PERMIAN QUARTERLY

Permian Basin Programmatic Agreement Quarterly Newsletter

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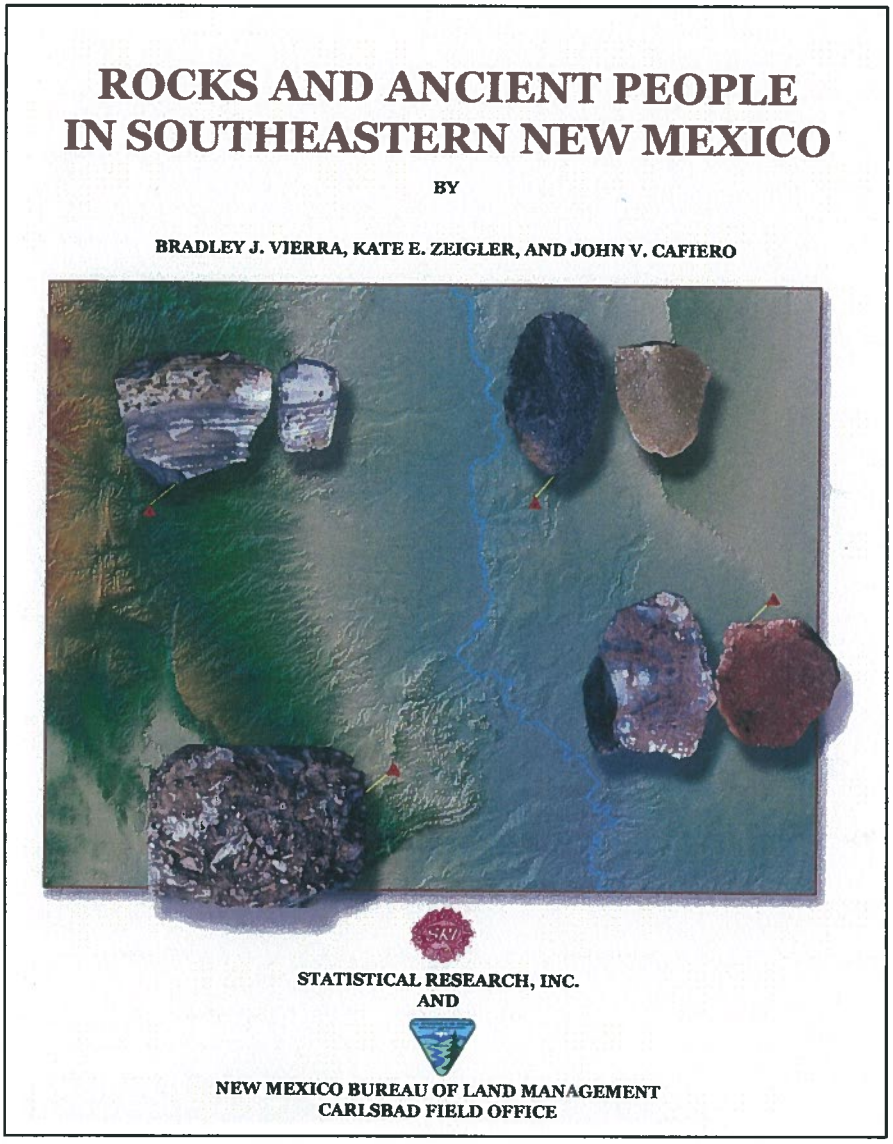
New Mexico



The cover page of a booklet, available to the public, describing rock sources important in the prehistory of southeast New Mexico. See inside for details.

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 the implementation of the PA and to disseminate that information to a wide audience.

Introduction to the Permian Basin Programmatic Agreement

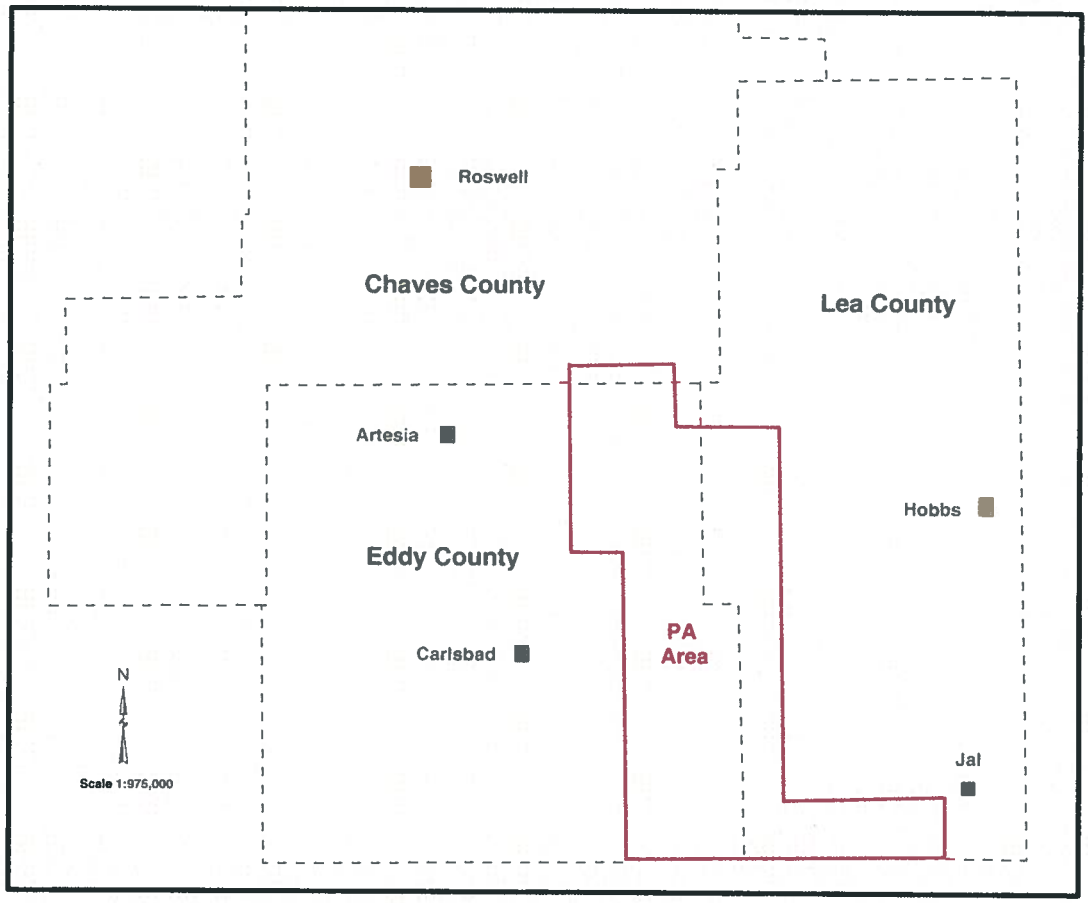


Figure 1. Map showing the Permian Basin PA Area.

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

PA Advisory Workgroup Meeting Cancelled

The PA Workgroup is composed federal and state archeologists with compliance or land management responsibilities in the PA area; contract and academic archeologists with research interests in the PA area; a representative of seven Indian tribes with historic ties to southeastern New Mexico, and a representative from the oil and gas industry. It was established to provide direction for archeological research conducted through the PA. The Workgroup meeting scheduled for October 3, 2013 in El Paso, Texas was cancelled due to the government shutdown. A new meeting time and location will be announced at a later date.

Task Order Update

Task Orders created through the BLM contracting system provide the major thrust of the research effort undertaken by the PA. Currently two task orders are underway, Task Orders 9 and 12. Task Order 9 is an historic context of the oil and gas industry in southeastern New Mexico and Task Order 12 is a Lidar aerial survey of rock ring middens within three study areas in the Carlsbad Field Office boundaries.

Task Order 9 - Draft copies of a pamphlet entitled, "Oil and Gas Development in Southeastern New Mexico's Permian Basin, 1923-1973," a National Register of Historic Places Multiple Property Documentation Form entitled, "Historic Resources of the Oil and Gas Industry in New Mexico's Permian Basin," and a National Register of Historic Places Registration Form entitled, "Flynn, Welch, & Yates No. 3 Oil Well," are currently being reviewed by BLM staff and preservationists at the New Mexico Department of Cultural Affairs, Historic Preservation Division. The pamphlet is for public information and the Multiple Property Documentation Form provides a context statement (a short history) of the oil and gas industry in southeastern New Mexico and identifies potential properties eligible for listing on the National Register of Historic Places. The Flynn, Welch, and Yates No. 3 Oil Well is the first property recommended for nomination using the context statement.

Task Order 12 – This contract is for a Lidar aerial survey of three study areas located west of the Pecos River in a region noted for containing rock ring middens. Ring middens are doughnut shaped piles of heat-fractured rock that accumulated from cooking primarily plants, such as agave species, for food. Rock middens range in size up to as much as 78 feet (26 m) in diameter and are piled as high as 6 feet (2 m) above the ground surface. Lidar, short for light detecting and ranging, is technology that uses laser beams to take precise measurements of height from an aircraft to the ground. The resulting measurements can be manipulated by software programs to show ground contours and objects above the ground surface in 3D fashion.

Task Orders 10 and 11 have been completed and will be available for free download through the Digital Archaeological Record (www.tDAR.org). Task Order 10, entitled "Landscape Testing Project: Analysis of Feature Samples" was an analysis of the content of soil samples taken from 500 features, primarily hearths, distributed across the PA area. This project resulted in an inventory of sites dated by the radiocarbon method and the identification of charred plant remains present within the features, as well as the identification of plants represented by microscopic starch and phytolith remains. An article, by Bruce Boeke, CFO archeologist, presenting one interpretation of the radiocarbon dates is appended to this newsletter.

Task Order 11 was an interdisciplinary geological and archeological study to identify geological formations containing stone suitable for producing chipped stone artifacts, such as projectile points, knives, scrapers, and other stone tools. Knowing the location of suitable raw stone for making artifacts was important to people using stone tool technology. It is also important to us today, because studying the prehistoric past depends upon interpretation of the artifacts people left behind and stone is among the most durable of all artifacts. The distribution of stone sources across the landscape figured into

Figure 2. Chert nodule in San Andres Formation limestone at site LA 144349. Chert weathered from bedrock was commonly used for making chipped stone tools.

prehistoric people's decision making about where they would locate camps or villages, or with whom they would trade or otherwise associate. The stone artifacts they left behind, to some extent, provide a visible trail of those decisions and interactions. Archeologists and geologists examined 18 sites and localities ranging from San Andres chert quarries in the foothills west of the Pecos River to silicified sandstone sources located along the caprock of the Llano Estacado east of the river. Many of the stone sources exploited by prehistoric people east of the Pecos River come from terraces containing cobbles of chert and quartzite, as well as smaller quantities of other stone types, concentrated there by erosion.

The value of this study, entitled "The Geologic and Archaeological Contexts for Lithic Resource Acquisition in Southeastern New Mexico," is that it includes a geological context, which explains the origin and distribution of "local" stone sources, as well as an archeological evaluation of how the stone was obtained and distributed through time and space in the archeological record. The study also defines site attributes that should be recorded when a stone source is documented and criteria to be used in evaluating the research potential of these specialized types of sites. As one archeologist commented, "At

last we will have a common language to talk about the stone artifacts we see. We will all be on the same page." To also assist archeologists in the identification of the lithic sources analyzed in this report study collections of stone from these sources were prepared for universities and research museums in New Mexico.

A limited number of copies of a booklet, based upon this report, entitled, *Rocks and Ancient People in Southeastern New Mexico*, written for the general public is available upon request. A pdf version of this booklet, which is pictured on the front cover of this newsletter, is also available. Please contact Martin Stein by e-mail (cstein@blm.gov), by telephone at (575) 234-5967, or by U.S. postal mail at BLM, Carlsbad Field Office, 620 East Greene Street, Carlsbad, NM 88220. Please specify the format desired, either pdf or paper.

Other Archeology News from the Permian Basin

Excavations have been completed at two sites (LA 124525 and LA 161918) located in the vicinity of the Intrepid Potash, Inc., East Mine, in Eddy County. Excavations were undertaken by Lone Mountain Archaeological Services, Inc., because the two sites were being impacted by mining operations. These sites are located on high points of land, approximately one-half mile apart, near the head of Nash Draw. The larger site, LA 124525, is located in sand dunes ranging from 2 feet to 5 feet in height. The artifact inventory at LA 124525 is more numerous and varied in content and the site has features, likely the remains of hearths, containing charcoal and charred plant remains that provided radiocarbon dates. Site LA 161918 is located on a hilltop with shallow soils. There are no feature remnants and the artifact inventory is limited in content and number.

The work at each site involved survey and mapping, surface collection of artifacts and in-field analysis of fire-cracked rock, excavation of features, systematic subsurface testing of each site area using hand tools, excavation of backhoe trenches, and at LA 124525, the excavation of 4 backhoe scrapes.

The results from site LA 124525 indicated the site occupies a landform where both erosion and deposition are occurring, resulting in the exposure of some cultural deposits, while covering others. Six excavated features, containing charcoal stained soil, provided datable material. Radiocarbon dates indicate the site was occupied intermittently during three intervals: first beginning from 770 B.C. to 410 B.C.; then during a period from A.D. 690 to A.D. 990; and finally during the period from A.D. 1050 to A.D. 1220. A projectile point from the site is of a style that may indicate an Early to Middle Archaic occupation (4000 B.C. to 2500 B.C.), but this point may also be an isolated artifact lost at this location during the earlier time period or perhaps found elsewhere and brought to the site by its later inhabitants.

This pattern of multiple occupations of a favored locality is one that is repeated elsewhere within the Permian Basin PA area and it complicates the analysis of some artifact classes, such as stone waste flakes, that have been displaced through erosion. These artifacts have limited observable attributes and because they were produced using similar flintknapping techniques, it is not possible to confidently assign them to one time period or another based upon their morphology. Ultimately, 450 pieces of flaked-stone debitage was found at the site and analyzed as a single class with no control for time.

Other artifacts from the site consisted of El Paso brownware sherds, one hammerstone, utilized stone flakes, biface fragments, side scrapers, a projectile point fragment, and groundstone in the form of metates and manos (see Figure 7).

The artifact inventory at LA 161918 includes one El Paso brownware sherd, utilized stone flakes, one biface fragment, one drill, three side scrapers and one end scraper, and one unidentified projectile point fragment. There were no groundstone artifacts present. In the absence of radiocarbon dates, the El Paso brownware sherd and the fragmentary projectile point together suggest use of the site at some time during the period from 1500 B.C. to A.D. 1350.

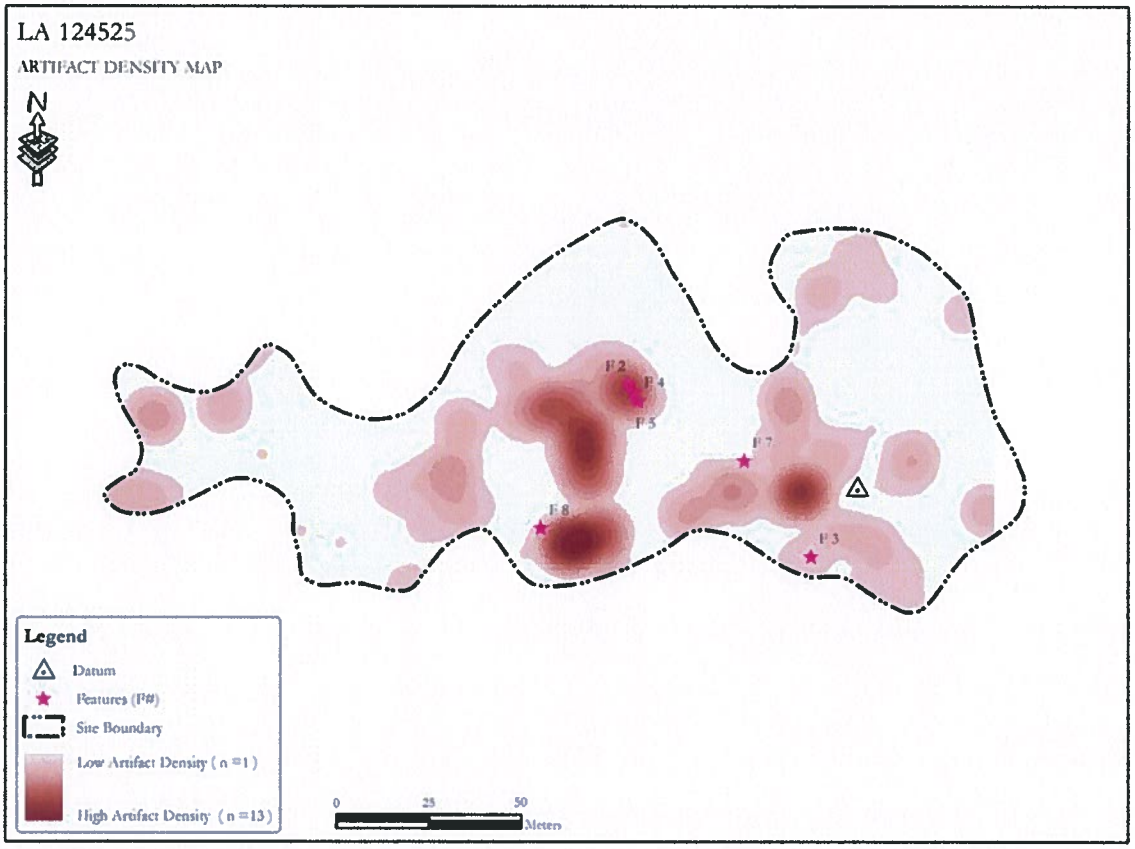


Figure 3. Artifact density map at site LA 124525. Features are indicated by stars.

Pollen, phytolith, starch, macrofloral and organic residue analyses were conducted on the fill of the six features at site LA 124525 and a scraper from LA 161918 was also subjected to organic residue analysis. The environmental signature suggested by the pollen analysis includes trees, represented by acacia, juniper, pine, mesquite, and oak. Sagebrush, saltbush, sunflower, ragweed, cocklebur, thistle, mustard, Mormon tea, wild buckwheat, smartweed/knotweed, spurge, and members of the mint and rose families, represent shrubby and herbaceous vegetation, while grass pollen was present in a moderate quantity.

Phytolith, starch, and charred plant remains from the features show that mesquite and saltbush provided fuel, and these charred remains were used for radiocarbon dating. Wood from creosote bush and a woody member of the buckthorn family also appear to have been burned in two of the features. Prickly pear

cactus pads provided food and/or were used to control the heat of the fire while cooking other types of food. Likewise, grass seeds and dayflower phytoliths indicate these plants were consumed or alternatively used as buffers in cooking. Purslane and goosefoot seeds are apparently remnants of processing these plants for food. No evidence for cultivated plants, such as corn or squash, was found.

A scraper from site LA 161918 was examined for protein residue analysis and residue from this tool tested positive for trout antiserum. These fish are present in the Pecos River, located approximately 25 miles to the west. This evidence, plus the presence of freshwater mussel shell at the site, indicates the inhabitants' use of the river and its resources.

This brief summary has highlighted some of the results from this work. Readers interested in more detail should consult the complete report, "Dunes and Deflation: Excavations at LA 124525 and LA 161918, at the Intrepid Potash East Mine, Eddy County, New Mexico," by Douglas H.M. Boggess, et al., Lone Mountain Archaeological Services, Inc., Report 1459. The report is available as a pdf file or a limited number of paper copies are available from the Archeology Section at the Carlsbad Field Office .

Newsletter Contact Information

Questions or comments about this newsletter or the PA may be directed to Martin Stein, Permian Basin PA Coordinator, BLM Carlsbad Field Office, 620 East Greene Street, Carlsbad, New Mexico 88220. Phone: (575) 234-5967; E-mail address: cstein@blm.gov.

Population Density and Movement Reflected in AMS Dates from the Permian Basin

by

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Permian Basin Programmatic Agreement (PA) Task Order Number 10 consisted of collecting 500 samples of soil containing charcoal and other charred material from features in previously recorded sites within the Carlsbad, New Mexico Bureau of Land Management (BLM-CFO) field office. With a few exceptions, the samples were acquired from sites located in the Permian Basin PA area and small sites with one or two recorded features were chosen when possible. These samples were then examined in a laboratory to identify charred plant remains, as well as microscopic remains of starch and phytoliths produced by plants when they were alive. Charcoal from each sample was processed for an Accelerator Mass Spectrometry (AMS) radiocarbon date. AMS dates require only a small sample size and annual plant remains, for instance, acorn caps or fragments of sunflower plants, were dated if present. This article is focused on the AMS dates from the 500 samples.

Radiocarbon dates can be obtained from preserved organic remains and the most commonly preserved material in prehistoric archeological sites is charred plant remains. Radiocarbon is useful for dating organic remains back to approximately 50,000 year ago, but material less than 200 years ago requires special consideration. The radiocarbon date denotes the death of the organism being dated, not necessarily when humans utilized the material being dated, which explains the preference for dating annual plants, rather than longer lived trees or other woody species. The radiocarbon date is a statistical statement of the probability that the organism being dated died within a specific time period, expressed as a sigma date.

All but 14 of the AMS samples were obtained within the Permian Basin PA area. The 14 outlying samples were collected primarily to determine the chronological occupation of selected sites, such as the Merchant Site, a 15th Century Formative period village, which figures prominently in the prehistory of the region.

There is a question about whether or not 13 of the dates came from cultural features, as these samples dated from A.D. 1682-1945, which is an unacceptably large time range. The features that were sampled were not totally excavated or uncovered in order to preserve them, as most are located in highly erodible sandy soil. Rather, they appear as dark soil stains, sometimes associated with burned caliche (see Figure 2). It was these dark stains that were sampled and in 487 cases, the resulting dates are within acceptable ranges. The questionable dates may have come from a root burn, or been mixed with pack rat midden remains, or modern charcoal. On the other hand the dates may be associated with either an historic Native American component or more recent Euro-American ranching activities. The features that produced odd dates need further investigation.

The 500 two-sigma AMS radiocarbon dates were assigned time periods based on Jim Railey's 2012 classification described 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." This is the most recent data synthesis conducted for the BLM-CFO, but it utilizes long-established cultural/historical units named: Paleoindian, Archaic (divided into Early, Middle, and Late) and Formative (divided into Early, Late, and Post-Formative/Native American). No dates were found for the Paleoindian period, but sites belonging to following periods have been dated and form the basis for Railey's classification: Early Archaic, 6000-3200 B.C.; Middle Archaic, 3200-1800 B.C.; Late Archaic, 1800 B.C. – A.D. 500; Early Formative, A.D. 500-1100; Late Formative, A.D. 1100-1400; and Post-Formative/Native American, A.D. 1400-present.

The 500 AMS radiocarbon dates from Task Order 10 fit into the above classification in the following way: 18 dates are Early Archaic; 8 dates are Middle Archaic; 107 dates are Late Archaic; 271 dates are Early Formative; 80 dates are Late Formative; and 3 dates are from the Post-Formative period (see Figure 1).

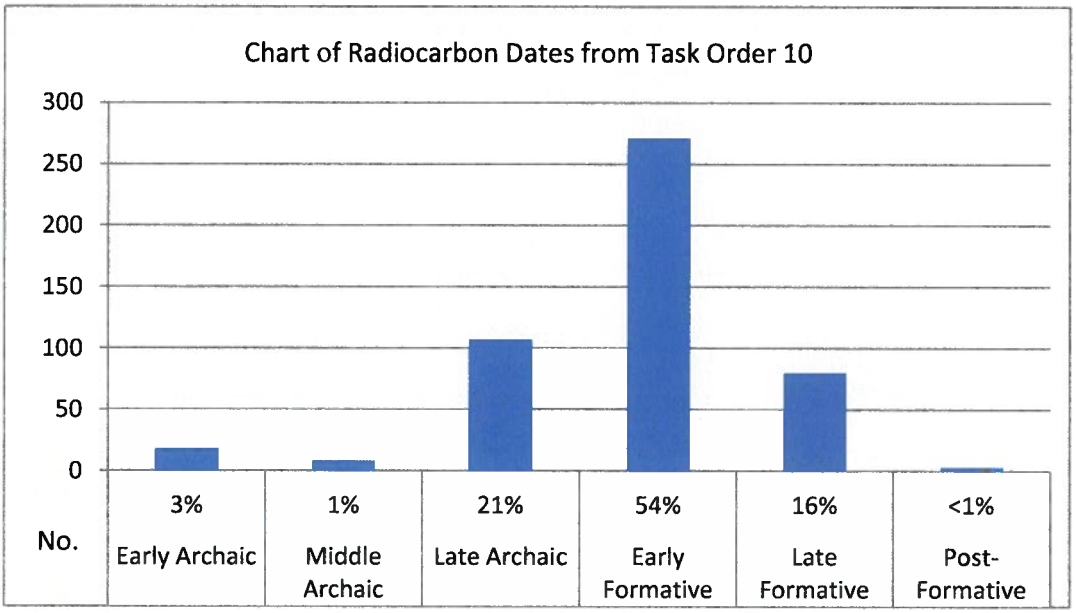


Figure 1. Chart of radiocarbon dates from Task Order 10.

Statistically these dates are not a random or systematic sample, but they can be used to postulate research questions, particularly about population density and movement by different people during the defined time periods.

The number of dates reflects a low population density within the desert floor prior to the Late Archaic period. Fourteen of the 18 Early Archaic AMS samples are from the northern portion of the Permian Basin PA. Does this reflect a spatial patterning landscape preference, geomorphology conditions, sampling strategies, or a combination of several factors? Interestingly, the number of dates decline from the Early to Middle Archaic period. Archaeologists may want to redefine what Middle Archaic is for southeastern New Mexico.

Figure 2. This burned caliche feature associated with a stain and small charcoal pieces is from LA 129348 that dated to A.D. 1686-1927. The lengthy 2-sigma range may indicate the charcoal is from a modern source.

Population significantly spikes in the Late Archaic and Early Formative eras, suggesting a more hospitable environment; perhaps, reflecting a substantial annual precipitation. Purely as speculation, we note the majority of the Early Formative dates are located in the quadrangles Pierce Canyon, Remuda Basin, Tower Hill South, Tower Hill North, Williams Sink, and Livingston Ridge. One potential population movement may have trended from the Pecos River corridor into Pierce Canyon, and then moved north to exploit the habitats surrounding the lakes located in Remuda Basin, and then proceeded into the Nash Draw drainage system in the Maroon Cliffs area (see Figure 3).

Early Formative sites situated in the northern portion of the Permian Basin PA area probably reflect a different Early Formative population landscape adaptation strategy. Small bands may have exploited a variety of habitats on a seasonal basis including playas, catchment basins, Bear Grass Draw, and the Cedar Lake drainage system.

Following the Early Formative time period, the number of radiocarbon dates drop; perhaps signaling the decline of measurable moisture for southeastern New Mexico. Subsistence strategies may have shifted to more of a reliance on buffalo hunting, pursuing larger herds in the plains further to the east outside the BLM-CFO field office area. However, a few bison remains are associated with certain sites dating to the Late Formative period within the study area. One of these, the Merchant site, is located strategically between the desert and plains landscape. Three dates were obtained from the Merchant site for this project, averaging A.D. 1310-1420.

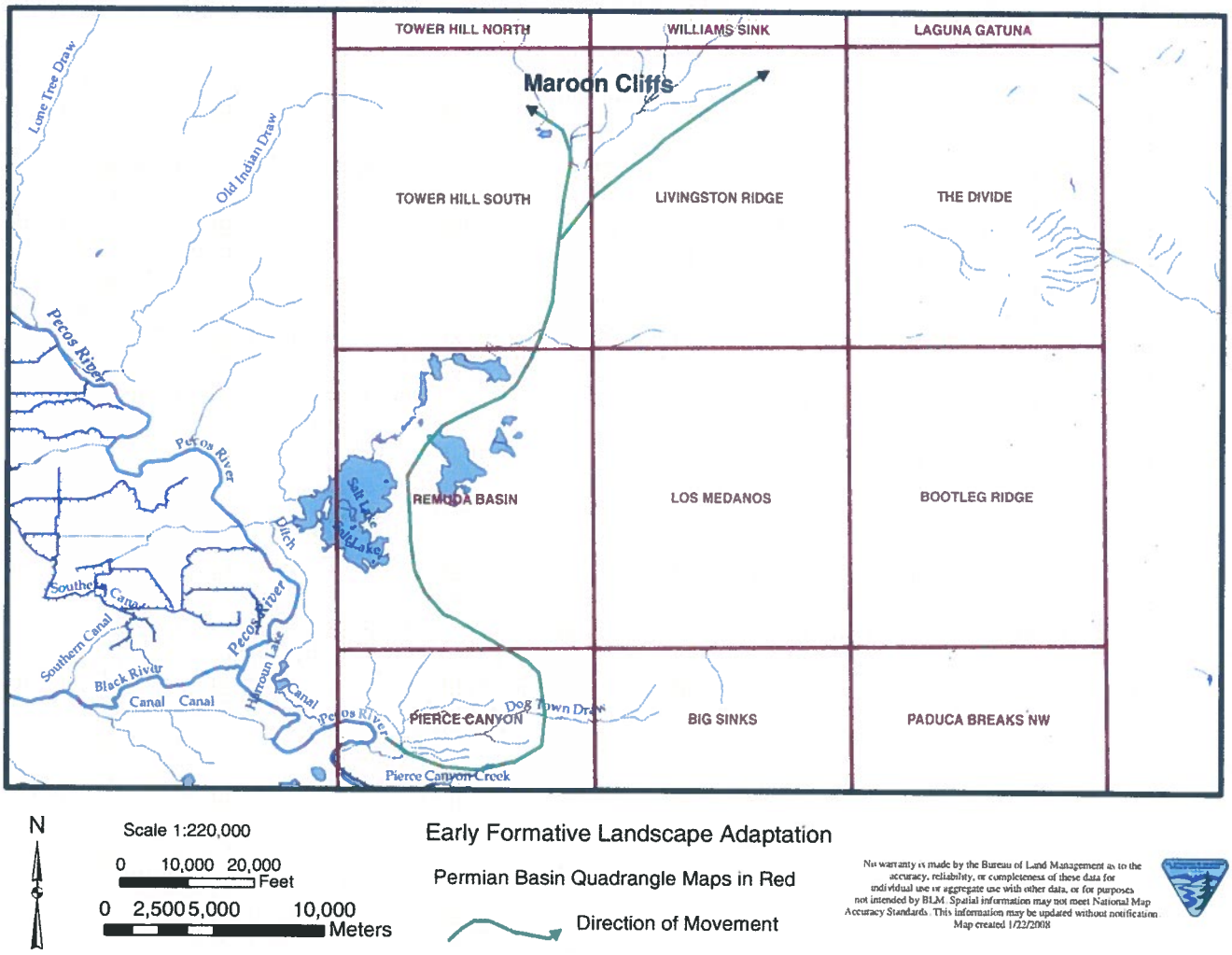


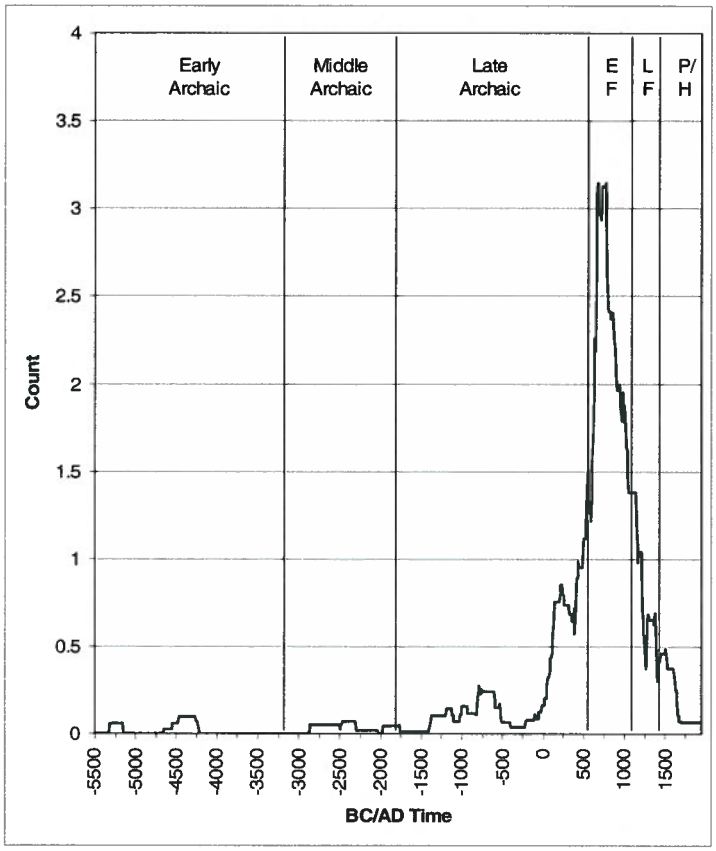
Figure 3. Suggested Early Formative landscape adaptation in Eddy County, New Mexico.

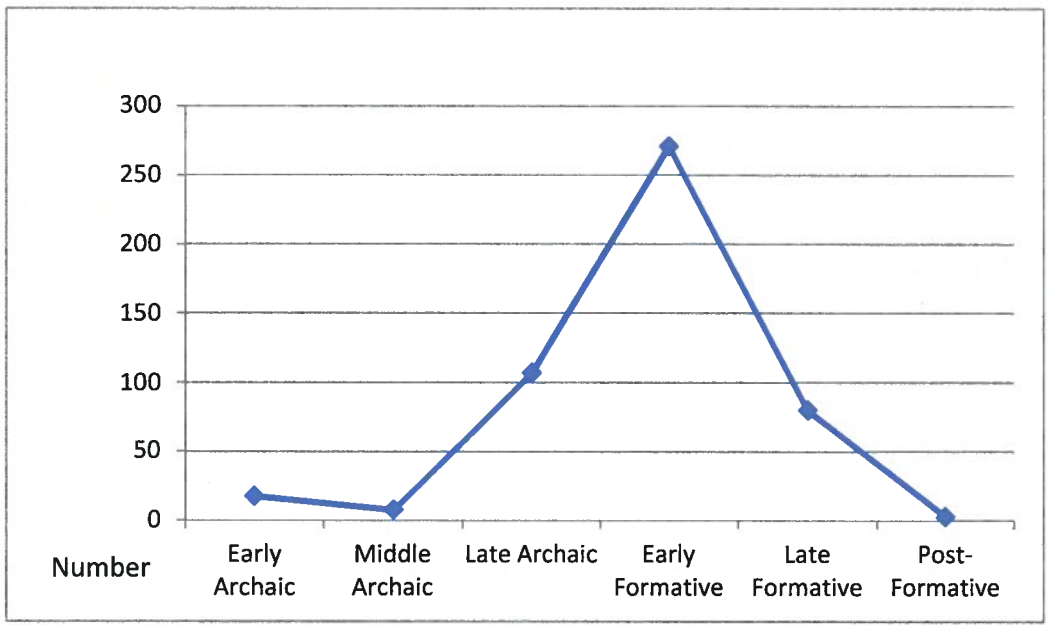
Post-Formative or Proto-historic dates are few. People may have settled in larger numbers near more permanent water sources to lessen their risk in a hostile environment (see Figure 4). In addition, site types dating to this time period may have been unrecognized by previous cultural resource inventories. There are several dated features from Task Order 10, especially from the Pierce Canyon area, that are associated with this time interval. Further investigations of these features are required to determine if they are cultural or created from a natural event.

Figure 4. View to the southwest from Maroon Cliffs. The lack of dependable water may have shifted Post-Formative people away from previously inhabited localities, such as the Maroon Cliffs area, pictured here in modern times.

Radiocarbon dates obtained from Permian Basin PA Task Order 10 mirror the chronological data reported in the Jim Railey, et al., 2009 report entitled, "Synthesis of Excavation Data for the Permian Basin Mitigation Program." The number of radiocarbon dates increase during the Late Archaic period, spike throughout the Early Formative era, and begin to decline from the onset of the Late Formative interval (see Figure 5). Railey's graph is based on 220 archaeological radiocarbon dates from the Permian Basin PA area and although Railey's study uses a different method to formulate the graph, the charted pattern is comparable to the results from Task Order 10. Similar chronological patterns, with a spike in the number of dates during the Early Formative period, are documented to the west within the Tularosa Basin desert floor on the Fort Bliss Military Reservation, perhaps reflecting region-wide events.

Figure 5. Comparison of radiocarbon dates from a 2009 report at right, with dates from Task Order 10 below. Note a similar spike in the number of dates from the Early Formative (EF) time period.





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