

MUSEUM OF NEW MEXICO

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**THE BARNETT SITE: EXCAVATION OF A
LATE ARCHAIC SITE ON THE PECOS RIVER
AT FORT SUMNER, NEW MEXICO**

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ARCHAEOLOGY NOTES 245

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**with a contribution by
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ADMINISTRATIVE SUMMARY

Between September 8 and October 3, 1997, the Office of Archaeological Studies, Museum of New Mexico, excavated a portion of the Barnett Site (LA 111917) for the New Mexico State Highway and Transportation Department. Part of LA 111917 is within the project area of the planned replacement of the U.S. 60 bridge over the Pecos River at Fort Sumner. LA 111917 is a late Archaic activity and habitation area. Excavation of the portion of the activity area within the project limits yielded a large amount of discarded prehistoric artifacts and one extramural feature.

NMSHTD Project No. BR-(US)-060-5(31)327, CN 1683

MNM Project No. 41.6231 (Fort Sumner Bridge)

New Mexico Cultural Properties Review Committee Archaeological Excavation Permit No. SE-111-48298

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INTRODUCTION

Between September 8 and October 3, 1997, the Office of Archaeological Studies (OAS), Museum of New Mexico, excavated a portion of the Barnett Site (LA 111917) for the New Mexico State Highway and Transportation Department (NMSHTD). Part of LA 111917 is within the project area of the planned replacement of the U.S. 60 bridge over the Pecos River at Fort Sumner.

In 1996, archaeologists from Cibola Research Consultants recorded LA 111917 near the southern end of the U.S. 60 bridge over the Pecos River in Fort Sumner, De Baca County, New Mexico (Marshall 1996). NMSHTD proposed to replace the U.S. 60 bridge, which encompasses a portion of LA 111917 lying within the proposed right-of-way. After testing by OAS, LA 111917 was recommended for data recovery.

LA 111917 is on private land and state land acquired from private sources and administered by NMSHTD (Fig. 1 and Appendix 1). The data recovery plan and subsequent archaeological data recovery efforts were proposed and performed by OAS. The principal investigator was Yvonne R. Oakes. The project director was Peter Y. Bullock. Field assistants were Phillip Alldritt, Jesse Murrell, and Sherry Butler. The report was edited by Tom Ireland, graphics were drafted by Ann Noble, and photographs were printed by Warren Loeb.

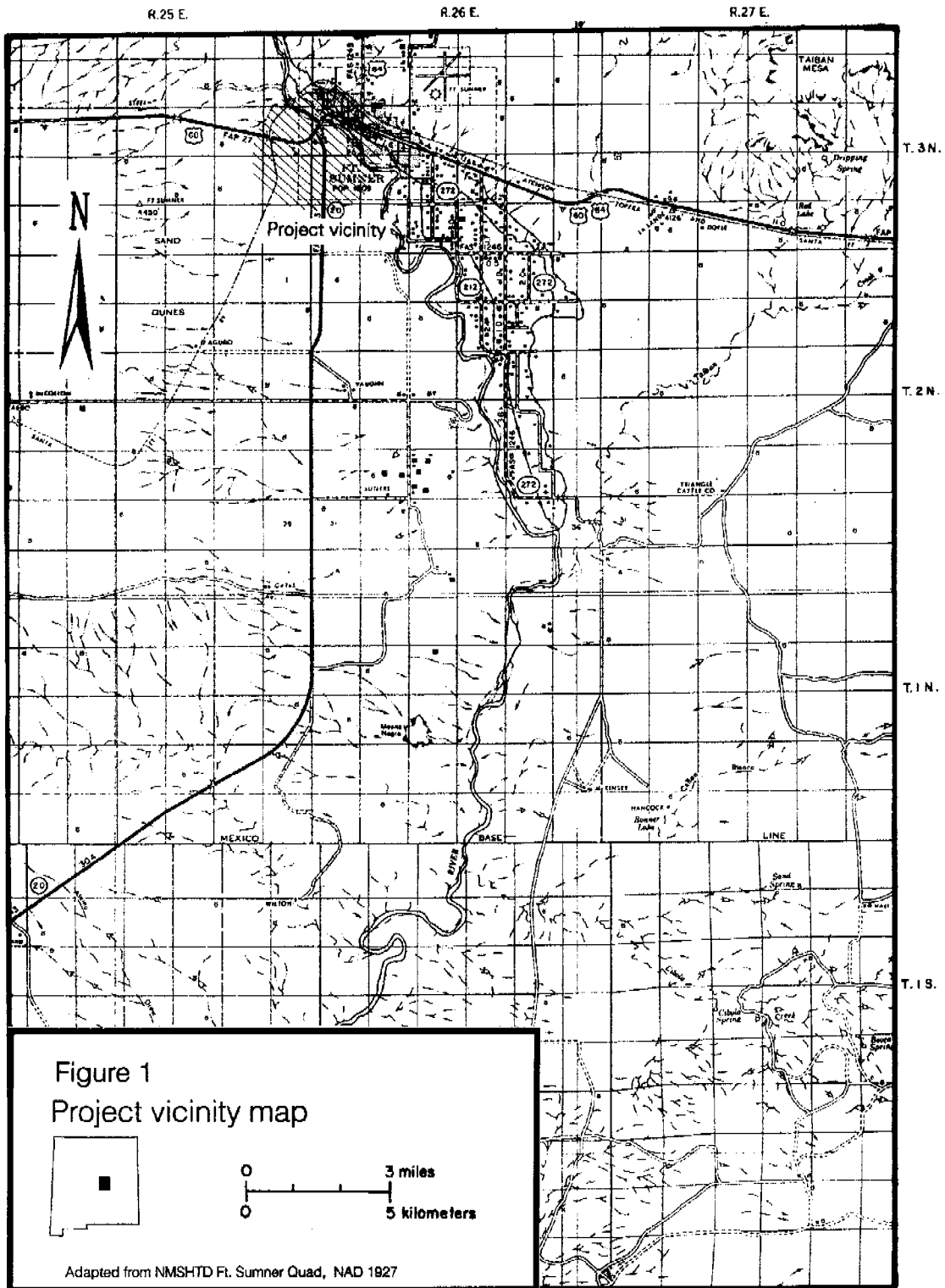


Figure 1
Project vicinity map



0 ————— 3 miles
0 ————— 5 kilometers

Adapted from NMSHTD Ft. Sumner Quad, NAD 1927

ENVIRONMENT

The project area is on the south and west sides of the Pecos River in the Middle Pecos Valley. Elevation within the project area is 1,235.4 m (4,050 ft).

The countryside, in the Middle Pecos Valley in the area of Fort Sumner, is rolling mixed grassland (Castetter 1956: Fig. 1). LA 111917 is on the second terrace above the Pecos River. The site area is an ecotone, an area of contact between the mixed grassland and riverine biotic communities (Reher and Winter 1977; Thurmond 1990). Overgrazing in the region has reduced the local grasses, allowing the spread of invasive species such as mesquite, sagebrush, and yucca.

Geology

The Pecos River is a tributary of the Rio Grande River joining the Rio Grande near Comstock, Texas. Part of the Great Plains province, the Pecos River Valley is a long trough lying between the High Plains (Llano Estacado) to the east, and the Basin and Range province to the west. This valley cuts through an alluvium-filled basin that represents the eroded extension of the High Plains west to the Diamond A Plain. The terrain of the valley is characterized at the local level by its underlying material. In the Fort Sumner area, the Pecos Valley has an uneven surface resulting from the degradation of the underlying deposits of limestone, sandstone, shales, and gypsum (Fenneman 1931:47-49).

The Fort Sumner area is pivotal to understanding the major shift that occurred in the course of the Pecos River during the late Pleistocene Tahoka Subpluvial period (Reeves 1965:45). The Pecos River north of Fort Sumner originally formed part of the upper Brazos River system of central Texas, flowing through Blackwater Draw, the Portales Valley, and present-day Lubbock, Texas. Near Fort Sumner the Pecos River was diverted south and integrated into the lower Pecos River system during the late Pleistocene Tahoka Subpluvial period by a series of solution cavities, still visible as a series of river basins, that developed in the soluble subsurface rocks of the region (Jelinek 1967:5-7; Sebastian and Larralde 1989:7).

The project area is on the second river terrace on the south and west side of the Pecos River. These terraces date to the Holocene (Kues et al. 1985:68) and are primarily comprised of alluvium and glaciation-derived gravel and sand deposits (Jelinek 1967:10). Outcroppings of reddish-brown sandstone from the Santa Rosa formation occur along the second terrace and are present within the project area at LA 111917.

The alluvial nature of these deposits is reflected in the soils of the area, which are primarily Camborthids and Calciorthids. Both soil types are derived from weathered sedimentary rocks, including shale, limestone, sandstone, and gypsum. These soils differ in depth of occurrence and depth of lime zone. Camborthids are generally deeper soils, with a weak lime zone at 45.7 to 101.6 cm (18 to 40 inches), while Calciorthids are characterized by a heavy lime zone at a depth of 30.5 to 50.8 cm (12 to 20 inches). Both soil types are well suited for rangeland and, when watered, are successfully utilized for crops (Maker et al. 1974:70-71).

Water availability in the form of perennial springs, spring-fed lakes (or playas), and ground water was greater in both the prehistoric and historic periods than it is today (Martin 1963). Historically, a number of substantial spring-fed streams flowed into the Pecos River from both the east and the west in the general Fort Sumner area. Truchas Creek, fed by Sunnyside Springs on the north side of Fort Sumner, was a permanent water source as late as the 1950s, as were Taiban Creek

to the east of the Pecos, and Yeso Creek to the west. Numerous seeps and springs were also present, both within the Pecos Valley as well as along the Caprock to the east (Morris 1997; Cranston et al. 1981).

The overall trend in the area has been toward increased aridity. This trend has been exacerbated by recent intensive water use and the resulting lowering of the water table. As the water table was lowered by the extensive drilling of wells in the region, upward leakage from the aquifer ceased, causing springs to go dry (Hudson 1978). The tendency of groundwater to flow toward areas of extensive drilling ensured that the water table dropped as the contents of the aquifers were drawn down. In this way, a larger area of an aquifer is affected by water wells than the immediate area where they are drilled (Maddox 1969). Thus, springs as far east as the Caprock escarpment also ceased to flow due to drilling for irrigation water in the Fort Sumner area (Fielder and Nye 1933; Hudson 1978; Wedel 1983).

Climate

The climate of the project area is semiarid continental, with hot days and cool nights. Average precipitation for this section of the Pecos Valley is 35.6 cm (14 inches), and most annual moisture comes in the summer months (Gabin and Lesperance 1977:103; Jelinek 1967: Fig 5.; Maker et al. 1974:47-48; Tuan et al. 1973: Fig. 2.). The average number of days without a killing frost is 200 (Anonymous 1975:9; Tuan et al. 1973: Fig. 48.), and the growing season averages an additional 80 days.

The current pattern of summer rains and cool relatively dry winters first appeared in the middle Holocene, when there was much more moisture than at present. Although fluctuations have repeatedly occurred (wetter periods are suggested for 1000 B.C. to A.D. 1000), the overall trend has been toward a drier climate through time (Martin 1963; Davis 1989:21; Haynes 1993:232-233). The most obvious result of this drying trend has been a gradual change in biotic communities, with a shift from park woodland dominated by pine and spruce to mixed grassland (Brunswig 1992; Elias 1990; Sebastian and Larralde 1989:16, Fig. 1.9; Van Devender and Spaulding 1979).

Flora and Fauna

A byproduct of project location within an ecotone (in this case the area adjacent to the Pecos River) is a range of environmental zones presenting an increased variety in available plant and animal resources (Epp 1984). The two life zones represented in the project area are the Upper Sonoran (representing the grasslands) and Lower Sonoran (representing the corridor of the Pecos River Valley) (Anonymous 1975:5). While the resources of the plains ecosystem appear limited, they are complimented by the riverine ecosystem of the Pecos River floodplain. This serves as a distinct linear oasis, providing habitat for plant and animal communities not normally associated with the steppe landscape. This added variety of plant and animal communities puts more species in close proximity, although some species (such as migrating birds) utilize this area in a transitory manner.

The grazing of livestock has modified the vegetation of the general project area (Castetter 1956:261-262). Previously heavy grass cover of blue grama, hairy grama, Indian grass, and side-oats grama has been eliminated. Mesquite, yucca, prickly pear, cholla, and sagebrush now dominate the existing local vegetation (Castetter 1956:266-267; Jelinck 1967:37,40).

Fauna is abundant along the river, with smaller quantities present in the grasslands bordering the valley. The contrast in available faunal species between the river valley and grasslands has been

mentioned. Deer, wild turkeys, and cottontail rabbits are present within the river floodplain, with antelope and jackrabbits common in the grassland areas (Anonymous 1975:6-7). Historically, bison were also present in the Fort Sumner area. A variety of small rodents and birds are locally available. Various fish and shellfish live in the Pecos River (Bailey 1931; Jelinck 1967:40; Findley et al. 1975).

CULTURAL HISTORY

A basic cultural history of the project area is presented in this report. For a more in-depth prehistoric coverage of the area, see Sebastian and Larralde (1989) and Stuart and Gauthier (1988). A more in-depth coverage of the history of the area is available in Kues (1985), Morris (1997), and Harlan et al. (1986).

Paleoindian Period

The Paleoindian period (10,000-5,500 B.C.) was first recognized in 1926 at the Folsom site in northeastern New Mexico (Wormington 1947:20). A series of Paleoindian traditions have since been defined, beginning with Clovis and continuing through Plano (Stuart and Gauthier 1988:294-300). Originally defined on the plains of eastern New Mexico, the Paleoindian cultural area has since been expanded to include virtually all of North America. Although it was once believed that the inhabitants depended mainly on big-game hunting, the importance of plant-gathering and small animal hunting to Paleoindian subsistence is now recognized (McGregor 1965:120; Willey 1966:38; Jennings 1968:78-79; Wilmsen 1974:115; Cordell 1979:19-21; Stuart and Gauthier 1988:31-33).

Paleoindian sites of any period are rare, but several Paleoindian sites are recorded in the region, including the Clovis type site of Blackwater Draw, Locality No. 1, and Blackwater Draw, El Llano. Few sites have been recorded in the Pecos River area. Distinctly shaped Paleoindian projectile points have been found, but usually as isolated finds. One isolated Clovis projectile point base has been recorded further north in the Pecos River Valley, southeast of Santa Rosa (Bullock 1995b). Late Paleoindian sites have been recorded in Guadalupe County to the north (Bullock 1994a). Other Paleoindian sites are probably present, buried under alluvial or eolian deposits (Cordell 1984).

Archaic Period

The Archaic occupation of the upper Pecos River Valley appears to have lasted quite late. Levine and Mobley (1975) define the Archaic occupation of northeastern New Mexico as lasting from 5000 B.C. until about A.D. 1000, but a local chronology has not been developed for this area. Projectile points in eastern New Mexico have been identified under a number of different schemes, including those of the Oshara Tradition (Irwin-Williams 1973) and chronologies used in central and western Texas (Johnson 1967).

The Archaic period is best defined in northwestern New Mexico, where it is generally referred to as the Oshara Tradition (Irwin-Williams 1973). This period is distinguished by distinctive projectile points and lithic artifact scatters, including grinding implements, fire-cracked rock, and a lack of ceramics. Archaic subsistence adaptations are based on a highly mobile broad-based economy characterized by a combination of seasonally scheduled hunting and gathering activities. The Oshara Tradition is divided into five phases: Jay (5500-4800 B.C.), Bajada (4800-3200 B.C.), San Jose (3200-1800 B.C.), Armijo (1800-800 B.C.), and En Medio (800 B.C.-A.D. 400) (Irwin-Williams 1973). Although centered in the northwestern area of New Mexico, Oshara Tradition projectile points do occur as isolated occurrences as far east as the Pecos Valley.

A separate sequence of projectile points for central and western Texas was developed by Johnson (1967) based on stratified sites yielding radiocarbon dates. This sequence is divided into five overlapping periods: Period I (8350-4800 B.C.), characterized by Luna and Plainview projectile points; Period II (6810-1315 B.C.), characterized by Early Barbed, Pandale, Nolan, Travis, and Bulverde projectile points; Period III (4850 B.C.-A.D. 110), characterized by Shumla, Almagre,

Langtry, Pedernales, and Montell projectile points; Period IV (350 B.C.-A.D. 1245), characterized by Ensor, Frio, Darl, Figuero, and Godley projectile points; and Period V (A.D. 50-1710), characterized by Scallorn, Livermore, Bonham, and Perdiz projectile points. In a number of cases the same projectile point morphologies have been given different names based on location.

A revised localized sequence for the Llano Estacado and adjacent areas (including the Pecos River Valley) has recently been developed by Shelley (1994). This sequence integrates diagnostic projectile points from well-dated sites with geological information from the area.

Pueblo Period

Evidence of Puebloan use of the Santa Rosa area is abundant, although no Pueblo sites with residential architecture have been recorded. The closest recorded pueblos to the Fort Sumner area are at Pintada Canyon, approximately 72 km (45 miles) to the northwest. These Puebloan sites appear to date from A.D. 1200-1400. Ceramics assemblages are dominated by Chupadero Black-on-white and brown utilitarian wares (Stuart and Gauthier 1988). Pueblo ceramics are found in association with open air sites, lithic artifact scatters, and rockshelters along the Pecos River, side canyons, and along some main arroyos. The occasional occurrence of other ceramic types indicates both regional trade, and possible use of the area by Pueblo groups from the Glorieta Mesa and Galisteo Basin areas. Sites associated with Puebloan use of the Pecos River Valley have been recorded for the western side of the Pecos River, south of Santa Rosa (Hannaford 1976), and from the Los Esteros Lake area (Levine and Mobley 1975).

Jornada Mogollon ceramics also occur in the Fort Sumner area, with a number of possible Jornada Mogollon sites recorded in the Santa Rosa area to the north (Harlan et al. 1986; Levine and Mobley 1975). Jornada Mogollon sites with structures have been recorded in the area of Fort Sumner (Corley 1965; Jelinek 1967:119-124) and at Sumner Lake (Kemrer 1994).

A local pueblo traditional sequence is documented for the middle Pecos River Valley by Jelinek (1967). This tradition seems to develop in the late A.D. 800s out of the Jornada Mogollon (Wiseman 1981). Anasazi or Anasazi-derived ceramics appear in the middle Pecos River Valley after A.D. 900 with the development of the Mesita Negra phase (Jelinek 1967:64-65). The presence of these structural sites suggests the gradual spread of sedentary subsistence, based on maize agriculture east, from the centers of the Mogollon and Anasazi traditions. The eastern limits of this probably marginal area appear to have been the Pecos Valley (Jelinek 1967:145-147). These developmental sequences continue until the termination of Crosby phase in the lower middle Pecos Valley between A.D. 1250 and 1300, and the termination of the Late McKenzie phase in the upper middle Pecos Valley about A.D. 1300 (Jelinek 1967:65-67). This cultural development appears to be centered south of the general project area around Roswell (Wiseman 1981).

Plains Indian Period

Both Kiowa and southern Athapaskan groups appear to have moved into the eastern portion of New Mexico during the late protohistoric period (Gunnerson 1987). Apachean sites are scattered throughout southeastern New Mexico as well as the central plains, and may date anywhere from the late 1400s to the late 1800s (Harlan et al. 1986:52). Many Apachean sites may actually be Kiowa camps.

Questions exist concerning Kiowa origins. These center on their language, Towa, a version of the Tanoan language, spoken by Puebloan peoples of both Jemez and Pecos pueblos (Jelinek

1967:162-163). Trager (1951) put the time of separation between these languages at A.D. 1000. This suggests that the Kiowa could be the descendants of the Puebloan colonizers of the Pecos Valley.

Shoshonean-speaking Comanches moved into the southern plains about 1700-1715. Most other Native American groups were driven from the area by these horse-mounted buffalo hunters, except for the closely politically allied Kiowas. Extermination of the buffalo herds and American military campaigns removed the Comanches, Kiowas, and other "Plains Indian" groups from the southern plains by 1875 (Schemer 1981). Sites identified as possibly Apache, Kiowa, Comanche, or other "Plains Indian" have been identified north of Santa Rosa at Los Esteros Lake (now Santa Rosa Lake) by Levine and Mobley (1975).

DATA RECOVERY RESEARCH ORIENTATION AND GOALS

The orientation and goals or expectations for the research that guided the data recovery effort are primarily derived from the recovery plan for LA 111917, developed by Bullock (1997). In accordance with Bullock's data recovery plan, a number of specific goals were pursued during this excavation.

Previous research in the Fort Sumner area has been limited, primarily focusing on site recording and regional cultural development. While this has contributed to at least some understanding of the region, there has been a need to supplement the small size of the data sets with additional work in the area.

It was once believed that LA 111917 was a stratified long-term occupation site (Bullock 1997). The site was also felt to reflect a subsistence approach shared by various cultural groups operating within this general ecotone through time (Bullock 1997).

Excavation proved this was not the case. Although the LA 111917 is a multicomponent site, the portion of the site within the project area was limited to a single Late Archaic component. The focus of the data recovery efforts was therefore shifted to examining the site as an example of a resource procurement area. Of particular interest was site structure and use.

The data recovery effort for LA 111917 focused on site chronology, the site's occupational history, and resource utilization and subsistence issues. These were identified as site cultural identification, a determination of site activities and their relationship to site structure, and an assessment of how the Barnett site fits into the resource procurement activities pursued on the eastern plains of New Mexico. The goals and expectations of the data recovery effort were as follows:

1. Site chronology and the form of its application in the determination of site utilization and structure is dependent on both an ability to obtain precise dates for a site, and an ability to assign the site a cultural affiliation. Precise dates for a site can be obtained through the collection and analysis of chronometric samples. Assigning a cultural affiliation is usually accomplished through the use of diagnostic artifacts or ceramics. However it has been demonstrated (Bullock 1994a, 1994b, 1995a) that a site's cultural affiliation can sometimes be determined when diagnostic artifacts are absent.

Excavation at LA 111917 focused on the collection of chronometric samples and temporally diagnostic artifacts. This data was to be integrated with artifact assemblage analysis data to address site structure and durability of occupation.

Archaeomagnetic dating and carbon-14 dating had the most potential for establishing a precise date for LA 111917. Unfortunately, the nature of the Barnett site (LA 111917) precluded the collection of chronometric samples. No charcoal was present within the single feature (roasting pit) found at the site, limiting our ability to collect radiocarbon (C-14) samples. The slight amount of heating that the hearth had experienced made archaeomagnetic dating of the feature impossible.

Relative dating of LA 111917 is possible through the comparison of diagnostic lithic artifacts with artifact assemblages from sites associated with absolute dates to refine the time frame of the LA 111917 occupation. Projectile points are the diagnostic artifacts with the most information concerning relative age and cultural affiliation.

In the absence of diagnostic artifacts, the lithic artifact assemblage of LA 111917 would be analyzed with special attention given to four 'marker' attributes. The ratio of debitage to tools (including utilized debitage), and the percentages of flakes, cores, and bifaces within the assemblage will be monitored. In this situation, focus of study would be two trends that occur through time, an increase in the ratio of debitage to tools and the percentage of flakes, and a decrease in the percentages of both cores and bifaces within the assemblage. Through a comparison of these four attributes, cultural affiliation can possibly be determined.

Flotation samples collected from the single feature at LA 111917, will aid in the determination of site structure at the site level. It was hoped that comparison of samples might reveal changes that occur in site structure through time. However, the limited number of features found made this type of comparison impossible.

2. The occupational history of the site, as well as its duration of use, are important to chronological and functional studies. Differences apparent within a site's occupational history may reflect discreet populations. However, this may also be an indication of cultural change through time.

It was originally believed that two midden areas represented at LA 111917 would exhibit the occupational sequence (Bullock 1997). Upon excavation, this proved not to be the case. Instead, excavation revealed that a single occupation is represented at LA 111917 within the project area. This has resulted in a change of emphasis in the study of the site's occupation. The focus of site study will be oriented less toward comparative stratigraphic analysis and more toward understanding the range of activities represented. Despite this change of direction, analysis of the use-area and the artifacts associated with it will aid in reconstructing the sites' occupational history.

3. Site subsistence can be postulated based on the range of activities that were pursued at the site locale. On-site activities at LA 111917 can be understood by determining the location and function of site features and their relationship to site structure. Feature function can be determined by describing the feature and analyzing the associated artifacts and other material.

The range of activities at LA 111917 should help reveal the form of subsistence adaptation practiced at the site. Sedentary site use should differ from seasonal site use, which this should be evident from the artifact assemblage. Subsistence can be inferred directly through dietary evidence and indirectly through the technology represented in the procuring and processing of food. Dietary evidence includes flora and fauna remains. Technological evidence includes the tools used in the procurement and processing of food.

Excavation of cultural features and deposits may yield faunal and macrobotanical remains. These remains will be analyzed for anatomical portion, age, condition, and frequency to obtain dietary information.

Pollen and macrobotanical samples will enable us to infer flora utilization and consumption. Pollen analysis also reveals information about the general prehistoric environment, including the favorability of agricultural conditions. The types of grinding implements present may also correspond to the sorts of gathered or cultivated plants.

Nonlocal lithic materials may provide information about social and economic organization. The presence of lithic materials that have specific source areas may confirm macrobotanical data.

Changes in subsistence and settlement patterns on both the eastern New Mexican plains and in

the Pecos Valley should be apparent through a comparison of known sites and their distribution through time and space. This should make apparent any subsistence resource procurement patterns at LA 111917.

EXCAVATION METHODS

The first goal of the excavation was to collect surface artifacts within the right-of-way. This was accomplished by setting up a 1 by 1 m grid system across the right-of-way. A site datum was established as 0N/0E with an arbitrary elevation of 1.00 m. Grid numbers were assigned to the southwest corner of each unit. Each grid unit was examined for artifacts, which were bagged by grid. Surface artifacts were collected and bagged by grid number for the total site area of the site within the existing right of way.

Following the surface collection, the area of the site's recorded surface artifact concentration was surface stripped of overburden to locate subsurface features and deposits. This overburden layer (Stratum 1) averaged 10 cm in thickness and was located directly over culturally sterile clay.

Once a feature or structure was defined, half of the fill was removed to reveal the interior stratigraphy. The stratigraphy and the feature were profiled, photographed, and described on field journal forms. The remaining fill was removed by cultural strata.

Part of the site was believed to be stratified midden deposits, located beneath recent highway fill. Once the later highway fill was removed with a backhoe, a trench was dug across these deposits and the dirt removed in arbitrary 10 cm levels to bedrock. The exposed profiles were drawn and photographed, and the remaining portions of the deposits removed by natural strata.

All of the dirt excavated at LA 111917 was sifted through 1/4-inch screen mesh. All artifacts were collected in paper bags that were labeled with vertical and horizontal provenience information.

Feature and site fill were described on field journal forms and grid forms. The forms included excavated depth in centimeters below site datum, information about soil color and texture, and artifact types and density. Soil colors were described using Munsell color notation.

After excavation was completed, the site was mapped with a transit and stadia rod, including the limit of the excavation, and cultural features.

Excavation defined three natural strata on LA 111917. These were assigned consecutive numbers at the site level that were used in the excavation notes and site and feature drawings. One area of intact cultural strata was present at LA 111917 in the area of the single feature.

Stratum 1 is a tan, fine, silty loam averaging 11 cm in thickness. Colluvial in origin, this material originated as terrace slope wash. Stratum 1 contains prehistoric artifacts and is present as a topsoil layer at LA 111917.

Stratum 2 is a thin layer of fine grayish soil containing artifacts. Eolian in origin, this stratum is associated with a use area in the vicinity of the single feature. However, no artifacts were found in direct association with the use area surface.

Stratum 3 is a reddish brown, caliche-flecked, fine-textured clay which also contains decomposing sandstone. This culturally sterile stratum is directly beneath Stratum 1 except where the cultural stratum (Stratum 2) or bedrock, is present.

SITE DESCRIPTION

LA 111917 is south of Fort Sumner on the south side of the Pecos River (Fig. 2) adjacent to U.S. 60. In the site area, the Pecos River bends toward the east. The site gets its name from the land owner, K. Barnett and Sons. The portion of the site within the project area is on the second terrace above the Pecos River. A later Jornada Mogollon component is also present at LA 111917. This is outside of the project area on the next, or third, terrace.

LA 111917 is a dual-component site. The Archaic component, dealt with in this excavation, is on a flat, but not level, gentle, north-facing slope on the top of the second terrace of the Pecos River (Fig. 2). A later Jornada Mogollon component is upslope on a flat area at the top of the next (or third) terrace.

The total site area measures 105 m by 125 m. The portion of the site within the project area measures 11 by 11 m, an area of 121 sq m (Fig. 3). After testing, the Archaic component at LA 111917 was believed to comprise two separate midden deposits (Bullock 1997). Excavation proved this not to be the case. One midden proved to be redeposited material within a telephone trench. The second midden proved to be stratified redeposited material in the fill of the existing U.S. 60 bridge over the Pecos River. In both cases this material contained not only prehistoric artifacts, but also recent plastic, glass, and metal trash down to bedrock.

Separate from the supposed midden areas, a single feature was found during the excavation, a prehistoric roasting pit with an associated use-area. The roasting pit and associated use-area covered an area of 23 sq m, and the main portion of the Archaic site area is to the west outside of the project area.

Feature 1

Feature 1, a small unlined roasting pit, measures 0.60 by 0.80 m, an area of 0.48 m, and 7 cm deep. Although surface artifacts were present in the area of the feature, testing had suggested that this was not the main area of focus on the site. The feature first appeared as a small area of charcoal-stained soil after removal of the top 10 cm of soil. Working outward from the stain, a total of 22 sq m were surfaced stripped to a depth of 10 cm, exposing the top of Feature 1.

Once the feature was defined, half of the fill was removed in a single arbitrary 7 cm level. The resulting profile of the feature was drawn, revealing the feature to be a hearth containing a single layer of feature fill. The remaining fill was removed as a single flotation sample.

A use area was found associated with the feature. In the immediate area of the hearth, this was comprised of a packed-earth surface measuring 50 cm by 80 cm. The rest of the use area corresponded with the extent of the site's Stratum 2. This extended for 23 sq m around the feature. Recovered artifacts from this area totaled 1,374, an artifact density of 59.7 per square meter. This cultural deposit is believed to extend to the west, outside of the project area. However, for this report, limits of this use-area are determined by the physical limits of its extent within the project area.

Stratigraphy

A single layer of fill was present within Feature 1. Stratum 1 is a fine, gray, charcoal-stained deposit of eolian soil. All of this fill was collected as a macrobotanical sample. A large number of

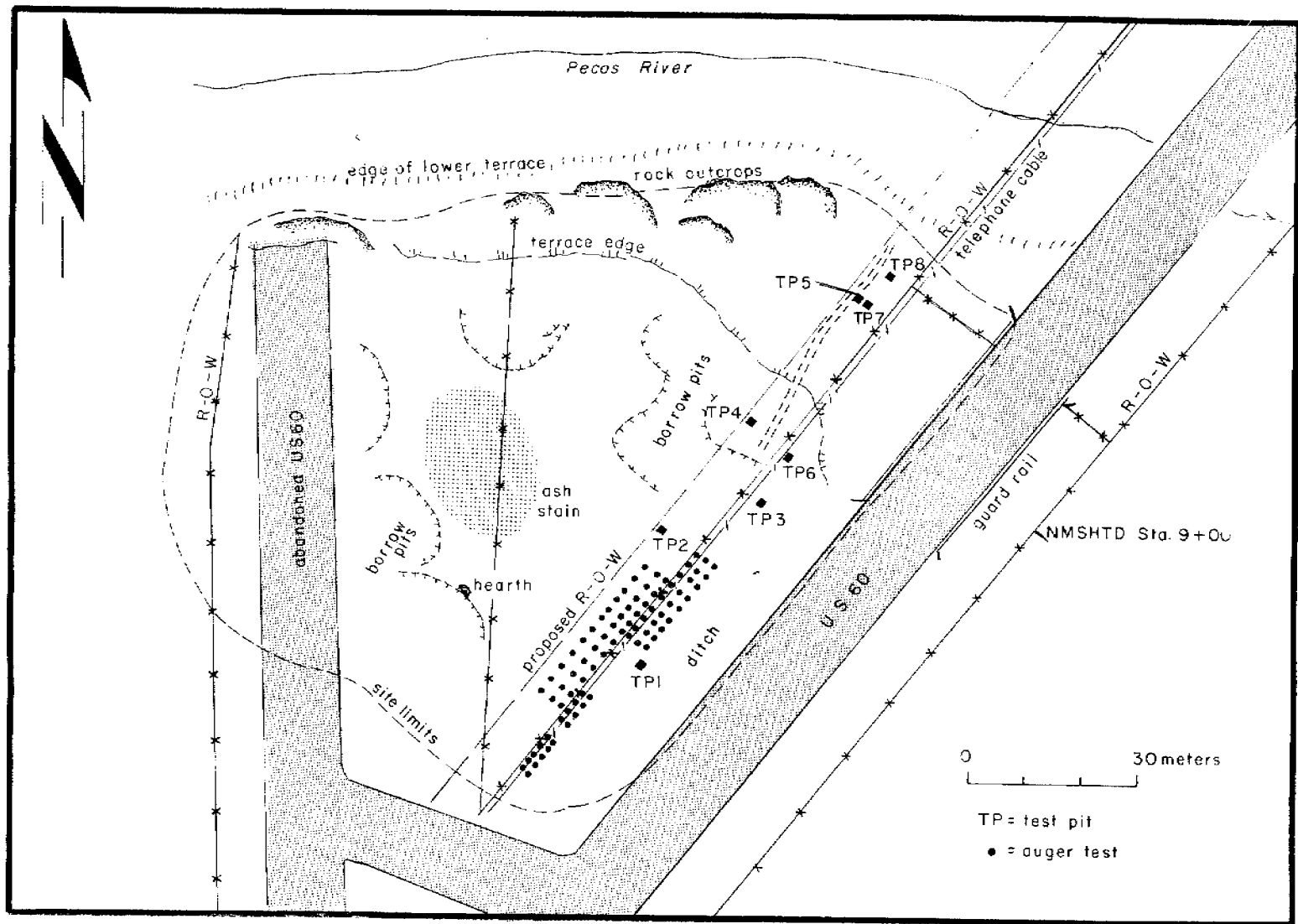


Figure 2. LA 111917 site map.

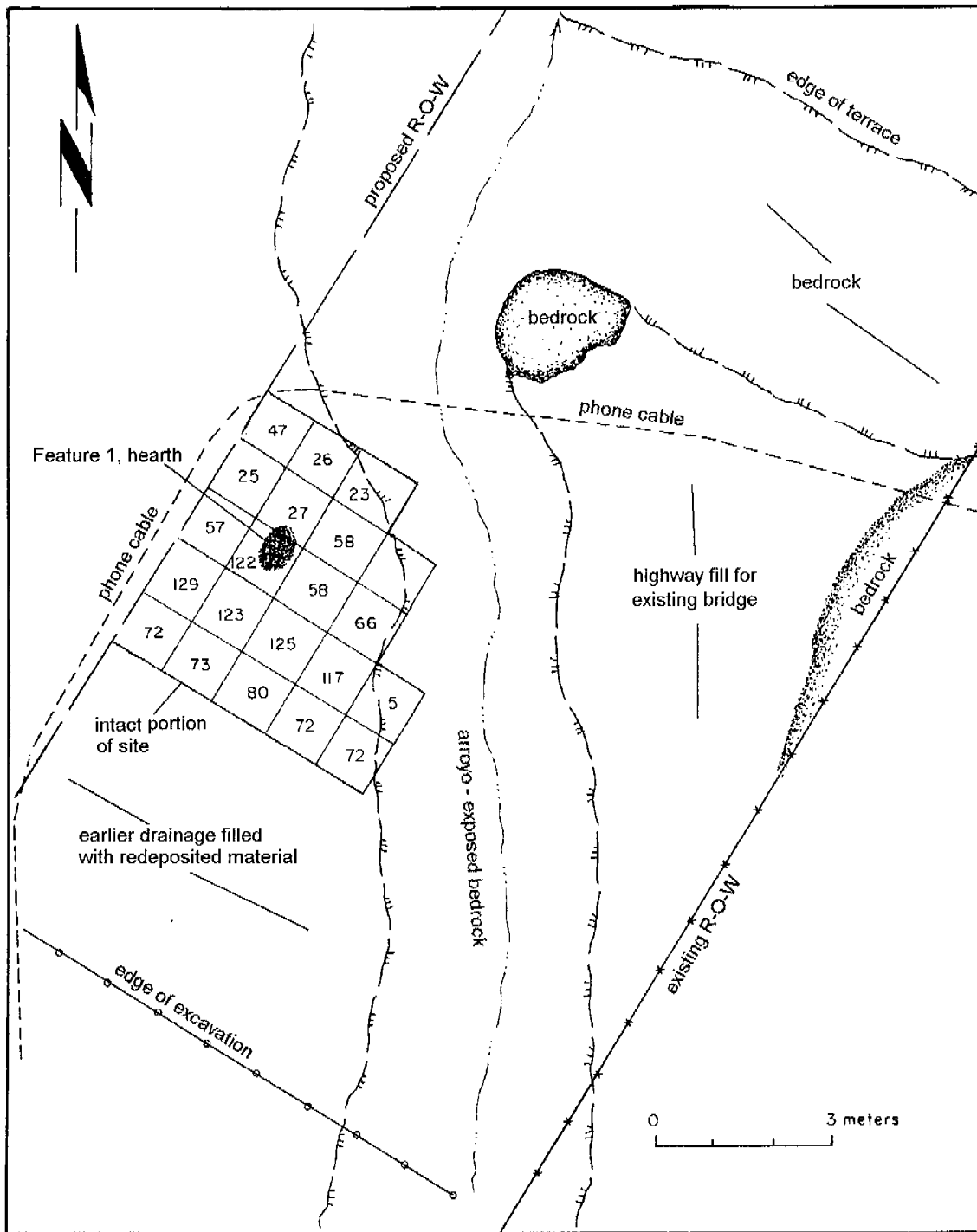


Figure 3. LA 111917 excavation area, showing artifact counts per grid.

fire-cracked cobbles (52) were also present within Feature 1. Artifacts within the feature numbered 13 lithic artifacts.

Feature 1 is a small roasting pit. Of simple construction, it was made by digging a shallow hole in the ground. Little or no further preparation took place prior to its use. The presence of large amounts of fire-cracked rock indicates that the feature may have served as an area for the processing of foodstuffs through roasting. The shallow nature of this feature, combined with the single layer of fill and large amount of fire-cracked rock suggests that it was used for only a short period of time or perhaps only once. The presence of large numbers of lithic artifacts around the feature indicates that while this feature may have had limited or short-term use, it is part of a larger long-term utilized site.

The cultural deposit and activity area associated with the hearth at LA 111917 is too extensive, and the artifact assemblage from it too dense, to be connected solely to Feature 1. These facts support the assertion that this is part of a larger, long-term, possible habitation site. That this activity area extends outside of the project area makes it even less likely that this roasting pit is the only feature associated with it.

SITE DATING

Dating LA 111917 has proved to be possible, but only at a very basic level, based on the presence of diagnostic artifacts. Other dating methods were not successful.

Dendrochronology can give a precise date based on the tree rings from specific species of wood recovered from archaeological contexts. The lack of wood fragments at LA 111917 severely limited our ability to utilize dendrochronology.

Archaeomagnetic dating is based on the presence of iron in the soil. Released by heat, these particles line up on magnetic north and remained fixed once they cool down. By measuring the angle present, and comparing it to the route of the wandering north pole, a precise date can be obtained for any area of burned earth (such as a hearth). The lack of intense burning at the single roasting pit at LA 111917 ruled out the collection of archaeomagnetic samples.

Radiocarbon dating involves the dating of carbonized organic material through the measurement of its radiocarbon content. The lack of charcoal in the fill of the roasting pit at LA 111917 made carbon-14 dating impossible.

A relative date for the feature is obtainable through the identification of the LA 111917 projectile point assemblage. Identification of these diagnostic artifacts allows a rough age to be determined for the site. Of the four fragmentary projectile points recovered at LA 111917, two can be dated to the Late Archaic based on form, although they cannot be assigned to a specific type (Bell 1989; Shelly 1994). The Late Archaic roughly dates LA 111917 to 2500 B. C.–1 A. D.

LITHIC ARTIFACT ANALYSIS

Lithic artifact analysis was accomplished using two basic goals. The first goal was to provide a descriptive summary of the lithic artifacts from the site. The second goal was to provide information that could be used to address the general research problems outlined in the data recovery plan for LA 111917. The artifact assemblage for LA 111917 contains 1,383 lithic artifacts.

The descriptive artifact analysis attempts to identify patterns in prehistoric artifact production and use that might allow the identification of patterns attributable to different activities. This can be done based on the different proportions of formal tools, utilized flakes, and exotic materials. Interpretation is based on the assumption that lithic assemblages reflect the need to satisfy two needs. One need is for material that can be modified into formal specialized tools. The second need is the production of flakes that can be utilized without further modification as expedient tools.

It has been argued that expedient tools (flakes utilized with little or no modification) are the result of material abundance on residential sites (Post 1993; Shelley 1983). However, they may also represent a convenient, flake-based, domestic lithic technology (Abbott et al. 1996), which is characteristic of long-term residential or habitation sites.

The existence of formal tools such as projectile points and drills within an assemblage implies design directed toward specific tasks or activities. Early stages of both formal tool manufacture and expedient flake production produce flakes that are indistinguishable from each other. The waste flakes produced in the later stages of formal tool production, however, are distinctive biface flakes (Neusius 1988).

Distinctive resharpening, or rejuvenation, flakes are a common by-product of tool maintenance and reuse. The presence of nonlocal, or exotic, materials can be used to postulate spheres of social and economic interaction. Conversely, an absence of nonlocal lithic material may reflect the isolation or insular nature of a population or community.

The combination of these attributes and occurrences should vary by cultural affiliation and through time. The research design developed for LA 111917 focused on the identification of site activities as a way of inferring the site's occupational history and the mode of subsistence practiced at that locale. While it is now apparent that LA 111917 is a habitation site, the lithic artifact assemblage can still aid in indicating the range of activities that may have taken place. Different activities can be inferred from the presence of different artifact types and their frequencies. Since LA 111917 contains such a large artifact assemblage, a wider range of activities can be expected than at a hunting camp or other short-term procurement area. The formal tools present include projectile points (3), graters (93), knives (29), choppers (14), spokeshaves (24), denticulates (8), hammerstones (3), and scrapers (71).

Analytic Methods

The guidelines and format of *Standardized Lithic Artifact Analysis: Attributes and Variable Code Lists* (OAS 1994) were followed in the analysis of lithic artifacts from LA 111917. The following attributes were included in analysis.

Material Type

Codes for material types are for general material groups unless the material is unquestionably

from a recognized source. For example, although a wide range of chert occurs on these sites, all were classified as “chert.” If a specimen was of a specifically named chert (such as Washington Pass chert), it was coded by the specific name.

Morphology (Artifact Type)

This is the characterization of artifacts by form.

Portion

Portion is that part of the artifact present. Flakes and tools can be whole or fragmentary. Angular debris and cores are whole by definition.

Dorsal Cortex

Cortex is estimated to the nearest 10 percent increment. For flakes this is the cortex on the dorsal surface. Cortex on the platform was not included. For other morphological types, the percentage of cortex on all surfaces is estimated and added together.

Flake Platform

Flake platform is recorded for whole and proximal flakes. Some lateral flakes also have their platforms recorded, if the platform is still present. The morphology of the impact area prior to flake removal or extreme modification of the impact area caused by the actual flake removal is coded.

Size

Artifact size is recorded in millimeters.

Edge Number

Artifacts can have one or more utilized edges. Each utilized edge on an artifact is given an edge number. Consecutive numbers are used for artifacts with more than one utilized edge. Each edge was analyzed separately for function and wear patterns.

Function

Function describes and characterizes artifact form.

Wear Patterns

Artifact modification caused by human use is coded as wear.

Analytic Results

A total of 1,387 artifacts were found at LA 111917, a large number even for a Late Archaic site.

Material Selection

Lithic artifacts collected at LA 111917 are comprised of eight materials (Table 1). However, a

majority of the artifacts are constructed of only two materials, chert (44.5 percent) and metamorphic sandstone (40 percent). Quartzitic sandstone and siltstone artifacts are present in substantial amounts, while smaller numbers of artifacts are made of Alibates dolomite (commonly called Alibates chert), limestone, obsidian, and silicified wood.

Table 1. Artifact morphology by material type

Artifact Type	Metamorphic Sandstone		Chert		Alibates Dolomite		Siltstone		Limestone	
	N	%	N	%	N	%	N	%	N	%
Core flake	521	93.4	552	89.3	2	100.0	75	90.4	1	100.0
Biface thinning flake			10	1.6						
Resharpener flake	1	0.2	8	1.3						
Hammerstone flake	12	2.2	8	1.3						
Uniface (1st stage)	2	0.4	3	0.5						
Biface (1st stage)	3	0.5	5	0.8			1	1.2		
Biface (2nd stage)			10	1.6						
Biface (3rd stage)			3	0.5						
Bidirectional core	2	0.4					1	1.2		
Unidirectional core	2	0.4	5	0.8			1	1.2		
Multifaceted core	15	2.7	14	2.3			3	3.6		
Total	558	100.0	618	100.0	2	100.0	83	100.0	1	100.0

Table 1 (continued)

Artifact Type	Quartzitic Sandstone		Obsidian		Silicified Wood		Total	
	N	%	N	%	N	%	N	%
Core flake	89	98.9	7	63.6	19	82.6	1266	91.5
Biface thinning flake			2	18.3	1	4.3	13	0.9
Resharpener flake					2	8.7	11	0.7
Hammerstone flake							22	1.6
Uniface (1st stage)							5	0.4
Biface (1st stage)							9	0.6
Biface (2nd stage)			1	9.1			11	0.7
Biface (3rd stage)			1	9.1			4	0.3
Bidirectional core							3	0.2
Unidirectional core							9	0.6
Multidirectional core	1	1.1			1	4.3	34	2.5
Total	90	100.0	11	100.0	23	100.0	1387	100.0

All but two of the materials represented in the lithic assemblage at LA 111917 are available in the Fort Sumner area (Bullock 1994b, 1995a, 1996). Obsidian is the only definite nonlocal material at this site. Eleven obsidian artifacts were recovered at LA 111917. This obsidian resembles Jemez obsidian, from north-central New Mexico. Jemez and Polvadera obsidian are known for the Pecos Valley (Ward et al. 1987). Alibates dolomite is another nonlocal material occurring in the Canadian River Valley of the Texas Panhandle. However, similar materials do occur locally in northeastern New Mexico, making the exact identification of this material problematic. (Banks 1990).

Material use serves as an indication of human decision-making processes with regard to the suitability of materials (Young and Bonnicksen 1985:128). The presence within a site area of tested material or substantial numbers of core flakes exhibiting dorsal cortex can thus be presumed to illustrate the manner in which this material suitability is determined. The LA 111917 assemblage contains large numbers of core flakes exhibiting dorsal cortex (Table 2). Of the lithic artifact total, only 43.6 percent lack any dorsal cortex. This suggests that this lithic material suitability analysis was conducted at LA 111917 prior to its use. This also supports the local origin of most of the lithic material present at the site.

Table 2. Percent of dorsal cortex by material type

Cortex	Metamorphic Sandstone		Chert		Alibates Dolomite		Siltstone		Limestone	
	N	%	N	%	N	%	N	%	N	%
0	186	33.3	346	56.1	2	100.0	14	16.9	1	100.0
10	46	8.2	29	4.9			5	6.0		
20	51	9.2	34	5.5			2	2.4		
30	49	8.8	35	5.6			11	13.3		
40	42	7.5	27	4.4			3	3.6		
50	26	4.7	15	2.4			4	4.8		
60	36	6.5	19	3.1			8	9.6		
70	35	6.3	38	6.2			9	10.8		
80	38	6.8	34	5.5			9	10.8		
90	29	5.2	19	3.1			6	7.2		
100	20	3.6	22	3.6			12	14.5		
Total	558	100.0	617	100.0	2	100.0	83	100.0	1	100.0

Table 2 (continued)

Cortex	Quartzitic Sandstone		Obsidian		Silicified Wood		Total	
	N	%	N	%	N	%	N	%
0	30	33.3	11	100.0	15	65.2	605	43.6
10	11	12.2			1	4.3	92	6.7
20	9	10.0					96	6.9
30	11	12.2			1	4.3	107	7.7

40	4	4.4					76	5.5
50	4	4.4			1	4.3	50	3.6
60	5	5.6			2	8.6	70	5.0
70	7	7.8			1	4.3	90	6.5
80	5	5.6			1	4.3	87	6.3
90	4	4.4					58	4.2
100					1	4.3	56	4.0
Total	90	100.0	11	100.0	67	100.0	1387	100.0

Artifact Morphology

Core flakes make up the largest category of artifacts at LA 111917, forming 91.3 percent of the total assemblage (Table 1). Although biface thinning flakes, resharpening flakes, and hammerstone flakes are also present, their percentages are extremely small.

Core flakes can represent core reduction or the manufacturing of flakes for use as expedient tools. Core flakes are present in all material types occurring at LA 111917. This range of occurrence suggests that the creation of core flakes for use as expedient tools was taking place. The range of cortex occurrence that might indicate core reduction is present in almost all of the local materials within the assemblage.

This form of conveniently disposable lithic technology is more characteristic of Anasazi and other Puebloan sites (Neusius 1988) than of Archaic sites, where a high percentage of biface thinning flakes is usually considered indicative of on-site tool production. The difference at this site, is the further modification of many of these core flakes to produce formal tools, particularly graters, spokeshaves, and knives. The resulting high occurrence of formal tools is more characteristic of the Archaic period than of any of the Puebloan cultures.

Flake Portion

Numbers of distal and proximal flake portions within an assemblage can be an indication of core reduction or trampling by livestock. An extremely high percentage of distal fragments suggests breakage took place during core reduction. Numbers of distal and proximal fragments that are roughly equal are believed to represent breakage caused by livestock (Moore 1994), as are high percentages of proximal fragments.

The LA 53678 flake assemblage (Table 3) contains a higher percentage of proximal portions to distal portions among flake fragments by a 3 to 1 margin. This suggests that at least some trampling by livestock took place at LA 111917. The small percentages of flake fragments within the flake totals suggest that this trampling may have occurred in the recent past.

Table 3. Flake type by flake portion

Flake type	Whole		Proximal		Medial		Distal		Lateral		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Core flake	1073	96.8	102	91.1	15	100.0	30	100.0	46	97.9	1266	96.5
Biface thinning flake	6	0.7	5	4.5							13	1.0
Resharpener flake	8	0.7	2	1.8					1	2.1	11	0.8
Hammerstone flake	19	1.7	3	2.7							22	1.7
Total	1108	100.0	112	100.0	15	100.0	30	100.0	47	100.0	1312	100.0

Flake Platform Type

Flake platforms are the remnants of the core or tool from which the flake was struck. Platform types provide information on the level of core reduction technology pursued at a particular site. Cortical platforms are those that contain cortex material, thus representing early-stage reduction. Single-facet platforms can occur at any stage of reduction. Multiple-facet platforms generally represent late stage core or biface reduction (Moore 1994).

Platform types are shown in Table 4. Cortical and single facet platforms are by far the largest categories (53.7 percent and 37.3 percent, respectively). Flakes where the platform was absent comprised only 4.1 percent of the total. Other platform types are present in smaller numbers.

Table 4. Flake type by platform type

Flake Type	Absent		Cortical		Single		Multifaceted		Collapsed		Crushed		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Core flake	54	100.0	482	98.2	684	97.2			39	100.0	7	100.0	1266	96.5
Biface thinning flake							13	76.5					13	1.0
Resharpener flake					7	1.0	4	23.5					11	0.8
Hammerstone flake			9	1.4	13	1.8							22	1.7
Total	54	100.0	491	100.0	704	100.0	17	100.0	39	100.0	7	100.0	1312	100.0

Tools

The percentage of tools in the lithic artifact assemblage from LA 111917 is extremely high, 43.2 percent of the total assemblage (Table 5). Of this total, expedient tools such as utilized debitage number 361 (26.0 percent), and formal tools number 246 (17.2 percent). Included in this assemblage are 93 graters, 71 scrapers (39 side scrapers and 32 end scrapers), 29 knives, 24 spokeshaves, 8 denticulates, three projectile points, and a drill.

Table 5. Artifact function by material type

Function	Metamorphic Sandstone		Chert		Alibates Dolomite		Siltstone		Quartzitic Sandstone	
	N	%	N	%	N	%	N	%	N	%
Utilized debitage	163	65.4	135	52.4			29	70.7	27	58.7
Hammerstone	1	0.4	1	0.4			1	2.4		
Chopper	10	4.0	1	0.4			3	7.3		
Drill			1	0.4						
Graver	31	12.4	52	20.2			2	4.9	7	15.2
Spokeshave	9	3.6	10	3.9			1	2.4	4	8.7
Denticulate	5	2.0	2	0.8					1	2.2
Scraper (end)	11	4.4	16	6.2			3	7.3	2	4.3
Scraper (side)	15	6.0	16	6.2	1	100.0	2	4.9	4	8.7
Knife	4	1.6	22	8.6					1	2.2
Projectile point			2	0.8						
Total	249	100.0	258	100.0	1	100.0	41	100.0	46	100.0

Table 5 (continued)

Function	Silicified Wood		Obsidian		Total	
	N	%	N	%	N	%
Utilized debitage	7	70.0			361	59.5
Hammerstone					3	0.5
Chopper					14	2.3
Drill					1	0.2
Graver	1	10.0			93	15.3
Spokeshave					24	4.0
Denticulate					8	1.3
Scraper (end)					32	5.3
Scraper (side)	1	10.0			39	6.4
Knife	1	10.0	1	50.0	29	4.8
Projectile point			1	50.0	3	0.5
Total	10	100.0	2	100.0	607	100.0

Utilized and retouched debitage makes up 59.5 percent of the total utilized lithic artifacts. Forty-five percent of the flakes within the total assemblage are utilized.

The large number of formal tools in this assemblage is dominated by gravers. Ninety-three, made of five materials, are in the assemblage. The numbers reflect the materials present in the assemblage, with higher numbers of gravers made of the more common materials such as metamorphic sandstone

and chert. Gravers are specialized tools used to split bone and wood.

The 71 scrapers (both side scrapers and end scrapers) are primarily chert and metamorphic sandstone, as are spokeshaves and denticulates. In contrast, the majority of the knives (22 out of 29) are chert, while the majority of choppers (10 of 14) are made of metamorphic sandstone. This large number of tools included only three projectile points, two of chert and one of obsidian.

Spokeshaves and denticulates are usually considered specialized tools associated with woodworking. Spokeshaves are assumed to have been utilized in the straightening of dart and arrow shafts. Denticulates may have functioned as miniature saws. The presence of both of these tool forms in large numbers strongly suggests woodworking took place at this locale.

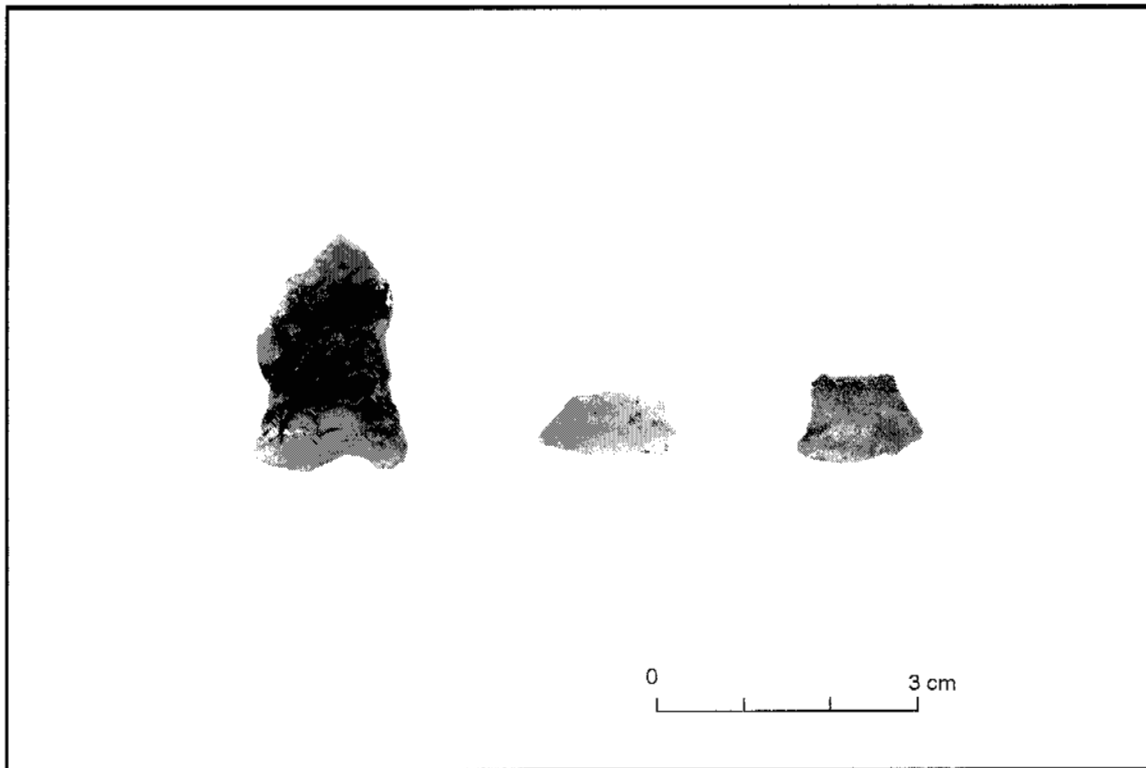


Figure 4. Projectile points from LA 111917.

Three projectile point fragments were recovered at LA 111917 (Fig. 4). These were assigned to temporal categories, although the fragmentary nature of these three artifacts limited their identification. Two projectile point fragments could be assigned to the Late Archaic period, dating from 2000 B.C. to A.D. 1000 (Shelley 1994), based on their shape, but could not be assigned to a specific type because of their small size. These two point fragments are made from local varieties of chert, available in the Pleistocene gravels along the Pecos River.

The other projectile point fragment is the center lateral portion of a possible Late Archaic point. Made of obsidian, large flakes have disfigured both edges and the base of this projectile point. Visually, the obsidian resembles Jemez obsidian from the Jemez Mountains northwest of Santa Fe (Shackley 1995).

Two of the three projectile point fragments are bases, the portion of the projectile point remaining after breakage connected with use. This suggests that rehafting was taking place at LA 111917, an activity that would be expected to occur at a camp or habitation site.

The presence of bifaces, and their percentage within an assemblage, has been used by Kelly (1988:721-723) to differentiate between types of sites. Biface production should take place at residential sites, indicated by the presence of large numbers of bifaces and biface thinning flakes. In contrast, logistical camps and resource procurement areas should have few biface thinning flakes, but large percentages of resharpening flakes and biface fragments.

The frequency of biface thinning flakes is extremely low in this assemblage, as we would expect of a logistical or resource procurement site. In contrast, the large percent of both expedient and formal tools are typical of an Archaic site and suggests long-term or year-round habitation (Akins and Bullock 1992).

Suggestions can be made of possible activities represented by utilized artifacts. Bidirectional wear is traditionally considered an indication of cutting and slicing, while unidirectional wear is thought to indicate scraping. Experiments conducted by Brose (1975), Vaughan (1985), and Moore (1994) show that wear patterns are unreliable indicators of use. However, it should be possible to determine, however roughly, the types of activities pursued at this site (Christenson 1987:77).

The rehafting of projectile points, based on the presence of projectile point bases, is likely to have taken place at LA 111917. The presence of choppers and extremely large numbers of graters, scrapers, knives, spokeshaves, and denticulates, however, indicates site specialization based on the cutting, scraping, and shaping of material. The realities of preservation prevent us from knowing whether this was leather, bone, wood, or a combination of materials. Whatever the material utilized, the high number of formal tools indicates an intensity of site use usually associated with both site specialization and high production. The combination of tools present and the lack of bone, however, suggest that specialized wood working could have been pursued at LA 111917.

Many of the expedient flake tools utilized in this assemblage could have also functioned like the formal tools. They may, however, represent different unknown activities, such as the processing of vegetal foodstuffs. While expedient tools can be the result of unplanned actions such as the repairing of clothing or equipment, the large number of expedient tools in this assemblage suggests that their use was also part of a planned intensive specialized use of the site.

Material Texture

While material selection may depend on local availability as well as intended use, studies have shown different material textural preferences among prehistoric Puebloan and Archaic groups (Elyea and Eschman 1985:246). Lithic artifacts from Archaic sites show a preference for fine-grained materials. In contrast, the utilization of a wide range of fine-grained to rough-grained materials is evident at Puebloan sites.

Projectile points, knives, and other cutting tools tend to be made of finer-textured material (Bleed 1985) such as chert, siltstone, and silicified wood, in contrast to scrapers and spokeshaves, which are made from a greater variety of textured materials than most of the other artifacts (Table 5). Utilized debitage occurs in the widest variety of materials. The largest range of tools is made from the most common materials: metamorphic sandstone, chert, siltstone, and quartzitic sandstone.

A third of the tools at LA 111917 show evidence of secondary use. Secondary use is present on both formal and expedient tools. Artifacts with secondary utilizations are principally metamorphic sandstone and chert (Table 5). This suggests that formal tools are made of material that will enhance their specialized functions. An ability to have a sharp edge is valued in materials such as obsidian and chert, used to make projectile points and knives and even graters. Materials such as metamorphic sandstone, quartzitic sandstone, and chert are utilized where durability is valued, as in scrapers and choppers. A greater variety of materials are acceptable as utilized debitage, where the main value of the artifacts may be availability and convenience.

Discussion

Analysis of the lithic artifacts from LA 111917 shows that large-scale intensive tool use was pursued by the site's inhabitants. They employed a biface-based reduction technology in the manufacture of a range of formal tools utilized at this locale in large numbers. The small number of both biface thinning flakes and resharpening flakes indicates that, except for possibly edge rejuvenation, little formal tool manufacturing took place within the project area.

The initial core reduction of common materials took place at LA 111917. Utilizing an expedient core-flake reduction technology, the generated core flakes were utilized as expedient tools or else used as a basis for the manufacturing of simpler formal tools such as graters and spokeshaves. Actual tool use focused on both expedient and formal specialized tools. This may be because of the intensive large-scale tool use taking place at the site.

A core-reduction strategy may have been employed, along with bifacial reduction. Bifacial reduction is generally associated with Archaic sites (Moore 1994) and seems to have been replaced later as part of the general cultural shift to a sedentary agricultural lifestyle. Assemblages from excavated Anasazi sites reflect an expedient lithic technology, with flakes produced for use as short-term, disposable tools (Vierra et al. 1993). Formal tools, other than projectile points, are rare (Larralde 1994; Vierra et al. 1993). On the other hand, Archaic sites tend to have a larger number of formal tools, although expedient tools also do occur (Larralde 1994).

One difference between LA 111917 and other Late Archaic sites is the sheer number of tools (both formal and expedient). Virtually all of these tools show evidence of use, and while assigning a specific form of wear to a specific tool use may be problematic, this is another indication that LA 111917 is an activity center and not a tool-manufacturing center.

This assemblage suggests LA 111917 had a population with a long-established lithic tradition based on bifacial reduction and the production of formal specialized tools. Expedient core reduction and flake tool use seems to have developed to meet the need for tools connected with large-scale specialized activities.

Nonlocal material is sparse at LA 111917 and limited to obsidian and possibly Alibates chert (Alibates dolomite). The presence of these nonlocal materials indicates at least a degree of long-distance contact, suggesting that this site functioned as part of a larger regional interaction and possibly trading system.

PLANT REMAINS

Pamela J. McBride

A vegetation survey was conducted at LA 111917 in September 1997. The area is principally a shrub-grassland. Mesquite is the dominate shrub at the site, but soapwood yucca, prickly pear cactus, sage, snakeweed, and rabbitbrush are other important shrubby species. Dropseed, sideoats grama, galleta, and three-awl grass were the predominate grass species identified at the site. Herbaceous species included pigweed, sunflower, doveweed, groundcherry, and spurge (Table 6). Many of these species have economic uses as food, medicine, fuel, or construction material. Riparian taxa found growing along the banks of the Pecos River included hackberry, cottonwood, and willow. A single Mexican soapberry was also identified growing along the river, overhanging a deep pool full of trout where the river had been dammed. Soapberry fruits contain the glucoside saponin, the same component found in yucca roots, which when macerated in water supply the soapy solution used to wash hair and clothing. Saponin is poisonous, and the fruits have been used to stun fish (Lampe 1986).

Table 6. Vegetation survey

Latin Name	Common Name	Comments
<i>Amaranthus</i>	pigweed	coll. seed, plant, abundant
<i>Aster</i>	aster	roadside
<i>Croton</i>	doveweed	roadside
<i>Helianthus</i>	sunflower	
<i>Asclepias</i>	milkweed	coll. seeds, plant, roadside
<i>Cirium</i>	thistle	
<i>Solanum</i>	groundcherry	coll. seeds, plant
<i>Euphorbia dentata?</i>	spurge	
<i>Gaura</i>	gaura	
<i>Clematis</i>	virgin's bower	riverbank wrapped around tamarisk
<i>Physalis</i>	groundcherry	
<i>Prosopis</i>	mesquite	roadside; plants are small (<5'); coll. plant, wood, bean
<i>Opuntia</i>	prickly pear	coll. fruit
<i>Gutierrezia</i>	snakeweed	in flower
<i>Chrysothamnus nauseosus</i>	rabbitbrush	in seed
<i>Yucca glauca</i>	yucca	coll. fruit, leaf
<i>Artemisia</i>	sage	
<i>Equisetum</i>	horsetail	riverbank
<i>Mimosa biuncifera?</i>	catclaw mimosa	

<i>Oenothera</i>	woody evening primrose	growing in bedrock, 4 petals, 8 anthers
<i>Ephedra</i>	Mormon tea	growing in bedrock
<i>Sapindus saponaria</i>	Mexican soapberry	20' tree growing on riverbank beside deep pool
<i>Celtis</i>	hackberry	15-20' trees growing on riverbank
<i>Populus</i>	cottonwood	20-30' trees growing on riverbank in floodplain
<i>Tamarix pentandra</i>	tamarisk	shrubby trees growing on riverbank
<i>Eleagnus</i>	Russian olive	small trees on riverbank
<i>Ribes</i>	currant	shrub on riverbank
<i>Compositae</i>		shrub
<i>Salix?</i>	willow	
<i>Bouteloua curtipendula</i>	sidecoats grama	roadside
<i>Sporobolus?</i>	dropseed	roadside flaggy dry leaves, open panicle
<i>Hilaria</i>	galleta	roadside
<i>Aristida</i>	three-awn	roadside
<i>Tridens pulchella</i>	fluffgrass	
<i>Chloris virgata?</i>	feather fingergrass	

Methods

The single soil sample collected during excavation was processed at the Museum of New Mexico's Office of Archaeological Studies by the simplified bucket method of flotation (see Bohrer and Adams 1977). The sample was immersed in a bucket of water, and a 30-40 second interval was allowed for the settling out of heavy particles. Samples ranged from 1.65 liters to 4.7 liters. The solution was then poured through a fine screen (about 0.35 mm mesh) lined with a square of chiffon fabric, catching organic materials floating or in suspension. The fabric was then lifted out and laid flat on coarse mesh screen trays until the recovered material had dried. The sample was sorted using a series of nested geological screens (4.0, 2.0, 1.0, and 0.5 mm mesh) and reviewed under a binocular microscope at 7.45X.

Results

Plant remains from the roasting pit at LA 111917 were restricted to uncharred plant materials (Table 7). Uncharred grass family, dropseed grass, tansy mustard, spurge, and evening primrose seeds were recovered from the single sample examined. Although grasses and tansy mustard were important sources of food, and references to their use can be found in various ethnographic studies, the uncharred plant remains are probably modern noncultural intrusives.

Table 7. Flotation plant remains

Taxon	FS 106 Feature 1, Roasting Pit
NONCULTURAL Grasses Gramineae grass family	1
<i>Sporobolus</i> dropsseed grass	132
Other <i>Descurainia</i> tansy mustard	2
<i>Euphorbia</i> spurge	8
<i>Oenothera</i> evening primrose	1

Archaeobotanists have struggled with the interpretation of uncharred seeds recovered from subsurface samples. The uncertainty about whether uncharred seeds were deposited because of cultural activity, from rodent and insect activity, or from seed rain precludes their clear interpretation. Minnis (1981) discusses problems inherent in interpreting uncharred seeds recovered from open-air sites. He tested a modern facsimile of an archaeological site to compare the presence of taxa known to have been used to the number of contaminants. Three economic taxa were recovered, as well as 16 taxa that had been deposited by nonhuman processes such as seed rain or rodent movement. Because of these kinds of questions about the origins of uncharred seeds found in open-air sites, uncharred plant remains are recorded during analysis but are usually considered more of a representation of the local vegetation than a reflection of cultural activity.

CONCLUSIONS

The data recovery efforts at LA 111917 focused on determining the site's chronology, its occupational history, and the form of subsistence adaptation it represents. Diagnostic artifacts were used to date the site and aid in refining the area chronology. The site's occupational history was determined through the sequence of deposition, length of occupation, and the identification of activity and discard areas. Subsistence at LA 111917 is understood through the study of site activities and features, and their relationship to site function. Interpretations are based on artifact and ethnobotanical analyses.

LA 111917 was originally believed to be a stratified Archaic site composed of two distinctive midden deposits (Bullock 1997). Excavation of the site proved that this was not the case: only one occupation was represented in the project area. Despite the resulting change of emphasis, excavation and analysis have followed the original focus of the research design.

Chronology

The temporal sequence for the Late Archaic occupation of the Upper Pecos Valley has remained ambiguous due to a lack of precise dates for the region (Shelley 1994). In the research design for LA 111917, Bullock (1997) stressed the need for precise dating to enhance the body of data and aid in establishing more definite Late Archaic dates for the Fort Sumner area. It was also hoped that precise dates would aid in the assessment of site use-life, population movements, settlement patterns, and community organization (Bullock 1997).

It was not possible to obtain precise dates at LA 111917. The lack of wood recovered from the site precluded the use of dendrochronology, and radiocarbon dating was impossible due to the lack of charcoal. Archaeomagnetic dating also proved to be impossible due to the lack of oxidation associated with the single feature found at LA 111917.

Relative dating proved to be more successful. Although the hoped-for comparisons between midden depositional layers proved impossible, it was possible to determine relative dates for LA 111917 based on the presence of diagnostic artifacts. Two projectile points dating to the Late Archaic period (2500 B. C.–A. D. 1000; Shelley 1994) were recovered in association with the roasting pit (Feature 1).

Occupational History

A site's occupational history can be determined by the depth of the cultural deposition, degree of artifact diversity, and number and type of features. A short-term site occupation should be composed of thin cultural deposition, low artifact diversity, and few features. Conversely, a long-term occupation will have either thick cultural deposition or distinct midden areas, high diversity of artifact types, and a large number of features. Also, knowledge of the site's structure can aid in understanding its occupational history.

A model for the Archaic in eastern New Mexico has been suggested by Shelley (1994). Drawing on geological and subsistence studies by Johnson and Holliday (1986), Shelley suggests that the Archaic period should be characterized as a shifting oasis based on hunting and gathering. Movement between oasis locations would combine resource availability and seasonality. This would result in intensive archaeological deposits at oasis locations and extensive transient archaeological depositions between oasis locations (Shelley 1994).

Under this model, LA 111917 should technically be an “oasis” location. In this interpretation, the Pecos River Valley would be considered a linear oasis (Reher and Winter 1977; Epp 1984; Thurmond 1990). Archaeological deposits should be intensive due to the extensive resource availability and span a range of temporal periods. The midden deposits originally believed present at LA 111917 would therefore be the type of deposit expected in such a locale.

The site proved to be more complex than expected. The portion of LA 111917 within the project area was originally believed to comprise two distinct stratified midden deposits. Upon excavation, most of this portion of the project area was found to be recent highway fill containing artifacts. The intact portion of the site within the project area proved to be considerably smaller than originally anticipated. Rather than a midden deposit, this site represents a single occupation.

Superficially, LA 111917 looks like a short-term use area. The cultural deposit is thin, with little that would suggest the presence of sheet trash such as soil discoloration or faunal remains. A small roasting pit (Feature 1) is the only feature within the project area. This feature shows evidence of limited use. It has a small, shallow basin form and little oxidation from burning. The intact use-surface of compacted earth associated with the roasting pit is also small. However, this could be attributed to poor preservation. The single form of projectile point recovered at LA 111917 is evidence of a site occupation restricted to a single period, as well as possible evidence of a single occupation.

In contrast to the basic ephemeral nature of the site is the intense occurrence of lithic artifacts. A total of 1,387 lithic artifacts were found in the area of Feature 1. Of this number, 246 are tools, and 361 are utilized and/or retouched debitage. The high artifact diversity apparent within this lithic artifact assemblage is also more indicative of long-term site occupation.

What is indicated by these conflicting aspects of LA 111917 is a single intense occupation. The apparent high artifact diversity is characteristic of specialized site usage. The problem thus becomes one of interpretation based on a realization of the site’s total size. The conflicting nature of the data is exacerbated by the small portion of the site that was excavated and the limited, possibly skewed, view of the site it presents.

The portion of LA 111917 within the project area may represent a specialized activity area. Additional features and midden areas could be present outside of the project area, within the main site area to the west. In addition, the effects of erosional forces in the modification of the site area cannot be ruled out.

Subsistence

The determination of site subsistence practices necessitates knowing the range of on-site activities that would have taken place at that locale. On-site activities can be deduced from the locations and functions of site features. Descriptive information on features, combined with analysis of the associated artifacts and other cultural material, can assist in determining feature type.

Analysis of the artifact assemblage and the single feature indicate little about the form of subsistence practiced at LA 111917. The possible activities represented by the artifact assemblage span the range of activities expected at a Late Archaic habitation site, including the preparation of foodstuffs, the processing of materials, and the production of stone tools.

Subsistence at LA 111917 would be expected to reflect the ecological zones associated with the

site's location. The position of LA 111917 near the juncture of two ecological zones (the Pecos River Valley and the plains) should have maximized the quantity of available plant and animal resources. Unfortunately, the small portion of the site that was examined limited our ability to interpret the site as a whole.

A number of models have been postulated for Archaic subsistence. A seasonal round of populations movements tied to hunting and gathering resource availability is one such model. Based on ethnographic studies, this model envisions Archaic populations as almost totally mobile (Cordell 1984).

The presence of permanent Archaic period camps along the Pecos River was theorized by Mobley (1979) from his work at Los Esteros. Resources were believed to have been abundant enough to support a relatively sedentary population. In such a situation, small-scale horticulture might have been also been practiced (Camilli and Allen 1979).

Within most models of Archaic subsistence, the emphasis in hunting is on small animals such as rabbits and mice. The general belief has been that large game (such as deer, bison, and antelope) played a small role in Archaic subsistence (Applegarth 1976; Collins 1971; Mobley 1979; Sebastian and Larralde 1989; Stuart and Gauthier 1988).

In an important departure from this prevailing view, Johnson and Holliday (1986) were able to tie the procurement of bison to environmental shifts in vegetation. Surveying Archaic sites in eastern New Mexico and the Texas Panhandle, they found that bison utilization intensified during more mesic periods and declined sharply during periods of increased aridity. This shifting subsistence utilization reflected the rise and fall of bison populations on the southern plains (Dillehay 1979).

Bison use in the Early Archaic drops off with the increased dryness of the period (Dillehay 1974). During the Middle Archaic it oscillates from low use to high use to low use, following the climatic fluctuations of the period. Bison again became an important food resource in the Late Archaic (Johnson and Holliday 1986) in a trend that seems to have continued until the beginning of the ceramic period in the Pecos Valley (Speth 1983). The exploitation of both plants and small game would have continued regardless of bison availability (Johnson and Holliday 1986).

The practice of hunting as part of Archaic subsistence patterns is well known. The evidence from LA 111917, however, indicates hunting could have played a larger role at the site than expected (even for the Late Archaic), given the site location. Rather than reflecting a mixed hunting and gathering subsistence focused on the Pecos River Valley, LA 111917 may have a more specialized nature than has usually been considered for Late Archaic sites.

These differences in hunting and gathering strategies should be reflected in the artifact assemblage (Kelly 1988), even when they occur within a single culture. This activity specialization would be most obvious in the variety of artifact assemblage content, site size, and location. These are the aspects of Archaic culture addressed by Shelley (1994) in his "oasis" model of Archaic subsistence.

The single feature found at LA 111917 is a small roasting pit. Oval in shape with a bowl-shaped base, it contained a large amount of fire-cracked rock. This fire-cracked rock is comprised of river cobbles, probably from the terrace deposit, that have been heated to a high temperature. Although this suggests that a high degree of heat was generated, the small size and shallowness of the feature are more characteristic of an expedient feature that experienced short-term use. The lack of oxidation

on the walls of the roasting pit also suggests little actual feature use.

It is apparent from the small roasting pit that food preparation occurred at LA 111917. The use of heated rocks in the preparation of food is well known historically. How this related to the other use of the area is problematic. The large amount of lithic artifacts suggests intense site use. It is impossible to tie this in with utilization of the roasting pit, suggesting that two distinctly different activities are represented, at least in this portion of the site. Any time frame associated with these two activities is relatively short, both occurring within the same period of site use.

Ethnobotanical samples were collected from the excavated roasting pit. These studies focused on the identification of plant remains and their significance with regard to economic and subsistence practices. This form of analysis is not limited to plants utilized for food. Activities such as the weaving of baskets and matting or the making of twine may be indicated. Unfortunately, only uncharred plant remains were recovered from the macrobotanical sample collected at LA 111917. Questions exist concerning interpretations based on uncharred plants remains (see McBride, this volume), making their value limited to information about the site's current vegetation.

Lithic artifacts are the second method of identifying activities that may have been pursued at LA 111917. Specific forms of flakes are produced by different lithic material-reduction strategies. Core flakes are produced on Puebloan sites as expedient and disposable tools. Biface flakes are produced during biface reduction, commonly in the production of specialized formal tools. These tend to be more common at Archaic sites. Formal tools are produced for specific functions, although their use may not be limited to a single action. Lithic tools wear during use. Although attempts to show forms of wear as task-specific have proved inconclusive (Brose 1975; Moore 1994), general interpretations of the range of activities represented by the lithic assemblage are possible.

The artifact assemblage at LA 111917 is limited to lithic artifacts. No ground stone artifacts were recovered at LA 111917. A number of activities can be identified from the types of artifacts present within the lithic artifact assemblage.

Of the 1,387 lithic artifacts recovered from LA 111917, 607 are tools. Of this total, there were 361 pieces of utilized and/or retouched debitage and 246 formal tools. These artifacts are all thought to be contemporary, the result of intensive use of this location. The artifact numbers are extremely high for a site of any kind. The high numbers indicate the intensity with which specific activities were pursued. This suggests that at least this portion of LA 111917 is a specialized activity area, where large-scale production utilizing these lithic artifacts took place.

Cutting, splitting, and scraping are the principal actions indicated by the lithic artifact assemblage. While most of the artifact types present, such as knives and scrapers, can be used with a number of materials, others are more specialized. Spokeshaves and denticulates are usually associated with wood working. Gravers are used to split wood and bone. The large numbers of specialized tools could indicate the type of material being worked. The thrust of the artifact assemblage suggests that wood was possibly the material being worked at LA 111917, given the lack of bone at this site.

Use-wear analysis was not conducted on the lithic artifact assemblage, except for presence or absence. Attempts to attribute forms of wear specific to the tool's use with specific materials have proved unreliable. The studies are inconclusive or have produced conflicting results (Brose 1975; Moore 1994).

From the recovered projectile point fragments, it is apparent that the rehafting of projectile points took place at this locale. Most of the recovered fragments are proximal or base fragments, the portion remaining in the haft when a point breaks. The reuse of the haft would involve the replacement of the broken projectile point fragment and result in their presence on the site. This further suggests that at least this portion of LA 111917 is a specialized site, possibly connected with wood working on a large scale. This may be connected with the production of dart shafts, as indicated by the rehafting known to have also taken place at this site. With a variety of wood such as willow and soapwood available in this area adjacent to the Pecos River, this is an activity that could have been pursued by a population whose primary focus was hunting.

The flakes within the assemblage indicate that although some lithic artifact manufacturing did take place at LA 111917, it was not the main focus of activity. Expedient tools were most likely made as needed to supplement the formal tools already available. Expedient tools, created with unmodified or retouched flakes, are present in large numbers. Artifact density is shown by grid in Figure 3.

Piece-plotting the locations of formal tools may indicate patterns of tool use and define activity areas on a site. Figures 5-7 show the locations of formal tools by type across the site. All of the tool categories are concentrated to the south of Feature 1, between the roasting pit and the edge of the now-filled drainage. Tools are present north of Feature 1 in very small quantities. Surprisingly, not a single artifact was recovered from the area of intact use surface associated with Feature 1. This suggests that use of this area was contemporary with the activities involving the lithic artifact assemblage. Use of this surface area may have focused on the roasting pit. No individual activity areas could be discerned from the piece-plotted artifacts.

Ground stone artifacts are commonly found on Late Archaic sites, both habitation sites and short-term use areas. Ground stone artifacts are produced and used for the processing of plant resources. No ground stone artifacts were recovered at LA 111917. This lack of ground stone artifacts could be a further indication of the specialized nature of the site, although ground stone may be present at LA 111917 outside of the project area.

Faunal remains represent another avenue for studying possible activities at LA 111917. The lack of ground stone artifacts suggest that a corresponding increased presence of hunting-related artifacts, such as faunal remains, would occur. The presence of faunal remains, especially in light of the high utilization present in the site's lithic artifacts, could indicate types and forms of faunal consumption.

The lack of animal bone suggests that hunting was not the main focus of activity at LA 111917. This may have been a specialized site connected with the manufacture of a specific type, or class, of item. However, the lack of bone at LA 111917 could also be the result of poor preservation.

Low bone frequencies in sheet trash deposits can result from natural and cultural factors. Sheet trash deposits are subject to erosional and deteriorational forces and to trampling and scavenging by resident dogs. The lack of a definable midden area at LA 111917 suggests that if the site's surface artifacts do represent sheet trash, it was a sparse deposit. However, midden deposits may exist outside of the project area.

Subsistence evidence at LA 111917 does not reflect what would be expected of an Archaic site in the Pecos River Valley. The broad range of available plant and animal resources in such a setting, which includes two ecotones, is not present. Although the presence of a roasting pit is evidence that meals took place at the site, there is nothing to connect the site with any specific form of game or

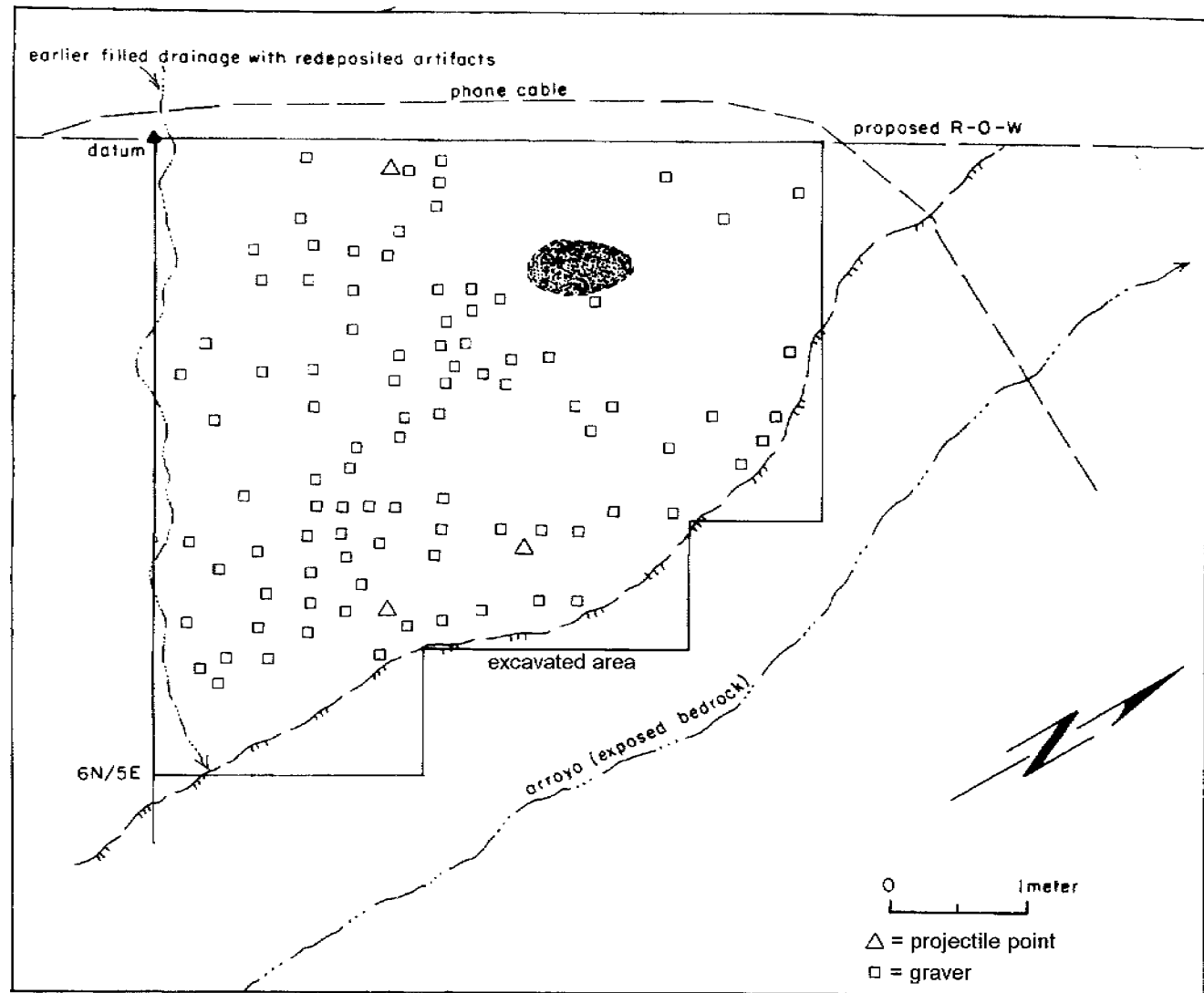


Figure 5. Piece-plotted locations of gravers and projectile points.

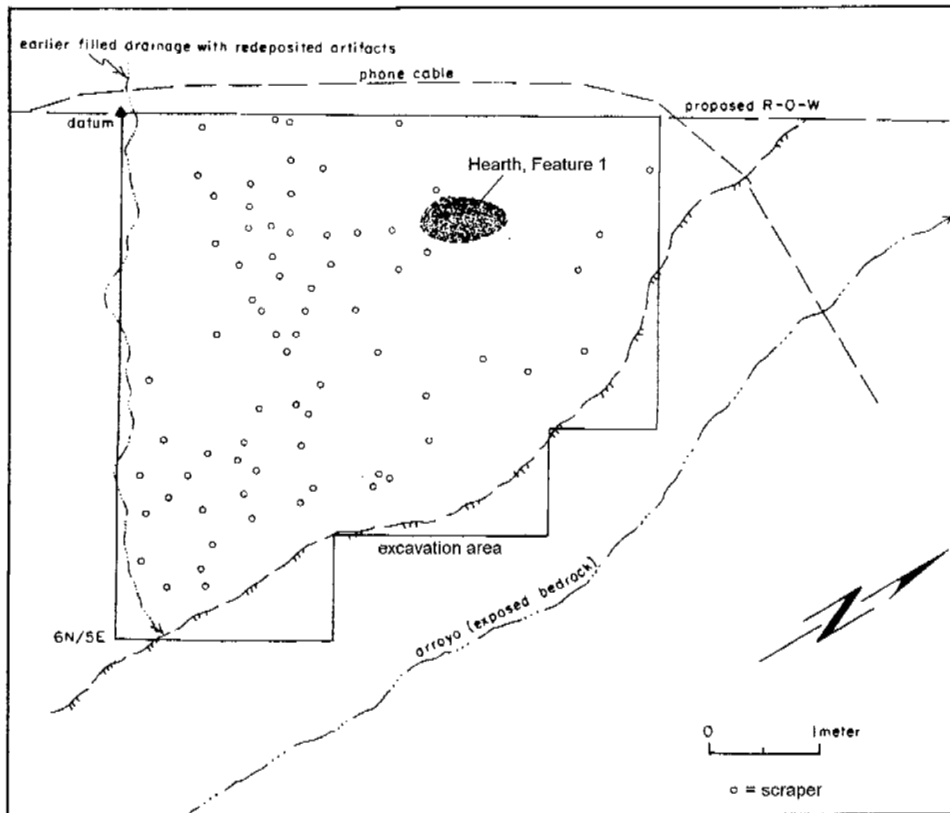


Figure 6. Piece-plotted locations of scrapers.

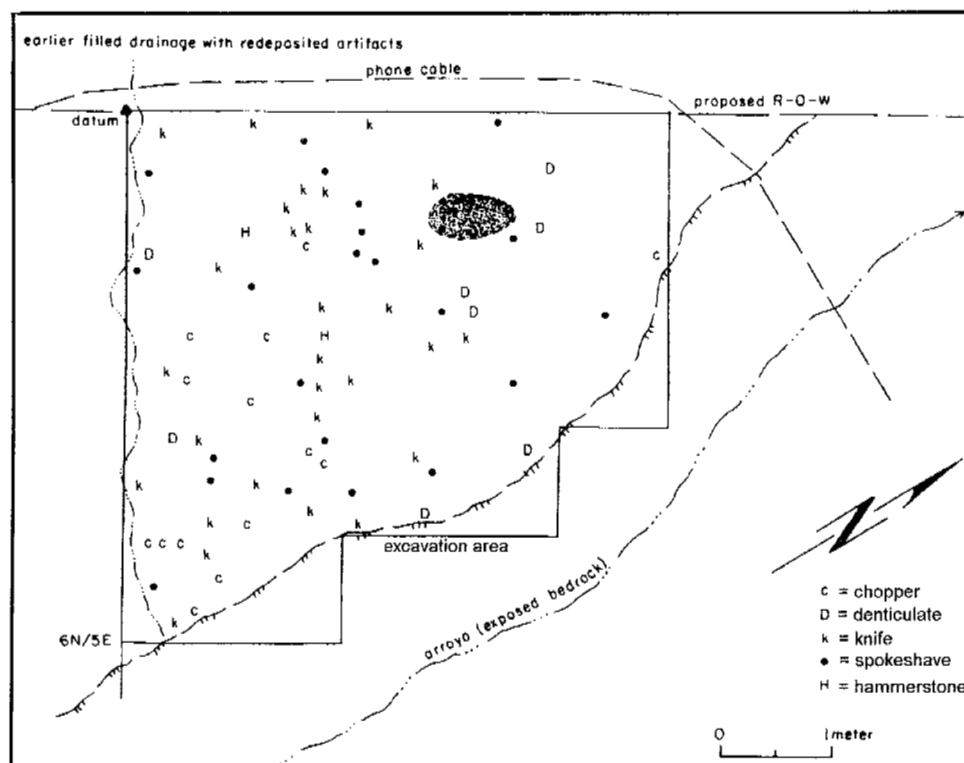


Figure 7. Piece-plotted locations of other formal tools.

edible plant. It is true that only a small portion of the site was excavated; however, all indications are that food preparation was not the main focus of activity, at least in this portion of LA 111917.

Discussion

LA 111917 is a Late Archaic habitation site whose population was intensely engaged in specialized activity. This intensive site use fits into Shelley's (1994) oasis model of Archaic subsistence, with its prediction of intensive archaeological deposits occurring seasonally near oases of permanent water.

The artifact assemblage at LA 111917 indicates intensive specialized activity at the site, possibly connected with the working of wood for dart shafts. Presumably this could be a seasonal activity pursued when hunting was poor or when alternative foodstuffs were available.

Environmentally, the Pecos River serves as a linear oasis among the grasslands of the plains. Fish, shellfish, and fowl, as well as a wide variety of edible plants, would have been available within the river valley. Plant materials useful in a multitude of ways would have been present, if not plentiful.

Hunting remained a constant element of Archaic subsistence rounds, but the importance of an activity such as the production of dart shafts would have increased during a period of intensified bison hunting such as in the Late Archaic (Johnson and Holliday 1986). This site may represent just such a subsistence shift.

Nonlocal lithic materials show evidence of regional connections, implying trade or long-distance travel. Either of these could have served as an impetus for specialization and production at LA 111917. It is also possible that the site reflects a need for supplies by a nonlocal group unfamiliar with the area before they moved on.

It is important to remember that only a small portion of LA 111917 was excavated. This may have skewed our view of both the site and the activities that may have taken place there.

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