PERMIAN QUARTERLY

Permian Basin Programmatic Agreement Quarterly Newsletter

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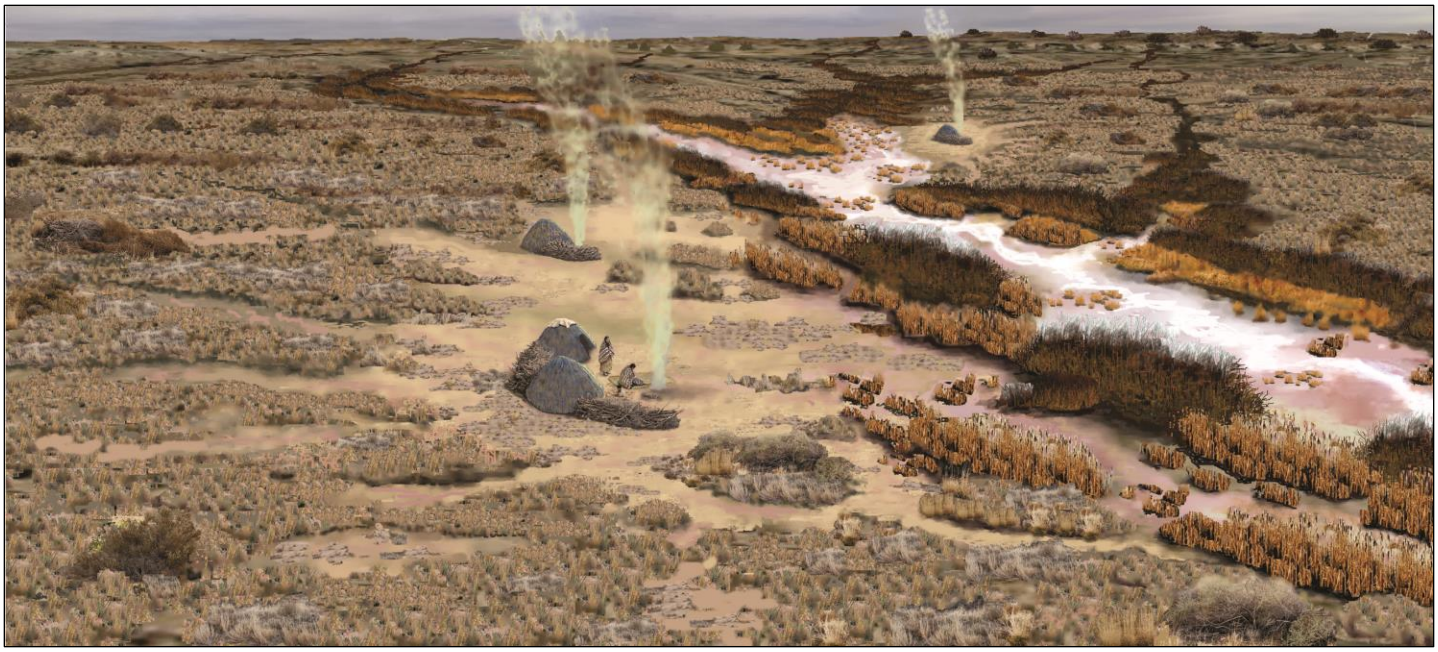
New Mexico



Hypothetical visualization of the Biting Ant site complex on a late autumn day in the first millennium B.C., looking east. The climate was cooler and wetter than today. The area was a much more lush and diverse grassland than today, with proportionately more grass and weedy species and fewer xeric plants (yucca, cacti, scrub, mesquite, etc.). Like today, a band of junipers occurred along the basin rim. Springs and seeps issuing from the basin rim created shallow, intermittent streams lined with willows and other wetland plants. The dome-shaped, brush huts had south- to southeast-facing entryways, and are flanked by brush windbreaks that shielded outdoor work areas from prevailing winds. Digital painting by Jim A. Railey. Read more about the Biting Ant site complex inside this newsletter.

The *Permian Quarterly* is a newsletter for participants in the Permian Basin Programmatic Agreement (PA) and for other interested persons. Its purpose is to provide information in a timely manner about implementation of the PA and to disseminate that information to a wide audience.

Introduction to the Permian Basin Programmatic Agreement

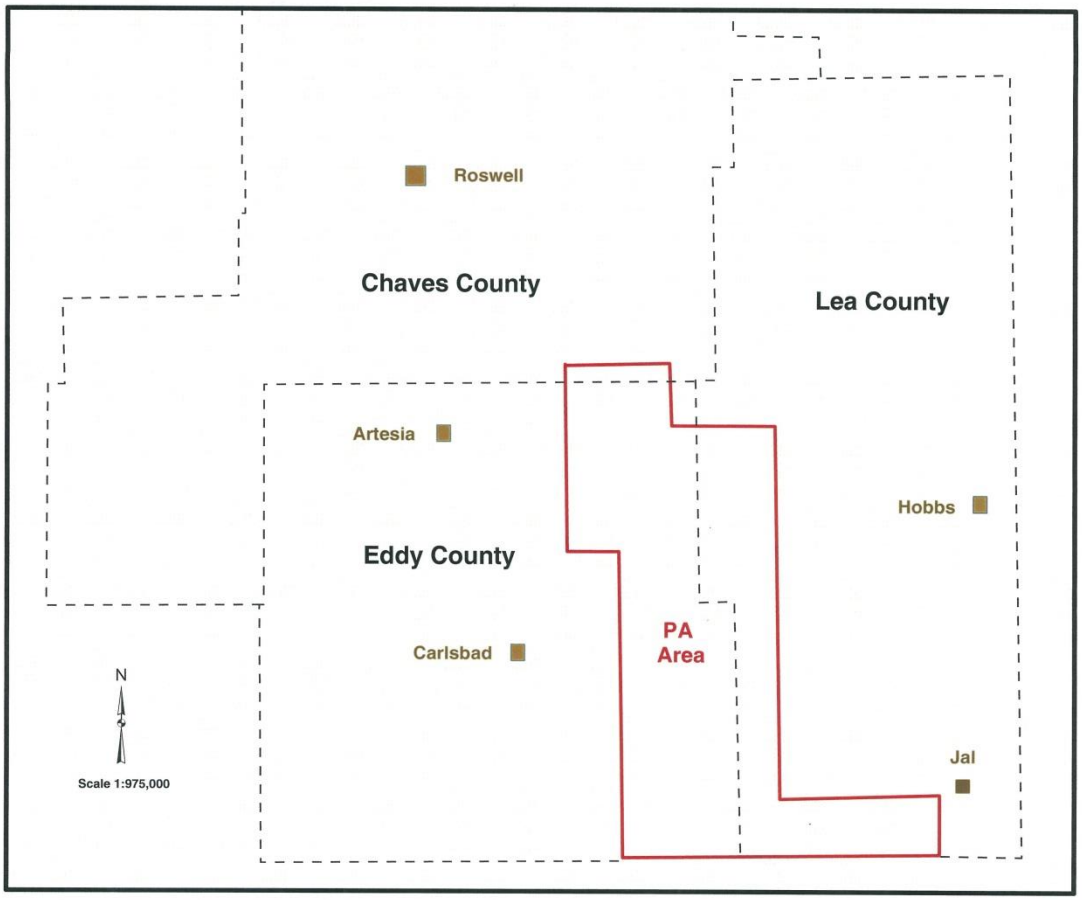


Figure 1. Map showing the Permian Basin PA Area.

The PA is an alternate form of compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, that is offered to the oil and gas industry, potash mining companies, and local governments in southeastern New Mexico for federal projects located on Bureau of Land Management (BLM) land or private property. Formerly called the Permian Basin MOA, it was extended for a period of three years in April 2013 as a Programmatic Agreement. The PA area, noted above in red, is located partially in Chaves, Eddy, and Lea counties and generally coincides with a physiographic region in southeastern New Mexico called the Mescalero Plain. Proponents of projects within the PA area may contribute to a dedicated archeological research fund in lieu of contracting for project specific archeological surveys, provided their proposed projects avoid recorded archeological sites. This dedicated fund is then used to study the archeology and history of southeastern New Mexico.

Current PA News

Permian Basin Programmatic Agreement Extended for Second Time

Signatories of the Permian Basin Programmatic Agreement agreed to an additional 10 year extension of the PA at a meeting on May 7, 2015. The meeting was held at the Bureau of Land Management State Office building in Santa Fe and was attended by representatives from the New Mexico Bureau of Land Management, the New Mexico State Historic Preservation Officer and selected staff, the Tribal Historic Preservation Officer of the Mescalero Apache Indian Tribe, staff from the Advisory Council on Historic Preservation, representatives from the New Mexico Oil and Gas Association, staff of the Independent Petroleum Association of New Mexico and the President of the New Mexico Archeological Council. Also in attendance were archeologists from SWCA Environmental Consultants. The extension allows the PA program to operate until May 2026.

New Member Added to the Permian Basin PA Workgroup

Thomas Rocek, an associate professor at the University of Delaware, has joined the Permian Basin PA Workgroup. Tom Rocek received his Ph.D. from the University of Michigan in 1985, was a fellow at the School of American Research (now School of Advanced Research) in Santa Fe 1985-1986, a visiting Assistant Professor of Anthropology at Oregon State University 1986-1987, and then joined the University of Delaware where he is currently an Associate Professor of Anthropology. His research has included studies of historical Navajo settlements on the Navajo Nation (*Navajo Multi-Household Social Units: Archaeology on Black Mesa, Arizona*; University of Arizona Press, 1995) and Formative through Late Prehistoric research in New Mexico, particularly within the Jornada branch of the Mogollon archeological culture (*The Henderson Site Burials: Glimpses of a Late Prehistoric Population in the Pecos Valley*,with John Speth. Museum of Anthropology, University of Michigan, 1986; *Diversity on the Edge of the Southwest: Late Hunter-gatherers and Farmers of the Jornada Mogollon* with Nancy Kenmotsu (editors) [in prep]; *The Dunlap-Salazar Site* [in prep]). His research interests include middle-range societies, agricultural origins, mobility and sedentism, quantitative analysis, and particularly comparative approaches to archeological analysis (*Seasonality and Sedentism : Archaeological Perspectives from Old and New World Sites*, with Bar-Yosef (editors), Peabody Museum, Harvard University), 2004. He is a member of the Society for American Archaeology, the American Anthropological Association, the European Association of Archaeologists, the Arizona Archaeological and Historical Society and the Archaeological Society of New Mexico.

The Workgroup is composed of state and federal regulatory archeologists, academic archeologists with research interests in Southeastern New Mexico, a representative from the Indian tribes and pueblos with ancestral ties to the region, and representatives from industries operating within the PA area. The Workgroup provides guidance for research projects undertaken through the Permian Basin Programmatic Agreement, as it is administered by the Carlsbad Field Office. The current members of the Permian Basin Workgroup are listed below:

Permian Basin Programmatic Agreement Workgroup

Jan Biella	Deputy New Mexico State Historic Preservation Officer
Nancy Brown	Advisory Council on Historic Preservation
David Carmichael	University of Texas at El Paso
Michelle Ensey	New Mexico Historic Preservation Division
Rand French	Concho Oil and Gas Company
Stacy Galassini	BLM Carlsbad Field Office Lead Archeologist

Permian Basin Programmatic Agreement Workgroup	
Cynthia Herhahn	BLM New Mexico State Office Lead Archeologist
Holly Houghton	Tribal Historic Preservation Officer Mescalero Apache Tribe
Signa Larralde	BLM National Transmission Support Team
Tom Rocek	University of Delaware
Dave Simons	BLM New Mexico State Office Data Recovery Review Team Coordinator
Deni Seymour	Research Associate Jornada Research Institute
Martin Stein	BLM Carlsbad Field Office Permian Basin PA Coordinator
Chris Turnbow	New Mexico Gas Company

The next scheduled meeting of the Workgroup will coincide with the October biennial Jornada-Mogollon Conference in El Paso, Texas, although the exact date has not been selected at this time.

Back Issues of the *Permian Quarterly* are Available

Back issues of the *Permian Quarterly* newsletter are available at the Bureau of Land Management, New Mexico State Office website at http://www.blm.gov/nm/st/en.html. Use the "Quick Links" section then go to Cultural Resources - Research/Partnerships - Permian Basin Partnership.

Other Archeology News from the Permian Basin

Two reports resulting from Section 106 compliance work have been received by the Carlsbad Field Office. One report concerned an archeological survey undertaken for a pipeline gathering system and the other described archeological excavations done in conjunction with remediation work for an oil and saltwater spill that took place at a tank battery storage facility. These reports illustrate how archeological information is acquired through survey and excavation and how that information can be used to further our understanding to the prehistory of this region.

The Survey Report

The survey report, completed by Statistical Research, Inc., is entitled, "A Cultural Resource Inventory of the Alpha Crude Connect Pipeline Project," by David T. Unruh, Bradley J. Vierra, and Phillip O. Leckman. This report describes a survey undertaken for a multi-branch oil gathering pipeline located in Eddy and Lea Counties, New Mexico and Culberson, Loving, and Winkler Counties in Texas. The cumulative length of the various lines total almost 467 miles. Forty-two new sites were recorded and 55 previously recorded sites were revisited and of these 33 were recommended as eligible for listing on the National Register of Historic Places for their research potential. Pipeline routes were changed to avoid sites recommended as eligible, or in two instances the pipeline was bored beneath sites; one adjacent to an irrigation canal and another at the Delaware River. Both prehistoric and historic sites were recorded and evaluated.

The report includes sections, such as an environmental context, an archeological background summary, and a description of survey methods used, that are common to most such reports. However two aspects

stand out: one is the inclusion of a geomorphic analysis of four large parcels of land within the project and 58 specific sites located in New Mexico and five in Texas that were potentially affected by pipeline construction. Geomorphology is defined as the science of landforms with an emphasis on their origin, evolution, form, and distribution across the physical landscape. When tied to the study of archeology it is referred to as "geoarcheology," with the goal of interpreting the context of the archeological record. Geoarcheological research examines soil formation processes, stratigraphy, and the chronological order of the different strata in order to provide a prehistoric landscape context for a particular artifact, feature, or site and uses this context to understand the spatial distribution and preservation potential of artifacts, features, or the site itself within the current landscape.

By using geoarcheological analysis in conjunction with traditional archeological sampling methods the authors of the report were able to better evaluate each site's physical condition, or integrity. After people leave a place they have occupied, the abandoned artifacts and physical alterations to the place that people have made, for instance by digging a storage pit, begin to change. Deterioration of artifacts made of fiber or feathers happens more quickly than those of wood or stone, but all are changed or destroyed through time. Likewise permanent features, such as storage pits, may be buried and better preserved, or they may be damaged or destroyed by processes of erosion. The physical integrity of a prehistoric site determines in large part what may be learned there, because the location and state of preservation of artifacts and site features provides the only avenue of study. There are no written records of the site occupation and its inhabitants that can be consulted. Having this enhanced evaluation of each site's integrity made it possible for the authors to explain and justify their recommendations for each site's eligibility to be listed on the National Register.

The other laudable aspect of the report is the authors' use of their survey information to examine the prehistoric use of the region through time by examining the geographical distribution of sites and the origin of ceramic and stone artifacts contained in those sites. This examination included a consideration of lithic-raw-material procurement and its implications for hunter-gatherer seasonal rounds, the development of prehistoric settlement and subsistence patterns in southeastern New Mexico and western Texas, and the nature of exchange relationships evident in the distribution of nonlocal artifacts, such as obsidian and intrusive ceramic types.

The routes of the main pipeline and laterals describe a large reverse "C" shape, mostly located in New Mexico, with its largest portion east of the Pecos River. This provided two east/west transects and one north/south corridor through portions of four of the physiographic units, the Llano Estacado, Mescalero Plain, Pecos Valley and Southwest Pecos Slopes, defined in the Permian Basin Regional Research Design (see Figure 2).

They found distinct patterns of clustering with prehistoric sites concentrated within the Pecos Valley and Southwest Pecos Slopes. Another cluster of sites surrounded Clayton Basin, a large depression located in the southern third of the Mescalero Plain. Elsewhere, along the mainline and laterals within the Mescalero Plain, there were markedly fewer sites recorded. The recorded sites had components related to all the major periods identified in southeastern New Mexico, Paleoindian, Archaic, Formative, and Historical.

Approximately 29,000 pieces of limestone or caliche fire-cracked rock were recorded during the survey, this is not surprising, since fire-cracked or burned rock is the most common artifact type found at

prehistoric sites in the region. Additionally, 6,200 lithic artifacts were recorded in the field, the majority (74 percent) consisting of flakes or other waste, produced during the manufacture of stone tools (collectively called debitage). Cores of stone, from which tools were made and debitage produced as a byproduct, totaled 15 percent, while hammerstones and other pounding tools made up two percent of the inventory. Grinding tools represented by manos and metates, but also by many indeterminate groundstone fragments, comprised four percent.

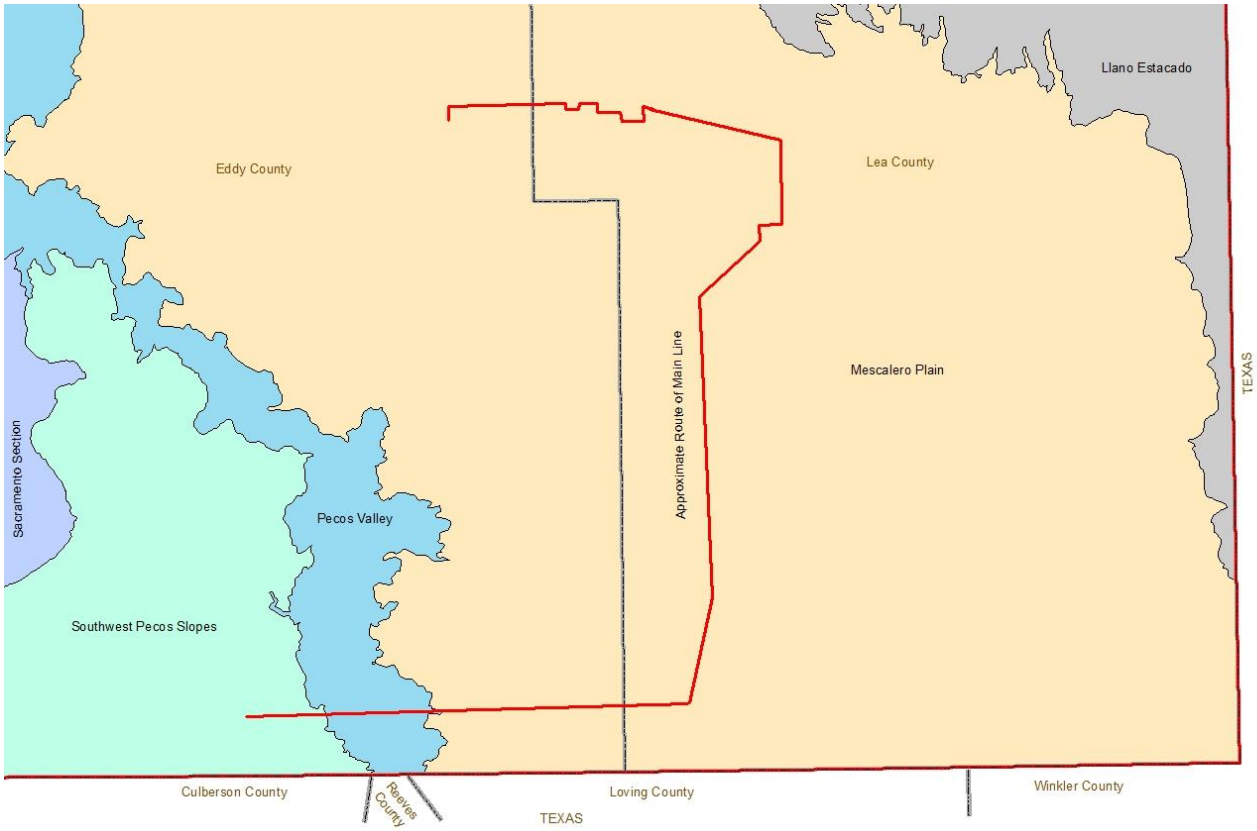


Figure 2. The route of the main line of the gathering system superimposed upon physiographic regions in Eddy and Lea Counties, New Mexico. The lateral lines are not shown.

Artifacts diagnostic of a particular period were found in small numbers. Forty-one projectile points and 160 pottery sherds were recorded. Projectile points were indicative of the Paleoindian, Archaic, and Formative Periods. Decorated potsherds include Chupadero Black -on-White as the most common (see Figure 3), but El Paso Polychrome, Three Rivers Red-on-Terracotta, Playas Red, and Ochoa Corrugated sherds were also present. However, the majority of the potsherds were undifferentiated brown wares.

No radiocarbon dates were obtained for any of the sites recorded during the survey, so the approximate age of the diagnostic artifacts provides the means of determining when the sites might have been inhabited. These approximate dates were combined with a series of 500 radiocarbon dates previously taken from other sites in the region for purposes of analysis. The radiocarbon dates indicate an initial period of occupation beginning A.D. 200, a peak in the number of dates at about A.D. 500; followed by a decline around A.D. 700, which was then followed by another peak circa A.D. 750; a subsequent decline in A.D. 1000; a lesser peak in A.D. 1100; and a decline to A.D. 1300. These peaks and valleys indicate

an episodic use of the region, more so in the Archaic, than in the following Formative Period. Most of the radiocarbon dated sites were associated with the Early Formative prior to A.D. 1000, while the diagnostic decorated pottery from sites in the survey was later in time, spanning a period of approximately 400 years, from A.D. 1050 to A.D. 1450.

Figure 3. A Chupadero Black-on-White rim sherd found at site LA 176265. This view shows the top of the vessel and a black band at the bottom of the neck. The surface is obscured by minerals precipitated from the soil.

The authors looked for patterns in the locations of sites through time and found that all but one of the Paleoindian points originated from a large site in a draw approximately 23 miles (37 km) east of the Pecos River. Paleoindian artifacts have also been found at nearby sites adding more weight to the interpretation of this draw as a locus of activity in those ancient times. Later Archaic and Formative Period artifacts are also found at this site, indicating a repeated use of this locality through time. The repeated use of a locality, with a resulting mixture of artifacts from different time periods and a range of radiocarbon dates, is a common occurrence in the PA Area.

Archaic Period sites clustered in the physiographic region referred to as the Southwest Pecos Slopes, an area of mostly gentle slopes located between the Guadalupe Ridge/Reef Escarpment and the Pecos River. It is possible that the lowland setting was part of a larger subsistence region that included the nearby Guadalupe Mountains. A 2009 study of burned-rock middens in those mountains identified two spans of Archaic period occupation: 2650–2300 B.C. and 1610–420 B.C. It appears that Archaic period groups practicing a broad spectrum of subsistence activities that incorporated seasonal exploitation of local resources favored that part of the project area over the Mescalero Plain, perhaps because of the variety of

environments in relatively close proximity to each other afforded by that location. From the Southwest Pecos Slopes, hunter-gatherers could access the Mescalero Plain to the east, the Pecos floodplain and terrace region along the river, and the foothills/montane zone to the west, all within a one or two day walk.

Formative Period sites, identified by the presence of ceramics or diagnostic arrow points were scattered across the survey corridors. However, clusters of Formative sites were found in the Mescalero Plain overlooking Clayton Basin and other nearby localities with prominent playas (depressions with no drainage outlet that hold water on an intermittent basis). Formative Period site types are artifact scatters, residential sites, and campsites, respectively. Farther to the east on the Mescalero Plain sites are more scattered and the inhabitants did not utilize large topographical features, such as ridges or large playas and this may reflect a shorter-term use of the area and more extensive seasonal rounds than the sites farther west.

The report also has information about the use of natural resources, specifically fresh water mollusks and stone useful for flintknapping. The report states:

> Mollusk remains were identified at six sites with Formative period components. Several of these sites did contain earlier components, but there were no Paleoindian or Archaic period sites with shell remains that did not also contain Formative components. Mollusk remains were obviously found in greatest abundances at large sites with multiple occupations directly on the Pecos and Delaware Rivers. However, small amounts of mollusk remains have also been recorded at sites at considerable distances from these rivers: LA 176865, a large, Late Formative period residential site located 31 km to the northeast of the nearest portion of the Pecos River; LA 120951, a multicomponent site spanning the Paleoindian and Formative periods that measured over 26 km to the northeast from the nearest point in the Pecos River; and LA 180637, a Formative period residential site at least 42 km away from the Pecos River. Undoubtedly, the presence of shell eroding out of deeply buried arroyo contexts at Pecos River sites, such as LA 132358 and LA 17429, indicated that Archaic period groups utilized that resource. However, the increase in the range of shell during the Formative period suggested either that mollusks became an increasingly important food source in later times or that this resource was exchanged between Formative period groups through indirect procurement, as opposed to the embedded procurement tactic of earlier hunter-gatherers.

The stone artifacts found during the survey were compared to "local" stone sources as part of an attempt to understand the organization of past economic and land-use practices. One lithic source of opalized caliche was found along the escarpment of the Llano Estacado. This material is variable in quality, but it occurs on both the eastern and western margins of the Llano. Two other sites also had artifacts of opalized caliche. Chert and quartzite are the two major stone types found at sites in the survey. Currently there are no independent analytical methods, such as X-Ray Fluorescence (XRF), to distinguish different chert or quartzite artifacts. Typing different chert and quartzite artifacts depends upon recognizing differences in color, color patterns and fossil content, and comparisons to samples from known sources. Some recognizable chert subtypes are banded San Andres chert from the foothills of the Sacramento Mountains, also called "fingerprint chert," and fossiliferous chert, both found west of the survey area. Purple and mustard colored quartzite nodules occur in the Pecos River gravels and in the Ogallala

Formation underlying the Llano Estacado. Lag gravel deposits eroded from the Ogallala are found in the Mescalero Plain westward from the current margin of the Llano. Purple quartzite composed 44 percent of all quartzite artifacts and the vast majority of all other quartzite and chert artifacts can be classified as local also.

A handful of artifacts were from exotic locales, including a few core flakes of Alibates agatized dolomite found at two sites in New Mexico and one site in Texas. Quarries of this distinctive stone are found at the Alibates Flint Quarries National Monument located in the Canadian River breaks north of Amarillo, Texas. Cobbles of this material are also found in river gravels downstream from the Monument. This material was brought into southeastern New Mexico as prepared cores and worked on-site.

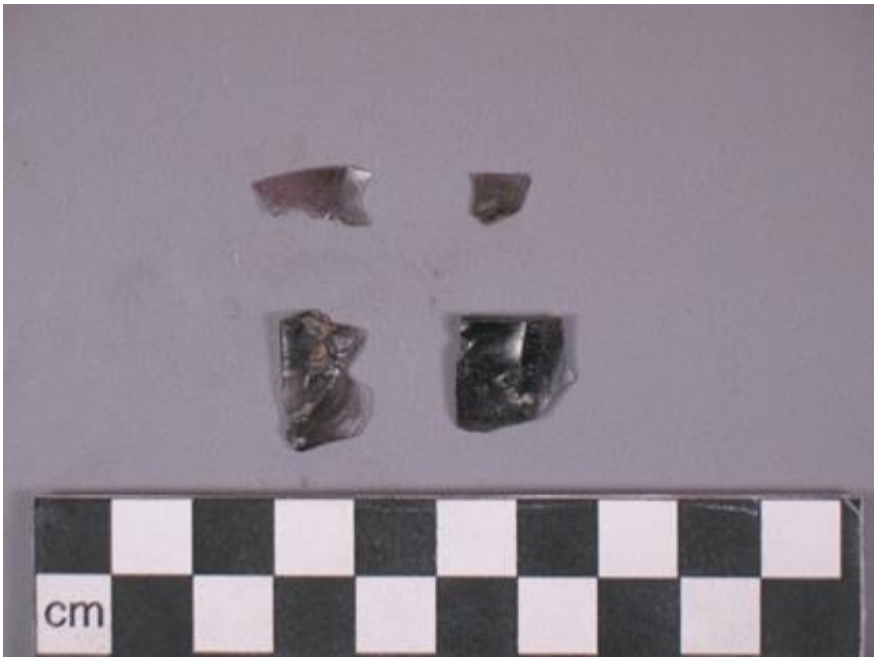


Figure 4. Obsidian flake fragments from site LA 132358. Although there is little to distinguish them visually XRF analysis can identify their place of origin.

A few obsidian artifacts including core flakes, a biface flake, a uniface, and a Formative period arrow point, were found at three other sites. One of the core flakes exhibited waterworn cortex, indicating that it had been obtained from secondary gravel sources. All the items were made of a black, translucent obsidian. XRF analysis revealed that five were made of Valles rhyolite, and four were made of Cerro Toledo rhyolite. All of the artifacts made of Valles rhyolite were collected from a very large site adjacent to the Pecos River; both the core flake with waterworn cortex and the arrow-point fragment were made of Cerro Toledo obsidian. These results were compared to other published and unpublished obsidian distribution studies in southeastern New Mexico which noted that Cerro Toledo rhyolite (also called Obsidian Ridge) made up 63 percent of obsidian artifacts, while Valles rhyolite (also called Cerro del Medio) comprised 24 percent. Smaller percentages were from other sources. The Cerro Toledo and Valles sources are in the Valles Caldera, a large volcanic caldera located in the Jemez Mountains in north-central New Mexico. An important distinction between the two is that nodules from the Cerro Toledo or Obsidian Ridge source have been transported through erosion into the Rio Grande River drainage and

they can be found several hundred miles from the source; while Valles rhyolite or Cerro del Medio is located within the caldera and nodules can only be transported beyond its boundaries by people. The report further states:

> The large of amount of Valles rhyolite obsidian in southeastern New Mexico was presumably derived from exchange relationships with pueblos who were in direct contact with other groups residing in the northern Rio Grande Valley. That might include the Sierra Blanca region, where Chupadero Black-on-white was produced and traded across the region (Creel et al. 2002), possibly with prepared obsidian cores and finished tools. It seems doubtful that any Valles rhyolite obsidian was procured from groups residing in the southern Tularosa Basin, because that material has composed only 2 percent of the obsidian at sites in the area (Miller and Shackley 1998). So, the questions are whether the Valles rhyolite obsidian was part of a larger exchange network between pueblos and groups residing in southeastern New Mexico and whether that relationship also involved the exchange of maize for bison meat prior to and/or after A.D. 1300. A preliminary attempt was made to evaluate these questions by looking at the distribution of sourced obsidian artifacts. It appeared that only a single obsidian artifact each was collected from LA 15189 and LA 121545, along the northern part of the pipeline mainline. Both items were identified as Cerro Toledo rhyolite, and those sites also contained small numbers of Chupadero Black-on-white ceramic sherds. That can be contrasted with the sourcing of obsidian artifacts from LA 132358, along the Pecos River, where only one out of six obsidian artifacts was identified as Cerro Toledo rhyolite; the rest were Valles rhyolite from the Cerro del Medio source. LA 132358 is a very large palimpsest that contained Late Formative period ceramic sherds; however, they were Playas Red (a Chihuahuan ware) and Three Rivers-red-on-terracotta; no Chupadero Black-on-white ceramics were identified. Three-Rivers-red-on-terracotta has been known to overlap in production range with Chupadero Black-on-white, but the complete absence of the latter from LA 132358 may indicate a difference in exchange networks. The contrast in sources between obsidian and ceramics from the two sites in the northern portion of the project area and sources of artifacts at the large site next to the Pecos River suggested that ceramics and obsidian may not have been involved in the same exchange networks. Although it appears that the occupants of LA 132358 obtained obsidian from pueblos to the north, they were also involved in exchange for ceramics with groups to the south and west. That appears to contrast with the situation at LA 15189, LA 121545, and other sites in the area west of Gatuna Canyon, the occupants of which obtained ceramics from pueblos to the north and possibly obsidian, as well. However, the obsidian from the Cerro Toledo source can also be found in the Rio Grande gravels, which could have been procured by the inhabitants of the region. That was at least partially the case, given that waterworn cortex was identified on an obsidian artifact made of Cerro Toledo rhyolite recovered from LA 15189.

The above sketch is intended to highlight some of the report contents and much has been left out. The authors were able to posit questions and provide partial answers to topics that are important for understanding the prehistory of the region and illustrate how survey information can make a contribution.

The Excavation Report

SWCA Environmental Consultants produced an excavation report entitled, " Mobile Hunter-Gatherers in the Cedar Lake Playa Depression: Archaeological Data Recovery at The Biting Ant Site Complex (LA 117293 and LA 171726), Linn Energy's Turner "B" South Tank Battery Produced Water Release Cleanup, Eddy County, New Mexico," edited by Jim Railey. This project involved archaeological data recovery at two sites as part of a remediation effort following a produced water release from the Turner "B" South Tank Battery, which contaminated a portion of LA 171726 with chloride and (less extensively) hydrocarbons. A scope-of-work (SOW) area was defined by the BLM, which encompassed the contaminated area within LA 171726, along with a portion of an arroyo that cuts through nearby LA 117293 (see Figure 5). The arroyo portion was included for geomorphic purposes. Data recovery fieldwork consisted of a geomorphic study, surface collection of artifacts, excavation of hand units (including a block of 12 units), feature excavation, and monitoring of remediation activities, including coring for the contamination site assessment and backhoe removal of contaminated soils.

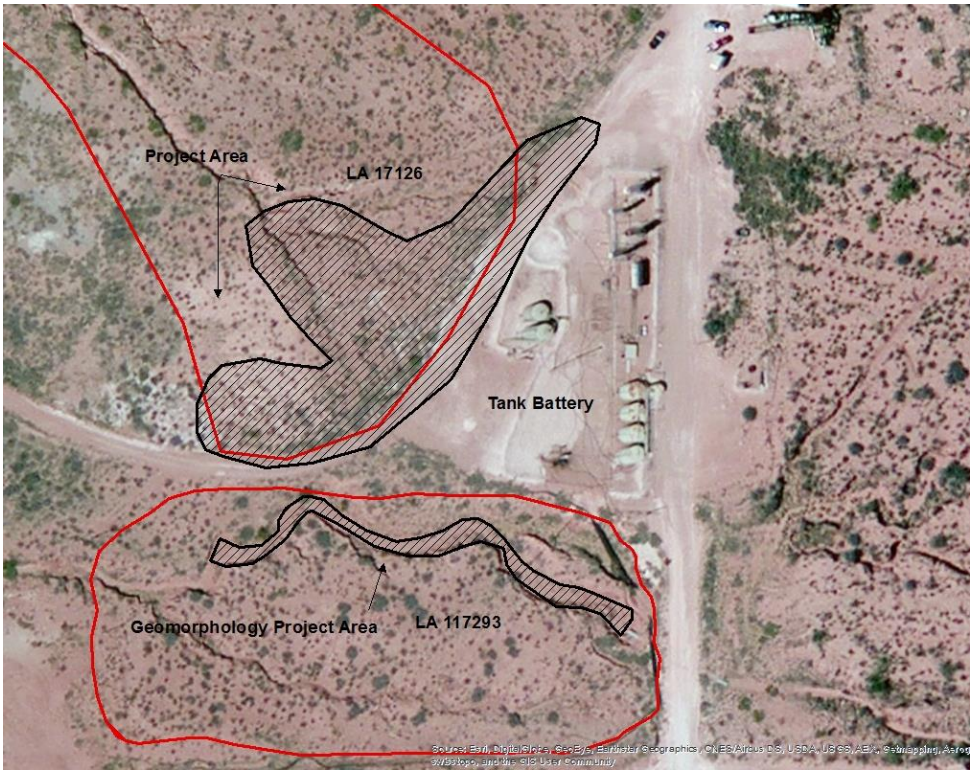


Figure 5. An aerial view of the two sites. The locations of archeological investigations are shown as hatched areas.

The portions of the two sites investigated (named the "Biting Ant Complex") are located midway on the slope of a large basin called Cedar Lake. This depression is approximately a mile wide and three to four miles long, formed by the dissolution of subsurface salt and gypsum beds, with the subsequent collapse of overlying strata. The basin measures from 24 to 67 m (80 to 220 feet) in relief, depending upon where the measurement is taken. Deep gullies dissect the margin of the basin and the vertical cut banks of these

gullies provide a natural window into the stratigraphy of the soil. Man-made features are sometimes exposed in the walls of these gullies and it is for this reason that the portion of LA 117293 was included in the study. Although archeologists have designated two sites at this locality, this is more for "bookkeeping" purposes of recording, than it is as recognition of a prehistoric reality, since the two are separated only by a modern unpaved road.

Twenty-one features have been recorded at LA 117293, including 8 exposed in the gully side walls measuring from 26 cm to 102 cm (approximately 10 to 42 inches) below the ground surface (see Figure 6). Four radiocarbon dates were obtained from four of the buried features at the site that are closest to the adjoining site LA 171726 and these are all of Late Archaic age. Previous recorders also noted Late Archaic style projectile points and the presence of a flake of obsidian and Alibates agatized dolomite at the site.

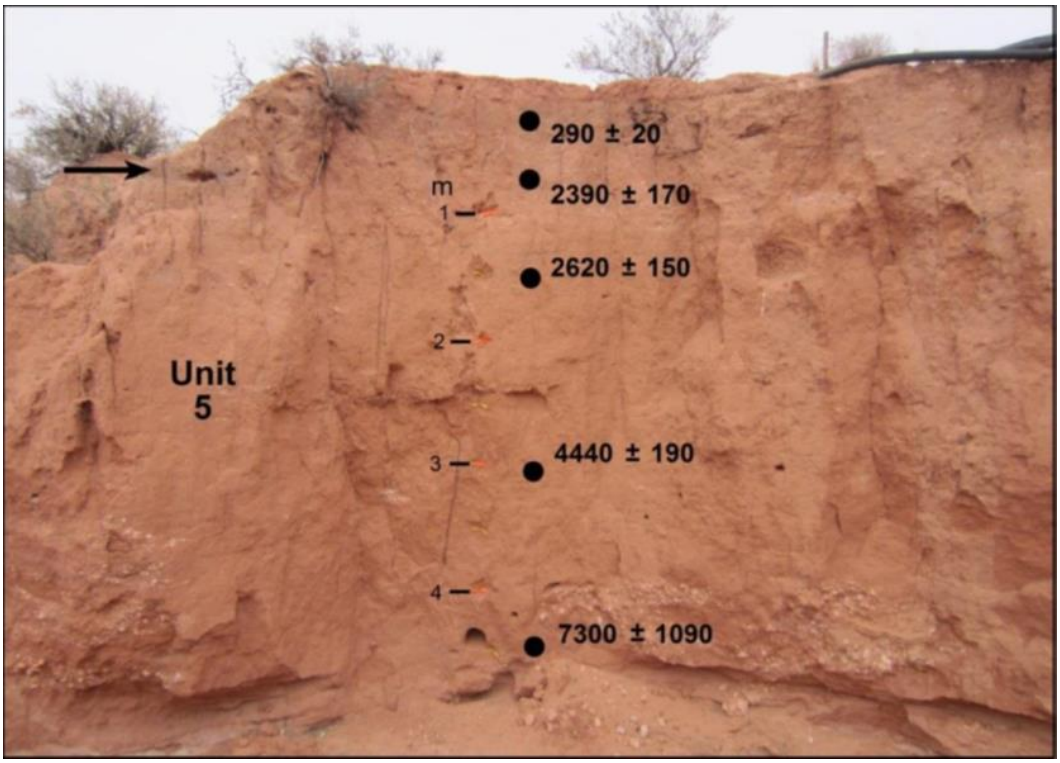


Figure 6. Five-meter thick eolian-colluvial section exposed in an arroyo at LA 117293. The lower 1 m is characterized by local fluvial gravel that occupies the base of the paleo-gully; the sediment is fine to very fine quartz sand with 6 percent silt and 6 percent clay; soil horizons are absent; rounded carbonate pebbles occur below 4 m depth. The arrow in the upper left indicates charcoal from a prehistoric feature. The figures in the column are years before 2014.

Most of the data recovery effort took place at site LA 171726 where 360 lithic artifacts were found and collected (343 flaked stone and 17 ground stone). In addition, burned caliche was collected from excavations and then counted, weighed, and discarded in the laboratory. Sixty-three features were excavated at the site for this remediation project, with the majority being hearth/roasting pit features.

Sediment samples from all features were processed through a flotation device and charred plant remains were recovered. The vast majority were mesquite wood, but mesquite seeds and a pod fragment, were

also found. Other remains were identified as Fourwing saltbush, Oneseed juniper, Creosotebush, Violet woodsorrel, Plantain, Panic grass, and grass species. Three manos and one pestle were examined for plant phytoliths. All had phytoliths of grass species, but one mano also had evidence of use on mesquite and another had a phytolith probably from a buffalo gourd.

SWCA's data recovery generated 18 radiocarbon dates from LA 171726, bringing the total number of dates from that site to 25 (seven dates were obtained from samples collected during previous monitoring activities at the site). Of these dates, all but three fall in the Late Archaic period, and more specifically in the interval 810-170 B.C. (based on the two-sigma, calibrated ranges). Two of the other dates fall in the Middle Archaic period, in the interval 2865-2505 B.C.; these are from features that were buried more deeply than nearby ones dating from the Late Archaic period. The other date is from a previous monitoring at LA 171726, and falls in the Historic time frame

The report examines in detail the lithic artifacts recovered; identifying raw materials, conducting a debitage analysis, classifying projectile points and discussing their research potential, examining other flaked stone tool categories, and describing the ground stone inventory. This lithic information was compared to the results of lithic analysis from five other excavated sites in New Mexico with the goal of defining a context and obtaining more detailed understanding of the Late Archaic occupations at the Biting Ant site complex. Part of this analysis explored how lithic assemblage patterns may relate to different mobility strategies, including the different kinds of site occupations established by hunter-gatherers and early farmers. The analysis included three Late Archaic temporary camp sites, one assumed Archaic Period temporary camp site, and two Basket Maker II sites with evidence of domesticated crops and longer-term residence. Two of these sites, Biting Ant and another along NM 128 in southeastern New Mexico, were defined as similar forager-residential occupations and the lithic assemblage involved tool finishing, use, and refurbishment, with very little early- and middle-stage biface reduction. The Biting Ant and NM 128 sites are typical for far southeastern New Mexico, where highly mobile, forager-based lifeways prevailed throughout the Archaic and Early Formative time frames.

The report also contains a section written by Jim Railey that brings to life how Archaic people may have lived and this portion of the report is reproduced below:

> The Archaic period people who encamped at Biting Ant were highly mobile hunter-gatherers, who relied on what most of us today would consider bush-survival skills. But unlike the staged exploits of those performing on outdoor-survivalist television shows, the lives of prehistoric people in far southeastern New Mexico involved much more than a daily quest for food using whatever materials nature offered in the immediate vicinity. Their lifeways and organizational structures were "simple" compared to larger, more "complex" societies of people who relied on farming, or other hunter-gatherers blessed with more abundant and concentrated resources (such as the salmon-reliant societies of the Pacific Northwest). Still, it is important to remember that the Archaic people at Biting Ant were members of communities, and that the artifacts and features found here are an impoverished record not only of the array of tools and materials they produced and used, but also of a multitude of lives enmeshed in cultural traditions and historical events and circumstances whose details we will never know. They were the heirs to more than a million years of evolution, which culminated with the emergence of biologically modern humans some 200,000 years ago. The dramatic geographic expansion of our species brought people, and their

cultural traditions, to the Western Hemisphere sometime during the late Pleistocene. Here they carried on the cultural-evolutionary journey, shaped in part by material and behavioral elements and patterns brought by their earliest ancestors to the New World, and adapted to the diversity of environmental conditions they encountered.

This evolutionary journey involved step-wise, technological and social developments that accelerated dramatically among most human populations worldwide over the course of the Holocene. Each generation learned and acquired an accumulated compendium of knowledge concerning the properties and uses of a staggering array of natural resources, and strategies and technologies to wrest a living from those resources that included an impressive degree of advanced planning. Their lives were enmeshed in social networks and organizations that enhanced subsistence-level survival, broadened their access to natural resources beyond their immediate home ranges, helped them find mates and establish families among populations that were dispersed across the landscape, and defended themselves and their resources from competitors and enemies. Moreover, the ongoing process of socialization and enculturation offered a cognitive structure that provided rules and frameworks governing one's kinship status, social roles and responsibilities, marriage arrangements, and behavioral protocols for interacting with others, ranging from the closest family members to socially distant "foreigners." To the extent that their visible world was carved up into ethnic enclaves, many people were probably multi-lingual. And to make sense of it all, their cultural heritage provided narratives through which they conceptualized their world and the universe, with their beliefs woven into social expression through rituals and group ceremonies.

Living in a world without metal, these hunter-gatherers depended heavily on making and using a variety of ground- and flaked-stone tools. Thus they needed access to suitable types of stone, not all of which were present within the local area. Large slabs of sandstone and limestone from which metates were fashioned, and perhaps at least some of the cobbles that were shaped and used as manos and pestles, had to be brought to the site from some distance. The same was apparently the case for at least some of the fine-grained stone, such as chert, petrified wood, and chalcedony, suited to the kinds of precision flaking necessary for making projectile points and other formal, flaked stone tools. The obsidian in the assemblage came from over 200 km (124 miles) away and was almost certainly obtained through exchange. At least some of these fine-grained materials arrived here in the form of small cores or flake blanks, late-stage bifaces, and finished tools. Given the lack of local supplies, prehistoric people at Biting Ant had to be very judicious in their use of these fine-grained materials and the tools fashioned from them. Hence we found very few discarded tools and comparatively little flaking debris, most of which are very small pieces of debitage resulting from finishing, repairing, and maintaining tools.

The fact that Archaic hunter-gatherers carried large, heavy metates and other ground stone milling tools to this place evidences a respectable measure of advanced planning, involving repeated encampments here as part of their mobile lifeways. Typical of residentially mobile foragers, the Biting Ant occupants spent the year moving between several, similarly provisioned campsites scattered throughout their territories. Ethnographic evidence suggests hunter-gatherer social organization is fluid, and that an individual nuclear family did not always camp together with the same group of other families. Through mobility, and interacting and cohabiting at

multiple campsites with a variety of families and individuals, the hunter-gatherers at Biting Ant were able to wrest a living by obtaining food at various places, obtain information about the current status of various resources (and the activities of other people) across the landscape, and do it all in an energetically efficient manner by moving themselves to available sources of foods rather than vice-versa. From campsites such as Biting Ant, hunter-gatherers fanned out to collect food from the surrounding landscape. Hunter-gatherers typically venture no more than 10 km (6 miles) from the camp in a given day, and usually less than that, especially if biomass and food resources were sufficiently abundant in the area surrounding a camp (Binford 1983:380; Cane 1987:395; Endicott and Endicott 1986:150; Hitchcock and Ebert 1984; Irimoto 1981:127; Kelly 1995:132–141; Kuchikura 1987; Lee 1968:31; Tanaka 1980:66; Tindale 1972:245; Vickers 1989; Vierra 1994:121–122). To increase the productivity of wild food resources, hunter-gatherers at Biting Ant probably burned off patches of land; this promoted the growth and density of grasses and weedy species bearing edible seeds, which formed an important component of their diet.

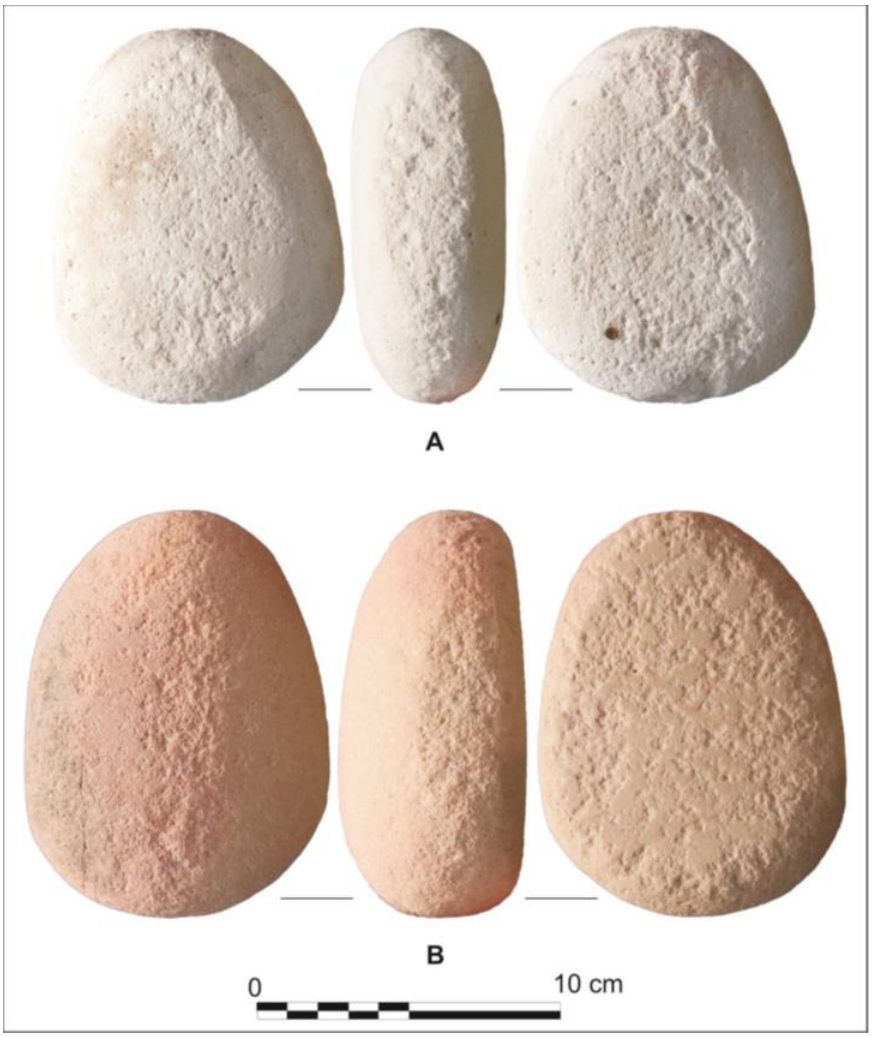


Figure 7. Top, side, and bottom views of two manos from LA 171726. Mano A is caliche, while mano B is of sandstone. Mano B has been burned which has turned it pink.

Although direct evidence in the charred plant remains we collected was lacking, it is a good bet that starchy and oily seeds collected from native grasses and weeds (such as wild barley and sunflower) were ground into flour using the manos and metates found at the site. Stone pestles, of which one was found in AOC 1, were mostly likely used with wooden mortars made from mesquite and/or juniper stumps. Unlike the grinding action employed with manos and metates, pestles and mortars involved a pounding technique to process foods, especially those that create a sticky mass when crushed and are thus are not well-suited to grinding with manos and metates. One of the plant foods most likely processed with mortars and pestles were mesquite pods—a highly nutritious and critically important food source for native peoples wherever mesquite trees were found. A charred fragment of a mesquite pod endocarp, along with charred mesquite seeds (which of course are contained within pods, but are themselves rock-hard and inedible), were found among the charred plant remains recovered from sediment samples. Acorns from shinnery oak (which are low in tannic acid compared to many other acorns), cattail roots, or other foods that create sticky masses may also have been processed with mortars and pestles at the site, although no direct evidence of these was found in the charred plant remains.

The Archaic period peoples of Biting Ant and southeastern New Mexico lacked pottery, and thus faced some particular challenges when it came to boiling. Boiling was most likely accomplished through the use of tightly woven, leak-proof baskets into which red-hot stones were repeatedly placed, stirred, removed once their heat was lost, and replaced with freshly heated stone. This practice was observed and documented in historic times among native peoples of California, who also did not have ceramics. Using this technique, the water or broth was brought to a boil and boiling was sustained for as long as needed to cook the food. This time-honored cooking method would strike most of us today (and many ceramic- and metal-using people of the past) as an onerously challenging task, but for pre-ceramic peoples it was part of their routine.

Cooking stones were also used in pit-baking, another time-honored cooking method that in North America became commonplace in post-Pleistocene times (see Thoms 2009). Heated stones and well-wrapped food packages were placed in cooking pits, or "earth ovens," then buried with the backdirt from the dug-out pit, and left for several hours or even days as the food was slow-cooked in the pit. Sometimes hot coals and ash were added in as well, or were used instead of cooking stones; in fact, there was a wide variety of cooking-pit configurations and techniques, some involving ingenious ways of introducing water into the pit to steam the food packages (Ellis 1997). Unlike cooking meat or other foods directly over an open flame, cooking foods in leak-proof, tightly wrapped packages (the wrapping consisting of multiple layers of leaves, textiles, or other materials secured with twine) helps retain the grease, oils, and other nutrition-rich substances contained within the organic tissues of the food. This was critically important for hunter-gatherers, who needed all the nutrition they could squeeze out of the wild foods they procured. We found virtually no direct evidence of what kinds of foods were pit-baked at Biting Ant. But archaeological evidence from elsewhere, along with historic accounts of native peoples, indicates a wide variety of foods were cooked in pit ovens, including meat, agave, cholla buds, yucca roots, and other edible plant parts. Pit-roasted agave hearts were especially important to the native peoples of the southern American Southwest, as they were a highly prized sweet in an environment with few naturally occurring sources of sugar. The cooked agave hearts could also

be stored and turned into alcohol. Agave is more common west of the Pecos River, however, so it is unclear if it was ever collected and cooked by the Archaic people at Biting Ant.

Although very little in the way of food remains were encountered in the charred plant parts carefully collected from flotation samples, there is still abundant evidence of cooking at Biting Ant and many other Archaic sites in the region. Numerous burned stones were found, the vast majority of which were pieces of caliche. At least most of these were collected from local gravel sources, and many were recognizable as cooking stones because they had been blackened and/or cracked through heating, and co-occurred spatially with other archaeological remains at the site. Pit features used for cooking and heating were numerous at the site, and some of these contained burned caliche.

Conspicuously absent at Biting Ant are any recognizable remains of shelters, and obviously the people who lived here did not invest heavily in whatever kinds of housing they erected. They very likely constructed small and rather expedient rush huts, similar to those used by mobile hunter-gatherers in various parts of the world, including those in the American Southwest and Great Basin observed in historic times (e.g., Arkush 1987; Gerald 1958; Steward 1941:282, 284; Stewart 1941:377, 379; Tuohy 1960) (Figure 12.5–Figure 12.9). Elsewhere in the American

Figure 8. Paiute wickiup camp in the southern part of present-day San Juan County, Utah, Photographed by John K. Hillers in the late nineteenth century. Note what appear to be slab metates near the entrance of the wickiup behind the two individuals

Southwest, many Archaic period huts were built over shallowly dug basins, and many of these contained interior hearths. These pit structures left behind archaeological features that are recognizable as the remains of huts. But in far southeastern New Mexico there are as yet no confirmed discoveries of Archaic period structure remains, suggesting that Archaic hut construction here typically did not involve digging house pits. At Biting Ant we found amorphous and irregularly shaped organic stains, some of which may (or may not) be the collapsed remains

of brush huts. At any rate, the absence of recognizable structure remains is, in itself, further evidence of short-term occupations at the site by highly mobile hunter-gatherers.

Also long gone is the diverse inventory of items made from a wide variety of organic materials. Yucca leaves, tree bark, and other plant parts provided fibers for a variety of items, including textiles such as baskets, sandals, woven mats, cordage, clothing, straps, and other items. There is no evidence that the mobile hunter-gatherers in the Mescalero Plain grew cotton, but some of their Late Archaic contemporaries to the east did, and it is entirely conceivable that they obtained cotton and/or cotton-made products (including blankets and clothing) through trade and exchange. Trees have always been scarce in the Mescalero Plain, but mesquite and junipers provided wood for many different tools and composite tool parts (including dart shafts to which projectile points were hafted, and the atlatls used to propel the darts), as well as structural materials and firewood. Various animal species provided not only a critical protein source in the form of meat, but also fur and hides from which blankets and leather were made, sinew for binding, hoofs for making glue, and bones for an array of tools and even rasp-like musical instruments. Unless accidentally preserved by charring, goods made from organic materials are absent at open sites like Biting Ant, but many such items have survived in dry caves and rock shelters (recesses beneath cliff overhangs), like Granado Cave, near the Pecos River in west Texas (Texas Beyond History 2014). Such sites provide splendid glimpses of the rich inventory of belongings produced and used by native peoples in the region, and help flesh out what life was like for the inhabitants of open archaeological sites such as Biting Ant.

The references cited in the sections of the two reports reproduced above are not provided in this newsletter. Interested readers should consult the reports for those citations.

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