ovate form in planview. Facets are variable, but closely spaced, and may extend across the midline of the biface. Stage 3 bifaces are still somewhat thick in cross section. Stage 4 bifaces are lancelate in shape and flat in cross section, with regular, closely spaced facets extending across the midline of the object. Stage 5 bifaces are elongated and ovoid in planview, thin in cross section, with regular, curvate edges and 25–45-degree edge angles. These objects may be used for a variety of cutting tasks, or as blanks to be carried and later used to create projectile points.

Among expedient tools, flakes that exhibit evidence of retouch or utilization that do not extend across a significant portion of either surface are considered informal tools. All artifacts exhibiting retouch or use wear were classified as tools. All artifacts were analyzed with a 10X lens, and only artifacts with definitive use wear clearly resulting from cultural use rather than post-depositional or post-excision processes were included as tools.

The following attributes were recorded for all tools: completeness, cortex, length, width, thickness, weight, number of used edges, edge location(s), edge type(s), edge angle(s), retouch type, use/retouch extent, and use/retouch invasiveness. Edge angle was recorded in 15 degree intervals (1–15 degrees, 15–30 degrees, and so on). When more than one edge was used or retouched, the more intensively used edge was recorded. Generally, edges with higher (steeper) angles were usually used for scraping or planing, while lower edge angles are associated with cutting or slicing, although there is most likely considerable angle overlap between these functions.

**Groundstone**

Following Adams (2002:1), groundstone was defined as “any stone item that is primarily manufactured through mechanisms of abrasion, polish, or impaction, or is itself used to grind, abrade, polish, or impact.” This definition clearly leaves some overlap between flaked-stone and groundstone artifacts, as hammerstones and similar items could be placed in either category. During the current analysis, hammerstones were included in the flaked-stone assemblage. There are important differences in how flaked-stone and groundstone analyses are approached. While flaked-stone studies rely heavily on analysis of the waste debris (debitage) removed during the production of tools or reduction of materials, only the tools can be observed during groundstone analysis. Because function therefore cannot be
inferred at the assemblage scale, it must be determined at the scale of the individual artifact, which results in classification schemes that focus heavily on the relationship among the concepts of form, function, and design.

Form is a descriptive concept—the specific shape, size, and morphological characteristics of an object—whereas function refers to how the object was used. As with flaked-stone tools, function cannot be directly recorded, and while it can sometimes be inferred from form using analogy, it can also be unrelated to form. Design, on the other hand, refers to the planning process that directed the manufacture of an item, including why the material was selected and the planned function of the item (Adams 2002). Design characteristics operate along a continuum between tools that are more expediently or strategically designed. Inferring function and placing artifacts within specific categories, therefore, involves assessing aspects of both form and design.

The attributes recorded during the current analysis can be divided into those that relate to (1) design, (2) form, (3) use, and (4) function/classification. Some attributes relate to both form and design; for example, the shape of a mano is fundamental to its dimensions and form but may also relate to design if a rock was chosen specifically for its shape or if the manufacturing process was directed towards creating a tool with a particular shape. Recorded attributes related to design include material type, material texture, manufacturing/shaping strategies, and surface preparation. Material characteristics (particularly texture) are important aspects of material choice for groundstone because they correlate with the needs for specific grinding activities. The raw material texture for all artifacts was recorded as fine, medium, or coarse. Evidence of manufacturing/shaping—including grinding, pecking, flaking, and combinations of these strategies—as well as the extent of this evidence was documented when possible, although most tools were too fragmented for evidence of manufacturing/shaping to be identified. Evidence of preparation/rejuvenation of used surfaces was also documented, with categories including pecking, abrasion, or impact fractures.

Attributes relating to form include dimensions, dimensional completeness, weight, overall tool shape in plan-view and cross-section, and the shape/configuration of each used surface. Artifact dimensions were recorded as maximum length, width, and thickness, and a check box was used to denote whether each dimension was complete. In addition, the condition of each tool was recorded as “complete,” “less than half complete,” or “more than half complete.” The profile/cross section of each tool was recorded as ovoid (convex/concave), rectangular, D-shaped, wedge, beveled, triangular, diamond-shaped, or indeterminate. The configuration or shape of the ground surface when observed in profile was recorded as flat, concave, convex, edge, conical, irregular, or indeterminate.

The outcome of use is wear, defined as the loss or alteration of material from the rock surface. Wear can be measured by how extensive or intensive it is; extensiveness refers to the number of surfaces and/or size of the grinding area, while intensiveness refers to the duration/intensity of the grinding. The grinding intensity of each surface was subjectively recorded as high, moderate, or low during the current study. Other recorded attributes related to wear include the presence/absence of burning, polish, and residue, the maximum length and width of each grinding surface (the size of the ground area often does not match the overall artifact dimensions), evidence of surface rejuvenation, and the orientation of the grinding stroke (reciprocal parallel, reciprocal perpendicular, circular, or indeterminate). These
characteristics were recorded separately for each surface on bifacial tools. It should be noted that this was a macroscopic study, so our ability to assess wear was limited to characteristics that could be observed with low magnification.

During the current analysis, groundstone tools were classified using the system presented by Adams (2002), with minor modifications. At the broadest scale, all groundstone tools were first classified as handstones or netherstones. Handstones include all active hand-held tools used to alter a surface or intermediate substance (Adams 2002:94). Netherstones are passive, stationary tools upon which a substance or surface is altered; they are usually too large to be hand-held. Handstones may be subdivided into more specific tool types based on their morphology/design and intended function, particularly whether they were used to smooth, grind, abrade, polish, pulverize, or percuss a surface or intermediate substance. Any artifact that was too small or fragmented to determine if it was a handstone or netherstone was placed in an indeterminate category.

Handstone types may include tools such as manos, abraders, polishing stones, pestles, tabular tools, crushers, and indeterminate handstones (among other items). Abraders have relatively rough surfaces and are used to roughen or reduce a contact surface, while polishing stones have smooth surfaces and are used to burnish or polish a contact surface, such as pottery or stone. Indeterminate handstones are active, hand-held tools that cannot be placed in a more specific functional category. A mano is a specific type of handstone used exclusively for grinding with a corresponding metate; by definition, manos and metates cannot be used without the other, and the wear on each tool is reflected on the surface of the other (Adams 2002). Manos are therefore classified based on the type of metate they were used with—basin, flat/slab, or trough—or whether they are sized for use with one hand or two hands. One-hand manos are usually used with basin and flat/slab metates, while two-hand manos require more strategic design and are used with trough metates.

Netherstone types can include metates, mortars, palettes, lapstones, and indeterminate netherstones. As noted above, metates are used as the passive piece for grinding an intermediate substance (usually maize or seeds) with a mano, and they can be subdivided into basin, flat/slab, and trough types based on the configuration of their grinding surfaces. Basin metates have concave, circular, or elliptical ground surfaces resulting from a circular stroke with a mano. Flat/slab metates have fairly flat or slightly concave grinding surfaces resulting from use of a flat mano in a rocking or reciprocal stroke. The ground surfaces of trough metates are rectangular basins intentionally created through an exclusively reciprocal (or back-and-forth) grinding motion. Lapstones and palettes are hand-held netherstones on which a substance is ground, with palettes usually utilizing a finer-grained material. The substances ground on palettes and lapstone are usually not related to subsistence and include pigments, ornaments, and other items. Indeterminate netherstones are passive, stationary pieces that cannot be placed in a more specific functional category.
Lithic Analysis by Site

The following analysis examines the lithic assemblages individually at each site, with the exception of the four sites in the Bear Grass Draw cluster. The remaining sites are divided into two categories: small sites with few artifacts, and one medium-sized site. Four sites fall into the former category: LA 15901, LA 104182, LA 137120, and LA 89659. Only three artifacts were recovered from LA 15901. A single basin metate was recovered from LA 104182 and six pieces of lithic debitage were recovered from LA 137120. The lithic assemblage at LA 89659 includes 48 lithic artifacts. One site (LA 83680) was categorized as a medium-sized site. A total of 236 artifacts were recovered from LA 83680. This assemblage is substantially larger than that of the small sites. Spatially, however, it is distinct from the Bear Grass Draw cluster and is therefore examined individually. The four Bear Grass Draw sites (LA 17041, LA 118318, LA 120949, and LA 120950) are discussed together and in contrast to one another due to their close proximity and inter-related nature.

Small Sites with Few Artifacts

LA 15901

Only three lithic artifacts were recovered from LA 15901. These include a projectile point, a medial biface fragment, and a groundstone fragment of indeterminate function. The projectile point is a tan chert Pueblo Side-notched point with a concave base (Figure 102). This point type appears around A.D. 1150 and became a standard point in the Southwest between A.D. 1300 and 1500. The point is incredibly small, measuring 15 mm in length, 10 mm in width, and 2 mm in thickness. It was recovered from TU 1 between 90 and 100 cm below modern ground surface. The biface fragment was recovered from the same unit at a depth of 40 to 50 cm below modern ground surface. It is manufactured from brownish-red chert of moderate quality, and measures 35 mm in length, 25 mm in width, and 8 mm in thickness, and exhibits use wear on both lateral margins, one of which is concave, and the other is irregular (Figure 103). The groundstone fragment was located on modern ground surface southwest of TU 1. It is coarse sandstone and represents less than 50 percent of the original piece size, measuring 80 mm in length, 40 mm in width, and 16 mm in thickness. The ground surface is planar, while the opposing, unground surface in convex. The artifact may have been used as an abrader, although other functions are possible. Additional flaked-stone artifacts are located at the site outside the APE. These items include debitage, as well as a mano, a bifacial scraper, a core tool, a core, and utilized cobble. Brownware ceramics were also observed during the survey phase of this project, and the site was assigned an Early to Late Formative (A.D. 500–1450) temporal affiliation based on these ceramics. The Pueblo Side-notched projectile point encountered during testing and data recovery supports these dates.

Figure 102 – Pueblo Side-notched projectile point recovered from LA 15901
LA 104182

Only one lithic artifact, a basin metate, was recovered from LA 104182. The metate is fragmented and measures 224 by 139 by 19 mm. It is bifacially ground, and the primary grinding surface is concave and basin-shaped (Figure 104). This surface is somewhat weathered. It is dimpled, but does not exhibit any polishing or striations. It is unclear whether the dimpling is the result of intentional rejuvenation pecking or natural weathering. The opposing side has a convex angular shape. One portion of this surface appears to be intentionally shaped to create a flat base that would support the object. A substantial amount of caliche is present on the basal surface of the artifact, suggesting that it has remained relatively stable since its initial deposition. The metate is broken through its center, forming two refitting fragments, and the terminal edges are rounded but highly friable. The artifact was recovered during mechanical scraping at a depth of 1.5 m below modern ground surface where sediments transition from aeolian sand to a compact reddish paleosol.

Figure 104 – Basin metate recovered from mechanical scrape at LA 104182
LA 137120

A total of six artifacts were recovered from LA 137120. These include four pieces of chert debitage and two pieces of chalcedony debitage, four of which were collected from the surface of the site and two of which were collected from Level 1 of TU 2. The surface artifacts include three chert lateral flake fragments in white, red, and light gray colors. They range from 10 to 40 mm in maximum dimension, and the largest of these three flakes exhibits cortex. A large chalcedony proximal flake fragment was also recovered from the surface. It measures 45 mm in maximum dimension, lacks cortex, and exhibits a multi-facet platform. The two artifacts recovered from TU 2 include a white chalcedony distal flake fragment measuring 11 mm in maximum dimension, and a complete brown chert flake measuring 6 mm in maximum dimension. Cortex was absent from both of these flakes. During survey, 36 pieces of lithic debitage were observed on the surface of the site, most of which are clearly outside the APE for this project. Although the analyzed assemblage is small, when examined in conjunction with the artifacts observed during survey, LA 137120 likely functioned as a small lithic-reduction locale.

LA 89659

A total of 48 artifacts were recovered from LA 89659, all but one of which were recovered from the surface of the site. The assemblage includes 46 pieces of debitage and two cores. Among the debitage, raw material types include chert (n=38), quartzite (n=3), chalcedony (n=3), and rhyolite (n=2). Chert is represented by a variety of colors including gray (light gray, gray, and dark gray; n=17), white (n=6), tan (n=5), brown (n=4), black (n=3), red (n=2), and orange (n=1). Thirty-five pieces of chert were categorized as being of moderate quality while three were categorized as being of high quality. Among the chalcedony artifacts, one dark gray and two white pieces of debitage are present. The quartzite artifacts range from tan to dark gray to black, while the two rhyolite artifacts are both brown.

Table 39 below presents artifact count and average weight by raw material type. Both quartzite and chalcedony debitage tend to weigh substantially less than chert or rhyolite. The quartzite debitage includes two complete flakes and one distal flake fragment, and two of these artifacts measure less than 10 mm in maximum dimension, while the third measures 25 mm in maximum dimension. Cortex is absent from all three artifacts, suggesting that they were likely removed during late stage reduction possibly focused on formal tool manufacture. The chalcedony debitage includes one complete flake, one distal flake fragment, and one lateral flake fragment. The fragments both measure approximately 10 mm in maximum dimension, and cortex is present on the lateral fragment. The complete flake measures 32 mm in maximum dimension, lacks cortex, and exhibits a multi-facet platform. Despite the presence of cortex on the lateral fragment, the chalcedony assemblage also suggests late-stage reduction that could be associated with formal tool manufacture.

The rhyolite debitage consists of one distal flake fragment and one medial flake fragment. Both exhibit cortex and measure 20 mm and 37 mm in maximum dimension, respectively. The medial fragment is thick, and, with a weight of 16.79 g, accounts for the large average weight of this material type. Rhyolite is also a coarse-grained material better suited for production of expedient rather than formal tools.

Chert is clearly the dominant material type at LA 89659. The following debitage types were identified in the chert assemblage: distal fragment (n=10), complete flake (n=7), lateral fragment (n=7), medial
fragment (n=6), proximal fragment (n=4), and angular debris (n=4). The majority of the debitage (n=31; 82%) is fragmented. The average maximum dimension among the fragments is 18 mm, and average weight is 2.85 g. Among the complete chert flakes, average length is 11 mm and 1.35 g. Identified platform types on complete flakes and proximal flake fragments include single facet (n=5), multi-facet (n=4), and cortical (n=2). Cortex is present on 18 pieces of chert debitage and absent on 20 pieces of debitage. Despite the relative equal proportions of cortical and non-cortical chert debitage, the small average size of the debitage suggests that most chert flakes were removed in the later stages of reduction. Like the quartzite and chalcedony debitage assemblage, this further suggests a focus on formal tool manufacture.

<table>
<thead>
<tr>
<th>Material</th>
<th>Count</th>
<th>Average Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chert</td>
<td>38</td>
<td>2.58</td>
</tr>
<tr>
<td>Chalcedony</td>
<td>3</td>
<td>0.83</td>
</tr>
<tr>
<td>Quartzite</td>
<td>3</td>
<td>0.35</td>
</tr>
<tr>
<td>Rhyolite</td>
<td>2</td>
<td>9.32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>46</strong></td>
<td><strong>2.61</strong></td>
</tr>
</tbody>
</table>

Throughout much of the Southwest, the transition from the mobile adaptation of the Archaic to a more sedentary community organization during the Formative periods brought with it a shift in lithic technology where formal bifacial tools were replaced with simple flake tools, lower-quality materials and an increased diversity of materials were used, and the use of minimally modified or unmodified flakes was more common (Vierra 2005:188). However, along the Mescalero Plain in far Southeastern New Mexico, a mobile lifeway persisted throughout the Early Formative period and into the Late Formative (Railey 2016, 2017). This phenomenon is suggested by the LA 89659 lithic assemblage where the generally small size of the debitage and the predominant use of chert indicate a focus on formal tool manufacture. Although formal tool manufacture is generally associated with mobile hunters and gatherers of the Archaic period, radiocarbon dates and the ceramic assemblage indicate Early and possibly Late Formative site components.

**Medium-Sized Site**

**LA 83680**

A total of 236 lithic artifacts were collected during testing and data recovery at LA 83680. This assemblage includes 219 pieces of flaked-stone debitage, eight flaked-stone tools, and nine groundstone objects. Radiocarbon assays from several excavated features indicate that LA 83680 had an occupational history spanning several centuries beginning in the Late Archaic around A.D. 260, and likely periodically and repeatedly occupied through A.D. 880. The recovered lithic assemblage is therefore a palimpsest of cultural material dating to different time periods. As such, the assemblage precludes any analysis that would seek to extrapolate diachronic changes in lithic technological organization at the site.
Debitage

Debitage clearly makes up the majority of the assemblage, and includes the following raw material types: chert (n=122), quartzite (n=58), chalcedony (n=30), rhyolite (n=6), and basalt (n=3). Average size (length and/or maximum dimension), weight, and presence/absence of cortex for each raw material type are presented in Table 40. These categories are clearly not comparable between material types. Rhyolite size and weight is skewed by one large specimen within a small sample, although it should be expected that average length and weight would be higher for this raw material type given its coarse texture and tendency to produce large flakes during flint-knapping. Interestingly, basalt (which tends to flake similarly to rhyolite) exhibits the smallest average size and weight, although this could simply be the result of the small sample size. Not surprisingly, chalcedony, which is a high-quality, fine-grained raw material, exhibits smaller size and weight than both chert and quartzite. Combined, these latter two materials account for 82.2 percent of the debitage assemblage.

<table>
<thead>
<tr>
<th>Material</th>
<th>Count</th>
<th>Average Length (mm)</th>
<th>Average Weight (g)</th>
<th>Cortex Present</th>
<th>Cortex Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chert</td>
<td>122</td>
<td>18.59</td>
<td>2.71</td>
<td>50 (41%)</td>
<td>72 (59%)</td>
</tr>
<tr>
<td>Quartzite</td>
<td>58</td>
<td>17.76</td>
<td>3.34</td>
<td>9 (16%)</td>
<td>49 (84%)</td>
</tr>
<tr>
<td>Chalcedony</td>
<td>30</td>
<td>15.78</td>
<td>1.74</td>
<td>11 (37%)</td>
<td>19 (63%)</td>
</tr>
<tr>
<td>Rhyolite</td>
<td>6</td>
<td>37.18</td>
<td>16.46</td>
<td>2 (33%)</td>
<td>4 (67%)</td>
</tr>
<tr>
<td>Basalt</td>
<td>3</td>
<td>15.41</td>
<td>0.97</td>
<td>-</td>
<td>3 (100%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>219</strong></td>
<td><strong>18.45</strong></td>
<td><strong>3.10</strong></td>
<td><strong>72</strong></td>
<td><strong>147</strong></td>
</tr>
</tbody>
</table>

Quartzite and chert both have similar maximum dimensions, although quartzite is on average slightly heavier than chert. This could be the result of differences in raw material quality, as quartzite tends to be more coarse-grained than chert, resulting in thicker fragments. Flake types for these two raw material types are presented below in Table 41. Complete flakes account for the highest proportion of flake types within these two raw materials, followed by distal flake fragments. Platform type was recorded for both proximal flake fragments and complete flakes. Among both raw materials, multi-facet platforms were most common, followed by single facet platforms (Table 42). Cortical platforms account for a higher proportion of chert assemblage than in the quartzite assemblage. Overall, both chert and quartzite tend to be small and non-cortical, with high proportions of complete flakes, and multi-faceted platforms. Generally, this pattern is reflective of late-stage reduction focused on formal tool manufacture, and indeed several formal tools were found at the site and are discussed below.
Previous archaeological studies in the area have demonstrated significant differences between surface and subsurface archaeological assemblages at a single site. Typically, surface assemblages yield flakes that are larger, thicker, heavier, and retain more cortex. However, these differences are not necessarily related to actual differences between surface and subsurface assemblages. Rather, they often result from surface collection bias, which tends to frequently miss smaller flakes. Collection of subsurface artifacts in 1/8-inch screens tends to result in recovery of artifacts that would otherwise get missed or overlooked during surface collection.

At LA 83680, a total of 165 (75.3%) pieces of lithic debitage was collected from the surface of the site, while the remaining 54 (24.7%) of the artifacts were recovered from subsurface contexts using 1/8-inch screens. The average weight of the surface artifacts collected at LA 83680 is 3.12 g, while the average weight of subsurface artifacts is 2.93 g; the average maximum dimension for surface debitage is 18.82 mm, while the average maximum dimension for subsurface debitage is 17.32. Additionally, 33.3 percent (n=55) of the surface debitage retained cortex while 31.5 percent (n=17) of the subsurface debitage retained cortex (Table 43). Statistically, these metrics were found to be not significantly different at a 95 percent confidence interval, suggesting that at LA 83680, surface debitage may be an accurate reflection of subsurface deposits in terms of size, weight, and cortical retention.

A total of 123 pieces of debitage were recovered from AC 1 in the central portion of the site, representing 58.3 percent of the total debitage assemblage. This is also where the majority of features were located. Raw materials in this portion of the site include chert (n=58), quartzite (n=43), chalcedony (n=17), rhyolite (n=4) and basalt (n=1). Only 13 pieces of debitage were recovered from the surface in and around AC 2 in the far eastern part of the site, and 14 pieces of debitage were clustered in the western part of the site near Features 1 and 2. AC 1 was therefore clearly the spatial locus for most

### Table 41 – Flake Types among Chert and Quartzite Debitage at LA 83680

<table>
<thead>
<tr>
<th>Flake Type</th>
<th>Angular Debris</th>
<th>Complete Flake</th>
<th>Distal Fragment</th>
<th>Lateral Fragment</th>
<th>Medial Fragment</th>
<th>Proximal Fragment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Count</td>
<td>Percent</td>
<td>Count</td>
<td>Percent</td>
<td>Count</td>
<td>Percent</td>
<td>Count</td>
</tr>
<tr>
<td>Chert</td>
<td>9</td>
<td>7.4%</td>
<td>55</td>
<td>45.1%</td>
<td>23</td>
<td>18.9%</td>
<td>18</td>
</tr>
<tr>
<td>Quartzite</td>
<td>5</td>
<td>8.6%</td>
<td>21</td>
<td>36.2%</td>
<td>10</td>
<td>17.2%</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>7.8%</td>
<td>76</td>
<td>42.2%</td>
<td>33</td>
<td>18.3%</td>
<td>27</td>
</tr>
</tbody>
</table>

### Table 42 – Platform Types among Chert and Quartzite Debitage at LA 83680

<table>
<thead>
<tr>
<th>Platform Type</th>
<th>Collapsed/crushed</th>
<th>Cortical</th>
<th>Multi-facet</th>
<th>Single facet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Count</td>
<td>Percent</td>
<td>Count</td>
<td>Percent</td>
<td>Count</td>
</tr>
<tr>
<td>Chert</td>
<td>1</td>
<td>1.43%</td>
<td>12</td>
<td>17.14%</td>
<td>31</td>
</tr>
<tr>
<td>Quartzite</td>
<td>0.00%</td>
<td></td>
<td>3</td>
<td>10.34%</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>1.0%</td>
<td>15</td>
<td>15.2%</td>
<td>45</td>
</tr>
</tbody>
</table>
activities that occurred at LA 83680. However, no distinct spatial patterning is observable in terms of raw material distributions or debitage types in this portion of the site.

<table>
<thead>
<tr>
<th>Provenience</th>
<th>Count</th>
<th>Average Weight (g)</th>
<th>Average Maximum Dimension (mm)</th>
<th>Cortex present</th>
<th>Cortex Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>165</td>
<td>3.12</td>
<td>18.82</td>
<td>55 (33.3%)</td>
<td>110 (66.7%)</td>
</tr>
<tr>
<td>Subsurface</td>
<td>54</td>
<td>2.93</td>
<td>17.32</td>
<td>17 (31.5%)</td>
<td>37 (68.5%)</td>
</tr>
</tbody>
</table>

**Flaked-Stone and Groundstone Tools**

A variety of formal flaked-stone tools were recovered from LA 83680. These include three bifaces, two scrapers, and one projectile point. One of the bifaces and one of the scrapers were found in subsurface contexts while the remainder of the tools were recovered from the surface of the site. Two hammerstones were collected from the surface of the site. The tools are described in greater detail in Table 44 below. The projectile point is a Temporal type point (Figure 105) named for the Temporal site near Tularosa, New Mexico. The point is “a small side notched arrow point with a triangular, often multi-notched blade and convex base (Justice 2002:255). It dates from ca. A.D. 400 to 900 and no later than ca. A.D. 1200. This date range falls firmly within the radiocarbon date ranges of the tested features (A.D. 420–880). This is the only temporally diagnostic lithic artifact identified at LA 83680.

![Image of a projectile point](image)

**Figure 105 – Temporal type projectile point recovered from LA 83680**

Eight groundstone tools and one manuport were collected from the surface of LA 83680. The manuport is a non-local conglomerate material that was clearly transported to the site, although its function is unclear. The remaining groundstone artifacts consist of tools with indeterminate function based on their small size and fragmented nature as all of them were determined to represent less than 50 percent of the original piece. As a result, these artifacts lack diagnostic form or design characteristics and therefore provide little technological information. Six of the groundstone artifacts were recovered from the modern ground surface and two were recovered from TU 2. All pieces are tan sandstone and were produced through formal shaping design strategies such as grinding. Sizes of groundstone artifacts range from 44 mm to 93 mm in length, 30 mm to 76 mm in width, and 22 mm to 40 mm in thickness. Five of the eight artifacts are
unifacial while the remaining three exhibit bifacial use wear (Figure 106). Two of the artifacts exhibit moderate intensity grinding and shaping while the remaining six artifacts exhibit low intensity grinding. While the exact function of these artifacts is unclear, they were likely used for a variety of purposes.

*Figure 106 – Indeterminate groundstone fragment recovered from LA 83680*

As a whole, the flaked-stone and groundstone tool assemblage at LA 83680 indicates that a variety of activities took place at the site throughout its occupation, including hunting, plant/animal processing, food preparation, and stone tool manufacture.

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Raw Material</th>
<th>Dimensions (mm)</th>
<th>Weight (g)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectile Point</td>
<td>White Chert</td>
<td>24 x 12 x 4</td>
<td>0.76</td>
<td>Complete Temporal type featuring side notches, and serrated margins with additional notch, convex base</td>
</tr>
<tr>
<td>Biface</td>
<td>Brown chert</td>
<td>41 x 37 x 32</td>
<td>66.92</td>
<td>Stage 1 or 2 biface with over 75 percent cortex, use wear on straight distal margin, 60- to 70-degree edge angle</td>
</tr>
<tr>
<td>Biface</td>
<td>White Chert</td>
<td>50 x 59 x 29</td>
<td>82.27</td>
<td>Stage 1 or 2 biface with 50 to 75 percent cortex, use wear on straight distal margin, 55-degree edge angle</td>
</tr>
<tr>
<td>Biface</td>
<td>Tan Chert</td>
<td>48 x 44 x 16</td>
<td>32.79</td>
<td>Stage 4 or 5 biface, no cortex, use wear on straight lateral margin, 5-0 to 60-degree edge angle, no cortex</td>
</tr>
<tr>
<td>Scraper</td>
<td>Tan Chert</td>
<td>43 x 55 x 20</td>
<td>36.08</td>
<td>15- to 30-degree edge angle, unifacial retouch along 55 mm of convex distal margin</td>
</tr>
<tr>
<td>Scraper</td>
<td>Brown chert</td>
<td>44 x 37 x 27</td>
<td>54.95</td>
<td>Lateral fragment, 75- to 90-degree edge angle along 33 mm of distal margin, 50 to 75 percent cortex</td>
</tr>
<tr>
<td>Hammerstone</td>
<td>Tan chert</td>
<td>54 x 56 x 57</td>
<td>263.66</td>
<td>Fragment over one half original piece size, heavy battering on one intact distal margin, likely fragmented during use</td>
</tr>
<tr>
<td>Hammerstone</td>
<td>Brownish Purple</td>
<td>78 x 84 x 65</td>
<td>554.12</td>
<td>Fragment, over one half original piece size, heavily battered and spalled on remaining intact margin, likely fragmented as a result of use</td>
</tr>
</tbody>
</table>

Table 44 – Description of Flaked-stone Tools Recovered from LA 83680
**Bear Grass Draw Cluster**

As discussed earlier in this report, four of the sites subjected to testing and data recovery (LA 17041, LA 118318, LA 120949, and LA 120950) are clustered along both sides of US 82 east of Bear Grass Draw. Likely at one time, no distinctive physical separation existed between cultural materials at these locations. Today, however, they are separated by modern physical disturbances such as US 82 and well pad access roads. The separate LA site number designations were assigned as a means of better managing the remaining, undisturbed cultural materials in these separate locations. Radiocarbon assays collected from these sites, however, suggest that the area as a whole is a palimpsest of repeated occupation dating to at least two periods: the Late Archaic to Early Formative (540 B.C. to A.D. 540; dates from LA 120949), and the Early to Late Formative (A.D. 780 to 1160; dates from remaining three sites). The following analysis compares the lithic assemblages between these four locales to determine whether differences in the assemblages could reflect discrete technologies or spatial clustering indicative of distinctive occupations or activities.

Table 45 below presents a comparative overview of the artifacts recovered and analyzed from the four sites. All surface-collected artifacts were provenienced according to 1-by-1-m surface grid units. A total of 1,827 pieces of flaked-stone debitage and 225 groundstone objects were collected from investigations at LA 118318. Due to the large size of the assemblage, only 909 pieces of debitage and 114 pieces of groundstone were subjected to systematic analysis. These samples each represent approximately 50 percent of the total assemblage for those artifact types. The sampled debitage was selected from subsurface contexts (i.e., test units and features), as well as the 1-by-1-m surface grid unit that corresponded to test unit locations, to compare proportions of surface and subsurface artifacts at that site. Groundstone artifacts were also sampled from these same contexts, although additional artifacts were randomly selected to be added to the sample to achieve a 50 percent sample.

<table>
<thead>
<tr>
<th>Table 45 – Overview of Artifacts Recovered and Analyzed from the Bear Grass Draw Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Artifact Type</strong></td>
</tr>
<tr>
<td>Debitage</td>
</tr>
<tr>
<td>Flaked-stone Tools</td>
</tr>
<tr>
<td>Groundstone</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

*Counts reflect artifacts selected through sampling, not total assemblage size.
LA 17041 is located on the northern side of the US 82, across the highway from LA 118318 and east of LA 120950. This site had the smallest number of surface artifacts (n=41) in the APE of the four sites within the cluster. However, 18 features and over 1,000 artifacts were observed during survey. Additionally, the site extends for approximately 200 m north of the US 82 right-of-way. Only a small portion of the site falls within the APE for the current undertaking, and the majority of that area has been previously disturbed by road construction and associated maintenance. As a result, the lithic assemblage at LA 17041 is not representative of the site as a whole and is therefore dismissed in the following discussions. It should be noted, however, that a heavily reworked Tularosa Corner-notched projectile point (100 B.C. to A.D. 900; Justice 2002:216-226) was collected from the surface of the site. The temporal range of the point type coincides with the radiocarbon ages from the dated features, placing the occupation of the site firmly in the Early Formative period.

**Surface versus Subsurface Artifacts**

One manner in which to compare the assemblages at these sites is to examine the ratios of surface to subsurface artifacts. This could inform on a number of topics such as possible differences in depositional patterns, geomorphology, and site formation processes to name a few. Table 46 below depicts counts, average weight, average maximum dimension, and presence/absence of cortex on all debitage recovered from surface and subsurface deposits at the Bear Grass Draw Cluster. At all four sites, surface artifacts tend to be larger in both size and weight, but less numerous than subsurface artifacts. As stated above in the discussion of LA 83680, this is often attributed to collection bias, wherein larger and heavier flakes are more frequently collected due to their visibility. While conducting subsurface excavations, a higher proportion of smaller flakes are caught and collected in 1/8-inch screen, resulting in smaller average size and weight. The presence/absence of cortical retention is variable in surface and subsurface contexts between the sites. At LA 118318, LA 120949, and LA 120950, non-cortical flakes are predominant in both surface and subsurface contexts, although it should be noted that a higher proportion of cortical flakes was collected from the surface of each of these sites.

**Inter-site Variability**

Chert, quartzite, chalcedony, and rhyolite comprise the majority of each assemblage at LA 118318, LA 120949, and LA 120950. The remainder of this analysis therefore focuses on these raw materials in attempt to determine whether any inter-site variation is present in the assemblage that may shed light on different site functions, activities, and technological practices. An examination of the percentage of cortical retention within each of these raw material types at each site reveals that approximately 75 percent of flakes of each material lack cortex (Table 47). The exception to this is chalcedony flakes, which at LA 120949 show a higher proportion of cortical flakes. Despite this slight variation, there does not appear to be any substantial difference in the amount of cortical retention between the sites or raw material types which suggests that the lithic assemblages at these sites may be a continuous distribution resulting from similar technological reduction practices.
Table 46 – Overview of Surface versus Subsurface Debitage Metrics from the Bear Grass Draw Cluster

<table>
<thead>
<tr>
<th>LA 17041</th>
<th>Count</th>
<th>Average Weight (g)</th>
<th>Average Maximum Dimension (mm)</th>
<th>Cortex Absent</th>
<th>Cortex Present</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>14 (36.8%)</td>
<td>15.81</td>
<td>23.20</td>
<td>3 (21.4%)</td>
</tr>
<tr>
<td></td>
<td>Subsurface</td>
<td>24 (63.2%)</td>
<td>2.11</td>
<td>15.12</td>
<td>14 (58.3%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>38</td>
<td>7.16</td>
<td>18.10</td>
<td>17 (44.7%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LA 118318</th>
<th>Count</th>
<th>Average Weight (g)</th>
<th>Average Maximum Dimension (mm)</th>
<th>Cortex Absent</th>
<th>Cortex Present</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>117 (12.9%)</td>
<td>5.73</td>
<td>21.80</td>
<td>70 (59.8%)</td>
</tr>
<tr>
<td></td>
<td>Subsurface</td>
<td>792 (87.1%)</td>
<td>1.54</td>
<td>15.46</td>
<td>626 (79.0%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>909</td>
<td>2.08</td>
<td>16.27</td>
<td>696 (76.6%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LA 120949</th>
<th>Count</th>
<th>Average Weight (g)</th>
<th>Average Maximum Dimension (mm)</th>
<th>Cortex Absent</th>
<th>Cortex Present</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>122 (31.9%)</td>
<td>7.80</td>
<td>28.24</td>
<td>68 (55.7%)</td>
</tr>
<tr>
<td></td>
<td>Subsurface</td>
<td>261 (68.1%)</td>
<td>2.10</td>
<td>15.50</td>
<td>211 (80.8%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>383</td>
<td>3.92</td>
<td>19.21</td>
<td>279 (72.8%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LA 120950</th>
<th>Count</th>
<th>Average Weight (g)</th>
<th>Average Maximum Dimension (mm)</th>
<th>Cortex Absent</th>
<th>Cortex Present</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>56 (16.2%)</td>
<td>3.84</td>
<td>21.57</td>
<td>40 (71.4%)</td>
</tr>
<tr>
<td></td>
<td>Subsurface</td>
<td>289 (83.8%)</td>
<td>1.32</td>
<td>13.96</td>
<td>240 (83.0%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>345</td>
<td>1.73</td>
<td>15.20</td>
<td>280 (81.2%)</td>
</tr>
</tbody>
</table>
Table 47 – Proportions of Cortical Retention at LA 118318, LA 120949, and LA 120950

<table>
<thead>
<tr>
<th>Material Type</th>
<th>LA 118318</th>
<th>LA 120949</th>
<th>LA 120950</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cortex Absent</td>
<td>Cortex Present</td>
<td>Count</td>
</tr>
<tr>
<td>Chert</td>
<td>548 (76.4%)</td>
<td>169 (23.6%)</td>
<td>717</td>
</tr>
<tr>
<td>Quartzite</td>
<td>88 (78.6%)</td>
<td>24 (21.4%)</td>
<td>112</td>
</tr>
<tr>
<td>Chalcedony</td>
<td>41 (74.5%)</td>
<td>14 (25.5%)</td>
<td>55</td>
</tr>
<tr>
<td>Rhyolite</td>
<td>16 (76.2%)</td>
<td>5 (23.8%)</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>693 (76.6%)</td>
<td>212 (23.4%)</td>
<td>905</td>
</tr>
</tbody>
</table>

**Flake Types**
As mentioned earlier, debitage was categorized according to type, which includes complete flakes, as well as fragments (proximal, distal, medial, lateral) and angular debris. Complete flakes are well-suited to comparison between materials as all attributes are preserved, whereas fragments can present skewed data relative to metrics such as length, width, thickness. Regardless, differences in maximum dimension and weight between material types remain useful for comparative purposes, as debitage dimensions and weight are highly replicable attributes that have been shown to correlate with stage of reduction, reduction strategy, and other aspects of lithic technological organization (Andrefsky 1998). Repeatedly at each site, quartzite and rhyolite are larger than chalcedony across all metrics for both complete flakes and flake fragments (Table 48). This, however, is not surprising as quartzite and rhyolite...
are more coarse-grained than chert and tend to naturally fracture into larger flakes. Chert also comprises the majority of the debitage assemblages at these sites, and appears to have been much more intensively targeted and reduced as a raw material type. Complete chert flakes tend to be smallest at LA 118318. This is likely due to more intensive occupation, and therefore more intensive lithic reduction with a greater emphasis on tool production, in this portion of the project area. The size and weight of chalcedony debitage appears somewhat variable between the three sites, although this could be the result of small sample size.

Table 48 – Comparison of Average Flake Metrics between Chert, Chalcedony, Quartzite and Rhyolite

<table>
<thead>
<tr>
<th></th>
<th>LA 118318</th>
<th></th>
<th>LA 120949</th>
<th></th>
<th>LA 120950</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Complete Flakes</td>
<td>Flake Fragments/Debris</td>
<td>Complete Flakes</td>
<td>Flake Fragments/Debris</td>
<td>Complete Flakes</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>Average Length</td>
<td>Average Width</td>
<td>Average Thickness</td>
<td>Average Weight</td>
</tr>
<tr>
<td>Chert</td>
<td>71</td>
<td>13.23</td>
<td>11.69</td>
<td>3.30</td>
<td>1.42</td>
</tr>
<tr>
<td>Chalcedony</td>
<td>8</td>
<td>9.81</td>
<td>9.93</td>
<td>2.31</td>
<td>0.39</td>
</tr>
<tr>
<td>Quartzite</td>
<td>6</td>
<td>20.57</td>
<td>16.82</td>
<td>6.09</td>
<td>3.91</td>
</tr>
</tbody>
</table>
Table 49 – Platform Types among Bear Grass Draw Debitage

<table>
<thead>
<tr>
<th></th>
<th>Material</th>
<th>Multi-facet</th>
<th>Single Facet</th>
<th>Cortical</th>
<th>Collapsed/crushed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 118318</td>
<td>Chert</td>
<td>62</td>
<td>60</td>
<td>18</td>
<td>14</td>
<td>154</td>
</tr>
<tr>
<td></td>
<td>Quartzite</td>
<td>10</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Chalcedony</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Rhyolite</td>
<td>2</td>
<td>4</td>
<td>-</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Obsidian</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>83</td>
<td>75</td>
<td>23</td>
<td>20</td>
<td>201</td>
</tr>
<tr>
<td>LA 120949</td>
<td>Chert</td>
<td>37</td>
<td>32</td>
<td>3</td>
<td>9</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Quartzite</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Chalcedony</td>
<td>4</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Rhyolite</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>48</td>
<td>42</td>
<td>5</td>
<td>12</td>
<td>107</td>
</tr>
<tr>
<td>LA 120950</td>
<td>Chert</td>
<td>50</td>
<td>49</td>
<td>11</td>
<td>-</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Quartzite</td>
<td>10</td>
<td>11</td>
<td>1</td>
<td>-</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Chalcedony</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Rhyolite</td>
<td>6</td>
<td>5</td>
<td>-</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Basalt</td>
<td>2</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Obsidian</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>81</td>
<td>74</td>
<td>13</td>
<td>2</td>
<td>170</td>
</tr>
</tbody>
</table>
Platform Types

At LA 118318, platforms are present on 201 pieces ofdebitage. Multi-facet platforms (n=83) are most numerous, comprising 41.3 percent of the assemblage, followed by single facet (n=60; 29.9%) (Table 49). Cortical platforms (n=23) and collapsed/crushed platforms (n=20) comprise 21.4 percent of the assemblage. Chert exhibits relatively equal proportions of multi-facet (n=62) and single facet (n=60), with 18 cortical and 14 collapsed/crushed platforms. At LA 120949, platforms are present on 107 pieces of debitage, and again multi-facet platforms (n=48) are most numerous comprising 44.8 percent of the assemblage, followed by single facet platforms (n=42; 39.25%). At this site, chert also exhibits relatively equal proportions of multi-facet (n=37) and single facet (n=32) platforms, with only three cortical and nine collapsed/crushed platforms. These patterns are also reflected at LA 120950, where 170 pieces ofdebitage retain platforms. In this assemblage, 81 flakes (n=47.6%) exhibit multi-facet platforms, while 74 (43.5%) exhibit single-facet platforms. Once again, there are relatively equal proportions of multi-facet (n=49) and single facet (n=50) platforms among the chertdebitage, with only 11 artifacts exhibiting cortical platforms. These patterns reflect a lack of substantial differences in platform types between the assemblages collected from the Bear Grass Draw cluster, suggesting that the assemblages at LA 120949 and LA 120950 are extensions of the larger and denser assemblage at LA 118318. The predominance of single and multi-facet platforms across all material types in the assemblage also suggests a focus on late stage reduction likely related to tool manufacture.

Spatial Clustering at LA 120949

At LA 120949, the majority of debitage located on the surface (n=107; 87.7%) were recovered from the far western portion of the site suggesting a locus of activity in this area. As a result, test unit excavations were concentrated in this area. Two features were also identified in this site, including a potential storage pit (Feature 7) and a hearth (Feature 8). Charcoal from these features yielded radiocarbon dates of 540–390 B.C. and A.D. 400–540. These features date much earlier than other features within the Bear Grass Draw cluster, which largely dated to the middle and late parts of the Early Formative period. Thus, it appears that the western portion of LA 120950 could represent an activity area dating to the late part of the Late Archaic and early part of the Early Formative period. As noted above, surface artifacts are not necessarily accurate reflections of subsurface deposits. This is certainly the case at LA 120949 where surface debitage is substantially larger in both dimension (7.80 mm average) and weight (28.24 g) versus subsurface debitage which averaged 2.10 mm in maximum dimension and 15.50 g in weight. Subsurface debitage recovered from test unit excavations in this area could potentially demonstrate whether the debitage assemblage in this portion of LA 120949 differs from other portions of the Bear Grass Draw cluster. As this part of the site dates in part to the Late Archaic, it should be expected that debitage would be smaller and less cortical than in other portions of the cluster.

Chert is the dominant material type at LA 120949, accounting for 71.8 percent of the total recovered debitage assemblage. A total of 258 pieces of debitage were recovered from test unit excavations in the western portion of LA 120949. Chert comprises 75.6 percent of the subsurface assemblage in this portion of the site, followed by quartzite (15.5%), chalcedony (6.2%) and rhyolite (2.7%). At LA 118318, chert comprises 80.4 percent of the subsurface assemblage, and accounts for 67.8 percent of subsurface debitage. There is therefore some variation between the sites, although it should be expected that a Late
Archaic activity area would exhibit the highest proportion of chert given the high quality of this material and its favored use for biface or formal tool production relative to lower quality materials such as quartzite and rhyolite. Of the 258 subsurface artifacts at LA 120949, 209 (81.0%) are non-cortical while the remaining 19 percent retain some degree of cortex. This proportion is similar to the proportion of non-cortical subsurfacedebitage at LA 118318 (79.0%) and LA 120950 (83.0%). Examining only chert, as this is clearly the favored raw material within the cluster, it is apparent that there are no substantial differences in average size (Table 50). However, the subsurface chert assemblage at LA 120950 exhibits the lowest average size and substantially lower average weight than either LA 118318 or LA 120949. While it is possible that the western end of LA 120949 may have functioned as a Late Archaic to Early Formative activity area predating the remainder of the Bear Grass Draw cluster, this is not reflected in the debitage assemblage from this portion of the site, which is largely similar in all characteristics to debitage recovered from the rest of the cluster. This portion of the site is the lowest in elevation, and the landform slopes upward to the east. It is therefore possible that the clustering of surface and subsurface materials at the western end of LA 120949 is a result of post-occupation displacement through alluvial activity, which may have relocated artifacts downslope to their current location.

**Table 50 – Average Maximum Dimension and Average Weight of Chert Recovered from Subsurface Contexts at LA 118318, LA 120949, and LA 120950**

<table>
<thead>
<tr>
<th>Site</th>
<th>Count</th>
<th>Average Maximum Dimension</th>
<th>Average Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 118318</td>
<td>637</td>
<td>15.39</td>
<td>1.41</td>
</tr>
<tr>
<td>LA 120949</td>
<td>195</td>
<td>14.78</td>
<td>1.93</td>
</tr>
<tr>
<td>LA 120950</td>
<td>196</td>
<td>12.74</td>
<td>0.80</td>
</tr>
</tbody>
</table>

**Summary of Debitage**

The debitage assemblage from the Bear Grass Draw cluster provides some insight into the nature of human activity in this area. The assemblage as a whole is fairly uniform between the three analyzed sites, and this pattern likely also continues at LA 17041 in areas outside the APE. Although no distinct spatial patterning or activity areas could be discerned through the assemblage, the area around Feature 6 at LA 118318 was clearly a locus for domestic activities and exhibits the highest density and number of artifacts in the project area. These sites as a whole are located at the northern extent of a larger cluster of sites along the eastern terrace of Bear Grass Draw, and LA 118318 may represent the northernmost locus of habitation. This may explain the more limited number of artifacts recovered from LA 120949 and LA 120950, although it is possible that the differences in artifact counts between these sites are a function of the limited sample area that the study corridor provides. For example, as noted earlier, LA 17041 extends over 200 m north of the APE, and over 1,000 surface artifacts and 18 features were observed during survey.
At each of the sites within the cluster, chert was the preferred raw material, accounting for 78.8 percent of the assemblage at LA 118318, 71.8 percent of the assemblage at LA 120949, and 67.2 percent of the assemblage at LA 120950. Quartzite, chalcedony, and rhyolite also occur at these sites in lesser proportions, along with a small number of other materials such as siltstone, limestone, petrified wood, and obsidian. Within these assemblages cortex is absent on approximately 75 percent of debitage in all material types. Multi-facet and single-facet platforms are the dominant platform type at each site. Chert debitage on average was smaller in size and weight than chalcedony and rhyolite, a pattern that is to be expected given the coarse-grained nature of rhyolite, the higher amount of inclusions and fracture planes in chalcedony, and the likelihood of both material types to generate larger waste flakes. From subsurface contexts, chert debitage ranged from 12.74 mm in average maximum dimension at LA 120950 to 15.39 mm in average maximum dimension at LA 118318. The results of this analysis generally suggest that lithic technology in the Bear Grass Draw cluster focused on late stage reduction likely geared toward the manufacture of formal tools such as bifaces and projectile points.

**Flaked-Stone Tools**

Three projectile points were recovered from sites in the Bear Grass Draw cluster: one at LA 17041, one at LA 118318, and one at LA 120950. The projectile point from LA 118318 was recovered from TU 4 approximately 20 to 23 cm below ground surface. This point is an indeterminate white chert proximal fragment that has been heavily reworked and no longer retains diagnostic attributes that allow it to be typed (Figure 107). Two other projectile points were recovered in the Bear Grass Draw cluster from LA 17041 and LA 120950. Both are reworked tan chert Tularosa Corner-notched projectile points which date from around 100 B.C. to A.D. 700–900 (Figures 108 and 109). The point recovered from LA 17041 was collected from the surface of the site. It measures 32 mm in length, 27 mm in width, 5 mm in thickness and weighs 3.63 g. The point is complete with an irregular base, and is heavily reworked on both blade margins. The point recovered from LA 120950 was found in TU 4 at a depth of 25 to 35 cm below ground surface. It measures 28 mm in length, 26 mm in width, 5 mm in thickness, and weighs 3.60 g in weight. The date range of these points is consistent with the radiocarbon dates produced from features within the cluster, and further supports an intensive Early Formative occupation on the terraces east of Bear Grass Draw.

![Figure 107 – Indeterminate projectile point recovered from LA 118318](image)
A total of nine cores were collected from sites in the Bear Grass Draw Cluster, three each from LA 118318, LA 120949, and LA 120950. The assemblage includes three chert cores, three quartzite cores, two chalcedony cores, and one petrified wood core (Table 51). Four of these objects were found in subsurface contexts while the remainder were collected from the surfaces of the sites. Seven of the nine cores are nearly exhausted. The remaining two cores are large quartzite cores with four to six flake scars and 25 to 40 percent cortex. All cores appear unstandardized, meaning that they are randomly and opportunistically flaked with no apparent patterning or specific flake-removal strategy. Eight of the cores exhibit multidirectional flaking, while the remainder exhibits bi-directional flaking although it does not constitute a true “biface core”. The high proportion of small, nearly exhausted cores relative to larger cores exhibiting less flake removal is consistent with the patterns described above for the flaked-stone debitage at the Bear Grass Draw cluster, in that lithic technology primarily appears to be focused on late-stage reduction, possibly in association with formal tool manufacture. The cores themselves may have been used as tools, and at least two cores in the assemblage exhibit possible use wear along their angular margins.
Table 51 – Description of Cores Recovered from Sites in the Bear Grass Draw Cluster

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Length</th>
<th>Width</th>
<th>Thickness</th>
<th>Weight</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 118318</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown Chert</td>
<td>39.46</td>
<td>27.95</td>
<td>32.31</td>
<td>36.53</td>
<td>Fragment, less than one-half original piece size, 7-10 multidirectional flake scars, 30 percent cortex, nearly exhausted</td>
</tr>
<tr>
<td>Tan Chert</td>
<td>61.95</td>
<td>5.51</td>
<td>35.49</td>
<td>91.75</td>
<td>Complete core with over 10 multidirectional flake scars, no cortex, nearly exhausted (Figure 110)</td>
</tr>
<tr>
<td>Brown Quartzite</td>
<td>66.21</td>
<td>65.86</td>
<td>67.46</td>
<td>491.72</td>
<td>Large multidirectional core with 4 to 6 flake scars, 40 percent cortex</td>
</tr>
</tbody>
</table>

| LA 120949                   |        |       |           |        |                                                                          |
| Purple Quartzite            | 59.25  | 43.22 | 49.09     | 191.10 | Complete core with 4 to 6 bi-directional flake scars, 25 percent cortex   |
| Gray Chalcedony             | 44.9   | 36.72 | 21.35     | 32.10  | Complete core, moderate quality material, 7 to 10 flake scars, multiple hinge fractures present, no cortex, nearly exhausted |
| Gray Chalcedony             | 45.18  | 37.53 | 30.65     | 54.90  | Complete core, poor quality material, over 10 flake scars, multiple hinge fractures, no cortex, nearly exhausted |

| 120950                      |        |       |           |        |                                                                          |
| Tan Petrified Wood          | 38.11  | 28.59 | 20.7      | 19.10  | Complete core, over 10 multidirectional flake scars, banding visible in material, 30 percent bark-like cortex, one possible used edge, nearly exhausted (Figure 111) |
| Black, Red, and Cream Banded Chert | 42.08  | 32.89 | 28.3      | 36.50  | Complete core, 7 to 10 multidirectional flake scars, swirls of red, gray, and cream visible in material, multiple angular fractures, 40 percent cortex, nearly exhausted (Figure 112) |
| Purple Quartzite            | 21.84  | 15.79 | 10.3      | 4.00   | Complete small core, 7 to 10 multidirectional flake scars, no cortex, possible use wear along one margin, nearly exhausted |
Figure 110 – Nearly exhausted tan chert core recovered from LA 118318

Figure 111 – Nearly exhausted petrified wood core recovered from LA 120950

Figure 112 – Black, red, and cream banded chert core recovered from LA 120950
Only two bifaces were collected from the Bear Grass Draw cluster, one from the surface of LA 118318 and one from TU 5 at LA 120949. The biface from LA 118318 is moderate-quality, dark gray chert and measures 38 mm in length, 28 mm in width, 8 mm in thickness, and weighs 7.87 g. It is a distal fragment with irregular convex margins that meet at a rounded point (Figure 113). In profile, the margins are also irregular and the object is not well thinned, indicating that it was in the middle stages of the reduction process when it was deposited. Step fractures are present on both surfaces, likely as a result of the moderate quality of the material. The biface recovered from LA 120949 is in an even earlier stage of reduction. It is a complete, moderate-quality, gray chert biface measuring 70 mm in length, 42 mm in width, 20 mm in thickness, 56.1 g in weight, and exhibits approximately 20 percent cortex. This early stage biface features irregular margins that taper to a blunt point (Figure 114). Flake scarring is also irregular, with only five to six flake scars on each surface.

Figure 113 – Biface fragment recovered from LA 118318

Figure 114 – Early-stage biface recovered from LA 120949
Four scrapers were recovered and analyzed from the Bear Grass Draw cluster: three from LA 118318 and one from LA 120949. All four were recovered from the modern ground surface. They range in length from 21 to 62 mm. Three are complete, non-cortical, unifacial scrapers with 45- to 75-degree edge angles. The smallest of these is a thumb scraper found on the surface of LA 118318 (Figure 115). Another a brown siltstone scraper with heavy unifacial retouch along several irregular margins, two of which converge into a drill-like tip (Figure 116). All of the scrapers are unifacial and generally ovoid in shape, with flat planar surfaces and convex to irregular margins. All are fashioned from modified flakes. Based on the steep edge angle of these tools, the scrapers were most likely used for plant processing as opposed to hide scraping.

![Figure 115 - Scraper recovered from surface of LA 118318](image)

![Figure 116 - Scraper recovered from surface of LA 120949](image)

Four hammerstones were recovered in the Bear Grass Draw cluster, one from LA 118318, two from LA 120949, and one from LA 120950. All four hammerstones are quartzite, and exhibit battering along their poles and margins (Figures 117 and 118). They range from 70 to 78 mm in length and 45 to 450 g in weight. The objects were likely procured locally from nearby drainages, as all exhibit waterworn cortex. The presence of these hammerstones indicates that hard-hammer percussion occurred on site. Typically, this type of percussion is utilized early in lithic reduction to remove large flakes that can then be shaped into various expedient tools. The hammerstones may have also been used to shape and rejuvenate groundstone objects such as metates. As noted above, the debitage from the Bear Grass Draw cluster appears to represent later-stage reduction that would more typically be associated with soft hammer bone billets. It is possible that easily accessible hammerstones were left at the site, but that soft hammer billets were more curated items.
Two retouched flakes were recovered from the surface of LA 118318. One of the flakes is a high-quality, brown petrified wood flake measuring 37 mm in length, 28 mm in width, 22 mm in thickness and 19.16 g in weight. It exhibits continuous, bifacial retouch along the platform and lateral margins, and a 60- to 75-degree edge angle. The other retouched flake is a purple quartzite flake of moderate quality measuring 20 mm in length, 16 mm in width, 10 mm in thickness, and 4.01 g in weight. Unifacial retouch occurred on the distal end of the specimen, which may be an early stage scraper or expedient tool. Generally, the paucity of retouched or edge-modified flakes at Bear Grass Draw is somewhat surprising, although it is likely that a number of such tools are present in the unsampled portion of the LA 118318 debitage assemblage. The lack of retouched flakes tends to support the hypothesis that lithic technology at Bear Grass Draw was more focused on formal tool manufacture rather than expedient tool production.
Groundstone

A total of 149 groundstone tools were analyzed from the Bear Grass Draw assemblage, including a sample of 114 objects from LA 118318, as well as all 26 groundstone tools recovered from LA 120949 and nine from LA 120950. The majority of groundstone objects (n=104) are small, indeterminate tabular sandstone fragments measuring less than 50 mm in maximum dimension, and exhibiting no evidence of formal shaping or grinding. It is possible given the easily eroded nature of sandstone that the ground surfaces are now exfoliated. Regardless, no sandstone outcrops are present in the vicinity of the project area, meaning that the objects themselves were transported to the site from some distant source location. Given the coarse texture of the raw material, these objects could have been utilized for any number of grinding tasks.

The handstone assemblage within the Bear Grass Draw cluster includes 29 manos (19 from LA 118318, five from LA 120949, and five from LA 120950), two polishing stones (one from LA 118318 and one from LA 120950) and two abraders from LA 118318. All but four of the manos were recovered from modern ground surface. Quartzite is the most prominent raw material type (n=14), followed by sandstone (n=8) rhyolite (n=3), indeterminate igneous (n=3), and limestone (n=1). Four of the objects are complete manos (Figures 119–121), four are fragments representing over half of the original piece, and the remainder are fragments representing less than half of original piece. These latter fragments are largely of indeterminate shape due to their small size and frequent lack of margins. All exhibit a moderate to high degree of polishing. The complete manos include two quartzite, one sandstone, and one igneous mano. All except for the sandstone mano exhibit battering along their margins and poles, indicating multi-functionality and use as both grinding stones and battering/bashing implements. The complete sandstone mano features a groove that may have been used for abrading. The sandstone mano fragments are both more tabular and more coarsely grained than the quartzite manos, and most are pecked to shape along their margins. Rejuvenation pecking is also present on the margins. The quartzite, rhyolite, and other igneous manos are circular to ovoid in planview, and convex in shape. These finer-grained materials exhibit a higher degree of polishing than the sandstone manos. The exception is one very formal mano fragment recovered from LA 120949 which is intensely ground and polished on one surface (Figure 122). Although the fragment is less than one half of the original piece size, it is possible that it was a two-hand mano based on its shape. On average, the sandstone mano fragments tend to be slightly larger, in length and width, and heavier than the quartzite mano fragments, although these metrics may not be representative of any larger pattern given that the majority of the manos are fragmented (Table 52). Most likely, sandstone and quartzite/igneous manos were utilized differently, and may be associated with processing different types of plant resources. However, the macrobotanical remains from the excavated features offer scant data regarding subsistence plants.
Table 52 – Average Dimensions of Quartzite and Sandstone Manos and Mano Fragments

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Average Length (mm)</th>
<th>Average Width (mm)</th>
<th>Average of Thickness (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartzite</td>
<td>14</td>
<td>64.43</td>
<td>47.23</td>
<td>36.71</td>
<td>126.61</td>
</tr>
<tr>
<td>Sandstone</td>
<td>8</td>
<td>74.13</td>
<td>54.05</td>
<td>27.37</td>
<td>215.65</td>
</tr>
</tbody>
</table>

*Figure 119 – Sandstone mano recovered from LA 118318 with possible abrading groove on left-hand face*

*Figure 120 – Complete quartzite mano recovered from LA 118318; note battering along margins*
The two polishing stones recovered from the Bear Grass Draw cluster consist of one quartzite polishing stone recovered from the surface of TU 18 at LA 118318 and one quartzite polishing stone recovered from the surface of LA 120950. The polishing stone recovered from LA 118318 is complete and ground to an ovoid shape, measuring 68 mm length, 43 mm in width, 23 mm in thickness and 100.3 g in weight. All surfaces are intensely ground and exhibit high polish. The polishing stone from LA 120950 is a complete, naturally shaped ovoid cobble that measures 71 mm in length, 40 mm in width, 25 mm in thickness, and 114.1 g in weight. It exhibits a flat grinding surface with moderate polish and parallel striations. Both artifacts were likely used for smoothing and polishing vessels during ceramic manufacture. The two abraders recovered from LA 118318 measure 78 and 117 mm in maximum dimension. Both are sandstone fragments. One exhibits a beveled edge with use-wear striations, while the other is wedge shaped in profile. As noted above, it is possible that many of the small, sandstone fragments of indeterminate function could also have been used for a variety of grinding or abrading tasks, although they appear less formal in shape than the two abraders just described.
Five metate fragments were recovered from the Bear Grass Draw cluster: one from LA 118318 and four from LA 120949. The metate fragment recovered from LA 118318 is less than one half the original piece size, and measures 142 mm in length, 117 mm in width, 52 mm in thickness and 725.3 g in weight. It is slightly concave in profile, with a 10-cm-diameter grinding surface. It is moderately ground and exhibits evidence of rejuvenation pecking. The four metate fragments recovered from LA 120949 are all sandstone and range in size from 27 to 126 mm in maximum dimension. The smallest is a very small fragment with one intact grinding surface. The ground surface is slightly concave and highly polished. The largest is a highly weathered lateral fragment measuring 126 mm in length, 116 mm in width, 45 mm in thickness and over 1.0 kilograms in weight. It features a flat grinding surface with light striations, light polishing, and light rejuvenation pecking, and is pecked to shape along one intact lateral margin. Two other lateral fragments were recovered from LA 120949. One is tabular in shape with a flat grinding surface, lightly ground with no visible striations or polish. It measures over 110 mm in maximum dimension, 725 g in weight, and it is unclear if it was intentionally shaped. The fourth metate recovered from LA 120949 is the lateral fragment of a sandstone basin metate with a pronounced concave grinding surface that tapers in thickness from an intact, bulbous margin that is pecked to shape (Figure 123). It is 85 mm in maximum dimension, 25 to 35 mm in thickness, and 248.7 g in weight. The ground surface is pecked and exhibits parallel striations. No polish is evident, although it is possible that it once contained a polished surface that has now been exfoliated. In addition to the metates, 11 groundstone artifacts recovered from LA 118318 were classified as tabular tools. All are sandstone. Based on their size and shape, they appear to be netherstones, and may have functioned as slab metates, lapstones, or palettes. These objects lack any direct evidence of grinding such as a striated or polished surface, and do not appear to be intentionally shaped.

![Figure 123 – Basin metate fragment recovered from LA 120949](image)

As discussed above, the goal of groundstone analysis was to help address research themes presented in the Research Design section of this report and, if possible, determine the types of foods that were processed, the intensity of grinding activities, and the degree of strategic tool design. Unfortunately, the defining characteristic of the groundstone assemblage is its poor condition and high degree of fragmentation, particularly among sandstone artifacts. Only four complete manos were recovered, along with two complete polishing stones. Because most of these fragments retain few technological attributes, many of the goals of the analysis could not be achieved. For example, the size of grinding surfaces could
only be determined on a small number of artifacts, and this attribute was ultimately not useful for assessing grinding extensiveness. Form, morphology, and design characteristics could be determined on very few artifacts. The assemblage exhibits some variation in raw material selection. For example, quartzite cobbles comprise the majority of the handstone assemblage, while all identified netherstones, including the five metates, are manufactured from sandstone. It is unclear if these differences are related to raw material availability, or if they result from undetermined preferential or functional differences between these material types. Sandstone also exhibits a greater degree of strategic design. When intact margins are present on sandstone tools, they are invariably pecked to shape, whereas the majority of quartzite groundstone are simply naturally occurring ovoid cobbles exhibiting no formal shaping as their natural shape is already suited for use as a handstone. Generally, the groundstone items in the Bear Grass Draw cluster lack attributes that would allow for better placement in functional categories beyond mano, metate, and indeterminate. Lastly, no spatial patterning could be identified in the distribution of groundstone objects across the three sites, although this may in part be a pattern of the “noise” created by the high degree of fragmentation among sandstone objects.

Summary

Lithic artifacts were recovered from each of the five sites east of the Bear Grass Draw cluster. At three of these sites (LA 15901, LA 104182, and LA 137120) few artifacts were recovered during excavation. At LA 15901, a Pueblo Side-notched point (A.D. 1150–1500) was recovered 90 to 100 cm below ground surface, along with a biface that was recovered 40 to 50 cm below ground surface, and a groundstone fragment that was recovered from the modern ground surface. These three artifacts reveal little about the nature of lithic technology at the site, not only because the sample size is small, but also because each artifact was recovered from a different stratigraphic context. An examination of material outside the current study area is needed to better characterize its lithic assemblage and draw inferences about site type and function. At LA 104182, a single basin metate fragment was recovered during mechanical excavation, and no radiocarbon dates were produced from the investigations at this site. Six lithic artifacts were found at LA 137120: four from the surface of the site and two from test unit excavations. Thirty-six pieces ofdebitage were found on the surface of the site during survey. Although the assemblage collected during the current investigation is small, when examined in conjunction with the artifacts observed during survey, the overall assemblage suggests that the LA 137120 functioned as a small lithic reduction locale. No radiocarbon dates were produced from this site, and it is unclear whether the lithics at this site represent a curated technology associated with Archaic period residential mobility, or if they are associated with knapping activities during later logistical encampment.

A total of 48 lithic artifacts were recovered from LA 89659, including 46 pieces ofdebitage and two cores. Generally, thedebitage is small and lacks cortex, suggesting a focus on late stage reduction and formal tool manufacture that represents a curated technology. Typically, in the Southwest, curated technology is attributed to Archaic period residential mobility. However, in the Mescalero Plain of southeastern New Mexico, this mobile lifeway is thought to have persisted throughout the Early Formative period and into the Late Formative (Railey 2016, 2017). A radiocarbon assay from the site produced a date range of A.D. 660–770, and one Chupadero Black-on-white (A.D. 1050–1550) ceramic was recovered. The curated technology—reflecting high residential mobility—represented by the lithic
assemblage at LA 89659 tends to support the notion that high residential mobility persisted well beyond the Archaic period in the Mescalero Plain.

Numerous radiocarbon dates were produced from features at LA 83680, and these range from A.D. 260 to A.D. 880. Additionally, a Temporal projectile point (A.D. 400–900) and a variety of ceramics were recovered from the site, including El Paso Brownware (A.D. 400–1450), Jornada Brownware (A.D. 520–1400) and Chupadero Black-on-white (A.D. 1050–1550). The site appears to have been repeatedly reoccupied throughout the latter portion of the Late Archaic, Early Formative, and Late Formative periods. A total of 236 lithic artifacts were collected during this investigation. This assemblage includes 219 pieces of lithicdebitage, eight flaked stone tools, and nine groundstone objects. As a whole, the diversity of the lithic assemblage at LA 83680 indicates that a variety of activities took place at the site throughout its occupation, including hunting, plant/animal process, food preparation, and stone tool manufacture.

At the Bear Grass Draw cluster, we initially thought, based on the volume of surface artifacts and features, that the four sites represented a permanent or semi-permanent habitation area. We therefore expected evidence of a more expedient lithic technology at this location, represented by larger flakes, greater cortical retention, and use of more marginal materials such as quartzite and rhyolite. In general, thedebitage in the Bear Grass Draw cluster is comparable in size and cortical retention to the sites east of Bear Grass Draw (i.e., LA 83680 and LA 89659), and does not appear to reflect a notable change towards an expedient technology that would be expected at a habitation site. Both formal and informal tools were identified, along with numerous cores, several of which were nearly exhausted. Crude bifaces and scrapers were recovered, along with numerous expediently used pieces of sandstone that were likely used for a wide variety of grinding or abrading tasks. Several quartzite manos were also found, along with a fragment of a formally shaped trough metate. The lack of clear evidence for a shift towards expedient technology, along with a lack of features such as habitation structures and storage pits, strongly suggests to us that the Bear Grass Draw cluster does not represent a habitation locale. Rather, the material evidence suggests repeated temporary occupation of the area over hundreds of years, creating a palimpsest of overlapping materials and non-contemporaneous features. Occupants of the region likely returned to locations along the Draw repeatedly throughout prehistory as a semi-reliable source for water and riparian resources.

To summarize, thedebitage within the Bear Grass Draw cluster does not reflect an expedient technology as would be expected. Rather, the lithic assemblage reflects a more curated technology, suggesting a continuation of a residentially mobile settlement pattern. The proximity of these sites to a water course that likely flowed at least intermittently during the Early and Late Formative periods likely made this location an attractive place for temporary settlement. The sites farther to the east do not exhibit the same volume or diversity of lithic material. However, this is attributed to the notion that they were not as frequently reoccupied as sites along Bear Grass Draw as resources in these locations were likely not as reliable. In general, the results of the lithic analysis continue to support the notion that high residential mobility persisted in southeastern New Mexico from the Late Archaic into the Late Formative period, and that shifts from curated to expedient lithic technology are not as pronounced in this region as in other parts of the state.
ARCHAEOBOTANICAL

By Pamela McBride

A total of 21 soil sediment samples from eight of the nine sites (LA 15901, LA 17041, LA 83680, LA 89659, LA 118318, LA 120949, LA 120950, and LA 137120) were selected for analysis. Archaeobotanical analysis of material from these sites involved flotation processing, full-sort analysis, and quantification with charred material considered culturally modified. A full documentation of methodology and analysis can be found in Plant Remains from Data Recovery along US 82, Eddy County, New Mexico (2017) (see Appendix D). Table 53 provides a summary of the features that were analyzed, feature types, and identified cultural plant materials with additional results summarized from McBride 2017 below.

Table 53 – Summary of Analyzed Flotation Samples

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Feature No(s.)</th>
<th>Feature Type</th>
<th>Cultural Plant Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 15901</td>
<td>Feature 3</td>
<td>Hearth</td>
<td>Mesquite Wood</td>
</tr>
<tr>
<td>LA 15901</td>
<td>Feature 4</td>
<td>Hearth</td>
<td>Mesquite Wood</td>
</tr>
<tr>
<td>LA 17041</td>
<td>Feature 19</td>
<td>Hearth</td>
<td>Goosefoot Seed, Mesquite Wood</td>
</tr>
<tr>
<td>LA 17041</td>
<td>Feature 20</td>
<td>Hearth</td>
<td>Goosefoot Seed, Yucca Caudex, Mesquite Wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 6B</td>
<td>Burned-Caliche Dump</td>
<td>Mesquite Wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 10</td>
<td>Hearth</td>
<td>Goosefoot Seed, Yucca Caudex, Mesquite Wood, Saltbush Wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 11</td>
<td>Hearth</td>
<td>Yucca Caudex, Cholla Wood, Mesquite Wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 19</td>
<td>Hearth</td>
<td>Mesquite Wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 20</td>
<td>Hearth</td>
<td>Goosefoot Seed, Dropseed Grass Seed, Yucca Caudex, Javelina Bush Wood, Mesquite Wood</td>
</tr>
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<td>LA 89659</td>
<td>Feature 9</td>
<td>Hearth</td>
<td>Mesquite Wood</td>
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<td>LA 118318</td>
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<td>Mesquite Wood</td>
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<td>Hearth</td>
<td>Goosefoot Seed, Mesquite Wood</td>
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<td>Feature 23</td>
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<td>Goosefoot Seed, Mesquite Wood</td>
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<td>LA 118318</td>
<td>Feature 25</td>
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<td>Goosefoot Seed, Purslane Seed, Mesquite Wood</td>
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<td>LA 118318</td>
<td>Feature 26</td>
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<td>Goosefoot Seed</td>
</tr>
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<td>LA 118318</td>
<td>Feature 27</td>
<td>Hearth</td>
<td>Purslane Seed, Mesquite Wood, Saltbush Wood</td>
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<td>LA 120949</td>
<td>Feature 7</td>
<td>Storage Pit</td>
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<td>Feature 5</td>
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<tr>
<td>LA 137120</td>
<td>Feature 1</td>
<td>Hearth</td>
<td>None</td>
</tr>
</tbody>
</table>


Site Summaries

The following summaries describe the archaeobotanical results from each site.

**LA 15901**

Two side by side thermal features were examined for plant remains. Non-cultural uncharred seeds in the legume family were recovered from Feature 4 and the only charred material was mesquite wood.

**LA 17041**

Flotation samples from two other side by side thermal features were analyzed from LA 17041. Charred goosefoot seeds were recovered from both features and yucca caudex from Feature 20. Yucca caudex consists of fragments from the base of the yucca stalk or caudex where leaf bases have either broken off when the plant dies and dries up or that have been cut off. The recovery of these fragments could be evidence for the use of leaf succulents as food or as fuel or firestarter. Mesquite was the only wood taxon identified.

**LA 89659**

The sample from the Feature 9 hearth produced unburned dropseed grass seeds and mesquite wood.

**LA 83680**

Goosefoot and dropseed grass seeds along with yucca caudex fragments were recovered from three of the five features examined for plant material. Unburned dropseed grass seeds were identified in Feature 19 along with mesquite wood. Mesquite wood was also recovered from the burned caliche dump (Feature 6B). Small quantities of wood that resembled cholla, as well as javelina bush and saltbush were found in the other three features along with mesquite.

**LA 118318**

Flotation samples were analyzed from a roasting pit and five hearths at LA 118318. Charred goosefoot seeds were identified in Features 22, 23, 25, and 26, while carbonized purslane seeds were found in Features 25 and 27. Non-cultural seed taxa included goosefoot, hidden flower, dropseed grass, and panic grass. The wood assemblage was entirely mesquite with the exception of one fragment of saltbush from Feature 27. Features 25, 26, and 27 were in close proximity of each other and the archaeobotanical assemblage may indicate that weedy annuals were processed in the features.

**LA 120949**

The probable storage pit (Feature 7) produced only mesquite wood and the Feature 8 hearth yielded unburned goosefoot seeds and four pieces of mesquite wood.

**LA 120950**

Charred goosefoot seeds were recovered from both features at LA 120950; unburned goosefoot was identified as well along with unburned dropseed grass. The wood assemblage from Feature 5 (described
as the most well-defined feature on the site) was diverse, including wood that resembled cholla, mesquite, and saltbush. Wood from Feature 3 consisted entirely of mesquite.

**LA 137120**

The sample that was analyzed from Feature 1 (a sediment stain) was devoid of any plant material, charred or otherwise.

**Discussion**

Charred weedy annual taxa were present at four of the eight sites and include goosefoot and purslane. These were found in very small quantities, making interpretation difficult. The seeds could be present as a result of “kitchen accidents” during preparation steps that might have included parching. However, the seeds could have blown into fires and were burned inadvertently. The seeds of goosefoot and purslane were parched, ground into meal, and often made into a thick gruel (Castetter 1935:16, 23, 30); their presence in flotation samples may indicate preparation in this way.

Only one charred dropseed grass seed was recovered from the project, presenting similar difficulties with interpretation. The ground seeds of dropseed grass were used by the Navajo to make dumplings, rolls, and griddle cakes, and the Hopi ground the seeds and mixed them with cornmeal (Castetter 1935:28). Even though dropseed grass grains are very small, the positive qualities of abundant seed production and the retention of the grains by the plant after maturation—preventing their loss before harvesting (Doebly 1984)—probably outweighed the problem of small seed size. Again, the single grass grain could have blown into the thermal feature or was carbonized during processing for food.

Yucca caudex was recovered at LA 17041 and LA 83680 and could be evidence for the use of leaf succulents as food at the two sites. Ethnobotanical accounts compiled by Bell and Castetter (1941) describe the collection of young flower stalks of *Y. glauca* by the Mescalero Apache. They were roasted on a bed of embers for a short time (about 15 minutes) and then the burned portion was scraped away, leaving the central, white portion which was regarded as the best part of the plant. The crowns were also gathered by the same group, from mid-March to the end of summer. “The portion between the ground and the leaves was peeled and baked overnight in an underground oven” (Bell and Castetter 1941:19), applying a method similar to that used for roasting agave hearts. The product of this process was then dried in the sun and stored for future use when pieces were softened in water to render them edible. The caudex fragments or leaf bases could represent residue from preparing the stems or crowns as described above. Equally plausible is the possibility that the very dry, easily gathered material was used as tinder.

Without a doubt, the wood assemblages from the project area sites reflect foraging of local stands of shrub species, foremost of which was mesquite. Mesquite’s admirable fuel qualities (it is a dense wood providing “a bed of hot, slow burning coals” [Ford 1977:200]) are most likely responsible for prehistoric preference for this resource.

Comparison of the US 82 archaeobotanical results with those of NM 128 (McBride and Toll 2016) near Carlsbad, indicates that although preservation was not optimal at NM 128, the carbonized plant assemblage from thermal features at NM 128 was much more diverse. A number of perennial taxa were
recovered including prickly pear cactus, hedgehog cactus, horse crippler cactus, and mesquite. Like at US 82 sites, goosefoot and purslane seeds as well as yucca caudex were recovered from NM 128 features, but in addition, hidden flower, amaranth, cheno-am, carpetweed, and aster family seeds were found.

Flotation and macrobotanical wood samples from NM 128 were primarily mesquite, but a few samples were dominated by lotebush (*Ziziphus obtusifolia*), a close relative in the same family as javelina bush that was recovered from LA 83680.

Although shinnery oak acorns would have been an easily gathered source of protein, they were absent from both projects and acorns in general are conspicuously absent from most Southwest archaeobotanical assemblages. On the rare occasion when they are recovered from sites, they are often unburned, rodent-gnawed specimens in caves or dry shelters, where their presence may not be related to prehistoric subsistence at all (e.g., Adams and Huckell 1986:297). Three sites from southeastern New Mexico provide some evidence of acorn utilization. In the WIPP core area to the southeast of the current project and just down the road from the NM 128 project, both charred and uncharred acorn nutshell fragments were recovered from two features (dating to A.D. 260 + 150 and A.D. 670 + 60) at ENM 10230 (Lord and Clary 1985). Floral material recovered from a subterranean structure (LA 2112) date to the A.D. 1300–1350 occupation of the site and included 34 oak cotyledons and two acorns (Ford 1976). Why the occupants of either site compared did not apparently use the acorns of the shinnery oak stands that were nearby is a mystery. It would seem that US 82 inhabitants focused on annual seeds and possibly yucca crowns and those who utilized the NM 128 features targeted annuals and yucca as well, but also exploited cacti and mesquite.

**Summary and Conclusions**

Results for three of the seven sites with carbonized plant material do not offer any interpretational possibilities aside from indicating that site occupants were using mesquite for fuel. Prehistoric inhabitants of LA 17041, LA 83680, LA 118318, and LA 120950 could have been processing annual seeds and/or dropseed grass and the presence of yucca caudex at LA 17041 and LA 83680 suggests the use of this resource for tinder or the possibility that the stems or crowns were roasted for consumption. Although wood assemblages were slightly more diverse, the only feature that contained more than two taxa was the Feature 5 hearth at LA 120950. Evidence for the use of shinnery oak acorns, mesquite pods, or cacti was absent from the record. Perhaps, these sites served as camps or brief overnight stops for groups on their seasonal rounds to mountain foothills and higher elevation basins for exploitable resources.
CHAPTER 9: INTER-SITE SYNTHESIS

This chapter addresses the research issues described in Chapter 4 – Research Design as presented earlier in this volume. The research design for this investigation centered around six research domains including Chronology and Cultural Affiliation, Chronology and Occupational History, Site/Feature Function, Subsistence, Mobility and Interregional Interaction, and Post-Depositional Effects on Thermal Features. A synthesis of information from the current investigation pertaining to each of these domains is presented below.

RESEARCH DOMAINS 1 AND 2: CHRONOLOGY, CULTURAL AFFILIATION, & OCCUPATIONAL HISTORY

Research Domains 1 and 2 both deal with site chronology and occupation. Research Question 1 deals with the cultural and temporal affiliation of the sites within the US 82 project area. Related questions address issues of possible multiple affiliations including Archaic or Paleoindian; narrowing the occupational range of sites; and how sites relate to broader cultural patterns of the region. Research Question 2 deals with the occupational history of the sites. Related questions include when each site was established and abandoned; identifying multiple site occupations; if sites were occupied contemporaneously; and how sites may fit into broader chronological patterns of the region. Given the related nature of these research areas, the two research domains are addressed together in this section.

Evidence of Paleoindian occupation was not discovered during the investigation. Sites LA 15901, LA 83680, and LA 120949 contained features that dated to the Late Archaic period. The ceramics found during the investigation include Jornada Brownware, El Paso Brownware, Jornada Plain Slipped Redware, and Chupadero Black-on-white. These ceramic types are commonly affiliated with the Jornada Mogollon in southeastern New Mexico and, as described below, show evidence of components ranging from the Early Formative to the Late Formative.

Data to address questions of chronology and occupational history is derived from multiple sources including radiocarbon dates from site features, diagnostic projectile points, and diagnostic ceramic types. Additional information was also obtained from ceramics using various morphological traits to improve chronological resolution beyond just the production span of a particular ceramic type (Carmichael 1986; Russell 2010; Seaman and Mills 1988; Speth and LeDuc 2007; Whalen 1978 and 1993). Similarly, the distinction between mobile hunting and gathering or a more sedentary adaptation, which corresponds to a transition from the Archaic period into the Formative in many areas, can be seen in the organization of lithic technology (Vierra 2005). However, as discussed in Chapter 8, a mobile hunting and gathering adaptation persisted in the Mescalero Plain throughout both the Archaic and Early Formative periods and extended into the Late Formative. As such, the general characteristics of the lithic assemblage are not used as a chronological indicator in this section. Table 54 below summarizes this data from each site.
## Table 54 – Summary of Chronological Data (using Railey’s 2013 Chronology)

<table>
<thead>
<tr>
<th>Site LA No.</th>
<th>Radiocarbon Dates</th>
<th>Projectile Points</th>
<th>Ceramic Types</th>
<th>Ceramic Assemblage Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 118318</td>
<td>A.D. 1020–1160</td>
<td>Indeterminate projectile point Noted during survey: Tularosa Corner-notched (100 B.C.–A.D. 900)</td>
<td>El Paso Brown (A.D. 400–1450) \ Jornada Brown (A.D. 520–1400) \ Chupadero Black-on-white (A.D. 1050–1550) \ Jornada Plain Slipped Red (A.D. 700–1350)</td>
<td>Late portion of the Early Formative \ Early portion of the Late Formative</td>
</tr>
<tr>
<td>LA 120949</td>
<td>A.D. 400–540</td>
<td>N/A</td>
<td>El Paso Brown (A.D. 400–1450) \ Jornada Brown (A.D. 520–1400) \ Chupadero Black-on-white (A.D. 1050–1550)</td>
<td>Late portion of the Early Formative \ Early portion of the Late Formative</td>
</tr>
<tr>
<td></td>
<td>540–390 B.C.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA 15901</td>
<td>540–380 B.C.</td>
<td>Pueblo Side-notched (A.D. 1150–1500)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>390–200 B.C.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA 89659</td>
<td>A.D. 660–770</td>
<td>N/A</td>
<td>Chupadero Black-on-white (A.D. 1050–1550)</td>
<td>N/A</td>
</tr>
<tr>
<td>LA 104182</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>LA 137120</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Site-Specific Chronological Discussion

Below is a discussion of each site pertaining to the research questions listed above and described in Chapter 4. For each site, temporal affiliations are identified, along with the possibility of multiple components. Additional refinements for the period of site occupation (see Table 54) are also described to the extent possible.

LA 17041

Two radiocarbon dates from two separate features at LA 17041 revealed very similar date ranges. The first was from Feature 19 which provided a calibrated date range A.D. 780–790 (5.5%), A.D. 800–850 (11.3%), and A.D. 860–980 (78.6%). The second date, from Feature 20, provided a calibrated date range of A.D. 780–790 (1.7%), A.D. 810–840 (1.9%), and A.D. 860–1000 (91.8%). Considering the highest percentage probabilities, Feature 19 would date from A.D. 860–980 and Feature 20 would date from A.D. 860–1000. Both of these date ranges are within the later portion of the Early Formative period.

This date range is also consistent with the diagnostic artifacts and assemblage characteristics from the site. A Tularosa Corner-notched point was recovered during surface collection and the date range from the features overlap with the later portion of the production span for this projectile point type. While the dates of the features and the point do overlap, it is also at least possible that the point was produced much earlier, perhaps as early as the Late Archaic.

The feature dates are also within the production period for both Jornada and El Paso Brownware. Further, based on the analysis of El Paso Brownware temper size and volume presented in Chapter 8, the brownware assemblage was likely produced within the first half of the type’s production span, within the Early Formative period. Similarly, the rim sherd index for the single Jornada Brownware rim sherd indicates production within the later portion of the Early Formative or the early portion of the Late Formative period.

These various lines of evidence indicate a single component for LA 17041 within the project APE dating to the later portion of the Early Formative period. Although an Archaic component is possible based on the Tularosa Corner-notched point, it is more likely the point was produced during the Early Formative period, consistent with the feature dates and the ceramic assemblage. It should also be noted that much of the site extends beyond the project APE and additional components may exist outside the project area. Further, LA 17041 is part of a larger conglomerate of sites—along with LA 118318, 120949, and 120950—near Bear Grass Draw that are separated only by modern features such as roads or well pads. When considered as a whole, the four sites show evidence of components dating from the Archaic through the Late Formative.

LA 118318

Six radiocarbon dates from six separate features at LA 118318 provided dates ranging in age from A.D. 780–1200. One feature (Feature 22) dates between A.D. 780–980 while the remaining features date somewhat later at A.D. 1020–1160 (Features 14, 26, and 27), A.D. 1030–1160 (Feature 23), and A.D. 1030–1200 (Feature 25). This information suggests that LA 118318 is a multi-component site dating to
the later portion of the Early Formative period and the first half of the Late Formative period. The features also represent separate, non-overlapping uses of the site.

This information is also consistent with the diagnostic artifacts and assemblage characteristics from the site. An Early Formative component is supported by the presence of a Tularosa Corner-notched point (noted during outside the current APE during survey but not collected as part of the current investigation) while a Late Formative component is supported by the presence of Chupadero Black-on-white pottery. Jornada Plain Slipped Red pottery was also present at the site and spans the transition from Early to Late Formative with a production range of A.D. 700–1350. Similarly, the analysis of El Paso Brownware temper indicated the assemblage dates to the middle portion of this pottery type’s production span, which is consistent with the late Early Formative to early Late Formative periods.

These various lines of evidence indicate multiple components for LA 118318 within the project APE dating to both the Early Formative and Late Formative periods. Although an Archaic component is possible based on the Tularosa Corner-notched point, it is more likely the point was produced during the Early Formative period, consistent with the ceramic assemblage and one of the feature dates. It should also be noted that much of the site extends beyond the project APE and additional components may exist outside of the project area. Further, LA 118318 is part of a larger conglomerate of sites—along with LA 17041, 120949, and 120950—near Bear Grass Draw that are separated only by modern features such as roads or well pads. When considered as a whole, the four sites show evidence of components dating from the Archaic through the Late Formative.

**LA 120949**

Two radiocarbon dates from two separate features at LA 120949 revealed dates from the Late Archaic period. Feature 7 dated to A.D. 400–540 while Feature 8 dated to 540–390 B.C. Although Feature 8 is firmly within the Archaic period, Feature 7 dates to the terminal portion of the period and could also represent an Early Formative component. Regardless, the features represent separate, non-overlapping uses of the site.

These date ranges vary somewhat from the diagnostic artifacts and assemblage characteristics of the site. Temporally diagnostic projectile points were not recovered from LA 120949; however, the presence of Chupadero Black-on-white sherds indicate a Late Formative component and, based on an analysis of temper size, the El Paso Brownware assemblage was likely produced during both the Early and Late Formative periods.

These various lines of evidence indicate multiple components for LA 120949 within the project APE dating to the Late Archaic, Early Formative, and Late Formative periods. However, it should be noted that much of the site extends beyond the project APE and additional components may exist outside the project area. Further, LA 120949 is part of a larger conglomerate of sites—along with LA 17041, 118318, and 120950—near Bear Grass Draw that are separated only by modern features such as roads or well pads. When considered as a whole, the four sites show additional evidence of components dating from the Archaic through the Late Formative.
**LA 120950**

Two radiocarbon dates from two separate features at LA 120950 revealed dates from the Early Formative period. Feature 3 provided a calibrated date range of A.D. 970–1050 (82.4%), A.D. 1090–1130 (10.4%), and A.D. 1140–1150 (2.6%) while Feature 5 dated to A.D. 780–970. Both features date to the Early Formative period; however, they indicate two distinct, non-overlapping uses of the site.

The date ranges from the two features are consistent with most of the diagnostic artifacts and assemblage characteristics of the site, although the presence of Chupadero Black-on-white pottery also indicates the possibility of a later component. A Tularosa Corner-notched point was recovered during excavation and the date range from the features overlap with the later portion of the production span for this projectile point type. While the dates of the features and the point do overlap, it is also at least possible that the point was produced much earlier, perhaps as early as the Late Archaic.

The feature dates are also within the production period for both Jornada and El Paso Brownware. Based on the analysis of temper, the El Paso Brownware assemblage was likely produced during the first half of the type’s production span, within the Early Formative period.

The presence of Chupadero Black-on-white is indicative of a Late Formative component. However, only a single Chupadero sherd was recovered from the site. While this could be incidental to the overall artifact assemblage, much of the site extends beyond the APE and additional evidence of a Late Formative site component may exist in portions of the site that were not investigated.

These various lines of evidence definitively indicate an Early Formative period component for LA 120950 with the possibility of a Late Formative component as well, similar to LA 17041 which is adjacent to the east. Although an Archaic component is possible based on the Tularosa Corner-notched point, it is more likely the point was produced during the Early Formative period, consistent with the feature dates and the ceramic assemblage. It should also be noted that much of the site extends beyond the project APE and additional components may exist outside the project area. Further, LA 120950 is part of a larger conglomerate of sites—along with LA 17041, 118318, and 120949—near Bear Grass Draw that are separated only by modern features such as roads or well pads. When considered as a whole, the four sites show evidence of components dating from the Archaic through the Late Formative.

**LA 15901**

Two radiocarbon dates from two separate features at LA 15901 revealed dates from the Late Archaic period. Feature 3 provided a calibrated date range of 540–530 B.C. (1.2%) and 520–380 B.C. (94.2%) while Feature 4 dated to 390–350 B.C. (31.3%) and 320–200 B.C. (64.1%). The only other temporally diagnostic artifact recovered from the site was a Pueblo Side-notched projectile point dating between A.D. 1300–1500. Previous documentation of the site also noted a limited amount of undifferentiated brownware sherds.

These various lines of evidence indicate at least a Late Archaic period component and a Late Formative component. However, it should be noted that much of the site extends beyond the project APE and additional components may exist outside the project area.
**LA 83680**

Five radiocarbon dates from five separate features at LA 83680 provided dates ranging in age from A.D. 260–880 as indicated below.

- Feature 6B dated to A.D. 260–270 (1.1%), A.D. 330–470 (85.8%), and A.D. 490–530 (8.5%)
- Feature 10 dated to A.D. 420–560
- Feature 11 dated to A.D. 430–490 (10.6%), A.D. 530–640 (84.8%)
- Feature 19 dated to A.D. 680–780 (61.3%), A.D. 790–880 (34.1%)
- Feature 20 dated to A.D. 410–550

While these features date to the Late Archaic and Early Formative periods, later components are also evidenced by diagnostic artifacts and assemblage characteristics. A diagnostic Temporal-style projectile point was recovered during surface collection. This point type dates to A.D. 400–900 and corresponds to the Early Formative period. Analysis of the El Paso Brownware temper indicates the ceramics were likely produced in the later portion of the Early Formative.

The presence of Chupadero Black-on-white is indicative of a Late Formative component. However, only a single Chupadero sherd was recovered from the site. While this could be incidental to the overall artifact assemblage, much of the site extends beyond the APE and additional evidence of a Late Formative site component may exist in portions of the site that were not investigated. These various lines of evidence indicate Late Archaic and Early Formative period components for LA 83680 with the possibility of a Late Formative component as well.

**LA 89659**

A single feature was radiocarbon dated from LA 89659 and returned a date of A.D. 660–770. This places the site within the Early Formative period. The only other diagnostic artifact recovered during excavation was a single Chupadero Black-on-white sherd. The presence of Chupadero Black-on-white is indicative of a Late Formative component. While this could be incidental to the overall artifact assemblage, much of the site extends beyond the APE and additional evidence of a Late Formative site component may exist in portions of the site that were not investigated. Additionally, previous documentation of the site also noted a Bajada projectile point dating to the Archaic period. These various lines of evidence indicate LA 89659 dates to the Early Formative period with Archaic and Late Formative components also possible.

**LA 104182 and LA 137120**

Temporally diagnostic artifacts or dateable features were not discovered for either of these sites during the current investigation or previous surveys. Both sites retain an unspecified prehistoric temporal affiliation.
Regional Chronological Patterns

This section discusses the possibility of sites being occupied contemporaneously and provides an overview of how the sites relate to broader cultural and chronological patterns of the region. Four sites within the project area are clustered approximately a half mile from Bear Grass Draw. The sites, from west to east along the north side of the road, are LA 120949, LA 120950, and LA 17041. These sites are paralleled along the south side of US 82 by LA 118318. The earliest feature dates extend into the Archaic period and date to 540–390 B.C. and A.D. 400–540. These two features are found in LA 120949 along the north side of the road and farthest to the west (closest to Bear Grass Draw) of all the dated features. Three of the four remaining feature dates on the north side of US 82 are from the Ninth Century A.D. with the fourth feature dating to A.D. 970–1150. This is in contrast to LA 118318 on the south side of the road where five out of six dated features returned a radiocarbon date between A.D. 1020–1200. Only one of the LA 118318 features dated to the Ninth Century. Despite these differences, three of the four sites (LA 17401, LA 118318, and LA 120950) have feature dates that overlap. However, rather than separate sites that were occupied contemporaneously, it is more likely that the site boundaries are a modern arbitrary distinction and that the entire area was temporarily occupied on a seasonal basis for generations to access and process the resources found near Bear Grass Draw. Temporally diagnostic artifacts and assemblage characteristics are generally consistent with the radiocarbon date ranges but do not provide a specific enough time frame to discuss contemporaneous site occupation.

The remaining five sites (LA 15901, LA 83680, LA 89659, LA 104182, and LA 137120) are located approximately 10 miles east of the Bear Grass Draw cluster along US 82. The five sites are spread out along approximately 4 miles and do not exhibit the same clustering pattern as the sites near Bear Grass Draw. Neither LA 104182 nor LA 137120 contained temporally diagnostic artifacts and cannot be assessed with regard to contemporary occupation with other sites. However, the dated features from LA 15901, LA 83680, and LA 89659 all pertain to the Late Archaic and very Early Formative periods. These features date to 540–200 B.C. at LA 15901 while features at LA 83680 and LA 89659 date to A.D. 260–880. The majority of the dated features are earlier than the concentration of Ninth and Eleventh Century dates noted at the Bear Grass Draw cluster. Two features in particular, Feature 19 from LA 83680 and Feature 9 from LA 89659, have similar date ranges between A.D. 660–880.

While the features from the eastern sites all date to relatively early prehistoric periods in the region, it should be noted that other chronological indicators (diagnostic projectile points and ceramics) from the sites indicate the possibility of later components. However, given the extended amount of time associated with the diagnostic artifacts (often four to five centuries), assessing site contemporaneity in any detail is not possible for these later periods.

Throughout the region, the Archaic period is characterized by a highly mobile hunting and gathering existence focused on exploiting a wide range of plant resources and game within a seasonal migration pattern (Condon 2008, Railey 2013). Throughout the Early and Late Formative periods, degrees of increased sedentism were noted during times of drought when populations would aggregate near perennial water sources (Railey 2013). Eventually, during the Late Formative period, in some parts of Southeast New Mexico, a permanent residential existence was established. However, in far Southeast...
New Mexico along the Mescalero Plain, an adaptation of seasonal mobility persisted throughout the Late Formative (Whitehead and Flynn 2017).

The sites associated with the current investigation include components from the Late Archaic period through the Late Formative and are generally interpreted as temporary logistical camps associated with resource procurement and processing (see Research Domain 3 below). This is seen in the technological organization, feature types, and spatial organization of the sites. Even though several of the sites have components dating to the Late Formative, the lithic assemblage shows evidence of a formal curated technology reflected by high-quality materials and relatively small debitage size. This style of technological organization is generally associated with a mobile adaptation. Features discovered during the excavation were mostly interpreted as either hearths or general thermal features. The lone exception to this is Feature 7 of LA 120949 which was possibly used for storage. The fact that the overwhelming majority of features were used for food processing and there is no indication of permanent habitation structures indicates a highly mobile adaptation. Finally, even in sites with a high density of artifacts and substantial artifact class variation (such as LA 118318) the sites were manifested as an extensive smear of A horizon sediments with random placement of hearth features and no evidence of organized site development such as middens or specialized activity areas within. This all suggests the area was used as a palimpsest of the same resource procurement and processing activities over hundreds of years.

This is consistent with the chronological patterns of the broader region as reported by Railey (2013), who identifies a correlation between increased moisture and expansion into marginal landscapes such as the Mescalero Plain. Railey cites wetter and cooler conditions from the mid to first millennium B.C. and again from A.D. 300–700 before hitting shorter dry and wet cycles after A.D. 700. A wetter period again occurred in the early A.D. 800s while the period from A.D. 900–1000 was a dry period during which populations appear to have congregated at reliable water sources such as the Pecos River or mountain slope areas (Railey 2013). This pattern of being “tethered” to reliable water sources persisted into the Late Formative when climatic conditions fluctuated frequently between wet periods and drought. This is generally consistent with the dates from sites excavated during the current investigation which clustered in the first millennium B.C., A.D. 800–900, and between A.D. 1020–1200.

The later dates from the Bear Grass Draw sites (five features dating to A.D. 1020–1200, as well as the A.D. 860–980 [78.6%] date from LA 120950), could indicate that the draw was a relatively consistent water source during dry periods. This may explain why all the dates from the sites further east were from relatively wet periods in the region’s prehistory while the Bear Grass Draw sites included dates from wet periods, dry periods, and periods of rapid oscillation between wet and dry.
RESEARCH DOMAIN 3: SITE/FEATURE FUNCTION

Research Domain 3 addresses site and feature function with research questions pertaining to the identification of human activities conducted across the sites and within defined use areas of sites. Related questions address the activities that occurred at each site; the residential or logistical use of sites; whether specific use areas are present within sites; and the function of features.

Site Function

Activities conducted at the Bear Grass Draw site cluster are consistent among the four sites (LA 17041, 118318, 120494, and 120950). Each of these sites contains a number of hearth features composed of burned caliche and stained soil, relatively consistent macrobotanical remains from the features, a chipped-stone assemblage indicative of a more formalized technology, ceramics, and groundstone. Combined with an absence of residential structures, defined use areas, and storage features (with the possible exception of Feature 7 from LA 120949), this assemblage suggests a logistical use of the area focused on resource procurement and processing. While macrobotanical evidence was limited to mesquite wood, saltbush, goosefoot and purslane seeds, and yucca caudex, several other resources were likely available and processed including mesquite beans, agave root, shinnery oak acorns, Indian ricegrass, and dropseed grass.

LA 118318 also contained a broad area of A-horizon soils with a high density of artifacts and features. While the lack of residential, storage, or midden features would indicate a temporary and seasonal occupation, the variety and density of artifacts indicate a more intensive occupation of this area. In particular, the ceramic assemblage indicates that a broader range of activities occurred at this site than at others in the cluster. The ratio of decorated wares to utility wares and the ratio of cooking to serving vessels are both consistent with expectations for residential sites (see Chapter 8). The size of the ceramic assemblages from the other sites was not sufficient for meaningful comparisons of this sort. This could indicate that LA 118318 represents a relatively intensive occupation of longer duration, perhaps serving as a base camp within a larger pattern of residential mobility. Also, as the decorated sherds used for this analysis were all Chupadero Black-on-white, this more intensive use of the site would pertain to the Late Formative period (A.D. 1100–1450). This date range is also consistent with five out of the six radiocarbon dates that were obtained from the site.

It should be noted though that all sites investigated contain large, substantial deposits outside of the project APE that were not excavated. Additional investigation of the site areas beyond the current APE would be needed before definitive conclusions could be drawn.

LA 83680 and LA 89659, located well to the east of Bear Grass Draw, both contain hearth features and ceramics. Radiocarbon dates from both sites date to the Early Formative period and macrobotanical remains included dropseed grass seeds, goosefoot seeds, yucca caudex, and mesquite wood. Groundstone was also recovered from LA 83680. This information implies a temporary seasonal occupation of the sites focused on resource acquisition and processing. LA 83680 and LA 89659 do not represent the same level of intensive occupation as the Bear Grass Draw sites and were likely more temporary in nature or used less often.
LA 15901 contained three hearth features, groundstone, and two flaked-stone tools. The features dated to the Late Archaic period and macrobotanical analysis revealed remains of charred mesquite wood. While the cultural deposits are minimal, they would suggest the site functioned as a short-term camp focused on resource procurement and processing somewhat earlier than other sites in the project area.

LA 104182 and LA 137120 both returned minimal remains during excavation. A single metate fragment was recovered from LA 104182 and six flakes were found at LA 137120. Based on the limited amount of material recovered from these sites, it is difficult to draw meaningful conclusions concerning site function. However, it should be noted, for these and all other sites within the project area, that additional resources may exist outside of the project APE that could provide additional insight into questions of site and feature function.

**Feature Function**

A total of 53 features, the vast majority being interpreted as hearth features, were identified and excavated. The hearth features are discussed below, followed by a discussion of additional feature types.

**Hearth Features**

Thirty-five features were interpreted as hearths. These features were composed of either burned caliche, stained soil, charcoal, or some combination thereof. Fifteen of these features were excavated at LA 118318, eight were from LA 83680, four from LA 120950, three from LA 15901, two from LA 17041, and one each from LA 89659, LA 120949, and LA 137120. These features generally range in size from 20 to 70 cm in diameter, often with a basin profile that is 10-20 cm thick, and many of the hearth features were excavated into the paleosol.

In several instances, two or more hearth features were located near each other and at approximately the same elevation. Within these paired features, one was often much denser with feature fill, charcoal, well oxidized boundaries, and generally better preserved than the other. It looked as if the two features represented different aspects of the food preparation process. For instance, one feature may have been used to prepare charcoal or heat rocks and the second feature would act as the processing or roasting pit. This method of cooking is often associated with ring middens, large features composed of burned rock and ash that were used to process agave or yucca. While the features within the project area are not ring middens, they could represent a form of pit baking. Pit baking was common throughout the region after Paleoindian times, occurred in a wide variety of configurations, and was used to cook both meat and plant foods (Whitehead and Flynn 2017:33).

This pattern of paired features was observed at LA 15901, Features 3 and 4; LA 17041, Features 19 and 20; LA 83680, Features 10 and 11 and 19 and 20; LA 118318, Features 25, 26, and 27; and LA 120949, Features 7 and 8. To explore the question of inter-related features, radiocarbon samples and macrobotanical analysis were conducted from samples of these paired features. The results of these analyses and various other characteristics such as feature depth and size were then reviewed to see if any patterns existed. This information is summarized in Table 55 below.
<table>
<thead>
<tr>
<th>Site No.</th>
<th>Feature No.</th>
<th>Size (cm)</th>
<th>Depth (cm bgs)</th>
<th>Date</th>
<th>Macrobotanical</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 15901</td>
<td>Feature 3</td>
<td>66x56</td>
<td>~100</td>
<td>540–530 B.C. (1.2%) 520–380 B.C. (94.2%)</td>
<td>Mesquite wood</td>
</tr>
<tr>
<td>LA 15901</td>
<td>Feature 4</td>
<td>46x33</td>
<td>~100</td>
<td>390–350 B.C. (31.3%) 320–200 B.C. (64.1%)</td>
<td>Mesquite wood</td>
</tr>
<tr>
<td>LA 17041</td>
<td>Feature 19</td>
<td>40x50</td>
<td>30</td>
<td>A.D. 780–790 (5.5%) A.D. 800–850 (11.3%) A.D. 860–980 (78.6%)</td>
<td>Goosefoot seed, Mesquite wood</td>
</tr>
<tr>
<td>LA 17041</td>
<td>Feature 20</td>
<td>40x40</td>
<td>30</td>
<td>A.D. 780–790 (1.7%) A.D. 810–840 (1.9%) A.D. 860–1000 (91.8%)</td>
<td>Goosefoot seed, Yucca caudex, Mesquite wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 10</td>
<td>65x55</td>
<td>14</td>
<td>A.D. 420–560</td>
<td>Goosefoot seed, Yucca caudex, Mesquite wood, Saltbush wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 11</td>
<td>52x50</td>
<td>11</td>
<td>A.D. 430–490 (10.6%) A.D. 530–640 (84.8%)</td>
<td>Yucca caudex, Cholla wood, Mesquite wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 19</td>
<td>43x50</td>
<td>&gt;100</td>
<td>A.D. 680–780 (61.3%) A.D. 790–880 (34.1%)</td>
<td>Mesquite wood</td>
</tr>
<tr>
<td>LA 83680</td>
<td>Feature 20</td>
<td>52x50</td>
<td>&gt;100</td>
<td>A.D. 410–550</td>
<td>Goosefoot seed, Dropseed Grass seed, Yucca caudex, Javelina bush, Mesquite wood</td>
</tr>
<tr>
<td>LA 118318</td>
<td>Feature 25</td>
<td>63x60</td>
<td>~100</td>
<td>A.D. 1030–1200</td>
<td>Goosefoot seed, Purslane seed, Mesquite wood</td>
</tr>
<tr>
<td>LA 118318</td>
<td>Feature 26</td>
<td>55x55</td>
<td>~100</td>
<td>A.D. 1020–1160</td>
<td>Goosefoot seed</td>
</tr>
<tr>
<td>LA 118318</td>
<td>Feature 27</td>
<td>60x70</td>
<td>~100</td>
<td>A.D. 1020–1160</td>
<td>Purslane seed, Mesquite wood, Saltbush wood</td>
</tr>
<tr>
<td>LA 120949</td>
<td>Feature 7</td>
<td>125x130</td>
<td>19</td>
<td>A.D. 400–540</td>
<td>Mesquite wood</td>
</tr>
<tr>
<td>LA 120949</td>
<td>Feature 8</td>
<td>50x50</td>
<td>2</td>
<td>540–390 B.C.</td>
<td>Mesquite wood</td>
</tr>
</tbody>
</table>
The radiocarbon dates from Features 3 and 4 of LA 15901, Features 19 and 20 of LA 83680, and Features 7 and 8 of LA 120949 do not overlap. This indicates that the features at these sites are not related and their placement was coincidental. This led to a second question of why features discovered at the same relative depth did not have overlapping date ranges. One possibility could be that the A horizon did not yet exist at the site when it was occupied. Erosion may have exposed the paleosol within this portion of the landform prior to the formation of the A horizon. This may explain why the majority of features were excavated into the paleosol at the time of their use. Furthermore, seasonal use of the area and continued human movement across the landscape over centuries may have prevented the buried A horizon from forming. This would indicate that the A horizon did not form until after the site was abandoned.

Features 10 and 11 at LA 83680 exhibit only marginally overlapping dates. Feature 10 dates to A.D. 420–560 and Feature 11 most likely dates to A.D. 530–640, although there is also a 10.6-percent chance that it dates between A.D. 430 and 490. If the higher probability date for Feature 11 is used, then there is only a 30-year period where the features would overlap, however the potential for overlapping dates is much larger if the entire date range of Feature 11 is used. Of the two features, Feature 11 contained darker deposits. Feature 11 is also slightly smaller than Feature 10. Additionally, both features have evidence of yucca caudex as well as burned wood such as mesquite, saltbush, and cholla; however, only Feature 11 showed the remains of goosefoot seeds. Given the minimal chance for overlapping feature dates and the similarities among the feature characteristics, the potential relationship between Features 10 and 11 is unclear.

Features 19 and 20 from LA 17041 both show overlapping dates in the range of A.D. 860–980, were at the same elevation, and were separated horizontally by approximately 20 cm. Feature 20 contained darker feature fill and was slightly smaller than Feature 19. Both features contained goosefoot and mesquite with Feature 20 also containing yucca caudex.

Features 25, 26, and 27 from LA 118318 were originally noted as a single dense charcoal smear; however, as excavation was initiated it became clear that the smear was composed of three distinct elements. Features 25 and 27 had much darker fill than Feature 26. Both Features 25 and 27 contained evidence of burned mesquite while Feature 26 showed no evidence of burned wood. All three features showed some evidence of food material with goosefoot located in Features 25 and 26 and purslane in Feature 27. Feature 26 is located between Features 25 and 27 and may have served as a charcoal dump for the other hearths. This could explain the lighter feature fill and absence of burned wood in Feature 26.

Based on the information above, it appears that the features with substantially overlapping dates were found within a few cm of each other and at the same elevation. Features with marginally overlapping dates at LA 83680 were approximately 2 m apart while the features with non-overlapping dates range from 1.5 to 5 m apart. Functional differences among paired features is difficult to discern. While the absence of burned wood at LA 118318’s Feature 26 may be significant, future excavations of other spatially and temporally related features with richer macrobotanical deposits would be needed to better explore these relationships.
**Additional Feature Types**

The remaining features identified during excavation include five burned-caliche concentrations, three amorphous stains, one depression, one possible storage pit, and eight natural stains that were originally defined as features but were determined to be burned roots or rodent burrows upon excavation. Each feature type is discussed below.

All five burned-caliche concentrations were located at LA 83680 and were designated Features 3, 6, 9, 12, and 13. Features 3, 6, and 9 were defined during surface survey while Features 12 and 13 were identified during excavation. Features 3, 9, and 12 were located in dunal blowouts or along the sides of dunes and contained no feature fill or intact cultural remains. Feature 6 was located in the side of a dune and contained an irregular, slightly basin-shaped depression under some of the burned caliche. This portion of the feature was identified as Feature 6B and interpreted as a potential burned-caliche dump. Feature 13 was a concentration of burned caliche located within a disturbed area that appeared to be an old access road or pipeline scar. Excavation revealed no intact cultural deposits and the feature was likely redeposited due to mechanical disturbance. The remaining features are likely burned-caliche dumps from hearth features that were not preserved.

All three amorphous stains, identified during surface survey, were located at LA 118318. They ranged in size from 0.75 m to 4.2 m and were designated Features 4, 5, and 6. The features manifested as charcoal stains containing artifacts and burned caliche. However, after testing, it was determined that in each case the staining was an exposed A horizon mottled with cultural material. In each case, one or more smaller intact hearth features was discovered within the exposed A horizons.

The function of the depression, designated Feature 29 and located at LA 118318, is unclear. The lack of any intentional shaping appears to indicate that the feature is a natural depression likely created by water erosion. However, the presence of charcoal, charcoal-dense sediments, and its location within one of the largest known sites along Bear Grass Draw suggest cultural use, or at least a randomly preserved sample of cultural sediment. The natural depression may have served as a water catchment, also called Tinaja, or a naturally occurring depression advantageously used for storage.

The possible storage feature was designated Feature 7 and was located at the west end of LA 120949 near Bear Grass Draw. The feature measured 125 by 130 cm which was larger than most hearth features but generally smaller than the amorphous A horizons found at LA 118318. Sixteen pieces of flaked stone were discovered in association with the feature, including chert, chalcedony and quartzite of various colors. Radiocarbon assays dated the feature to A.D. 400–540 and macrobotanical analysis revealed burned mesquite wood within the sample matrix. Based on the size of the feature, the yellowish matrix, and the artifact density, Feature 7 is interpreted to be a prehistoric storage pit that was likely filled in with sediments and cultural materials from natural erosional processes. It should be noted that Feature 7 of LA 120949 is located approximately 45 m north of Feature 29 at LA 118318 described above. The individual nature of each of these features is unclear as is their potential relationship.

As indicated earlier, the remaining eight features were determined to be created from natural processes such as burned plant roots or rodent burrows. Five of these features were from LA 83680 and three were from LA 118318.
RESEARCH DOMAIN 4: SUBSISTENCE

Research Domain 4 addresses subsistence practices with research questions focused on identifying the plant and animal food resources that were collected, processed, and consumed at the sites. Related questions address the environmental conditions that may have influenced the high-density occupation of the area around Bear Grass Draw; how those conditions compare to today; and if there is evidence of corn production or consumption at the sites.

Direct evidence of subsistence practices includes faunal remains and macrobotanical materials. Only a limited amount of faunal remains (five bone fragments and four shell fragments) were found during excavation. These were found from three of the sites that form the cluster near Bear Grass Draw (LA 118318, 120949, and 120950). The bone fragments were too small to identify the animal type, although they most likely represent small mammals and the shell fragments most likely derived from freshwater mollusks inhabiting the Pecos River and its tributaries, possibly including Bear Grass Draw. It is also possible that the shell fragments derive from land snails, and could post-date the occupation of the site.

Macrobotanical analysis was conducted on 21 samples from eight of the nine sites in the project area (LA 15901, LA 17041, LA 83680, LA 89659, LA 118318, LA 120949, LA 120950, and LA 137120). Results of the analysis revealed a limited amount of plant resources. Wood materials used for fuel were composed of locally available shrub species dominated by mesquite but also including saltbush, javelina bush, and cholla. Charred weedy species suitable for food were found in small quantities but included goosefoot and purslane seeds, dropseed grass seeds, and yucca caudex. Both goosefoot and purslane seeds can be parched, ground into meal, and made into a thick gruel. Dropseed grass seed can be used to make dumplings or giddle cakes or mixed with cornmeal. Yucca caudex could be processed for eating through roasting. The yucca caudex could also have been used as tinder for starting fires. (Castetter 1935; Bell and Castetter 1941; reported in McBride 2017).

Evidence of non-charred remains was found for the bean family, hidden flower, and panic grass. Non-charred dropseed grass and goosefoot seeds were also noted. While these seeds were not culturally modified, they represent resources that were at least available prehistorically. Additional plant resources that were likely available to prehistoric inhabitants of the area but not noted in the macrobotanical samples include agave, mesquite pods, shinnery oak acorns, and various types of cactus. These resources have been documented from nearby excavations and throughout Southeast New Mexico (McBride 2017).

Indirect evidence of subsistence practices can be found in the artifact assemblage and site locations relative to environmental parameters. The groundstone and ceramic assemblages are the most relevant to this research domain. The groundstone assemblage is composed of 272 artifacts with a sample of 158 being analyzed for the current investigation. Inferences from the assemblage were limited by the fact that the vast majority of groundstone artifacts were indeterminate fragments. What could be inferred pointed to generalized grinding tools that could be used for a variety of food processing needs. One potential exception was a possible two-hand mano fragment from LA 120949. A two-hand mano is typically used with a trough metate. These artifacts require more strategic design and are often associated with processing corn. However, the mano fragment is less than 50 percent complete and could not be positively identified as a two-hand mano.
The locations of the sites within the project area were also reviewed to gain a general understanding of site locations relative to potential food resources. The sites in the project area can be divided into two groups with LA 17041, LA 118318, LA 120949, and LA 120950 clustered together near Bear Grass Draw and the remaining sites (LA 15901, LA 83680, LA 89659, LA 104182 and LA 137120) spread out over a wider area further to the east. The Bear Grass Draw sites are within a half mile of the bottom of the draw. This major drainage likely had a more regular flow during prehistoric times than it does today, and would have provided prehistoric occupants access to a variety of food resources. In contrast, the eastern sites are far from any major drainage or known spring. The location and artifact/feature assemblages of the sites near Bear Grass Draw indicate that the area was used frequently at various times as a temporary seasonal camp for procuring and processing site-specific resources, or as a base camp for logistical foraging. The eastern sites on the other hand were likely only used as seasonal temporary camps.

Notably absent from the above materials is any direct or indirect evidence of the practice of horticulture such as burned corn cob remains. Corn was not present in the macrobotanical remains and the artifact assemblage was inconclusive at best relative to indirect indicators of corn consumption or horticultural practice. The direct evidence, artifact assemblage, and site settlement patterns observed within the project area are more consistent with a mobile foraging subsistence that utilized the Mescalero Plain throughout generations to exploit naturally available resources.

**RESEARCH DOMAIN 5: MOBILITY AND INTERREGIONAL INTERACTION**

Research Domain 5 addresses mobility and interregional interactions with research questions pertaining to the use of nonlocal and exotic materials, their sources, evidence for preferential use of lithic or clay raw material sources, and evidence of direct procurement or trade. These issues are discussed below.

The nine sites investigated along US 82 produced radiocarbon dates ranging from the Late Archaic into the Late Formative period. The Late Archaic is considered a continuation and intensification of earlier regional cultural trends, where highly mobile groups subsisted on a regime of broad-spectrum hunting and gathering. In some parts of New Mexico, the Late Archaic period witnessed the introduction of features such as pit houses, bell-shaped pits, and midden-like deposits which suggest reduced mobility compared to earlier periods. However, this does not appear to be the case in the Mescalero Plain region, where there is a paucity of pit structures and storage pits (Katz and Katz 1993). Indeed, structural remains are difficult to identify, in part due to their temporary and perishable and nature (Figure 124), and few pit houses have been discovered in the region. No temporary or permanent habitation structures were identified at any of the sites investigated for this project.

Mobility in the region was driven largely by the availability and predictability of critical resources, namely water and food. Additionally, climatic changes on multiple temporal scales throughout the entire prehistoric occupational sequence resulted in shifts in the availability and predictability of resources that required constant adaptation. Mobility was one such adaptation that occurred to take advantage of seasonally available resources, and was also required to adapt to climate-driven shifts in geographic availability of resources. In modern times, the Mescalero Plain is largely devoid of perennial water sources, with the exception of the Pecos River west of the project area. During the Late Archaic, climatic conditions were cooler and wetter than they are today, and abundant water sources may have
been present in the region (Blum et al. 1994; Hall 1990; Polyak and Asmerom 2001). Examination of the NMCRIS database shows markedly high site density along the terraces of Bear Grass Draw, suggesting that the draw likely had abundant water, at least seasonally, and was an attractive place to visit for that reason and others. Along with water, the drainage likely also supported a variety of riparian plant species that could have been procured for food, as well as numerous animals that also were attracted to the water. While it is unclear whether Bear Grass Draw flowed perennially, it does not appear to have held sufficient water to support year-round occupation as no permanent habitation structures have yet been identified. Population in the region continued to increase over time and subsistence strategies focused on foraging of goosefoot, purslane, wild grass barley, yucca caudex and root, mesquite pods, various succulents, and other flora (Huckell and Toll 2004). Remains of these plant resources—in particular goosefoot seeds, purslane seeds, and mesquite wood—were observed in the analyzed macrobotanical sample recovered from features at seven of the nine sites. The collection and processing of wild plant resources at Late Archaic sites is also evidenced by the presence of groundstone milling equipment such as manos and metates (Huckell 1996).

Figure 124 – Historic (1898) photograph of an Apache wikkiup, a structure that may have been similar to the temporary and perishable structures constructed during the Archaic and Formative periods in southeastern New Mexico.
Three of the investigated sites (LA 15901, LA 83680, and LA 120949) produced radiocarbon date ranges that place occupation, in part, either firmly in the Late Archaic period or spanning the latter part of the Late Archaic and early part of the Early Formative. Additionally, projectile points dating to the Late Archaic were found on the surface of other sites in the project area, either during survey or during testing and data recovery. All of the identified Late Archaic projectile points were manufactured from chert. Although most cherts are notoriously difficult to source using trace elemental chemical signatures, raw material was likely locally gathered from residual Ogallala Formation cobbles and gravels that occur across the Mescalero Plain, or from cobbles and gravels along the Pecos River. The only non-local raw material identified during this investigation is a very limited amount of obsidian, the closest source of which is Rio Grande gravels located 200 miles west of the project area. It is unclear if obsidian was gathered during seasonal rounds or exchanged between mobile groups occupying the broader Jornada Mogollon cultural region.

The project data indicate a mobile Late Archaic presence in the project area, overlain at several sites by later Early and Late Formative cultural materials. Given what is known about Late Archaic mobility, these sites were presumably reoccupied seasonally at various points in time over the course of several centuries. It is further possible that certain Late Archaic campsites and resource acquisition areas were abandoned for years or even generations to allow diminished/consumed resources to increase in abundance before the sites were reoccupied. Alternatively, certain resources may have simply not been available for certain periods of time in certain areas.

The Early Formative period is characterized primarily by the appearance of undecorated brownware ceramics and bow and arrow technology. Aside from these technological shifts, patterns of land use established in the Late Archaic persisted into the Early Formative. Artifact assemblages in the Early Formative period remained similar to those of the Late Archaic, and foraging strategies continued to focus on wild plant remains (Railey 2015:30-32). Population appears to have increased during this time, as suggested by a greater number of thermal features dating to the seventh and eighth centuries A.D., such that “extensive and ubiquitous use of the landscape by hunter-gatherers, accomplished through high residential mobility, appears to have remained the norm during this time” (Railey 2015:33). Six of the nine sites investigated during this project, including all four sites in the Bear Grass Draw cluster, contain features that produced radiocarbon dates that either spanned the Late Archaic to Early Formative transition, were solidly in the Early Formative, or spanned the Early to Late Formative transition. Interestingly, several of these features produced terminal calibrated two-sigma dates in the late 900s. This corresponds to the onset of the Medieval Climatic Anomaly (MCA), which dates from around A.D. 800/900 to A.D. 1350. In the Mescalero Plain region, the MCA is characterized by a distinct drying trend beginning around A.D. 900 (Grissino-Mayer et al. 1997). This is associated with a substantial drop in the number of features radiocarbon dated to these centuries, which strongly suggests less extensive foraging, reduced mobility, and possibly population loss (Railey 2015). As a result, inter-regional interaction and social ties (including reciprocity, trade, and exchange) may have increased at this time as a means of reducing risk of starvation. Despite some terminal feature dates roughly corresponding to the onset of the MCA, feature dates across the Bear Grass Draw cluster as a whole span the entire late Late Archaic to middle Late Formative time period. In other words, no hiatus in occupation is suggested by the data recovered during this project.
The Late Formative in the region is marked by the appearance of distinctive decorated ceramic types such as Chupadero Black-on-white and El Paso painted wares. Shifts in arrow point morphology occurred as well, and by A.D. 1300, “villages” began appearing, signifying a marked shift towards increased sedentism. The latest dated feature from the Bear Grass Draw cluster was Feature 25 at LA 118318, which had a calibrated two-sigma date range of A.D. 1030–1200, demonstrating that occupation/use of the area extended to within the first half of the Late Formative period. Occupation at these sites thus predates the earliest known villages in the region, and while settlement and subsistence practices may have been trending towards increased sedentism, this is not reflected at Bear Grass Draw.

One hallmark of increased sedentism is a shift from curated to expedient lithic technologies (Bamforth 1986; Nelson 1991; Parry and Kelley 1987). Highly mobile groups tend to favor higher quality lithic raw materials. Reduction is focused on the manufacture of bifaces (either as standalone tools or as blanks for knives and projectile points) which can be easily transported across the landscape. Primary reduction therefore also typically occurs at raw material sources to reduce transport weights. This results in a fairly distinctive debitage pattern at mobile hunter-gatherer sites. Debitage is typically of high quality material, small, and lacks cortex. At more sedentary sites, lithic reduction tends to focus on the expedient end of the spectrum and the reduction of cores for flakes that can be used as expedient tools. Assemblages are often characterized by a greater abundance of moderate- to poor-quality materials, and debitage tends to be larger with more cortex (Parry and Kelley 1987). Additionally, tools such as retouched or used flakes tend to comprise the majority of the tool assemblages at these sites.

Within the Bear Grass Draw cluster, and at other sites such as LA 83680 and LA 89659, the lithic assemblages are highly reflective of a curated, mobility-based reduction technology. It should be noted that radiocarbon data indicates a wide occupation date range for these sites, and that the lithic assemblages are likely the result of continued, repeated occupation over the course of centuries. This inhibits our ability to distinguish between assemblages of different periods. As a whole, however, the assemblages at these sites are dominated by a single lithic raw material, chert, which could be locally acquired from remnant Ogallala Formation cobbles and gravels. Debitage as a whole, and chert debitage in particular, tends to be small (generally around 20 mm or less in maximum size), and non-cortical (e.g., only approximately 25 percent of debitage of all material types retained cortex in the Bear Grass Draw cluster). Numerous formal tools were found at these sites, including projectile points, bifaces, and scrapers, as well as reduction equipment such as hammerstones and cores. Nearly all of the projectile points are heavily reworked and most of the cores are exhausted, further indicating a curation-based technological strategy. Hardly any retouched or utilized flakes were observed in the assemblage. The debitage collected and analyzed during this investigation therefore reflects a continuation of highly mobile, foraging lifeways that began in the Late Archaic and intensified throughout the Early Formative and into early part of the Late Formative period.

The form and size of ceramic vessels can also be used to infer the duration of site occupation, which is directly related to mobility. Sites with short-term occupations, associated with high mobility, tend to have ceramic assemblages dominated by utility vessels whereas the amount of serving and decorated vessels increases along with the duration of site occupation. Similarly, temporary occupations tend to have a higher ratio of jars to bowls than do residential sites. LA 118318 was the only site with a large
enough ceramic assemblage for a meaningful analysis of this sort. The lack of decorated wares or bowl sherd would indicate the remaining sites were temporary occupations representing a limited range of activities while the ceramic assemblage of LA 118318 is consistent with expectations for a residential site with a long-term occupation (see Chapter 8). However, this is somewhat at odds with other lines of evidence including the curated lithic technology and lack of habitation, storage, or midden features. LA 118318 was likely visited more often than other sites in the project area due to its access to resources associated with Bear Grass Draw and may have been occupied for longer periods, possibly even serving as a seasonal base camp within a larger pattern of residential mobility where nearby available resources were exploited.

Inter-regional interaction is best indicated by the presence of non-local materials or exotic items. The only non-local lithic raw material identified in the site assemblages was obsidian. Three obsidian flakes were found in the Bear Grass Draw lithic assemblage. They most likely derive from sources in the Jemez Mountains. Some of these sources have washed out of the Jemez Mountains and appear as deposits within the Santa Fe Gravels, an extensive geological sheet that extends down the length of the Rio Grande. As obsidian nodules wash farther downstream, they reduce in size through natural micro-flaking and develop a waterworn cortex. These nodules, known as Apache Tears, can be acquired from gravel beds along the Rio Grande, which is approximately 200 miles west of the project area. It is also possible that the obsidian was acquired at its source and arrived on site through long-distance trade. All other lithic raw materials could be acquired through locally available cobbles and gravels. The lithic assemblage recovered from this project, therefore, does not lend itself towards shedding light on broader networks of interaction and exchange.

A number of ceramics were also collected from six of the nine sites in the project area, including all four sites in the Bear Grass Draw cluster. Types include El Paso Brown, Jornada Brown, Chupadero Black-on-white, Jornada Plain Slipped Red, Plain Red, and Undifferentiated. The assemblage is dominated by El Paso Brown and Jornada Brown. Oxidation analysis revealed that these utility ware ceramics were manufactured using clay from two primary alluvial clay types which likely encompass numerous individual clay sources. Furthermore, given the wide occupational date ranges at the sites, the analysis suggests that either the same clay sources were used for ceramic production over a long period of time, or that raw clay or finished vessels were exchanged over generations using similar trade relationships. The specific clay deposits or raw material sources remain unknown. Petrographic analysis on ceramic temper materials suggests that temper may have been derived from a source in the Sierra Blanca region, located approximately 120 miles northwest of the project area (See the Chapter 8 Ceramics section in this Report). NAA analysis was performed on 15 sherd, including five Chupadero Black-on-white sherd. Chupadero Black-on-white is the most common decorated type in the Mescalero Plain region and is considered to be an imported ware. The analysis revealed that all five of these sherd correspond to a reference group associated with the Capitan Mountains, approximately 100 miles northwest of the project area. The remaining analyzed utility ware sherd corresponded to reference groups in the northern Sacramento Mountains, the southern Tularosa Basin/northern Hueco Bolson, and the Guadalupe Mountains. None of these overlaps with potential obsidian sources in New Mexico.
The sites investigated during this project were occupied by highly mobile groups of hunter-gatherer-foragers. Beginning in the latter part of the Late Archaic period, these nomadic groups occupied the Mescalero Plain region, including the terraces along Bear Grass Draw, making seasonal rounds across the landscape to collect necessary resources to survive. The sites were thus repeatedly occupied, most likely during specific seasons, over the course of centuries, with population growing and occupation intensifying throughout the Early Formative and into the early part of the Late Formative. Material remains indicate that these groups participated in geographically large exchange networks encompassing multiple regions beyond southeastern New Mexico. These exchange networks, and the social ties through which they were fabricated, were likely maintained over generations. At the same time, periodic changes in climate and concomitant shifts in resource availability most certainly required evolving adaptive strategies in both social relations and resource acquisition, and enabled persistent land use. These strategies appear to have been highly successful, allowing individuals to survive under harsh conditions in a region that today could no longer support such lifeways.

**Research Domain 6: Post-Depositional Effects on Thermal Features**

In the Testing and Data Recovery Plan, we discussed how erosional processes and modern disturbances often alter, deflate, bury, or completely remove the surface expressions of thermal features. This can result in mischaracterization of features and/or feature function at the survey level. Testing and data recovery activities provide an opportunity to characterize surface versus subsurface expressions of features. Based on the results of the survey conducted for this undertaking, we anticipated that many, if not most, of the thermal features encountered during testing and data recovery would be fire-altered rock scatters, and proposed to evaluate how accurately surface expressions of features reflect size and morphology. Typically, at the surface level, the spatial integrity of an exposed feature is used to evaluate its physical integrity and data potential, and physical integrity is usually evaluated by the density of fire-altered rock and the presence of ashy or charcoal-stained deposits. It is generally assumed that a dense cluster of burned rock indicates a higher degree of spatial integrity than that of a low-density scatter. However, a completely deflated thermal feature can also appear to have integrity based on high density clustering of fire-altered rocks resulting from deflation of all rocks within a feature onto a single surface. In the data recovery plan, we proposed to conduct statistical tests to determine if there was a relationship between surface density of burned rock and depth of feature to evaluate whether surface density is a reliable indicator of feature integrity. However, only one of the surface features identified during survey (Feature 6 at LA 83680) and found within the APE contained associated subsurface deposits and, as discussed below, the context of these deposits is somewhat questionable.

At LA 15901, two burned-caliche concentrations were identified during survey. Both were located outside the APE and were therefore not investigated. Three intact subsurface hearths were found during mechanical scraping between 100 and 120 cm below ground surface. At LA 17041, a total of 18 surface thermal features were identified during survey, the majority of which were burned-caliche concentrations. None were located in the APE or investigated during data recovery. However, two intact hearths were found 30 cm below ground surface during mechanical trenching. Nine surface thermal features were identified during survey at LA 83680. Two of these (Features 6 and 9) were in the APE and investigated during testing and data recovery. Both manifested on the surface as burned-caliche
concentrations. Excavations at Feature 9 revealed that the features contained no intact feature fill. The feature was located in an erosional blowout at approximately the same elevation as the buried paleosol. Feature 6 appeared on surface as a large burned-caliche concentration eroding out of the side of the dune. It appeared that much of the feature remained intact and buried. Excavations at Feature 6 revealed that the majority of the concentration was simply burned caliche with no associated feature fill. The north end of the feature however contained intact feature fill, albeit the fill was substantially more shallow than other nearby hearths (e.g., Features 10 and 11). It is possible that the most of the burned caliche was removed from other nearby features and deposited at this location. At LA 104182, one thermal feature was found during survey. The feature consisted of a 1.0-m-diameter light gray charcoal stain with four burned-caliche fragments scattered in the vicinity. The feature was located outside the APE and was not investigated.

Thirteen fire-related features were identified during survey at LA 118318, including six burned-caliche concentrations without surface stains and seven burned-caliche concentrations with surface stains. Of these, Features 6, 7, and 11 exhibited large, midden-like deposits. During testing and data recovery, it was determined that most of the features identified during survey were actually remnants of an exposed A horizon, including Features 3, 4, 5, 6, 7, and 11. One feature (Feature 12) appeared as a small charcoal stain during survey, but was later revealed to be a blackened, decaying mesquite root. Fourteen subsurface hearths were found at LA 118318 during testing and data recovery, most in the vicinity of Feature 6. One feature (Feature 18) appeared on surface as a possible charcoal stain within previously recorded Feature 4. However, after excavations at this possible feature, it was determined that was simply a darker, discolored area within the broader exposed A horizon. Several of the excavated subsurface features exhibited substantial bioturbation from roots and rodents and did not retain much integrity. The same A horizon sediments exposed at LA 118318 were visible in portions of LA 120949, where they were also characterized as charcoal stains during survey. One subsurface hearth was found 2 cm below ground surface during testing and data recovery in the far western portion of the site. At LA 120950, one charcoal stain feature was identified on the surface of the site outside the APE, and four subsurface hearths were found between 6 and 50 cm below modern ground surface. One subsurface hearth was identified 100 cm below ground surface at LA 137120, where no features were found on the surface.

The above pattern indicates that surface expressions of features in the project area, and in the Mescalero Sands east of Artesia, are not good indicators of subsurface preservation. In fact, most features recorded during survey as burned-caliche concentrations lacked integrity. These were typically found in erosional blowouts, particularly in the five easternmost sites in the project area (LA 15901, LA 83680, LA 89659, LA 104182, and LA 137120). The rocks themselves were simply remnants of now-absent features.

Preservation is clearly best where the living surface is deeply buried (e.g., below the large dunes at LA 83680 and LA 118318). The surface geomorphology of the Mescalero Plain is characterized by large parabolic and coppice dunes ranging from 1 to 3 m in height. These deposits are thought to be of historic age and less than 100 years old (Hall 2002:5). These dunes overlie massive sand sheets designated by Hall (2002:3-5) as Unit 1 Eolian Sand and Unit 2 Eolian Sand. Unit 1 is older and deeper than Unit 2 and formed as sand accumulated in the area over the course of about 14,700 years between
70,000 to 90,000 years ago. It rests on the Mescalero Paleosol, which is the distinctive carbonate-rich caliche (sometimes referred to as caliche bedrock) that can be seen exposed in various places throughout the sand sheet. In most portions of the Mescalero Plain, Unit 1 Eolian Sand is yellowish red to red (5 YR 5/8 to 2/5 YR 5/8) in color and measures between 40 and 60 cm in thickness, although in other areas it appears to have eroded immediately following deposition and may therefore be absent from the stratigraphy. A second paleosol occurs at the top of Unit 1 sands. This red to dark red (2.5 YR 4/8 and 2.5 YR 3/6) paleosol appears where Unit 1 sands are shallow (30 to 50 cm thick) and sometimes comprises the entirety of the Unit 1 Eolian Sand.

Unit 2 Eolian Sand overlies Unit 1 sands and accumulated over a 3,700-year period between 5,000 and 9,000 years ago. Unit 2 can measure up to 4 m in thickness in the central part of the Mescalero sand sheet, but is less than 1 m in thickness near the margins, and is reddish yellow (5 YR 6/6) in color. In the project area, Unit 2 sands may be overlain by an A-horizon soil known as Loco Hills soil. This is a 10- to 30-cm-thick A-horizon soil and is reddish brown to reddish yellow to yellowish red (5 YR 4/4, 5 YR 6/6, and 5 YR 5/6) in color. In the field, it is typically darker in color than the underlying Unit 2 sands, and comprised the feature fill identified during survey for Features 3–7 and 11 at LA 118318. Five radiocarbon assays from organic matter in the Loco Hills soil indicate the A horizon developed between 500 and 100 years ago, and thus predates the overlying historic parabolic and coppice dune deposits.

During testing, Loco Hills soil was only observed in the Bear Grass Draw Cluster, and comprised many of the features identified during survey. At LA 118318 in the vicinity of Feature 6 (where most test unit excavations occurred and where most features were identified) Loco Hills soil overlaid a thin stratum of Unit 1 sands which rested directly on caliche. Loco Hills soil was not present at the western end of the site, where elevation was much lower. The eastern portion of LA 118318 was characterized by 1- to 2-m thick coppice dune sands. Mechanical excavation within these dunes exposed the Loco Hills A horizon between 1 to 2 m in depth. The contact between the overlying dunal deposits and Loco Hills A horizon is flat and distinctive. Both Unit 2 sands and the Unit 1 paleosol are visible below the Loco Hills A horizon (Figure 125). This stratigraphy was also visible in mechanical excavations at LA 120950 and LA 17041, which both occur at approximately the same elevation as the central core of LA 118318, and all three sites occur at the top of the eastern terrace of Bear Grass Draw. This pattern was not seen at LA 120949 which slopes down to a lower terrace of the draw. Mechanical excavations in the western part of LA 120949 did not expose an A horizon. The stratigraphy at this location consists of a 40- to 60-cm-thick stratum of Unit 2 sands lying directly on caliche. In general, all four sites in the Bear Grass Draw cluster exhibited less erosion than the sites farther to the east. Additionally, nearly all features were found within Unit 2, either at the top of Unit 2 in contact with the A horizon, or at the bottom of Unit 2 partially excavated into the underlying Unit 1 paleosol.
Figure 125 – Stratigraphic profile from MS 1 in the eastern portion of LA 118318
At LA 83680, approximately 10 miles east of Bear Grass Draw, the surface of the site was characterized by a combination of 1- to 2-m tall coppice and parabolic dunes interspersed with substantially deflated erosional blowouts. Numerous fire-altered rock scatters were visible on the surface of the site, and excavations revealed that the majority of these were feature remnants with no remaining intact cultural sediment. Two charcoal stains were visible on the surface of the site, partially exposed in the sides of dunes. Numerous additional hearths were also identified during mechanical scraping within the APE, primarily within MS 1 and MS 2. This portion of the site contained approximately 1 m of eolian dune deposits overlaying buried Unit 2 sands, which ranged from 75 to 100 cm in thickness (Figure 126). The Unit 2 sands rested above Unit 1 paleosol at a somewhat irregular contact surface, and all identified features were located at the interface of these two strata, with some features being excavated into the Unit 1 paleosol. The interdunal blowouts observed elsewhere at this site were deflated to an elevation lower than the Unit 1 paleosol, and thus did not retain any intact cultural deposits.

The four sites farther to the east (LA 15901, LA 89659, LA 104182, and LA 137120) are all located within parabolic dune fields. Dense shinnery oak covers and stabilizes the dunes, preventing erosion, and this dense vegetation obscures surface visibility at these sites. As a result, no surface features and very few artifacts were found within the APE. Subsurface features were found at all of these sites with the exception of LA 104182, and all identified features were encountered through mechanical excavation at the interface of Unit 2 sands and the Unit 1 paleosol between 100 to 120 cm below modern ground surface.

Figure 126 – Stratigraphic profile from MS 1 at LA 83680
As a whole, the geomorphological patterns observed during mechanical scraping suggest that feature preservation is best within dunes, and that the majority of site deposits throughout the project area are buried. Where no A horizon is present, artifacts may only be visible in erosional blowouts and therefore do not retain vertical context, but could indicate the presence of nearby buried deposits. If erosional blowouts extend down into the Unit 1 paleosol, any features such as burned-caliche concentrations are in actuality feature remnants that no longer contain associated cultural fill or any integrity. Surface expressions of features are therefore not good indicators of feature size, morphology, or integrity. Test unit excavation along the sides of dunes within Unit 2 sands could yield features. Given that overlying dune deposits measure anywhere from 1 to 2 m in thickness, placing test units on top of dunes is unlikely to produce valuable information. The targeted area should be the Unit 1 and Unit 2 interface, which in many cases may only be accessible through mechanical excavation.

**DATA GAPS AND AVENUES FOR FUTURE RESEARCH**

The insights and interpretations gained from data recovery investigations at the nine sites along US 82 are consistent with previous research in the area. The sites reflect repeated seasonal or temporary occupation by residentially mobile hunter-gatherer groups. This mobile settlement pattern with its associated adaptive lifeways emerged in southeastern New Mexico in the Late Archaic (5500 B.C. to A.D. 500), and intensified throughout the Early Formative period (A.D. 500–1100) and early part of the Late Formative period (A.D. 1100–1450) as population in the region grew. Despite what is known about cultural adaptations in the region, numerous data gaps still exist. This section discusses several gaps in our current understanding of cultural and social developments in southeastern New Mexico, and presents avenues for future research that could aid in filling those gaps.

One of the most striking data gaps is the limited amount of direct evidence for subsistence resources in the region. While there is a general understanding of the types of plant and animal resources that were exploited by occupants of the Mescalero Plain region (e.g., cheno-ams, mesquite pods, shinnery oak acorns, prickly pear pads, antelope, and a variety of small game), the physical remains of these resources are frequently lacking in the archaeological record. The US 82 testing and data recovery project produced scant macrobotanical and faunal remains, even from sealed contexts such as subsurface hearths. Future efforts, perhaps not tied to the physical footprint of a project impact, could focus on identifying and excavating features and contexts most likely to provide additional physical evidence of the plant and animal resources exploited prehistorically in the area. An effort such as this could compliment the recent work conducted by the BLM to document known information on plant utilization in Southeast New Mexico (Whitehead and Flynn 2017).

Another data gap and potential avenue for future research is geological sourcing. We know, for instance that certain lithic raw materials (e.g., certain types of chert) are derived from sources far distant from the project area. Exploratory geological surveys of the region (e.g., Kremkau et al. 2013) have identified regional sources of chert and other lithic raw materials. However, it is still unclear whether materials were collected during seasonal rounds or exchanged through broader geographic socioeconomic trade networks. Recent applications of XRF technologies have revealed promising results in better characterizing and distinguishing the geochemical signatures of both chert artifacts...
and chert raw material source locations (Gauthier et al. 2012). The development of a more robust raw material dataset would aid future researchers in this regard, and would also contribute to a better understanding of the adaptive inter-regional interaction and raw material acquisition strategies employed throughout prehistory.

As has been demonstrated, groups occupying the Mescalero Plain area were highly mobile throughout prehistoric occupation of the region, and this mobility was driven in part by changes in climate and accompanying shifts in resource availability and predictability. In order to better understand how climate and resource availability may have impacted patterns of mobility and social interaction, a higher-resolution model of climatic variation is needed for the region. This could be achieved by correlating oxygen isotope data and uranium/thorium isotope data derived from a variety of sources such as speleothems, tree rings, lake beds, and other deposits. A recent study in the Maya Lowlands (Kennett et al. 2012) used similar data to construct a precise, sub-annual climate record of that region for the past 2,000 years. This record provided a clearer understanding of how shifts in rainfall drove population expansion, and the proliferation and eventual collapse of major political centers. A similar, high-resolution record for the Southwestern U.S. could allow for similar studies of social change not only on the Mescalero Plain, but in adjacent regions as well. Such data could further aid in more precisely dating certain events, or sequences of events. For example, by utilizing known climatic events such as the MCA, or periodic droughts in southeastern New Mexico, Bayesian statistical modeling can be applied to radiocarbon datasets to produce more constrained date-ranges than standard radiocarbon modeling, thereby resulting in more accurate site chronologies. Bayesian methods have been demonstrated to improve and constrain traditional radiocarbon measurements in several recent studies (Dee et al. 2013; Kennett et al. 2011; Steier and Rom 2000).

Several of the sites (e.g., LA 15901, LA 104182, and LA 137120) produced limited data, and features and materials that were found (e.g., features, flaked-stone tools, and a metate) were all uncovered during mechanical scraping. These three sites were all located in parabolic dune settings. Despite efforts to place test units in high probability areas based on topography, the labor effort of hand excavation was not productive. It therefore seems that sites with limited surface material, particularly if the majority of that material is outside a narrow APE, could simply be mechanically scraped, along with trenching and profiling as appropriate, to develop a geomorphic context ahead of construction.

One final data gap recognized during testing and data recovery at US 82 is the limitations in understanding a site when confined to a narrow area of investigation. For example, the total site area at LA 17041 is 40,070 m², but only 240 m² were investigated during this project, representing less than 1 percent of the total site area. Additionally, only two features and a small number of artifacts were identified. However, the site extends far outside the APE, where eighteen features and thousands of artifacts were identified on survey. In other words, a linear focus in data recovery efforts provides only a narrow window into the true nature of the site. Had data recovery efforts at Bear Grass Draw been possible within a broader spatial perspective, a more holistic understanding of the site may have been achieved, the research questions could have been more thoroughly addressed, and additional research questions could have been proposed. For instance, where on each site (as whole) is artifact density highest, and do these densities reflect specific activity locales? Does artifact density significantly decline
with distance from the “core” of LA 118318? If so, does this suggest that these sites are along the periphery of a more centralized settlement area farther to the south along Bear Grass Draw?

The above approach would amount to a site-oriented mitigation strategy rather than a linear APE-oriented one. This should however always be balanced against the benefits of a linear approach where one could do things like compare site types in different ecological zones across a landscape. For instance, the current investigation looked at differences in site characteristics between the sites clustered near Bear Grass Draw and sites located further out on the Mescalero Plain. To gain a broader perspective, this linear approach could also have been expanded beyond the project APE to include sites on the Llano Estacado to the east and along the Pecos River to the west.

For either mitigation approach described above (site-oriented or expanded linear), investigating sites and site areas outside of the project APE could and should have a preservation focus so that cultural resources not impacted by a proposed project would be only minimally disturbed while still contributing to specific research questions. The cost of an expanded investigation area should also be considered since most excavations are undertaken to mitigate adverse project effects. Expanding the area of investigation at certain sites or including sites beyond the APE would likely need to be offset by conducting a more limited investigation at other sites within the APE. This would need to be negotiated as part of the consultation under Section 106 of the National Historic Preservation Act.

Alternative mitigation strategies analogous to those described above have been successfully undertaken by the BLM through the Permian Basin Mitigation Program, and have greatly enhanced knowledge of the prehistory of the region. Perhaps the concepts and spirit of this agreement could be used as a model when developing future mitigations as part of the Section 106 consultation process.
CHAPTER 10: PROJECT MANAGEMENT SUMMARY

This report summarizes the results of testing and data recovery conducted to mitigate adverse effects to nine archaeological sites—LA 15901, 17041, 83680, 89659, 104182, 118318, 120949, 120950, and 137120—along the US 82 corridor between Artesia and Lovington in Eddy and Lea counties, New Mexico. The NMDOT, in conjunction with the FHWA, proposed various roadway improvements on NMDOT, BLM, and SLO lands. Investigations were completed in accordance with the testing and data recovery plan approved for this project (Lawrence et al 2016); NMAC 4.10.16, Standards for Excavation and Test Excavation; and BLM’s Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities. Excavations were conducted on BLM land under Cultural Resource Use Permit 166-2920-14-K, which satisfied the stipulations of ARPA for archaeological excavations on federal land.

The project was previously granted clearance to proceed based on a preliminary data recovery report submitted in September 2016 and approved by the NMDOT and HPD (Mastropietro et al 2016). The portion of each site within the APE was excavated in accordance with the methods presented in the testing and data recovery plan approved for this project and to the standards and guidance discussed above. All nine sites extend outside the APE and, therefore, have remaining elements that were not investigated. The remaining portions of the sites exhibit moderate-to-extensive surface artifact density and visible features with additional data potential. The sites therefore retain attributes that merit their continued inclusion in the NRHP and should remain eligible. For seven of the nine sites (LA 15901, 17041, 83680, 89659, 104182, 120950, and 137120) the remaining deposits that contribute to the site’s information potential are located well away from the project APE and no additional action is necessary. However, due to the close proximity of features to the project APE, temporary protective fencing is recommended for LA 118318 in the areas of Features 3, 4, 5 and 6 and for LA 120949 in the areas of Features 7 and 8. The temporary protective fencing will ensure that construction activity does not inadvertently trespass onto those portions of the sties that contribute to their NRHP eligibility.

The submission of this final technical report fulfills NMDOT’s cultural resource compliance requirements under Section 106 of the NHPA and other applicable laws and guidelines pertaining to the treatment of cultural resources. It also fulfills the environmental commitments agreed to in the Memorandum of Agreement, National Environmental Policy Act documentation, and any other legal agreements pertaining to cultural resource mitigation for this project.

CURATION

WSP maintains a curation agreement with the Archaeological Research Collection (ARC) managed by the Museum of Indian Arts and Culture (MIAC) and the Laboratory of Anthropology (LA). All records and collections which are not subjected to destructive analysis were submitted for long-term curation pursuant to NMAC 4.10.8.19: Curation of Collections and Records. All records and collections were prepared for curation in a manner consistent with ARC’s Procedures Manual for the Submission of Archaeological Artifact and Record Collections.
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Schlanger, Sarah H.

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APPENDIX A: RADIOCARBON SAMPLE REPORT
**Summary of Ages**

**Submitter Name:** Hollis Paul Lawrence  
**Company Name:** WSP - Parson Brinckerhoff  
**Address:** 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<th>Pretreatment</th>
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<th>Calibrated Age</th>
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<td>Cal 430 - 490 AD (10.6%) Cal 530 - 640 AD (84.8%)</td>
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<td>Cal 260 - 270 AD (1.1%) Cal 330 - 470 AD (85.3%) Cal 490 - 530 AD (8.5%)</td>
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<td>1140 +/- 30 BP</td>
<td>Cal 780 - 790 AD (5.5%) Cal 800 - 850 AD (11.3%) Cal 860 - 980 AD (78.6%)</td>
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International Chemical Analysis Inc.
1951 NW 7th Ave
STE 300
Miami, FL U.S.A 33136

Summary of Ages

Submitter Name: Hollis Paul Lawrence
Company Name: WSP - Parson Brinckerhoff
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<td>Cal 810 - 840 AD (1.9%)</td>
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<td>Cal 860 - 1000 AD (91.8%)</td>
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<td>Cal 1090 - 1130 AD (10.4%)</td>
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<td>Cal 1140 - 1150 AD (2.6%)</td>
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* Unless otherwise stated, 2 sigma calibration (95% probability) is used.
* Conventional ages are given in BP (BP=Before Present, 1950 AD), and have been corrected for fractionation using the delta C13.
## Sample Report

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**Company Name:** WSP - Parson Brinckerhoff  
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![Graph showing radiocarbon age (BP) vs calendar years (AD)](image-url)
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![Graph showing radiocarbon age vs. calendar years]
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![Graph showing radiocarbon age and calendar years](image-url)
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![Graph of Radiocarbon Age (BP) vs Calendar Years (AD)](image-url)
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Radiocarbon Age (BP) vs. Calendar Years (AD)
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Calendar Years (AD)

Radiocarbon Age (BP)
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<td>16C/1009</td>
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| Submitter ID        | LA 83680 FS#67 / F11 | Calibrated Age | Cal 430 - 490 AD (10.6%)  
|                     |                  |               | Cal 530 - 640 AD (84.8%) |

![Graph showing radiocarbon age (BP) vs. calendar years (AD)](chart.png)
Sample Report

Submitter Name: Hollis Paul Lawrence
Company Name: WSP - Parson Brinckerhoff
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

<table>
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<tr>
<td>Calibrated Age</td>
<td>Cal 680 - 780 AD (61.3%) Cal 790 - 880 AD (34.1%)</td>
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</table>
Sample Report

Submitter Name: Hollis Paul Lawrence  
Company Name: WSP - Parson Brinckerhoff  
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<td>Submitter ID</td>
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<td>Calibrated Age</td>
<td>410 - 550 AD</td>
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![Graph showing radiocarbon age (BP) vs. calendar years (AD)]

Calendar Years (AD)  | 12 of 23
Sample Report

Submitter Name: Hollis Paul Lawrence  
Company Name: WSP - Parson Brinckerhoff  
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<td>ICA ID</td>
<td>16C/1012</td>
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<td>1650 +/- 30 BP</td>
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| Submitter ID      | LA 83680 FS#105 / F68 | Calibrated Age | Cal 260 - 270 AD (1.1%)  
|                   |                  |               | Cal 330 - 470 AD (85.8%)  
|                   |                  |               | Cal 490 - 530 AD (8.5%)  |
Sample Report

Submitter Name: Hollis Paul Lawrence
Company Name: WSP - Parson Brinckerhoff
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<td>Submitter ID</td>
<td>LA 120949 FS#86 / F8</td>
<td>Calibrated Age</td>
<td>Cal 540 - 390 BC</td>
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![Graph of Radiocarbon Age (BP) vs Calendar Years (AD)](image)

-800 - 680 - 560 - 440 - 320 - 200

1700 1900 2100 2300 2500 2700

Calendar Years (AD)
Sample Report

Submitter Name: Hollis Paul Lawrence
Company Name: WSP - Parson Brinckerhoff
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<td>ICA ID</td>
<td>16C/1014</td>
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<td>Submitter ID</td>
<td>LA 120949 FS#94 / F7</td>
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<td>Cal 400 - 540 AD</td>
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![Graph showing radiocarbon age (BP) vs calendar years (AD) range from 1200 to 1900.]
Sample Report

Submitter Name: Hollis Paul Lawrence  
Company Name: WSP - Parson Brinckerhoff  
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<td>Submitter ID</td>
<td>LA 89659FS#28 / F9</td>
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<td>Cal 660 - 770 AD</td>
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![Graph showing radiocarbon age vs. calendar years](image_url)

The radiocarbon age is plotted against calendar years to illustrate the age distribution of the sample.

16 of 23
# Sample Report

**Submitter Name:** Hollis Paul Lawrence  
**Company Name:** WSP - Parson Brinckerhoff  
**Address:** 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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| Submitter ID        | LA 17041 FS#23 / F19 | Calibrated Age | Cal 780 - 790 AD (5.5%)  
Cal 800 - 850 AD (11.3%)  
Cal 860 - 980 AD (78.6%) |

![Graph showing radiocarbon age versus calendar years](image)
Sample Report

**Submitter Name:** Hollis Paul Lawrence  
**Company Name:** WSP - Parson Brinckerhoff  
**Address:** 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

<table>
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| Submitter ID        | LA 17041 FS#24 / F20 | Calibrated Age | Cal 780 - 790 AD (1.7%)  
|                     |                 |               | Cal 810 - 840 AD (1.9%)  
|                     |                 |               | Cal 860 - 1000 AD (91.8%) |

![Radiocarbon Age vs Calendar Years Graph]

Calendar Years (AD)  
Radiocarbon Age (BP)
Sample Report

Submitter Name: Hollis Paul Lawrence
Company Name: WSP - Parson Brinckerhoff
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<td>Submitter ID</td>
<td>LA 15901 FS#3 / F4</td>
<td>Calibrated Age</td>
<td>Cal 390 - 350 BC (31.3%) Cal 320 - 200 BC (64.1%)</td>
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</tbody>
</table>

![Graph showing Radiocarbon Age vs Calendar Years (AD)](image)
# Sample Report

Submitter Name: Hollis Paul Lawrence  
Company Name: WSP - Parson Brinckerhoff  
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| Submitter ID        | LA 15901 FS#10 / F3 | Calibrated Age | Cal 540 - 530 BC (1.2%)  
|                     |                  |               | Cal 520 - 380 BC (94.2%) |

![Graph of Radiocarbon Age (BP) vs Calendar Years (AD)](image-url)

The graph shows the radiocarbon age (BP) against calendar years (AD) for the sample. The calibrated ages range from Cal 540 - 530 BC (1.2%) to Cal 520 - 380 BC (94.2%).
Sample Report

Submitter Name: Hollis Paul Lawrence
Company Name: WSP - Parson Brinckerhoff
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<td>Cal 780 - 970 AD</td>
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![Graph showing radiocarbon age (BP) vs. calendar years (AD)]
Sample Report

Submitter Name: Hollis Paul Lawrence
Company Name: WSP - Parson Brinckerhoff
Address: 6100 Uptown Blvd NE Suite 700 Albuquerque, NM 87110

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<td>ICA ID</td>
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<td>Conventional Age</td>
<td>1010 +/- 30 BP</td>
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| Submitter ID    | LA 120950 FS#93 / F3 | Calibrated Age | Cal 970 - 1050 AD (82.4%)  
|                 |                  |               | Cal 1090 - 1130 AD (10.4%)  
|                 |                  |               | Cal 1140 - 1150 AD (2.6%)  |

Radiocarbon Age (BP)

Calendar Years (AD)
**QC Report**

**Submitter Name:** Hollis Paul Lawrence  
**Company Name:** WSP - Parson Brinckerhoff  
**Address:** 6100 Uptown Blvd NE Suite 700  Albuquerque, NM 87110

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- pMC = Percent Modern Carbon.  
- IAEA = International Atomic Energy Agency.
APPENDIX B: PETROGRAPHIC ANALYSIS REPORT
Petrographic Analysis Report: 
El Paso and Jornada Brownwares from Sites LA 118318, LA 83680, LA 17041, LA 120949, and LA 120950

Petrographic Consultant: Emma Britton

Contract Information: ebritton@ucsc.edu; (661) 496-8411

Business Address: 713 Sykes Circle
Dayton, Ohio 45433

Introduction:

This report presents the results of a general petrographic analysis of 10 petrographic thin sections of sherds from Sites LA 118318, LA 83680, LA 17041, LA 120949, and LA 120950. The slides were manufactured by Spectrum Petrographics.

I use a Nikon Labophot T2-Pol optical mineralogy microscope to complete my analyses. I initially work with the samples, blind, not referring to any of the information related to me by the client or the academic, or gray, literature that currently exists. As part of my analysis, I complete a 100-click point count, using an arbitrary, absolute scale, identifying the mineralogical components that occur, under the cross-hairs, at every point along this scale. On average, each point count takes at least an hour to complete. I execute the majority of my analysis at 40x magnification, the lowest magnification available to me. As part of my mineral identification process, I shift to 100x magnification, or higher. Typically, there are two major categories of inclusions within archaeological ceramics: mono-crystals and lithic fragments. A third, major type of inclusion includes sherd (grog) temper. Point counts are appended to the end of this report.

Lithic fragments may pose a dilemma for ceramic petrographers in that we rarely have fragments large enough to make what many geologists would consider to be a clear or certain identification. However, with enough fragments in a single sherd, the ability to situate a site and collection of artifacts within the geologic context, and an understanding erosional processes and their effects on specific types of geologic units, identification of these fragments can be made with a fair degree of certainty.

I use standard optical mineralogical methods in identifying each non-plastic inclusion, including, but limited to, properties such as color, birefringence, fracture, cleavage, crystal habit, pleochroism, twinning, extinction, and relief in thin section. Interference figures are frequently used to further ascribe attributes to minerals. For rock fragments, I use collections of mineral identities and individual crystal's relationships to one another, to assign a lithic description. I frequently note the angularity and roundedness of these inclusions in my more-qualitative, written descriptions in addition to the size distribution of these inclusions within the sherds themselves (ie. well-sorted, poorly-sorted, bimodal distribution).

Angularity and roundedness is frequently a product of natural processes, both chemical and mechanical. However, these qualities may also be a result of human-action. “Crushed rock,” for
example, is a phrase often used in the American Southwest to describe the mechanical reduction of rocks, by humans, to intentionally produce temper for pottery (see Shepard 1939). A marked difference in the roundedness of some inclusions in comparison to the angularity of others, may indicate the addition of non-plastic materials by potters. Alternatively, this could be a result of the natural introduction of relatively new sediments into a depositional system.

Similarly, size distributions of inclusions may be a result of either natural or cultural processes. Aeolian and alluvial processes may selectively winnow the smaller size fractions of a collection of sediments, producing a well-sorted collection of eroded material. Poorly sorted material may be indicative of an episodic, high-energy event, such as a flash flood through an arroyo. Alternatively, humans can achieve similar results, creating well-sorted sediments, through sieving or levigation, among other methods. Or, people may add non-plastic materials, with different angularity or roundedness, to ameliorate perceived flaws within raw clays.

The focus of most petrographic analysis of sherds inevitably dwells on mineralogical inclusions rather than the clay itself, as most all clay minerals are not visible using optical mineralogy. However, frequently, there are spaces during point counts where a single mineral inclusion does not fall under the cross-hairs of the field of view. During these instances, I will describe the clay matrix itself. If there are no, small inclusions, I note these spaces as, simply, “clay matrix.” If there are small, angular or rounded, crystals in this clay matrix, I describe these spaces as “silty clay matrix.” The silt component of the clay matrix is often too small for significant mineralogical analysis.

After completing point-counts, I organize samples into broader mineralogical-based categories. The descriptions, below, are a result of, primarily, the similarities and differences in my observations. However, I do discuss texture as is appropriate in distinguishing sherds from one another. Few ceramics are virtually identical. If ceramics share enough of a collective, mineralogical identity, I group these individual sherds together. I generally identify sub-groups based on major textural differences between sherds within a larger group. I also create sub-groups based on minor discrepancies in mineralogy. For example, the minor addition of a rock fragment or type of mineral that is somehow diagnostic.

At this time, I consult with available sources regarding local geology and the archaeological literature, to see what is locally available to potters as well as what previous ceramicists have noted during their studies. I include this background in my broader discussion, at the end of this report.

**Introduction to Group Descriptions:**

As expected, from reviewing literature concerning El Paso and Jornada Brownwares, the vast majority of the inclusions I observed are either granitic or syenetic in nature (see Hill 1997, 2009; Stewart et al. 1990 among others). By definition, granites are felsic, or quartz-rich. In contrast, syenites are more intermediate in nature, with quartz comprising 5% or less of the rock. Additionally, syenites are typified by the dominance of alkali feldspars, such as orthoclase. In contrast, granites may contain a mix of feldspars, from alkali to plagioclase. However, both are intrusive igneous rocks, meaning that they have cooled over long periods of time beneath the earth's surface and exhibit large, well-formed crystals. Additionally, both share accessory minerals, including but not limited to biotite, hornblende, and augite. Nepheline, which can only be differentiated from quartz by producing an interference figure and identifying optic sign, can be diagnostic of syenites, but I was not successful in identifying nepheline. Overall, however, mineralogically, the two are relatively near neighbors. As such, differentiating small, mechanically- and chemically-weathered inclusions and further assigning these fragments to one rock type rather than the other is difficult. What is more, granites and syenites can grade into one another,
with different mineralogical compositions existing within the same geologic body. Identifying fragments as one of the other is no guarantee that temper fragments may hold dramatically different origins. Joe Stewart and his colleagues (1990) distinguished sherds as having syenitic or granitic inclusions only to have neutron activation analysis (NAA) of those same sherds suggest that, chemically, they are similar and likely to share common paste composition.

Despite these difficulties, I have identified at least one sherd that I believe to be more syenitic than granitic. The majority of sherds in this sample set, though, have been identified as being more granitic in nature (full descriptions are provided below). Ideally, chemical testing, such as NAA, may be helpful in either confirming the predominance of more-granitic sources or help split these samples into more appropriate groupings. However, Stewart and his colleagues' (1990) research suggests this may not be the case. I will suggest that future petrographic research with similar ceramic types, or work in this area, may be enhanced by feldspar staining, a technique employed during the manufacture of thin sections. This staining aids in the quick identification of different feldspars which may help reinforce or split groups. As with NAA, this may not ultimately provide all the answers, but is a relatively cheap technique and worth attempting in the future.

Group #1:

Includes:

Slide FS-84, Jornada Brown, Site LA 83680

I have identified Slide FS-84 as being more representative of syenitic rock fragments rather than granitic rock fragments. Many of the rock fragments exhibit signs of chemical weathering. The inclusions in this slide are relatively bimodal, with the larger inclusions being comprised entirely of syenite rock fragments and the smaller size fraction being comprised of feldspar and quartz monocrystals, in addition to the occasional pyroxene.

Group #2:

Includes:

Slide FS-91, Jornada Brown, Site LA 120950

I have identified Slide FS-91 as being more granitic than syenitic. This is, in part, due the physical appearance of the occasional rock fragment, which appears to be more quartz-rich. Plagioclase crystals are also significantly more common throughout the slide, which are less common in Slide FS-84. Slide FS-91 also exhibits granophyric and graphic igneous textures, making it appear to be distinct from Slide FS-84. Granophyric and graphic igneous textures are not exclusive to granites. Syenites may also exhibit such features. Both textures are caused by the intergrowth of quartz and alkali feldspar, with graphic textures being more more “runic” or organized than the wormy, meandering textures better described as granophyric. As previously stated, syenites are not devoid of quartz, simply quartz-poor, and so may can exhibits this sort of igneous texture. But granite, having more quartz, will ultimately be more likely. Accessory minerals include biotite and hornblende.

What makes Slide FS-91 distinctive within this sample set is the presence of grog (crushed sherd) temper.
Group #3:

Includes:

Slide FS-160 Jornada Brown, Site LA 118318
Slide FS-330, Jornada Brown, Site LA 118318
Slide FS-389, Jornada Brown, Site LA 118318
Slide FS-371, Jornada Brown, Site LA 118318
Slide FS-21, Jornada Brown, Site LA 17041
Slide FS-46, El Paso Brown, Site LA 120949

Group #3 is a relatively diverse group. However, whereas splitting Groups #1, #2, and #4 may be ultimately useful, I cannot justify splitting Group #3 to any useful end. This group is dominated by sherds from Site LA 118318, which is not represented in the mineralogical groups, which further bolsters my conclusion that these should be grouped together. Importantly, I created this group without referring to information regarding sample provenance. However, I will discuss some of the aspects that distinguish each slide from the other.

Significantly, this group has fewer clear rock fragments in comparison with those previously described. Rather, they tend to be dominated by mono-crystals. There are some rock fragments throughout the slides and I do identify these as being more granitic than syenetic for reasons similar to those in Group #2. Slides FS-330, FS-371, and FS-389 exhibit significantly fewer more-mafic minerals, such as pyroxenes and hornblende, which are much more common Slides FS-21 and FS-160. Slide FS-371 contains inclusions that are much more bimodal in size distribution, with mono-crystals and rock fragments being approximately the same size amid a much smaller sea of quartz and feldspar crystals. This could be a product of human processing of the raw clay. Slides FS-330, FS-389, FS-21, and FS-160 are much more disorganized, with regard to size-distribution of inclusions leading me to think that they are endemic to the raw clay. Granophyric igneous textures, already discussed, appear occasionally in these slides.

Slide FS-46 is the sherd that I would consider expelling from Group #3. In contrast to those discussed above, there are no apparent rock fragments. There is also a noticeable difference in the number of biotite crystals, which are prevalent throughout the slide. There are biotite crystals in slides discussed previously, but the difference in frequency is remarkable. Hornblende and pyroxenes, though, are absent.

Group #4:

Includes:

Slide FS-1 Jornada Brown, Site LA 17041
Slide FS-39 El Paso Brown, Site LA 83680

Slides FS-1 and FS-39 are virtually identical to one another. Slide FS-1 has a few more rock fragments than FS-39, but other than this attribute, they are remarkably similar. Rock fragments and mono-crystals appear to be relatively unaltered, chemically, and appear much fresher in appearance than other slides in this sample set. This may be partly due to the general absence of quartz-feldspar intergrowths. Various igneous textures involving the intergrowth of feldspar with another mineral may create a cloudy-like appearance, as the feldspars are more inclined to chemical weathering than the host
mineral. This is not to say that chemical weathering is not absent in Group #4, just that it much less prevalent than in Groups #1, #2, and #3.

The rock fragments' identity remains somewhat nebulous. Given the nature of the boundaries between the minerals, it appears to be a felsic (quartz-rich) igneous rock. Accessory minerals associated with these rock fragments, however, are relatively few. I have identified only one biotite crystal associated with a rock fragment. I do not consider this to be enough evidence to attempt a further identification.

**Discussion:**

Overall, my analysis is not at odds with previous petrographic studies of brownwares from Southeastern New Mexico. Articulating with Hill's (2009) synthesis, I have no reason to disagree with his suggestions that many of these brownware ceramics likely find their origins in the Sierra Blanca region, to the west of Bear Grass Draw. Given that the sites in this study have been largely determined to be short-term residential or logistical sites, it is logical that pots were not manufactured on-site, but were rather traded or intentionally transported to this area.
Works Cited:

Hill, David
1997 Petrographic Analysis of Ceramics and Clay Samples from LA89652. Manuscript on file, Department of Anthropology, The University of Texas at San Antonio, San Antonio.


Shepard, Anna O.

Stewart, Joe D., Philip Fralick, Ronald G.V. Hancock, Jane H. Kelley and Elizabeth Garrett
APPENDIX C: NEUTRON ACTIVATION ANALYSIS REPORT
Instrumental Neutron Activation Analysis of Chupadero and Brownware Ceramics from Five Sites in Eddy County, New Mexico

ANIDS: PBI001 – PBI015

Report Prepared by:
Jeffrey R. Ferguson and Michael D. Glascock
Archaeometry Laboratory
Research Reactor Center
University of Missouri
Columbia, MO 65211

Report Prepared For:
Hollis Paul Lawrence
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**Introduction**

This report describes the preparation, analysis, and interpretation of 15 pottery specimens from five sites in Eddy County, NM. The small sample size limits a detailed discussion of differences between the sites in this study, but a comparison to broader regional ceramic production/movement is possible. The broader patterns of brownware production and distribution in southern New Mexico and surrounding areas have been the focus of a multi-year study by Ferguson and Myles Miller. We have assigned the all but one of specimens to existing reference groups primarily produced in the northern Jornada region. The five Chupadero specimens fit well with a single reference group identified by Creel et al. (2002) – Group 1B likely produced in the Capitan Mountain area.

**Sample Preparation**

Pottery specimens were prepared for NAA using procedures standard at MURR. Fragments of about 1 cm² were removed from each specimen and abraded using a silicon carbide burr in order to remove slip, paint, and adhering soil, thereby reducing the risk of measuring contamination. The samples were washed in deionized water and allowed to dry in the laboratory. Once dry, the individual sherds were ground to powder in an agate mortar to homogenize the samples. Archival samples were retained from each sherd (when possible) for future research.

Two analytical samples were prepared from each source specimen. Portions of approximately 50 mg of powder were weighed into clean high-density polyethylene vials used for short irradiations at MURR. At the same time, 200 mg samples were weighed into clean high-purity quartz vials used for long irradiations. Individual sample weights were recorded to the nearest 0.01 mg using an analytical balance. Both vials were sealed prior to irradiation. Along with the unknown samples, Standards made from National Institute of Standards and Technology (NIST) certified standard reference materials of SRM-1633b (coal fly ash) and SRM-688 (basalt rock) were similarly prepared, as were quality control samples (e.g., standards treated as unknowns) of SRM-278 (obsidian rock) and Ohio Red Clay (a standard developed for in-house applications).

**Irradiation and Gamma-Ray Spectroscopy**

Neutron activation analysis of ceramics at MURR, which consists of two irradiations and a total of three gamma counts, constitutes a superset of the procedures used at most other NAA laboratories (Glascock 1992; Neff 1992, 2000). As discussed in detail by Glascock (1992), a short irradiation is carried out through the pneumatic tube irradiation system. Samples in the polyvials are sequentially irradiated, two at a time, for five seconds by a neutron flux of $8 \times 10^{13}$ n cm⁻² s⁻¹. The 720-second count yields gamma spectra containing peaks for nine short-lived elements: aluminum (Al), barium (Ba), calcium (Ca), dysprosium (Dy), potassium (K), manganese (Mn), sodium (Na), titanium (Ti), and vanadium (V). The samples are encapsulated in quartz vials and are subjected to a 24–hour irradiation at a neutron flux of $5 \times 10^{13}$ n cm⁻² s⁻¹. This long irradiation is analogous to the single irradiation utilized at most other laboratories. After the long irradiation, samples decay for seven days, and then are counted for 1,800 seconds (the "middle count") on a high-resolution germanium detector coupled to an automatic sample changer. The middle count yields determinations of seven medium half-life elements, namely...
arsenic (As), lanthanum (La), lutetium (Lu), neodymium (Nd), samarium (Sm), uranium (U), and ytterbium (Yb). After an additional three- or four-week decay, a final count of 8,500 seconds is carried out on each sample. The latter measurement yields the following 17 long half-life elements: cerium (Ce), cobalt (Co), chromium (Cr), cesium (Cs), europium (Eu), iron (Fe), hafnium (Hf), nickel (Ni), rubidium (Rb), antimony (Sb), scandium (Sc), strontium (Sr), tantalum (Ta), terbium (Tb), thorium (Th), zinc (Zn), and zirconium (Zr). The element concentration data from the three measurements are tabulated in parts per million

**Interpreting Chemical Data**

The analyses at MURR, described above, produced elemental concentration values for 33 elements in most of the analyzed samples. Data for Ni in many samples was below detection limits (as is the norm for most New World ceramics) and was removed from consideration during the statistical analysis.

Use of log concentrations rather than raw data compensates for differences in magnitude between the major elements, such as calcium, and trace elements, such as the rare earth or lanthanide elements (REEs). Transformation to base-10 logarithms also yields a more normal distribution for many trace elements.

The interpretation of compositional data obtained from the analysis of archaeological materials is discussed in detail elsewhere (e.g., Baxter and Buck 2000; Bieber et al. 1976; Bishop and Neff 1989; Glascock 1992; Harbottle 1976; Neff 2000) and will only be summarized here. The main goal of data analysis is to identify distinct homogeneous groups within the analytical database. Based on the provenance postulate of Weigand et al. (1977), different chemical groups may be assumed to represent geographically restricted sources. For lithic materials such as obsidian, basalt, and cryptocrystalline silicates (e.g., chert, flint, or jasper), raw material samples are frequently collected from known outcrops or secondary deposits and the compositional data obtained on the samples is used to define the source localities or boundaries. The locations of sources can also be inferred by comparing unknown specimens (i.e., ceramic artifacts) to knowns (i.e., clay samples) or by indirect methods such as the “criterion of abundance” (Bishop et al. 1992) or by arguments based on geological and sedimentological characteristics (e.g., Steponaitis et al. 1996). The ubiquity of ceramic raw materials usually makes it impossible to sample all potential “sources” intensively enough to create groups of knowns to which unknowns can be compared. Lithic sources tend to be more localized and compositionally homogeneous in the case of obsidian or compositionally heterogeneous as is the case for most cherts.

Compositional groups can be viewed as “centers of mass” in the compositional hyperspace described by the measured elemental data. Groups are characterized by the locations of their centroids and the unique relationships (i.e., correlations) between the elements. Decisions about whether to assign a specimen to a particular compositional group are based on the overall probability that the measured concentrations for the specimen could have been obtained from that group.
Initial hypotheses about source-related subgroups in the compositional data can be derived from non-compositional information (e.g., archaeological context, decorative attributes, etc.) or from application of various pattern-recognition techniques to the multivariate chemical data. Some of the pattern recognition techniques that have been used to investigate archaeological data sets are cluster analysis (CA), principal components analysis (PCA), and discriminant analysis (DA). Each of the techniques has its own advantages and disadvantages which may depend upon the types and quantity of data available for interpretation.

The variables (measured elements) in archaeological and geological data sets are often correlated and frequently large in number. This makes handling and interpreting patterns within the data difficult. Therefore, it is often useful to transform the original variables into a smaller set of uncorrelated variables in order to make data interpretation easier. Of the above-mentioned pattern recognition techniques, PCA is a technique that transforms from the data from the original correlated variables into uncorrelated variables most easily.

PCA creates a new set of reference axes arranged in decreasing order of variance subsumed. The individual PCs are linear combinations of the original variables. The data can be displayed on combinations of the new axes, just as they can be displayed on the original elemental concentration axes. PCA can be used in a pure pattern-recognition mode, i.e., to search for subgroups in an undifferentiated data set, or in a more evaluative mode, i.e., to assess the coherence of hypothetical groups suggested by other criteria. Generally, compositional differences between specimens can be expected to be larger for specimens in different groups than for specimens in the same group, and this implies that groups should be detectable as distinct areas of high point density on plots of the first few components. It is well known that PCA of chemical data is scale dependent (Mardia et al. 1979), and analyses tend to be dominated by those elements or isotopes for which the concentrations are relatively large. This is yet another reason for the log transformation of the data.

One frequently exploited strength of PCA, discussed by Baxter (1992), Baxter and Buck (2000z), and Neff (1994, 2002), is that it can be applied as a simultaneous R- and Q-mode technique, with both variables (elements) and objects (individual analyzed samples) displayed on the same set of principal component reference axes. A plot using the first two principal components as axes is usually the best possible two-dimensional representation of the correlation or variance-covariance structure within the data set. Small angles between the vectors from the origin to variable coordinates indicate strong positive correlation; angles at 90 degrees indicate no correlation; and angles close to 180 degrees indicate strong negative correlation. Likewise, a plot of sample coordinates on these same axes will be the best two-dimensional representation of Euclidean relations among the samples in log-concentration space (if the PCA was based on the variance-covariance matrix) or standardized log-concentration space (if the PCA was based on the correlation matrix). Displaying both objects and variables on the same plot makes it possible to observe the contributions of specific elements to group separation and to the distinctive shapes of the various groups. Such a plot is commonly referred to as a “biplot” in reference to the simultaneous plotting of objects and variables. The variable inter-relationships inferred from a biplot can be verified directly by inspecting bivariate elemental concentration plots. [Note that a bivariate plot of elemental concentrations is not a biplot.]
Whether a group can be discriminated easily from other groups can be evaluated visually in two dimensions or statistically in multiple dimensions. A metric known as the Mahalanobis distance (or generalized distance) makes it possible to describe the separation between groups or between individual samples and groups on multiple dimensions. The Mahalanobis distance of a specimen from a group centroid (Bieber et al. 1976, Bishop and Neff 1989) is defined by:

\[ D^2_{y,X} = [y - \overline{X}] I_x [y - \overline{X}] \]

where \( y \) is the 1 x m array of logged elemental concentrations for the specimen of interest, \( X \) is the n x m data matrix of logged concentrations for the group to which the point is being compared with \( \overline{X} \) being it 1 x m centroid, and \( I_x \) is the inverse of the m x m variance-covariance matrix of group \( X \). Because Mahalanobis distance takes into account variances and covariances in the multivariate group it is analogous to expressing distance from a univariate mean in standard deviation units. Like standard deviation units, Mahalanobis distances can be converted into probabilities of group membership for individual specimens. For relatively small sample sizes, it is appropriate to base probabilities on Hotelling’s \( T^2 \), which is the multivariate extension of the univariate Student’s \( t \).

When group sizes are small, Mahalanobis distance-based probabilities can fluctuate dramatically depending upon whether or not each specimen is assumed to be a member of the group to which it is being compared. Harbottle (1976) calls this phenomenon “stretchability” in reference to the tendency of an included specimen to stretch the group in the direction of its own location in elemental concentration space. This problem can be circumvented by cross-validation, that is, by removing each specimen from its presumed group before calculating its own probability of membership (Baxter 1994; Leese and Main 1994). This is a conservative approach to group evaluation that may sometimes exclude true group members.

Small sample and group sizes place further constraints on the use of Mahalanobis distance: with more elements than samples, the group variance-covariance matrix is singular thus rendering calculation of \( I_x \) (and \( D^2 \) itself) impossible. Therefore, the dimensionality of the groups must somehow be reduced. One approach would be to eliminate elements considered irrelevant or redundant. The problem with this approach is that the investigator’s preconceptions about which elements should be discriminate may not be valid. It also squanders the main advantage of multielement analysis, namely the capability to measure a large number of elements. An alternative approach is to calculate Mahalanobis distances with the scores on principal components extracted from the variance-covariance or correlation matrix for the complete data set. This approach entails only the assumption, entirely reasonable in light of the above discussion of PCA, that most group-separating differences should be visible on the first several PCs. Unless a data set is extremely complex, containing numerous distinct groups, using enough components to subsume at least 90% of the total variance in the data can be generally assumed to yield Mahalanobis distances that approximate Mahalanobis distances in full elemental concentration space.
Lastly, Mahalanobis distance calculations are also quite useful for handling missing data (Sayre 1975). When many specimens are analyzed for a large number of elements, it is almost certain that a few element concentrations will be missed for some of the specimens. This occurs most frequently when the concentration for an element is near the detection limit. Rather than eliminate the specimen or the element from consideration, it is possible to substitute a missing value by replacing it with a value that minimizes the Mahalanobis distance for the specimen from the group centroid. Thus, those few specimens which are missing a single concentration value can still be used in group calculations.

**Comparative Data Background**

**Brownwares**

An understanding of ceramic production, exchange, and discard generally improves with increased sample sizes. Some regions have been sampled enough to allow the identification of large regional reference groups that often represent geographically and/or temporally isolated ceramic paste recipes. Southern New Mexico brownwares have been the focus of numerous academic and CRM studies for decades, and the complexity of the regional reference groups expanded as well. The visual similarity of some of the major wares (Jornada, Mogollon, and El Paso) further complicated efforts to isolate production groups.

As of a 2007 report by Robert Speakman, the reference groups for the region included only a small number of very large (in terms of both the number of samples and the internal compositional variability) reference groups that would include the vast majority of new analyses while not providing much fine-scale information about production areas. This type of compositional group structure that includes a few large groups is common in regions with large numbers of samples that built up from the gradual accumulation of small isolated projects. Myles Miller and Jeff Ferguson decided that the entire region needed to be reexamined from scratch in order to try to develop more spatially isolated, and thus more archaeologically informative, compositional groups. Miller and Ferguson (2010) presented an early iteration of this reinterpretation, and Ferguson and Miller (2011) presented yet another version.

One advantage of the collaboration of Miller and Ferguson has been the separate and independent approaches. Miller is intimately familiar with the regional archaeology, the ceramic types included, and many of the specific projects involved, while Ferguson has extensive experience in the examination of the compositional data. Both worked together to compile a single database with uniform descriptive information, but then examined the data independently. Ferguson focused only on the compositional data without initial regard to any descriptive information, whereas Miller used descriptive information (ceramic type, site, dated contexts, etc…) to inform initial groupings. The different approaches produced remarkably similar results – providing further support of the stability of the current reference groups. Miller and Ferguson have collaborated sporadically over the past few years in an effort to refine the combined regional reference groups, and this effort is nearly complete. The current version includes approximately 40 reference groups with the vast majority identified to at least a general location of production. A few of the large groups remain poorly defined and overlapping. Large portions
of the region remain un- (or under) sampled, and continued research will help to fill the gaps.

**Chupadero**
Chupadero Black-on-white ceramics remain one of the most technologically and temporally distinct types in the American southwest. Creel et al. (2002) present the most current version of the reference groups for this type, and specimens recovered from sites across much of the Southwest and even the Plains generally project well into these reference groups. The five specimens in this project are no exception.

**Brownware Results**
Miller and Ferguson are nearing completion of the brownwares reference groups, but this large project is not quite ready for full release. Most of the reference groups are robust enough to allow a preliminary projection of the sample from the current project. The reference groups fall into about nine major divisions based on ware and spatial patterns. Of these nine divisions, only the El Paso, Jornada, Mogollon, Three Rivers, and Middle Pecos divisions have clear relevance to the present study. Each of these divisions are addressed individually below. Initial assignments were made using a Euclidian distance projection of the new data to the entire brownware database. The reference group membership of the ten closest matches for each specimen provided initial indications of group affiliations, and then refinements were made using Mahalanobis distance projections and bivariate plots of elemental, principal component, and canonical discriminant analysis. The single specimen that remains unassigned seems similar to some of the larger Jornada Brownware groups, but does not consistently plot with a single group. Table 1 is a list of some of the descriptive affiliation along with group assignments for the specimens in this project. Figure 1 is a plot of all brownware groups represented and shows the separation of groups 13 and 94. Figure 2 shows the further separation of Groups 71, 73, and TRT2a.

**El Paso Groups**
One specimen (PBI009) is a good fit for the predominantly El Paso Brownware Group 1033. This group is most likely a core production group for the Hueco/southern Tularosa Basin area. It is interesting that the specimen is described as a Jornada Brownware, but these groups show significant overlap by ware.

**Jornada Groups**
Five specimens fall confidently into two of the five Jornada reference groups currently defined by Miller and Ferguson. Group 71 is a distinct reference group from the Guadalupe Mountains and two new specimens (PBI002 and PBI010) match this group. Both specimens are Jornada Brownwares.

Three specimens (PBI001, PBI005, and PBI007) match reference Group 73. The previous members of reference Group 73 are primarily from the northern Sacramento Mountains and Capitan Mountains. This possible association with production in the Capitan Mountains area is interesting given the strong connection of the five Chupadero specimens in this project also strongly tied to ceramic production this region.
Mogollon Groups
One specimen (PBI006) is listed as an El Paso Brownware, but it is a good fit with Group 13 – a typologically and spatially mixed group that might represent production in the western Jornada or somewhere in the Mogollon region.

Three Rivers Groups
One of the Jornada Brownware specimens submitted (PBI004) fits well with one of the Three Rivers Terracotta reference groups. Group TRT2a includes primarily Three Rivers ceramics from the Guadalupe Mountains. It might be worth a reexamination of the remaining portion of this specimen to confirm its type designation.

Unassigned Specimens
Only 1 of the specimens remains unassigned. PBI002 does not fit well with any single group, but it does plot close to the two large Jornada groups 71 and 73.

Chupadero Results
The apparently localized production of Chupadero Black-on-White ceramics has facilitated the identification of a number of compositionally and spatially distinct compositional groups as presented by Creel et al (2002). Most of the groups are large enough to allow the calculation of group membership probabilities using a Mahalanobis distance projection (Table 2). Smaller reference group (too small for Mahalanobis distance calculations using all elements) were eliminated as potential matches by visual examination of elemental scatterplots. PBI012 does not have a high probability of membership in Group 1B (see Table 2), but the scatterplots suggest this is the closest group.

Creel et al (2002) suggest that this group was likely produced in the Capitan Mountains, and more specifically, possibly in the vicinity of the Robinson site. This group includes more that 25 percent of the pre-1300 A.D. specimens studies from southern New Mexico.

Conclusions
The large regional reinterpretation of the brownwares database is still ongoing by Miller and Ferguson; however we have been successful in assigning all but one specimen to existing regional reference groups. Similar success was found with the Chupadero specimens, with four out of five specimens assigned to a Chupadero production group.

Acknowledgments
We acknowledge Dr. Brandi MacDonald for her role in overseeing sample preparation and data collection.

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Table 1: Descriptive information along with compositional group assignment for the specimens in this study.

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<th>ANID</th>
<th>Comp Grp</th>
<th>Alternate ID</th>
<th>Site Number</th>
<th>Ware</th>
<th>Ceramic Type</th>
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<td>PBI001</td>
<td>g73</td>
<td>FS 389</td>
<td>LA 118318</td>
<td>Three Rivers Redware</td>
<td>Jornada Plain Slipped Red</td>
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<td>PBI002</td>
<td>unas</td>
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<td>Chup1B?</td>
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Table 2: Group membership probabilities for Chupadero groups.

GROUP CLASSIFICATION USING MAHALANOBIS DISTANCE

Results are based on the following variables:
Na  Al  K  Ca  Sc  Ti  V  Cr  Mn  Fe  Co  Zn  As  Rb  Sr  Zr  Sb  Cs
Ba  La  Ce  Nd  Sm  Eu  Tb  Dy  Yb  Lu  Hf  Ta  Th  U
Best Group is based on highest membership probability > 0.001%

Probabilities calculated by projecting unknowns against reference groups.

<table>
<thead>
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<th>ANID</th>
<th>CHUP1A</th>
<th>CHUP1B</th>
<th>CHUP1C</th>
<th>CHUP2A</th>
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<td>0.000</td>
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Figure 1: Bivariate plot of rubidium and europium concentrations showing the new samples assigned to brownware reference groups (individually plotted and labeled) and the corresponding reference groups. The ellipses represent 90% confidence intervals for membership in the groups.
Figure 2: Bivariate plot of ytterbium and chromium showing further separation of the brownware groups 71, 73, and TRT2a. The ellipses represent 90% confidence intervals for membership in the groups.
Plant Remains from Data Recovery along US 82,

Eddy County, New Mexico

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INTRODUCTION
This chapter reports on plant remains recovered from flotation samples collected from eight sites located on both sides of US 82 near Loco Hills, New Mexico. Flotation samples were analyzed from thermal features, a probable storage pit, and a burned caliche dump. The sites are in parabolic and coppice dunes with the dominant shrubby species of shinnery oak (Quercus havardii) that stabilizes the parabolic dunes and honey mesquite (Prosopis glandulosa) on coppice dunes which serve the same function. Understory species consist of weedy annuals like goosefoot (Chenopodium sp.) and purslane (Portulaca sp.), and other forbs including scorpionweed (Phacelia sp.), limoncillo (Pectis angustifolia), bladderpod (Lesquerella sp.) senna (Senna bauhinioides), and pepperweed (Lepidium montanum). Grasses that may occur include grama (Bouteloua sp.), alkali sacaton (Sporobolus airoides), and ring muhly (Muhlenbergia torreyi).

METHODS
Plant remains from the US 82 project were recovered by collecting a sample of feature sediment that was later submerged in water to extract plant remains. This technique is commonly referred to as flotation (Pearsall 1989). Archaeobotanical analysis of material recovered involved full-sort analysis and quantification as described below. Identification was aided by the use of a modern comparative collection and comparison to photographs in seed identification manuals (Martin and Barkley 1961 and Delorit 1970). Scientific nomenclature and common names followed those presented in Allred and Ivey 2012 and Ivey 2008. Identifications were made to different taxonomic levels: family (e.g., Fabaceae) and genus (e.g., Chenopodium sp.). Non-cultural remains such as roots and insect parts observed during flotation analysis were also recorded. These observations are reported along with sample volumes (before flotation) and sample weights (after flotation) in Table 1.

FLOTATION SAMPLES
Flotation Processing
The 21 soil sediment samples were collected during the excavation of cultural features at the site and processed by Office of Archaeological Studies personnel using the simplified "bucket" version of flotation (see Bohrer and Adams 1977). The volume of flotation soil samples ranged from 1.0 to 2.35 liters (Table 1). Two liters of sediment was removed from ten of the sediment samples and set aside for flotation; the remaining sediment was dryscreened and carbonized material was removed from the 4mm and 2mm
geological sieves and was inspected along with the plant material recovered from flotation during full-sort analysis.

Each sample that was floated was immersed in a bucket of water, gently stirred, and allowed to settle for 30-40 seconds, offering sufficient time for the plant remains to surface and the heavier particles to settle out. The solution was then poured through a fine mesh "chiffon" fabric, catching the organic materials floating or still in suspension. The fabric was then laid flat on screen trays and allowed to dry.

**Full-Sort Analysis**

Once dry, each sample was sorted by size using a series of nested geological screens (4.0, 2.0, 1.0, 0.5 mm mesh and the pan), and then examined under a binocular microscope at 7-45x. Charred seeds were identified and counted. Charred non-reproductive plant parts (yucca caudex) and uncharred plant parts were also identified and quantified as an estimate of abundance/sample, which is the number perceived to be present by the analyst. Flotation data for carbonized seeds are reported as the actual number of seeds recovered.

**Charcoal Identification**

From each flotation sample that contained a minimum of 20 pieces of wood charcoal, a sample of 10 pieces was identified from the 4 mm screen and 10 pieces from the 2 mm screen. In smaller samples, all charcoal from the 4 mm and 2 mm screens was analyzed. Each piece was snapped to expose a fresh transverse section, and then examined at 45x. Each identified taxon was weighed on a top-loading digital balance to the nearest tenth of a gram and placed in foil packets or polyethylene capsules and labeled with the corresponding taxon. Low-power, incident light identification of wood specimens does not often allow species- or even genus-level precision but can provide reliable information useful for distinguishing broader patterns in the utilization of resources derived from different environmental settings, such as scrubland, riparian, or woodland.

All reproductive plant parts that were counted and identified from each sample were placed in polyethylene capsules or bags and labeled for future reference. An example of each uncharred or non-reproductive charred plant part encountered during analysis was also separated and placed in a polyethylene capsule or bag.

To aid the reader in sorting out botanical occurrences of cultural significance from the considerable noise of post-occupational intrusion, data in tables are sorted into categories of "Cultural" (all carbonized remains) and "Non-Cultural" (unburned materials, especially of taxa not economically useful, and when found in disturbed contexts together with modern roots, insect parts, scats, or other signs of recent biological activity).
Uncharred Plant Remains from Flotation Samples

Various studies have addressed the uncertain origins and difficulty of interpreting uncharred plant remains found in open-air sites (Minnis 1981; Keepax 1977). Due to these kinds of questions, this report will focus on charred plant remains. When present, uncharred remains were recorded during full-sort analyses, but were considered intrusive and unassociated with the prehistoric use of the sites.

Unburned taxa included bean family, goosefoot, hidden flower, dropseed grass, and panic grass seeds. Goosefoot is found in virtually any disturbance situation and is widespread throughout the Southwest. Dropseed grass and other grasses take advantage of roadside runoff and are prolific in the scrub and grassland habitat of the site environs. Evidence of insect activity was present at every site; unburned plant material could have been introduced by insects or wind or during excavation of the sites.

Charred Plant Remains from Flotation and Macrobotanical Samples

LA 15901
Two side by side thermal features were examined for plant remains. Non-cultural uncharred seeds in the legume family were recovered from Feature 4 and the only charred material was mesquite wood (Table 2).

LA 17041
Flotation samples from two other side by side thermal features were analyzed from LA 17041. Charred goosefoot seeds were recovered from both features and yucca caudex from Feature 20 (Table 2). Yucca caudex consists of fragments from the base of the yucca stalk or caudex where leaf bases have either broken off when the plant dies and dries up or that have been cut off. The recovery of these fragments could be evidence for the use of leaf succulents as food or as fuel or firestarter. Mesquite was the only wood taxon identified.

LA 89659
The sample from the Feature 9 hearth produced unburned dropseed grass seeds and mesquite wood (Table 2).

LA 83680
Goosefoot and dropseed grass seeds along with yucca caudex fragments were recovered from three of the five features examined for plant material (Table 3). Unburned dropseed grass seeds were identified in Feature 19 along with mesquite wood. Mesquite wood was also recovered from the burned caliche dump (Feature 6B). Small quantities of wood that resembled cholla, as well as javelina bush and saltbush were found in the other three features along with mesquite.
LA 118318
Flotation samples were analyzed from six hearths at LA 118318. Charred goosefoot seeds were identified in Features 22, 23, 25, and 26, while carbonized purslane seeds were found in Features 25 and 27 (Table 4). Non-cultural seed taxa included goosefoot, hidden flower, dropseed grass, and panic grass. The wood assemblage was entirely mesquite with the exception of one fragment of saltbush from Feature 27. Features 25, 26, and 27 were in close proximity of each other and the archaeobotanical assemblage may indicate that weedy annuals were processed in the features.

LA 120949
The probable storage pit (Feature 7) produced only mesquite wood and the Feature 8 hearth yielded unburned goosefoot seeds and four pieces of mesquite wood (Table 5).

LA 120950
Charred goosefoot seeds were recovered from both features at LA 120950; unburned goosefoot was identified as well along with unburned dropseed grass (Table 5). The wood assemblage from Feature 5 (described as the most well-defined feature on the site) was diverse, including wood that resembled cholla, mesquite, and saltbush. Wood from Feature 3 consisted entirely of mesquite.

LA 137120
The sample that was analyzed from Feature 1 (a sediment stain) was devoid of any plant material, charred or otherwise.

DISCUSSION
Charred weedy annual taxa were present at four of the eight sites and include goosefoot and purslane. These were found in very small quantities, making interpretation difficult. The seeds could be present as a result of “kitchen accidents” during preparation steps that might have included parching. However, the seeds could have blown into fires and were burned inadvertently. The seeds of goosefoot and purslane were parched, ground into meal, and often made into a thick gruel (Castetter 1935:16, 23, 30); their presence in flotation samples may indicate preparation in this way. Only one charred dropseed grass seed was recovered from the project, presenting similar difficulties with interpretation. The ground seeds of dropseed grass were used by the Navajo to make dumplings, rolls, and griddle cakes, and the Hopi ground the seeds and mixed them with cornmeal (Castetter 1935:28). Even though dropseed grass grains are very small, the positive qualities of abundant seed production and the retention of the grains by the plant after maturation, preventing their loss before harvesting, (Doebley 1984) probably outweighed the problem of small seed size. Again, the single grass grain could have blown into the thermal feature or was carbonized during processing for food.
Yucca caudex was recovered at LA 17041 and LA 83680 and could be evidence for the use of leaf succulents as food at the two sites. Ethnobotanical accounts compiled by Bell and Castetter (1941) describe the collection of young flower stalks of _Y. glauca_ by the Mescalero Apache. They were roasted on a bed of embers for a short time (about 15 minutes) and then the burned portion was scraped away, leaving the central, white portion which was regarded as the best part of the plant. The crowns were also gathered by the same group, from mid-March to the end of summer. “The portion between the ground and the leaves was peeled and baked overnight in an underground oven” (Bell and Castetter 1941:19), applying a method similar to that used for roasting agave hearts. The product of this process was then dried in the sun and stored for future use when pieces were softened in water to render them edible. The caudex fragments or leaf bases could represent residue from preparing the stems or crowns as described above. Equally plausible is the possibility that the very dry, easily gathered material was used as tinder.

Without a doubt, the wood assemblages from the project area sites reflect foraging of local stands of shrub species, foremost of which was mesquite. Mesquite’s admirable fuel qualities (it is a dense wood providing “a bed of hot, slow burning coals” [Ford 1977:200]) are most likely responsible for prehistoric preference for this resource.

Comparison of the US 82 archaeobotanical results with those of NM 128 (McBride and Toll 2016) near Carlsbad, indicates that although preservation was not optimal at NM 128, the carbonized plant assemblage from thermal features at NM 128 was much more diverse. A number of perennial taxa were recovered including prickly pear cactus, hedgehog cactus, horse cripliner cactus, and mesquite. Like at US 82 sites, goosefoot and purslane seeds as well as yucca caudex were recovered from NM 128 features, but in addition, hidden flower, amaranth, cheno-am, carpetweed, and aster family seeds were found. Flotation and macrobotanical wood samples from NM 128 were primarily mesquite, but a few samples were dominated by lotebush (_Ziziphus obtusifolia_), a close relative in the same family as javelina bush that was recovered from LA 83680.

Although shinnery oak acorns would have been an easily gathered source of protein, they were absent from both projects and acorns in general are conspicuously absent from most Southwest archaeobotanical assemblages. On the rare occasion when they are recovered from sites, they are often unburned, rodent-gnawed specimens in caves or dry shelters, where their presence may not be related to prehistoric subsistence at all (e.g., Adams and Huckell 1986:297). Three sites from southeastern New Mexico provide some evidence of acorn utilization. In the WIPP core area to the southeast of the current project and just down the road from the NM 128 project, both charred and uncharred acorn
nutshell fragments were recovered from two features (dating to AD 260 ± 150 and AD 670 ± 60) at ENM 10230 (Lord and Clary 1985). Floral material recovered from a subterranean structure (LA 2112) date to the AD 1300-1350 occupation of the site and included 34 oak cotyledons and two acorns (Ford 1976). Why the occupants of either site compared did not apparently use the acorns of the shinnery oak stands that were nearby is a mystery. It would seem that US 82 inhabitants focused on annual seeds and possibly yucca crowns and those who utilized the NM 128 features targeted annuals and yucca as well, but also exploited cacti and mesquite.

SUMMARY AND CONCLUSIONS
Results for three of the seven sites with carbonized plant material do not offer any interpretational possibilities aside from indicating that site occupants were using mesquite for fuel. Prehistoric inhabitants of LA 17041, LA 83680, LA 118318, and LA 120950 could have been processing annual seeds and/or dropseed grass and the presence of yucca caudex at LA 17041 and LA 83680 suggests the use of this resource for tinder or the possibility that the stems or crowns were roasted for consumption. Although wood assemblages were slightly more diverse, the only feature that contained more than two taxa was the Feature 5 hearth at LA 120950. Evidence for the use of shinnery oak acorns, mesquite pods, or cacti was absent from the record. Perhaps, these sites served as camps or brief overnight stops for groups on their seasonal rounds to mountain foothills and higher elevation basins for exploitable resources.

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Ford, Richard I.


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Keepax, Carole

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McBride, Pamela J. and Mollie S. Toll

Minnis, Paul E.

Pearsall, Deborah M.
Table 1. US 82 Data Recovery, flotation sample summary data.

<table>
<thead>
<tr>
<th>Site</th>
<th>FS No.</th>
<th>Sample Volume (liters)</th>
<th>Sample Weight (grams)</th>
<th>Roots</th>
<th>Insects</th>
<th>Fecal pellets</th>
</tr>
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<tbody>
<tr>
<td>15001</td>
<td>3</td>
<td>2.0</td>
<td>2.4/3.68</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>1.75</td>
<td>9.26</td>
<td>+</td>
<td>+</td>
<td>insect</td>
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<td>17041</td>
<td>23</td>
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<td>17.77</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>2.35</td>
<td>13.6</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>83680</td>
<td>59</td>
<td>2.0</td>
<td>13.9</td>
<td>+</td>
<td>+</td>
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<td>66</td>
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<td>+</td>
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<tr>
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<td>96</td>
<td>1.1</td>
<td>8.5</td>
<td>+</td>
<td>+</td>
<td>insect</td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>2.0</td>
<td>3.9/11.0</td>
<td>+</td>
<td>+</td>
<td>insect</td>
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<td></td>
<td>105</td>
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<td>4.0/1.3</td>
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<td>+</td>
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<td>+</td>
<td>+</td>
<td>–</td>
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<td>5</td>
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<td>46.7/5.07</td>
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<td>+</td>
<td>insect</td>
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<td></td>
<td>380</td>
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<td>18.7/40</td>
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<td>+</td>
<td>rodent</td>
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<td>391</td>
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<td>11.1</td>
<td>+</td>
<td>+</td>
<td>insect</td>
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<td></td>
<td>403</td>
<td>2.0</td>
<td>66.9/31.7</td>
<td>+</td>
<td>+</td>
<td>insect</td>
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<td></td>
<td>404</td>
<td>2.0</td>
<td>20.3/4.5</td>
<td>+</td>
<td>+</td>
<td>insect</td>
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<td>415</td>
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<td>31.7/7.0</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
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<td>118318</td>
<td>86</td>
<td>1.8</td>
<td>2.2</td>
<td>+</td>
<td>+</td>
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<td>2.0</td>
<td>9.7</td>
<td>+</td>
<td>+</td>
<td>insect</td>
</tr>
<tr>
<td></td>
<td>120949</td>
<td>90</td>
<td>19.2/3.5</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>120950</td>
<td>93</td>
<td>20.9/7.7</td>
<td>+</td>
<td>+</td>
<td>insect</td>
</tr>
<tr>
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<td>137120</td>
<td>6</td>
<td>2.0</td>
<td>1.21</td>
<td>+</td>
<td>insect</td>
</tr>
</tbody>
</table>

+ present, - absent, light fraction weight/dry screen weight.
Table 2. LA 15901, LA 17041, LA 89659, flotation plant remains.

<table>
<thead>
<tr>
<th>Site</th>
<th>Feature</th>
<th>15901</th>
<th>17041</th>
<th>89659</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Hearth</td>
<td>Hearth</td>
<td>Hearth</td>
</tr>
<tr>
<td>FS No.</td>
<td>9</td>
<td>3</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Cultural</td>
<td>Annuals: Goosefoot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perennials: Yucca</td>
<td>3.0</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Non-Cultural</td>
<td>Other: Bean family</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grasses:</td>
<td>Dropseed grass</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Wood</td>
<td>Non-Conifers: Mesquite</td>
<td>20/2.35</td>
<td>20/2.45</td>
<td>12/.27</td>
</tr>
</tbody>
</table>

Cultural plant material is charred, non-cultural plant material is uncharred.
Plant remains are seeds unless indicated otherwise.
Wood: count/weight in grams.
+ 1-10/sample.
Table 3. LA 83680, flotation plant remains.

<table>
<thead>
<tr>
<th>Feature</th>
<th>6B Burned caliche dump</th>
<th>10 Hearth</th>
<th>11 Hearth</th>
<th>19 Hearth</th>
<th>20 Hearth</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS No.</td>
<td>105</td>
<td>59</td>
<td>66</td>
<td>96</td>
<td>98</td>
</tr>
<tr>
<td>Cultural</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annuals: Goosefoot</td>
<td></td>
<td>1.0</td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Grasses:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dropseed grass</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Perennials: Yucca</td>
<td>+ caudex</td>
<td>+ caudex</td>
<td>++ caudex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Cultural</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grasses:</td>
<td></td>
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<td>Dropseed grass</td>
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</tr>
<tr>
<td>Wood</td>
<td></td>
<td>1/.01</td>
<td>2/.10</td>
<td></td>
<td></td>
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<tr>
<td>Non-Conifers:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cf. Cholla</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Javelina bush</td>
<td>20/.60</td>
<td>19/1.8</td>
<td>19/.80</td>
<td>20/.70</td>
<td>18/4.6</td>
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<tr>
<td>Saltbush</td>
<td>1/.02</td>
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</table>

Cultural plant material is charred, non-cultural plant material is uncharred. Plant remains are seeds unless indicated otherwise. Wood: count/weight in grams. + 1-10/sample, ++ 11-25/sample, cf. compares favorably.
Table 4. LA 118318, flotation plant remains.

<table>
<thead>
<tr>
<th>Feature</th>
<th>14 Hearth</th>
<th>22 Hearth</th>
<th>23 Hearth</th>
<th>25 Hearth</th>
<th>26 Hearth</th>
<th>27 Hearth</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS No.</td>
<td>5</td>
<td>380</td>
<td>391</td>
<td>403</td>
<td>404</td>
<td>415</td>
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<tr>
<td>Cultural</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Annuals:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goosefoot</td>
<td>1.0</td>
<td>3.0</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purslane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
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</tr>
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<td>Annuals:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Goosefoot</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Hidden flower</td>
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</tr>
<tr>
<td>Grasses:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dropseed grass</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic grass</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Wood:</td>
<td>20/2.97</td>
<td>20/60</td>
<td>15/50</td>
<td>20/2.4</td>
<td>19/2.2</td>
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<td>Non-Conifers:</td>
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</tr>
<tr>
<td>Mesquite</td>
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<td></td>
</tr>
<tr>
<td>Saltbush</td>
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<td></td>
<td></td>
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<td>17.02</td>
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</tbody>
</table>

Cultural plant material is charred, non-cultural plant material is uncharred.  
Plant remains are seeds unless indicated otherwise.  
Wood: count/weight in grams.  
+ 1-10/sample.
Table 5. LA 120949, LA 120950, flotation plant remains.

<table>
<thead>
<tr>
<th>Site</th>
<th>Feature</th>
<th>120949</th>
<th>120950</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS No.</td>
<td>7 probable storage pit</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>8 Hearth</td>
<td>86</td>
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<tr>
<td></td>
<td>3 Hearth</td>
<td>93</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>5 Hearth</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Cultural Annuals: Goosefoot</td>
<td></td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Non-Cultural Annuals: Goosefoot</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Grasses: Dropseed grass</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Wood Non-Conifers: cf. Cholla</td>
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<td>4/01</td>
<td>20/84</td>
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<tr>
<td></td>
<td>Mesquite</td>
<td>3/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saltbush</td>
<td></td>
<td>4/10</td>
</tr>
</tbody>
</table>

Cultural plant material is charred, non-cultural plant material is uncharred. Plant remains are seeds unless indicated otherwise. Wood: count/weight in grams. + 1-10/sample, cf compares favorably.