THE ANGUS SITE:
A LATE PREHISTORIC SETTLEMENT ALONG THE RIO BONITO, LINCOLN COUNTY, NEW MEXICO

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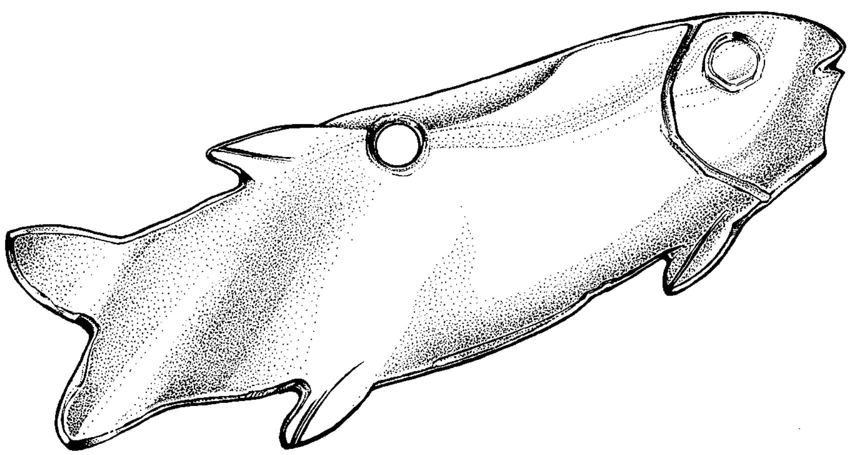

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A LATE PREHISTORIC SETTLEMENT ALONG THE RIO BONITO, LINCOLN COUNTY, NEW MEXICO

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ADMINISTRATIVE SUMMARY

This report details the results of excavations carried out on two sites located in the Sierra Blanca region of south-central New Mexico. Both sites are within NMSHTD right-of-way acquired from privates sources. The Angus site (LA 3334) was partially excavated in 1956 by Stewart Peckham of the Laboratory of Anthropology, Museum of New Mexico, because of road construction activities at the intersection of NM 37 and 48 at Angus, near Ruidoso, in Lincoln County, New Mexico. In 1997, proposed reconstruction of the bridge over NM 48 was the impetus for further testing at the site because the existing right-of-way had not been fully excavated in 1956. The testing program (Zamora 1998) revealed evidence of buried cultural deposits and several utilized surfaces.

The Little Creek site (LA 111747) seemed to represent a small lithic and ceramic scatter. The site was tested and also contained subsurface artifacts but no cultural features were located. Subsequent excavations revealed a lack of features. Based on the ceramics from the site, it dates to the mid-Glencoe phase at ca. A.D. 1100-1200. However, most of the site was found to lie under a commercial development, the extent of which indicates that it was once probably a moderate-sized community.

Data recovery plans for the Angus site called for reopening the square kiva dug by Peckham in 1956 and locating any other cultural features. Besides the kiva, Office of Archaeological Studies (OAS) excavations uncovered five cobble-walled surface rooms, two shallow pit structures, an outside work area with a ramada, a large storage pit, and two areas of heavy trash deposits. One pit structure may date somewhat earlier than the kiva and associated rooms at ca. A.D. 1015. The other pit structure may date to ca. A.D. 1265. The main occupation of the site produced 15 radiocarbon dates with a mean date of A.D. 1310, placing it late in the prehistoric sequence for the Sierra Blanca region of New Mexico. Ceramics and architectural styles correlate with several of the phase designations used for the region. A minor Athabaskan occupation may also be present on the site as indicated by several Athabaskan Utility sherds and ^{14}C dates in the 1400s. A wide variety of projectile points and grinding implements indicate that the subsistence economy was diversified. This report examines the implications of this diversity in terms of adaptations within the settlement system.

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INTRODUCTION

Between February 1 and March 26, 1999, and also from August 2 to August 20, 1999, the Office of Archaeological Studies (OAS) conducted a data recovery program at two archaeological sites within New Mexico State Highway and Transportation Department (NMSHTD) bridge replacement project (TMP-BR-0048[16]) along NM 48 near Angus in Lincoln County, New Mexico (Fig. 1). Funds provided by the NMSHTD and the Federal Highway Administration were utilized for this project.

Fieldwork was initiated at the request of F. Craig Conley of the NMSHTD. Project director was Dorothy A. Zamora, assisted by Yvonne R. Oakes, who also served as principal investigator. Other crew members included Phil Alldritt, Tess Fresquez, Rick Montoya, Jesse Murrell, and James Quaranta of the OAS. Donna Lenneway was hired locally to assist in the work. A team from the Mescalero Apache Tribe volunteered their help in excavating the Angus site. They were Francis Blake and Silas Cochise under the direction of Holly Houghton. Another team from Americorp with seven college students, under Dave Purdy, gave a day's work to the project.

Report compilation was completed by Dorothy Zamora and Yvonne Oakes. Various material analyses were undertaken by the following people:

Ceramics–Dean Wilson
Petrography–David Hill
Lithics–James Quaranta and Phil Alldritt
Ground stone–Dorothy Zamora
Miscellaneous–Sonya Urban
Fauna–Nancy Akins and Susan Moga
Human Remains–Nancy Akins
Flotations–Mollie Toll and Pam McBride
Pollen–Richard Holloway
^{14}C–Beta Analytic, Inc.

Both sites are on right-of-way lands acquired by the NMSHTD. They were tested by OAS and data recovery plans were prepared prior to excavation (Zamora 1998). LA 111747 (Little Creek site) was a sherd and lithic artifact scatter, which, upon testing, appeared to have cultural depth. Excavations revealed no cultural features in the right-of-way area, but discussions with local landowners determined that the site had previously extended across NM 48 onto leveled private lands. Only the edge of this larger site was examined by OAS. Ceramic artifacts place the date for the site at approximately A.D. 1100-1200, during what is currently called the middle Glencoe phase.

LA 3334 (Angus site), situated along the banks of the Rio Bonito, had been partially excavated in 1956 by Stuart Peckham. He uncovered a kiva and portions of a few surface rooms. OAS testing and subsequent excavation revealed the presence of five surface rooms, two pit structures, an outside ramada-covered work area, a large storage pit, and several burials. Several periods of occupation are indicated by the various architectural features and their accompanying radiocarbon dates. An earlier date of ca. A.D. 1015 is suggested for the shallow pit structure and ca. A.D. 1265 for the other. The later surface rooms are dated at ca. A.D. 1310. A final, minor occupation, possibly by Athabaskans, is represented by several Athabaskan Utility sherds and dates in the A.D. 1400s in the ramada area and in several remodeled rooms.

This report presents the findings of the OAS excavations at the Angus sites. Comparisons are made with other sites in the area in order to understand subsistence adaptations in the region through time. The recovery of numerous radiocarbon dates and a possible Athabaskan occupation are important contributions to an understanding of the prehistory of the area.

This undertaking complies with the provisions of the National Historic Perservation Act of 1966, as amended through 1992, and applicable regulations. The report is consistent with applicable federal and state standards for cultural resource management.

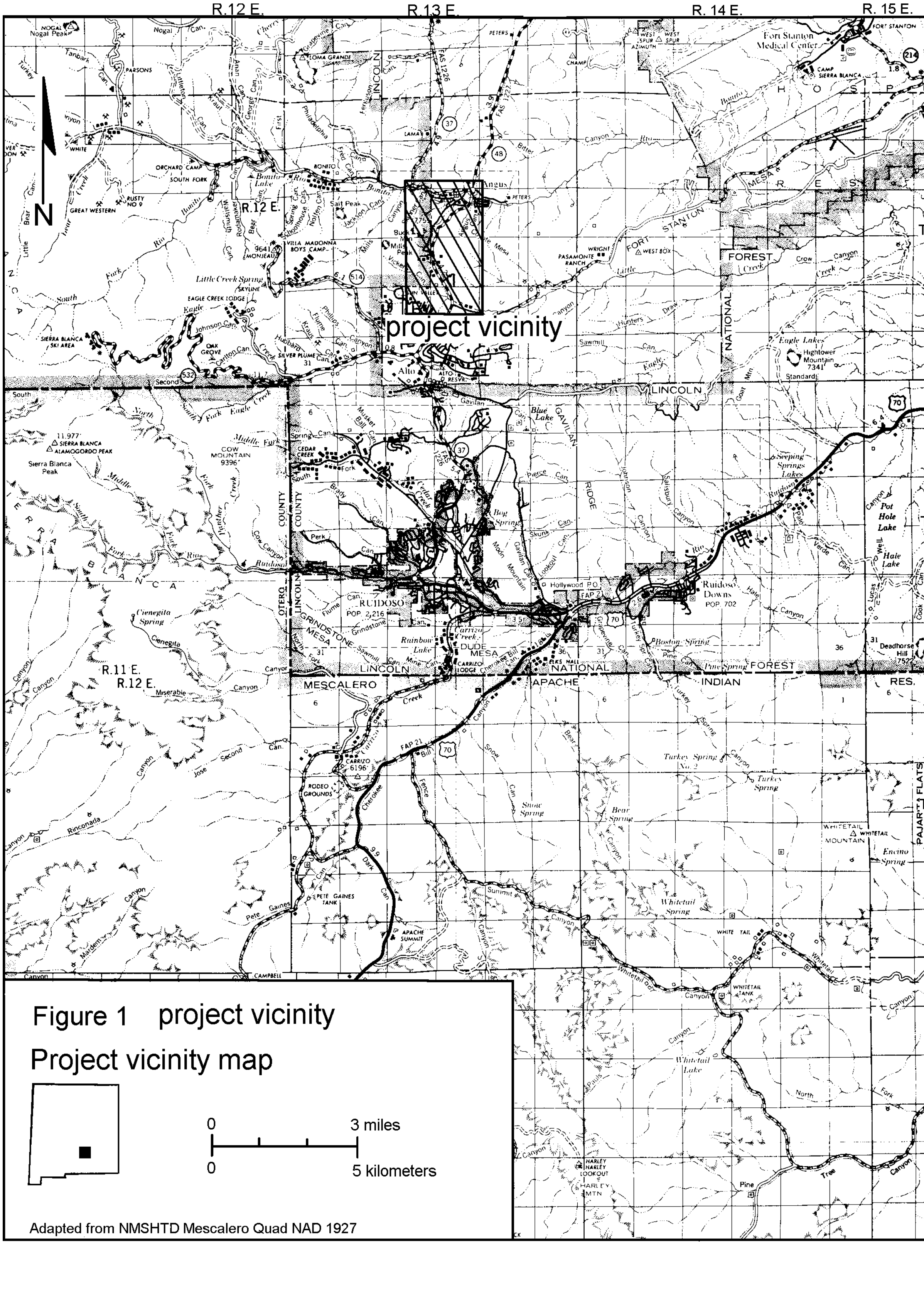


Figure 1 project vicinity

Project vicinity map

ENVIRONMENTAL SETTING

Phil Alldritt

Introduction

The Angus site (LA 3334) and the Little Creek site (LA 111747) are located high in the Rio Bonito Valley at Angus, New Mexico (Fig.2). The northern tributaries drain the northeastern flanks of the Sierra Blanca Mountains and join the Rio Ruidoso at Hondo forming the Rio Hondo (Fletcher 1997). The Angus site is situated at 6,850 ft (2,088 m) above sea level. Nearby, Sierra Blanca Peak rises to 12,003 ft (3,660 m) above sea level. The western slope of the Sierra Blancas drops sharply down to the Tularosa Basin with elevations around 4,000 ft (1,220 m). The eastern slope recedes more gradually into the Pecos River Valley where many of the upland drainages eventually converge. Mining in the area of these archaeological sites brought geologists to the region early in the twentieth century. Jones (1904) provides early descriptions of three mining districts, Nogal, Bonito (Parsons), and Eagle-Creek Rio Ruidoso. Continuing work was done in the 1960s by T. B. Thompson and was summarized in a study of the White Mountain Wilderness area (Segerstrom et al. n.d.).

Geology

The Sierra Blanca volcanic complex is of Oligocene Age and has been divided into four formations by Thompson (1972): Walker andesite breccia, Church Mountain latite, Nogal Peak trachyte, and Godfrey Hills trachyte. Intrusive rocks include Rialto monzonite, Chavez Mountain syenite, Three Rivers syenite and the Bonito Lake stock of biotite syenite, andesite porphyry, quartz monzonite, and aplite dikes (Griswold 1959). Igneous rocks are most abundant in the higher elevations; rhyolite is common in dikes, but is a raw material that is not easily worked (Kelley 1984:2). The Upper Cretaceous Mesaverde Formation and the Cretaceous/Early Tertiary McRea Formation are the sedimentary formations found in the Rio Bonito drainage. Sandstone and shale from the Mesaverde Formation and thin-bedded conglomerates of quartzite and chert pebbles comprise the McRea Formation. Outcrops of the McRea Formation are found in the project area by numerous diabase dikes (Farwell et al. 1992:6).

Siliceous rocks such as quartz, quartzite, chert, and flint may be found as pebbles in Glorieta sandstone, Santa Rosa conglomerate, and the Chinle formation in the Sierra Blancas. Good quality, nodular, siliceous materials such as chalcedony were, however, probably more difficult to locate (Kelley 1984:2). More abundant are the shale and sandstone sources found at higher elevations where older geologic beds are exposed (Kelley 1984:2). Sidwell (1946a) reports extensive alteration of sedimentary rocks up to 9 m deep on either side of dikes in this region. One documented area of altered shale is located in the mixed oak-pine zone of Carrizo Peak. It is located on a ridge that extends north-northeast to south-southwest within the Lincoln National Forest at an approximate elevation of 7,100 ft (2,235 m). Three prehistoric quarries have been found along this ridge in silicified shale deposits. The shale is bedded so that slabs ½ inch to 4 or 5 inches might be easily broken off (Kelley 1984:251-252). According to Kelley, this area is the source of the great quantities of black silicified shale found in the Hondo and Ruidoso valleys.

Soils

Soils of the area consist of the Caballo-Peso-Supervisor Association and Deama-Limestone-Rock Land Association (Maker et al. 1971). The Caballo-Peso-Supervisor Association generally is dark colored with rocky soils having a moderate to high organic content ranging from mildly alkaline to slightly acidic. The Deama-Limestone-Rock Land Association is formed from gray-brown stony loam, 6 to 20 inches deep, overlying limestone bedrock.

Caballo-Peso-Supervisor Association

The soils in the vicinity of the Angus and Little Creek sites are described above and also include important minor soils that are associated. Included are:

Irock soils. These soils comprise old alluvial sediments of mixed igneous and sedimentary sources. The surface layer is a brown, noncalcareous cobbly sandy loam, and the subsoil is a yellowish brown cobbly heavy sandy loam. Bedrock generally lies between 40 and 72 inches below the surface.

Figure 2. The Rio Bonito Valley.

Tularosa soils. These deep alluvial sediments are also derived from mixed igneous and sedimentary sources. The surface layer is a dark gray silty clay loam or clay loam with a dark organic content. The subsoil is the same but generally lacks the organic material. Below 30 inches, dark, weakly stratified clays and clay loams are normal. Slopes are nearly level to moderately steep.

Deama-Limestone-Rock Land Association

Minor soils in this association which were probably agriculturally important include:

Remunda and Ruidoso soils. These soils have dark clay loam and silty clay loam surface layers and clayey subsoils. They are found on level to high-angled valley slopes and alluvial fans.

Peña soils. These soils, which form in alluvium, have a dark grayish brown gravelly and cobbly loam surface layer and a light gray cobbly to very cobbly loam subsoil. Both are high in lime.

Shanta soils. The thick surface layer of this soil is brown or grayish brown calcareous loam, and the subsoil is a deep deposit of loam or light clay loam. These soils are typically found on the terminal points of alluvial fans, valley bottoms, and depressions.

Plant and Animal Life

The Rio Bonito Valley sites are located in the midst of a great variety of potential economic resources that cross between the Rocky Mountain conifer forest and Great Basin conifer woodland biotic communities (Brown 1994:52-57; Case 1994:49-51), alternating in appearance depending upon elevation and the steepness of slope. Within ½ km of the Angus site there are riparian, grassland, and woodland communities. The Rio Bonito Valley sites occur in small, open meadows on the first or second bench above the river, bordered on the north by stands of piñon and juniper (which grade into ponderosa pine as one moves upslope) and on the south by riparian species such as oak, cottonwood, and walnut. Ground cover consists mostly of grama grasses, brome, and bluegrass, as well as wildflowers including sunflower, thistle, and Indian paintbrush. (Farwell et al. 1992). Table 1 presents the flora from the Angus sites, compiled from Human Systems Research (1973).

Table 1. Floral Species Found Archaeologically at the Angus Sites

aster	*Aster* spp.
blue gramma	*Bouteloua gracilis*

bluegrass	*Poa* spp.
chokecherry	*Prunus virens*
common reed	*Phragmites communis*
cottonwood	*Populus angustifolia*
fescue	*Festuca* sp.
gambel oak	*Quercus gambeli*
globemallow (hollyhock)	*Sphaeralcea* spp.
Indian paintbrush	*Castilleja integra*
juniper	*Juniperus* spp.
maple	*Acer* sp.
mountain brome	*Bromus* spp.
mountain mully	*Muhlenbergia pauciflora*
mustard	Cruciferae
oak	*Quercus* spp.
pigweed (amaranth)	*Amaranthus retroflexus*
pinyon pine	*Pinus edulis*
ponderosa pine	*Pinus ponderosa*
prickly pear	*Opuntia*
rabbitbrush	*Chrysothamnus*
Rocky Mountain bee plant	*Cleome serrulata*
sagebrush	*Artemisia*
sideoats grama	*Bouteloua curtipendula*
snakeweed	*Gutierrezia sarothrae*
spruce	*Picea* sp.
sunflower	*Helianthus*
tansy mustard	*Descurainia*
walnut	*Juncus*
wheatgrass	*Agropyron trachycaulum*
willow	*Salix* spp.
yucca	*Yucca*

The following table (Table 2) presents the faunal species expected to be present on the Angus sites, compiled by Human Systems Research (1973).

Climate

The variability of the Rio Bonito topography reflects the differences in climate within the study area (Table 3). The sites in the rolling grasslands between the Sierra Blanca and Capitan ranges are subject to less severe weather than the sites in the rugged and narrow valley of the Rio Bonito. Such narrow canyons experience extremes in temperatures and, by channeling air movement, create their own rapidly changing temperature fluctuations. For example, in only two hours, the temperature can drop from 68 degrees F to freezing (Tuan et al. 1973:69-70).

Table 2. Faunal Species from the Angus Sites

bighorn sheep	*Ovis canadensis*
black-tailed jackrabbit	*Lepus californicus*
black bear	*Ursus americanus*
bobcat	*Lynx rufus*
coyote	*Canis latrans*
desert cottontail	*Sylvilagus audubonii*
elk	*Cervus elaphus*
hog-nosed skunk	*Conepatus mesoleucus*
kit fox	*Vulpes macrotis*
Mexican pocket gopher	*Cratogeomys castanops*
mountain lion	*Felis concolor*
mule deer	*Odocoileus hemionus*
Ord's kangaroo rat	*Dipodomys ordii*
pocket gopher	*Thomomys bottae*
porcupine	*Erethizon dorsatum*
raccoon	*Procyon lotor*
rock squirrel	*Citellus variegatus*
silky pocket mouse	*Perognathus flavus*
spotted ground squirrel	*Citellus spilosoma*
toad	*Bufo* spp.
white-tailed deer	*Odocoileus virginianus*
wild turkey	*Meleagris gallopavo*

Most precipitation generally occurs in the form of summer thundershowers. The frost-free season is short at Ruidoso, with a recorded average of 102 days and a standard deviation of 18 days (Tuan et al. 1973:19). The growing season at Nogal is 140 days. Out of 11 recorded years, only 3 had growing seasons of 120 days or less. A site located in a canyon such as Angus would most likely align with the shorter growing season as cold air will pool at the bottom of the valley and will create earlier frost dates. Rainfall in this area is among the highest in the state, with exposed slopes probably receiving somewhat more than the valleys (Tuan et al. 1973:19).

Table 3. Weather Statistics from Nearby Stations

Station	Elevation (ft/m)	Number Years Record	Mean Annual Precipitation (in/mm)	Mean Annual Temperature (F/C)	Mean January Temperature (F/C)	Mean July Temperature (F/C)
Bonita Dam	7,500 2,286	8-11	20.94 532.00	- -	- -	- -
Capitan	6,350 1,935	53-55	16.11 409.00	49.2 9.6	30.3 -0.9	67.7 19.8
Ft. Stanton	6,220 1,896	94-97	15.11 384.00	51.9 11.6	35.0 1.7	69.6 20.9
Loma Grande	8,200 2,499	12-13	24.03 610.00	47.2 8.4	32.8 0.4	62.8 17.1
Nogal Lake	7,180 2,189	8-11	14.30 363.00	- -	- -	- -
Ruidoso	6,838 2,084	32-34	21.25 540.00	48.3 9.1	33.0 0.6	64.8 18.2

CULTURAL ASSOCIATIONS IN THE SIERRA BLANCA REGION

Yvonne R. Oakes

Introduction

"Probably no other area in the Southwest has a more confused ceramic status than that in south-central New Mexico" (Kelley and Peckham 1962:6). Add confusing cultural designations to the confusing ceramics and a more accurate description of the Sierra Blanca region is obtained. Documentation of the cultural history of the area begins with Lehmer's (1948) concept of a Jornada branch of the Mogollon culture for south-central and southeastern New Mexico. He divided the area from north of Carrizozo south into Mexico into southern and northern regions of the Jornada branch, "distinct, but closely similar" (Lehmer 1948:84). Distinctions between the two were based mostly on the differences in brown ware ceramics, which included El Paso Brown in the south and Jornada Brown in the north.

The mountainous northern region (focus of this report) was basically not further examined until Kelley's extensive studies (Kelley 1966, 1984). She is credited for mapping out the Sierra Blanca region as extending from the Peñasco River on the south to the Upper Gallo drainage near Corona on the north, and from the Sierra Blanca Mountains on the west to the Roswell area on the east. More importantly, Kelley is responsible for developing a three-phase classification system specifically constructed for the region. It is still used today as a standard for placing sites within a definable cultural scheme. These phases start with the appearance of ceramics on earlier sites and end with the abandonment of the region. They do not cover earlier Paleoindian and Archaic cultural manifestations as sites of these types were little known and less understood at the time. This section describes each phase or period of the Sierra Blanca region and offers some new insights on the ground-breaking work done by Kelley in the 1950s and 1980s.

Paleoindian Period

Amazingly few Paleoindian sites have been recorded in the Sierra Blanca region. This may be due to such sites being heavily buried by alluvial soils in this mountainous zone, but the lack of survey and excavation in much of the area is also probably a factor. When Paleoindian sites are found, Spoerl (1983) notes that they usually consist of the use of caves and rockshelters at elevations between 5,000 and 6,000 ft. The few recorded sites consist mostly of lithic artifact scatters with Paleoindian dart points. One site in the Sacramento Mountains contained a Folsom point (Broster 1980:97). Another along the Rio Bonito drainage had a Meserve point (Sebastian and Larralde 1989:30). One other site on the flanks of Patos Mountain (LA 48267), at an elevation of approximately 8,000 ft, possessed an unidentified Paleoindian point (NMCRIS files). No further details are available for these sites. The high elevation for this last site suggests the use of higher areas by Paleoindian peoples, probably for hunting wild game.

Archaic Period

The Archaic occupation of the Sierra Blanca region is identified by smaller diagnostic projectile points, lack of ceramics, and the occasional use of maize for subsistence. However, no structures have been recorded for this period and no sites have been dated to this time, which lasts from approximately 5000 B.C. to A.D. 300 or more. The lack of absolute dating for sites of all periods in the region is regrettable and, in particular, hinders an accurate assessment of Archaic settlement systems.

Origins of the Archaic peoples in the region were thought to lie in the Cochise tradition of southern New Mexico and Arizona (Lehmer 1948). Others suggest ancestral sites lie to the east (Beckett 1973) or in the Oshara tradition to the northwest (Sebastian and Larralde 1989:42) with the Sierra Blanca region being divided by influences from the several outside areas. Because of a consistent lack of comparative dates, this issue cannot be resolved with such a limited data base.

Manifestations of the Archaic in the region include numerous hearths with a lack of ceramics and diagnostic lithic artifact scatters. Rockshelters are frequently used. Fresnal Shelter, located on the southwest edge of the region, is the most well known. From this cave, which exhibits use from approximately 1600 B.C. to A.D. 1, a variety of cultural materials have been recovered, including

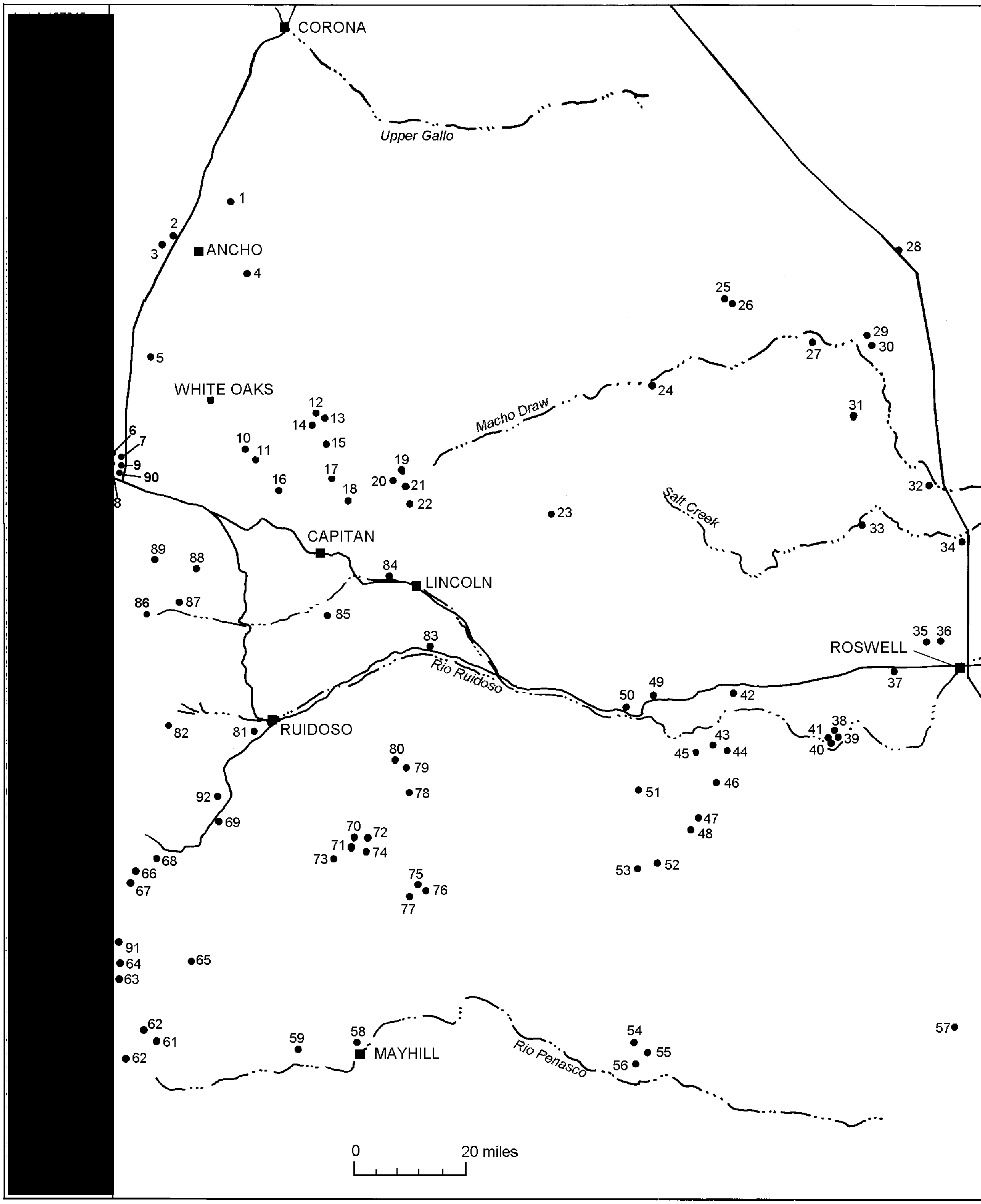


Figure 3. Archaic sites of the Sierra Blanca Region.

baskets, matting, possible sandals, atlatls, and ground stone (Sebastian and Larralde 1989:66). High Rolls Cave, opposite the canyon from Fresnal Shelter, promises to hold similar items (Oakes 2000). Another undated site, Pfingsten 1, along the Rio Ruidoso, had multiple hearths and probable Archaic dart points (Kelley 1984:295).

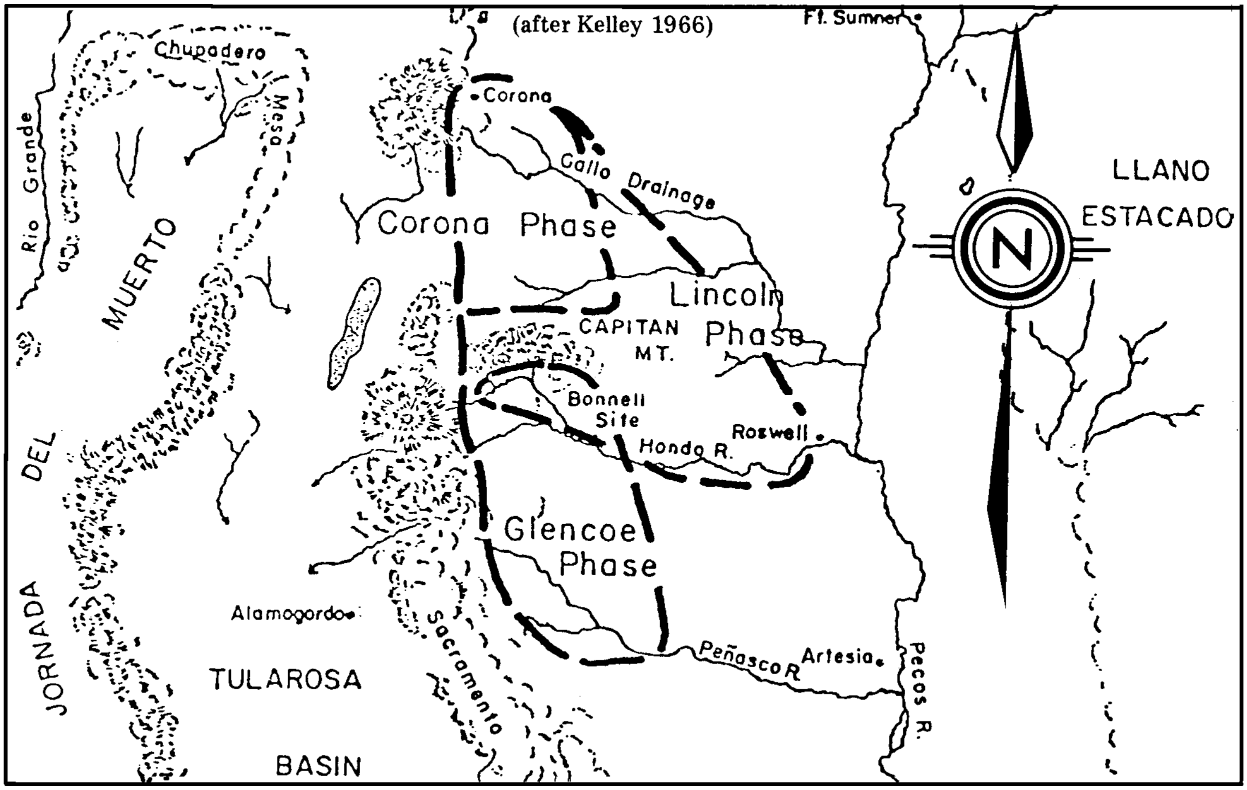


Figure 4. Geographic distribution of the Sierra Blanca phases. (From Stuart and Gauthier 1981)

The only extensively surveyed areas for Archaic sites include the Three Rivers area just outside of the project area to the east (Wimberly and Rogers 1977) and a large survey on Mescalero Apache land (Broster 1980). On this survey, projectile points of the Oshara, Chiricahua, and San Pedro traditions were found, suggesting the region is truly a mix of Archaic derivations. The Lincoln National Forest is also currently recording more Archaic sites within their domain.

In a search of NM CRIS Files, 96 USGS quadrants were examined and files were checked for recorded Archaic sites in the Sierra Blanca region. A total of 92 Archaic sites were found (Fig. 3) in this 5,861.7 sq mile area (yielding 1 site for every 63.7 sq miles). Many more may be present as only 38 of the 96 quads (39.6 percent) contained sites, suggesting large areas of the region remain undersurveyed. Figure 3 displays the locations of all known Archaic sites and yields some interesting data. First, Archaic sites are scattered throughout the entire region except for the area east of Corona and north of the Capitan Mountains. This may represent a lack of survey or, less likely, Archaic sites may not be present. Another observation is that many sites are located along major drainages such as the Peñasco, Rio Hondo, Rio Bonito, and Macho Draw. Numerous others are in the high mountain zones north of Capitan and in the Sierra Blanca Peak area at about 8,000 ft but they range all the way to the lower and flatter elevations north of Roswell near 3,600 ft. Locational and environmental diversity is apparently characteristic of the Archaic period in the Sierra Blanca region.

In summary, the wide dispersal of Archaic sites as seen in Figure 3 clearly indicates viable hunter-gatherer populations in the region prior to the Ceramic period occupations. Adaptations range from the use of high mountain zones to the sand hills on the eastern limits. This may indicate a highly mobile subsistence pattern with peoples shifting from resource to resource as climate, dietary need, or population pressure dictates, or it may suggest different groups of people selecting different environmental niches for their home bases. Subsistence items found include maize, mescal, piñon nuts, yucca fruit, deer, bison, antelope, and mountain sheep, which indicate a large variety of economic habitats were exploited. How wide ranging the groups were that utilized these resources cannot be determined without some type of chronometric control and more excavated sites.

Ceramic Period

Not until the 1950s was the Ceramic period in the Sierra Blanca region defined by phases. Prior to this, Lehmer's (1948) division of the region into three somewhat vague sequential phases of Capitan, Three Rivers, and San Andres (beginning at about A.D. 900 and patterned after southern New Mexico designations) based upon the ceramic frequencies of mostly brown wares, stood as the only classificatory scheme used. Kelley's subsequent study of the Capitan region in the 1950s-1960s led her to develop phase sequences just for the northern Sierra Blanca area (Fig. 4). Her system was fairly basic with broad architectural and ceramic generalizations characterizing each phase. At the time, she had a limited number of sites upon which to base the distinctions and limited geographic distributions. Today, many more sites constitute the data base and Kelley's work could benefit from a fresh assessment of the Sierra Blanca classification system. This section defines the phases as used by Kelley (1984) and then looks at some new approaches to defining sites in the area.

Glencoe Phase (A.D. 900-1450; Farwell et al. 1992; Vierra and Lancaster 1987) (A.D. 1100- 1450; Kelley 1984)

Geographic boundaries of the Glencoe phase, according to Kelley (1984), include the southern portion of the Sierra Blanca region from the Peñasco Valley north to Nogal and east along the Rio Ruidoso and Rio Bonito. She dates the beginning of ceramic use in the area earlier than Lehmer (1948) at ca. A.D. 1100. Along with Eidenbach (1983) and Wiseman (1996b), she believes that Glencoe phase people, possessing a ceramic technology, were the original inhabitants of the mountainous Sierra Blanca region, perhaps coming out of the Mesilla phase occupations in the Tularosa Basin. Eidenbach (1983) explains his reasoning by stating there was a shift to summer-dominant rainfall at about A.D. 1100. He thinks this is what caused populations to move into the mountain zone where there was enough moisture to grow their crops. Kelley (1984:49) concludes that because this population was isolated, sparse, and dispersed into small communities, the Sierra Blanca region was culturally out of step. She says a basic conservatism is present whereby the area lags behind others to the south and north and this can be seen in architectural styles, pottery, and artifact types. Her examples include pithouses as a major architectural form as late as A.D. 1200, slab outlining of pithouses, high frequencies of undecorated brown wares, and a lack of mealing bins.

Kelley describes early and late Glencoe phase adaptations, with the dividing line at about A.D. 1200, but does not define them as separate entities. She notes that the basic house forms and settlement patterns continue from one into the other and, therefore, states there is no compelling reason to distinguish them (Kelley 1984:147). Earlier dates for the beginning of the phase have been proposed at ca. A.D. 900 (Farwell et al. 1992; Vierra and Lancaster 1987; Sebastian and Larralde 1989) and these seem warranted in the light of recent radiocarbon dates (Rocek 1995). This issue is examined later.

Sites are mostly located in wooded piñon-juniper habitats along streams, on nearby ridges, or on the valley bottoms. Early Glencoe phase sites usually consist of small villages of 5-10 pithouses with no definable pattern of placement. No above-ground rooms are recorded for the early period. However, some surface jacal structures are associated with the later part of the phase. The pithouses range from very shallow to deep. Most are shallow or of medium depth. Shapes can vary from circular to sub-rectangular to almost square, sometimes with all three types on the same site. Kelley (1984:47) sees a slight tendency toward nearly square pit structures with four support posts and a central firepit that is either basin-shaped or cylindrical. Other interior pits are not regularly present (Kelley 1984:69). No antechambers, ventilator systems, or mealing bins have been found for the early part of the Glencoe phase and lateral entries are rare (Farwell et al. 1992; Kelley 1984:49). As Vierra and Lancaster (1987:14) point out, however, the investment spent on building Glencoe phase pithouses does not necessarily validate a year-round occupation for such units. They could be seasonal or geared toward use during specialized resource acquisitions.

Later Glencoe phase site organization does change somewhat, however. Sites display complex reoccupations with multiple floors and frequently overlapping structures (Wiseman 1996b:213). Kivas are present in the larger communities and may either stand alone or be incorporated into the room alignments. However, sites do not exhibit the patterned organization of the Anasazi area to the northwest; rooms are placed on the landscape seemingly without orientation and the use of some slab lining of walls occurs.

Sierra Blanca kivas may contain footdrums, sipapus, wall niches, and ash pits. The use of a variety of possible sipapus is of interest. Some are small vertical holes in floors with no particular orientation in relationship to hearths. Others may be worn or cupped stones with very smooth surfaces that are embedded into floors, sometimes covering a vertical hole. Artifacts have sometimes been found associated with these features and include mussel shell ornaments, turquoise, and beads. One stone sipapu was recovered at the Angus site, LA 3334. The only other area where this use of smoothed stones occurs is in the vicinity of Pecos Pueblo (Kidder 1958).

The dominant pottery type associated with the Glencoe phase is Jornada Brown; however, Chupadero Black-on-white and Three Rivers Red-on-terracotta are often also found on early Glencoe sites along with minor frequencies of Mimbres Boldface Black-on-white. Also, some El Paso Brown Wares do begin to show up during this early part of the phase. Later ceramics include El Paso Polychrome, some Lincoln Black-on-red, St. Johns Polychrome, and Rio Grande Glaze I. Minor representations of Gila Polychrome, Ramos Polychrome, Heshotauthla Polychrome, and Playas Red Incised may also occur late in the phase. The variety of ceramics from widely different sources may suggest a strong trade network by the end of the phase.

Other artifacts associated with the Glencoe phase include open-ended metates changing to closed-end troughs with mano rests by later in the phase (Stuart and Gauthier 1981). Mussel shell is occasionally used for pendants and ornamentation at the beginning of the phase and is heavily employed by the end. Other fairly common items include stone effigies, clay pipes, stone palettes, full-grooved axes, *olivella, glycymeris,* and *strombus* shell ornaments and beads, bone gaming pieces, and turquoise. One unique find was thick-billed parrot remains (Mexican Highlands variety) found at Tortolita Canyon near Nogal by Hard and Nickels (1994). Kelley stated (1984:49) that luxury items were few, particularly during the earlier part of the phase; however, the accumulation of more data since then seems to have somewhat nullified that statement.

Glencoe phase burials exhibit no particular orientation or placement. They have been found in room fill, beneath floors, and in extramural sheet trash. They can be flexed, on their back, or side. Most contain no grave goods; however, a variety of items have been found associated with burials of this time. At Site 2000A at Mayhill, two of four burials had bowls over the faces, and one has a "kill" hole (Kelley 1984:119). Other burials had pendants, olivella necklaces (some on children), scattered beads, and a few bowls of unknown types. Animals are also sometimes given individual burials. These include an eagle burial at Crockett Canyon (Farwell et al. 1992:42), a small bird at the Bonnell site, and two dogs in pithouse fill at Mayhill (Green 1956:15).

Subsistence items recovered from the few excavated sites include corn, beans, beeweed, mesquite beans, sunflowers, wild grasses, walnuts, cholla buds, bison, deer, antelope, rabbit, pocket gopher, turkey, and occasional fish. Often percentages of recovered items are not provided in reports and it is difficult to assess dependency on gathered versus wild game food versus agricultural products. Stuart and Gauthier (1981) believe gathering was predominant early in the Glencoe phase but that hunting gradually became the more important subsistence adaptation. They also suggest that the use of maize was marginal in early times but that dependency developed by the end of the phase.

Kelley (1984) carries the Glencoe phase on up to the time of abandonment of the Sierra Blanca region at about A.D. 1400-1450, although the Lincoln phase exists at the same time in the same area. Mera (1940:296) was the first to suggest the Sierra Blanca peoples moved to the Gran Quivira area. He believes the large room block settlements were built by these southern immigrants. Tainter (1985:145) cautions that such a migration has not been proven and that it requires comparative skeletal analysis to verify.

Corona Phase (A.D. 900-1200; Kelley 1991:166) (A.D. 1100-1200; Kelley 1966; Ravesloot and Spoerl 1984:182; Vierra and Lancaster 1987:12)

Based on Kelley's early studies, the Corona phase has been thought to date contemporaneously with the early Glencoe phase, at about A.D. 1100-1200. However, Kelley (1991:166) recently has conducted some chronometric studies in the Capitan area and has revised the beginning date to A.D. 900 as a result of several new radiocarbon dates in the A.D. 1000s and earlier. This, in effect, may make the Corona phase *earlier* than the Glencoe and dramatically changes the assumed migration pattern from southern New Mexico into the Peñasco River Valley and later into the Capitan and Corona areas as initially proposed by Kelley (1984). Site settlement patterning will be used to examine the viability of an earlier date for the phase in a following section.

Currently, Corona phase sites are thought to extend from the slopes of the Capitan Mountains into the upper Macho and upper Gallo drainages north to the Corona area (Kelley 1984:50; see Fig. 4). This is outside of defined limits for the Glencoe phase and the two do not overlap. Sites are usually located within the higher piñon-juniper zone or in valleys and flat areas along water.

House forms are generally shallow pit structures (7.5-30.5 cm deep), rectangular or square shaped with probable jacal superstructures, some internal posts, and contain slab-lined pits and surface rooms. In fact, slab-lined structures become the dominant characteristic of Corona phase architecture; however, Kelley (1984:72) remarks that some are present in the earlier Glencoe phase and some continue into the later Lincoln phase. The slabs are commonly upright, sometimes with large gaps between them. Their utility is not well understood as the pit structures are almost always very shallow. Slabs are also used to face storage pits, surface storage rooms, benches, and later kiva walls. Kelley (1984:74) considers this type of architecture to be of Anasazi derivation, traceable to the BM III period. Brew (1946:219-220) thinks it is similar to architecture from the Mesa Verde area while Sayles (1936:31) found slab features on survey in Chihuahua, Mexico. Some rooms have flagstone floors, probably created for storage purposes. Hearths may be rectangular, slab firepits, or circular or cylindrical pits as in the Glencoe phase.

Sites can be up to 50 rooms in size, scattered in open areas over the landscape as small house units. There seems to be a general lack of trash, most of it being thin sheet trash, which has led Kelley (1984:50) to suggest short-term occupations for most sites. A seeming lack of remodeling also draws her to this conclusion. No plazas are known nor are kivas; however, Kelley (1984:51) notes two unexcavated circular depressions with surrounding upright slabs, which she believes may be ceremonial.

Pottery during this phase is dominated by Jornada Brown Wares and Chupadero Black-on-white with some Three Rivers Red-on-terracotta (Kelley 1984:50). Some Red Mesa Black-on-white and Mimbres Black-on-white may also be found (Kelley 1991:169), which are similar to ceramics found to the west in the Salinas and Mimbres areas. This similarity is the basis for several archaeologists believing that the phase represents an intrusion of people into the Jicarilla and Capitan mountains (Wiseman 1985:16) from this area.

So few excavated sites exist for the Corona phase that most are only known from survey data. Some of these include Clint Sultemeier 1, Hiner 1, Clark 2, Black Stump Canyon, Las Tablas, Escondida, and the Phillips site (House Units 1-39, 43). On a restudy project in the Capitan Mountains, several Corona sites have been radiocarbon dated by Stewart et al. (1991:189). These include LA 51334 near White Oaks at ca. A.D. 1000, LA 51333 in the Jicarilla Mountains at ca. A.D. 1025, and the nearby Robinson site (LA 46323) at ca. A.D. 850-1000.

The lack of excavated sites led Kelley to produce a very limited list of artifact types for the phase, mostly described in terms of absences, such as metates, full-grooved axes, shaft straighteners, and fairly uncommon projectile points (Kelley 1984:89-112). This scant description of artifacts is undoubtedly due to the lack of archaeological work done in the area and not an actual lack of these artifact types. No burial data or specific subsistence items are known.

Lincoln Phase (A.D. 1200-1450)

The Lincoln phase follows the Corona phase sequentially according to Kelley's scheme (1984). Its geographic reach includes all of the Corona phase area with an extension to the east as far as Roswell and south to the Rio Hondo drainage system, overlapping some of the Glencoe area (see Fig. 4). Site locations are in the higher piñon-juniper mountain zones, which Eidenbach (1983) interprets to be a result of the Great Drought of A.D. 1250 when populations moved into these higher areas where moisture was sufficient for agriculture. A few sites sit at transitional zone elevations; however, Bloom Mound on the periphery of the area near Roswell is at 1,150 m (3,775 ft). Streamside location does not seem to be as critical a variable as in earlier phases. Only Block Lookout, sitting high on a hill, may have been defensive (Kelley 1984:52).

At this time, populations tend to aggregate into fewer but larger settlements. No studies have been done to indicate whether populations were decreasing or increasing, but Speth and Scott (1985:146) suggest there does not seem to be a decline. Aggregation involves a more sedentary adaptation with usually more dependence on agriculture. In the Sierra Blancas, they believe this aggregation also helped to establish strategies for trading partnerships–particularly in the area of meat procurement (Speth and Scott 1985:147).

The Lincoln phase is characterized by large adobe or masonry pueblos with multiple rooms. There are two basic forms that pueblos usually take, either a linear room block facing east with an associated plaza and probable kiva or a generally enclosed square roomblock built around a small plaza. The linear-roomed pueblos are usually much smaller than the enclosed pueblos (Kelley 1984:52-53). Sites may contain from 10 to 200 rooms with adjunct features including stone alignments for water control or garden plots (Kelley 1991:171), some use of upright slabs to outline rooms, occasional pithouses (Farwell et al. 1992:20), and the use of jacal structures. Kelley defines the architecture as a hodgepodge of styles, and remodeling of rooms is common (Kelley 1984:61,252). One site, Ryberg 3, in the Gallo drainage, may have been multistoried.

Kivas in the area all seem to postdate A.D. 1200 (Wiseman 1996b:206). They are usually square, deep, and had central firepits. The identification of structures as kivas is not unambiguous, however, as most are designated as such mainly on the basis of large size (Wiseman 1996b). Other features may include ashpits, wall niches, sipapus, floor drums, benches, and ventilators. Ashpits and sipapus are the most commonly found features occurring, with only a few instances of the others. One kiva site, Fox Place, had a wall mural of a plumed serpent with green, white, and black colors extending 4.2 m along the wall. Below the mouth was a small depression in the floor which may have constituted an offering point (Wiseman 1996b:220).

The pottery of the phase includes all of the late Glencoe types but also much more corrugated ware (Corona Corrugated), El Paso Polychrome, St. Johns Polychrome, Gila Polychrome, Heshotauthla Black-on-white, and Rio Grande Glaze A. Jornada Brown Wares lessen in importance while Chupadero Black-on-white continues fairly strongly. Lincoln Black-on-red appears as a locally made ware (Kelley 1984:53). The lack of later glaze wares suggests abandonment by 1400-1450 (Farwell et al. 1992:20). A few Glaze II and III sherds have been observed in the upper Gallo area, however (Kelley 1984:52).

Trade goods are at a peak during the Lincoln phase and the existence of several trade centers has been suggested. Siliceous black shale is found in the Capitan area near the Phillips site and distribution may have been controlled by site occupants. Lincoln Black-on-red pottery is very abundant at this site and may have been another commodity traded by them (Kelley 1984:55). Bloom Mound, near the Pecos River and adjacent to the eastern Plains, may have been another major trade center. Because the pueblo burned, an unusual array of goods was recovered including copper bells, bone gaming pieces, bushels of charred corncobs, many projectile points, ground stone, and full-grooved axes, stone pipes, awls, whistles, over 1,770 disc beads, mussel shell ornaments, olivella shell tinklers, textiles, mats, coiled baskets, and cordage (Kelley 1984:457-477). Also found were numerous long bones of bison, many more than recovered on any other Lincoln phase site. Driver (1990:254-257) thinks bison meat was being traded to the Sierra Blanca region from Bloom Mound. He suggests corn and piñon nuts may have been exchanged in return.

Other artifacts found on Lincoln sites are manos, trough metates (but rarely mealing bins), shaft straighteners, mostly corner-notched projectile points, scapula scrapers, bone tube beads, and glycymeris and strombus ornaments (Kelley 1984:54-55). The recovery of projectile points increases dramatically at this time with approximately 4,000 collected privately from the Phillips site in five years (Kelley 1984:252) and 3,000 at the nearby Robinson site (Kelley 1991:171).

More subsistence data are available for this time period than earlier ones. Large game increases on Sierra Blanca sites and is dominated by antelope, deer, and bison (Kelley 1991:173). This is a shift from small mammals (rabbit) commonly found on earlier sites. Trade networks for obtaining more large mammal meat are hinted at, rather than an increase in relative resource abundance (Speth and Scott 1985:143). Concomitant with increasing use of large mammals is a growing dependency on agricultural products (Katzenberg and Kelley 1991:216). Corn usage is evident at all major settlements. However, size of the cob varies from small to large from site to site (Farwell et al. 1992:21). Kelley (1984:54) suggests the small size could have been selected for because it may have been drought resistant. High mountain sites such as Block Lookout have the small strain while the low elevation site of Bloom Mound contains a larger type. Other subsistence items recovered from Lincoln phase sites include thorn apples, sunflower seeds, cholla buds, walnuts, hackberry seeds, and occasional beans (Kelley 1984:54, 489).

Burials are more commonly found during this phase, perhaps another sign of increasing sedentism. They may occur in structural fill, burial pits in rooms, in extramural areas, and in one case, as cremations. Often, later burials are imposed over earlier ones. They are usually flexed on the back or sides with no standard orientation. Grave goods are rare and consist mostly of ornaments or decorated ceramic bowls. Children seem more likely to have associated goods than adults (Kelley 1984:55). At Block Lookout, Wiseman (1976:26-33) reports a mass cremation with 12 or more persons divided into two groups. Analysis indicated the individuals suffered violent deaths and mutilations. Many other human bones on the site were burned or calcined and the kiva was intentionally set on fire with grass bundles. This is an unusual occurrence and further study of potentially violent deaths should be conducted for late Lincoln phase sites.

Dating Lincoln phase sites has been mostly through ceramic comparisons of pottery types. The presence of St. Johns Polychrome and Glaze A sherds is recognized as a definite chronometric marker (Stewart et al. 1991:185). Several other more accurate temporal assignments have been made, however. These include tree-ring dates from Armstrong Ruin in the Gallo Valley at A.D. 1342-1366 (Smiley et al. 1953:37), and radiocarbon dates of ca. A.D. 1150-1525(?) for the Robinson site (Stewart et al. 1991:179) and A.D. 1311-1430 for the Lower Stanton Ruin along the Rio Bonito (Shelley 1991:32).

Athabaskan Occupation (ca. 1400s to present)

Athabaskans, or Apache groups, have a long history of occupation in the Sierra Blanca region where now the Mescalero Apache continue to reside. While early-dated sites are extremely rare, there are several that hint of a pre-Hispanic presence. By the time of Spanish excursions onto the southern Plains in 1590, reports mention sightings that may have been part of the Mescalero heritage (Opler and Opler 1950). Coexistence of Apache and Spanish peoples was apparently peaceful until approximately the late 1630s. By 1672, the nearby Salinas Pueblos were abandoned because of Apache incursions (Schroeder 1974). By the 1700s, there were repeated conflicts between the two groups in the Sacramento, Guadalupe, and Sierra Blanca mountains (Thomas 1974). These continued sporadically up to at least 1855 when Fort Stanton was established along the Rio Bonito in the Sierra Blancas. Military forays from the fort were common in the 1860s and 70s. In 1869, Apaches raided cattle from the Casey Ranch near Lincoln and they were tracked by soldiers to the Guadalupe Mountains where remains of the ensuing skirmish have been recorded (Adams et al. 2000:1). On May 29, 1873, the Mescalero Reservation was established for those Apaches in the area. Not until 1922 was the reservation turned over to the Mescalero for their control (Adams et al. 2000:17).

For all the conflicts that occurred between the 1600s and late 1800s, there is little archaeological evidence, and even fewer earlier Apache sites. Some researchers have hinted at a possible prehistoric Apache presence on some late Pueblo sites abandoned about A.D. 1400 or so. A hilltop fort on the Mescalero Reservation is defensively situated and could be Athabaskan (Kelley 1984:298). Feather Cave, near Lincoln, contained in situ different sized bows, decorated arrows, feathers, prayer sticks, sandals, and a pictograph (Kilby and McNally 1994:31). One must ask whether the excellent preservation of these items and the nature of the items might reflect Apache-related goods. Similarly well-preserved Athabaskan-like artifacts were found in caves in the Gila River drainage of western New Mexico (Cosgrove 1947).

Mention is made of widespread burning of rooms and humans at Bloom Mound near Roswell, that Kelley (1984) says *could* be ascribed to Apache-like groups or Plains populations. Burning of rooms and calcined human bones also occurred at Block Lookout in the Capitan Mountains (Wiseman 1976). The site is the only pueblo settlement considered to possibly be defensive because of its hilltop location. Other sites that might suggest an Athabaskan presence include the Gore site south of Nogal where a likely Ocate Micaceous sherd and a historic Toyah projectile point were found on the late Glencoe phase site (Farwell et al. 1992:189). Three micaceous sherds classified as Athabaskan Plain or plain unpolished were found at the Angus site (see Ceramic section) along with eight radiocarbon dates ranging in midpoint between A.D. 1400 and 1450, about 100 years after probable abandonment of the site. On the Lincoln National Forest, likely Apache finds include stone rings, worked glass, glass beads, metal tinklers and projectile points, an Athabaskan jar, breastworks, and rock art (Beidl 1990; Adams et al. 2000). Peeled tree bark (ascribed to Athabaskan groups) has been recorded in the Sacramento Mountains, possibly dating to the late 1700s (Williamson 1997).

Evaluation of Sierra Blanca Cultural Schemes

In devising her cultural scheme for the Sierra Blanca region, Kelley (1984) employed a combination of several overlapping criteria to distinguish the currently used phases. At the time, data were skimpy and information was limited to those sites that had been excavated between approximately the 1940s and the 1970s. Figure 4 reveals generally separate geographic zones for Kelley's different phases, but with some obvious overlap. Likewise, she thought she detected a division of brown wares into Jornada Brown and El Paso Polychrome wares associated with the geographically separated phases. Upright slab features are distinctive and their presence made Kelley (1984) call for a separate but chronologically overlapping phase (Corona phase). In sum, geographic boundaries somewhat overlap, sherd limits do likewise, and upright slabs overlap chronometrically with sites without slabs.

The data base has greatly expanded since the 1970s and, therefore, current information on site locations, pottery limits, and architectural styles is perhaps more representative of the region. However, so much of the area still remains undersurveyed that even the new data has serious gaps when attempting explanatory models. Even so, we suggest that updating of the cultural succession in the Sierra Blanca region is warranted. Therefore, we have attempted to isolate unambiguous variables that can be measured geographically and chronologically and match them to the existing phase sequences. So, to begin, no a priori locational zones were established for the three cultural phases; areas were defined as the result of the sorting of the specific variables.

Kelley (1984) distinguishes between Glencoe and Corona/Lincoln phases by a general east-west boundary roughly paralleling the Rio Bonito. She states that Jornada Brown Wares appear in the southern Glencoe area, while El Paso Brown Wares show up in the northern Corona and following Lincoln regions. She admits to some overlap. For this exercise, the entire ceramic sequence for the region is examined and sites sorted by chronological appearance of ceramic types, regardless of locational placement. This will pinpoint locations of early brown wares and should also indicate the geographic spread of later types into the region. We can then look at what defines the Glencoe versus Corona/Lincoln phases and determine if there are unambiguous distinctions in ceramic use or if there is widespread use of many types. The Jornada Brown-El Paso Brown dichotomy will be specifically examined to see if it really exists temporally or locationally.

Lastly, the suggestion that slab-lined structures are characteristic of a specific area (north of the Rio Bonito) and of a definite time period (Corona on into Lincoln phase) is examined. Mapping slab-lined units onto the cultural landscape should provide a more accurate assessment of their distribution.

We could have also sorted sites by those that have been dated by absolute means, such as radiocarbon or dendrochronological sampling, rather than by ceramic cross-dating as have most sites. However, to this day, few archaeological sites in the region have undergone such accurate dating procedures. A later chapter will review known dates for the region.

Sequential Ordering of Ceramics

A chart (Table 4) of ceramic types usually found in the Sierra Blanca region was produced showing the span of use, with initial utilization being most important for this study. Dates may vary from researcher to researcher but generally are the most commonly accepted time frames.

Next, NMCRIS files, site reports, and extant literature were searched for types and frequencies of ceramics found on as many sites as possible. Because many ceramics have similar time spans, some types were collapsed, creating six sequentially-ordered ceramic categories (I-VI) with later ones built on the earlier.

- I Jornada Brown Wares
- II Mimbres Wares, Red Mesa Black-on-white, Chupadero Black-on-white
- III El Paso Polychrome, Gila Polychrome, Three Rivers Red-on-terracotta
- IV Ramos Polychrome, Playas Red Incised, Mesa Verde Black-on-white, Galisteo Black-on-white, Santa Fe Black-on-white, Corona Corrugated
- V Heshotauthla Glaze Polychrome, Lincoln Black-on-red
- VI Glaze I (A)

Table 4. Chronological Ordering of Ceramic Types

I	Jornada Brown	A.D. 450 to A.D.1400
II	Mimbres Wares	A.D. 1000 to A.D.1200
	Red Mesa Black-on-white	A.D. 1050 to A.D. 1125
	Chupadero Black-on-white	A.D. 1050 to A.D. 1125
III	El Paso Polychrome	A.D. 1050 to A.D. 1550
	Gila Polychrome	A.D. 1100 to A.D. 1450
	Three Rivers Red-on-terracotta	A.D. 1150 to A.D. 1450
IV	Ramos Polychrome	A.D. 1150 to A.D. 1350
	Playas Red Incised	A.D. 1150 to A.D. 1520
	St Johns Polychrome	A.D. 1175 to A.D. 1350

I	Jornada Brown	A.D. 450 to A.D.1400
	Mesa Verde Black-on-white	A.D. 1200 to A.D. 1300
	Galisteo Black-on-white	A.D. 1200 to A.D. 1400
	Santa Fe Black-on-white	A.D. 1200 to A.D. 1450
	Corona Corrugated	A.D. 1225 to A.D. 1460
V	Heshotauthla Glaze Polychrome	A.D. 1275 to A.D. 1400
	Lincoln Black-on-red	A.D. 1300 to A.D. 1400
VI	Glaze A (I)	A.D. 1315 to A.D. 1425
	Glaze III	A.D. 1450 to A.D. 1475

The occurrence of these ceramic categories were then plotted individually on base maps of the region (Figs. 5-10). Site categories were based upon the latest ceramic type in evidence; thus, some sites may predate the beginning time of the category, particularly if they had lengthy occupations. As a result, some interesting patterns emerged. While there are only 14 Type I sites, all probably dating prior to A.D. 1000, based on the presence of Jornada Brown Wares only, there is obvious locational clustering. The majority of sites are in the triangle between the Sierra Blanca foothills on the west, the confluence of the Rio Bonito and the Rio Hondo on the east, the Rio Bonito on the north, and the Rio Ruidoso on the south (Fig. 5). Another grouping appears in the upper Gallo drainage near Corona, while only one shows up outside of these areas–in the Capitan Mountains. Very interestingly, there are no early brown ware sites in the southern part of the region in the Peñasco Valley, where Lehmer (1948) suggests brown ware sites first appeared.

If we accept that these are probably the earliest ceramic sites in the Sierra Blancas (all with simple pit structures), then the origins of the early regional population need rethinking. It would seem that early pottery-bearing peoples *did not* enter the area from the south into the Peñasco Valley as thought by Kelley (1984) and Lehmer (1948). They may instead have entered from the Tularosa Basin to the west, perhaps from the Three Rivers area, and through the natural corridor now part of U.S. 180 into the Rio Bonito and Ruidoso valleys. The grouping near Corona may have resulted from similar peoples moving on north along the west face of the Capitan Mountains until reaching the major Gallo drainage. (Settlement along water courses seems to have been important.) Or, populations may also have been an outgrowth of the widespread Archaic occupations in the Sierra Blancas; however, one must ask why settlement patterns shifted dramatically from universal Archaic use of the region to that of only the Rio Bonito and Corona areas.

Sites with this Jornada Brown composition would be considered part of the early Glencoe phase according to the current cultural scheme. However, their presence in the Corona area negates the established south-of-the-Bonito location (see Fig 5) for the phase. Kelley (1991:169) considers them to be early Corona phase sites dating as early as A.D. 900. They are thus potentially as early as Glencoe sites; however, it is not possible to determine which of the two brown ware areas are earlier without the availability of absolute dates.

The addition of Chupadero Black-on-white to ceramic assemblages with lesser amounts of Mimbres wares and Red Mesa Black-on-white at ca. A.D. 1000-1050, constitutes the Type II category of this study. Sites with only these early decorated wares are shown in Figure 6. Recorded sites at this time increase to 20, still a very low amount when making judgments regarding settlement patterns. It can be seen, however, that sites do begin to spread out from the Corona and Rio Bonito areas, specifically into the Capitan Mountains and the southern Mayhill area along the Peñasco River. For the first time the Peñasco displays a clustering of sites that have previously been thought to have been the earliest settled, such as Green's Pithouse. It is possible, though speculative, that settlement into this area occurred from the north rather than the south as thought by Lehmer (1948). Both Chupadero and Red

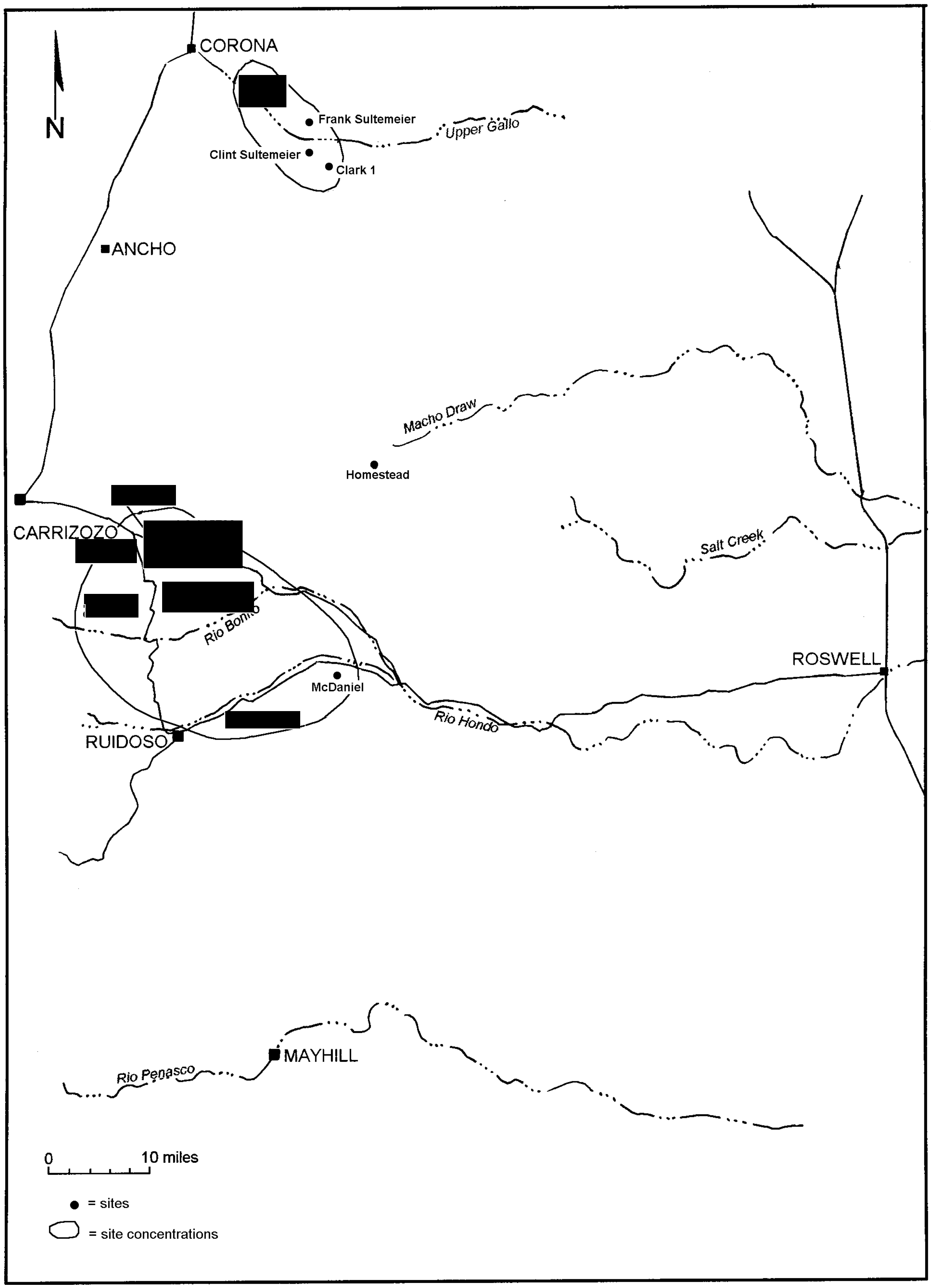


Figure 5. Type I sites with Jornada Brown only (ca. A.D. 450-1000).

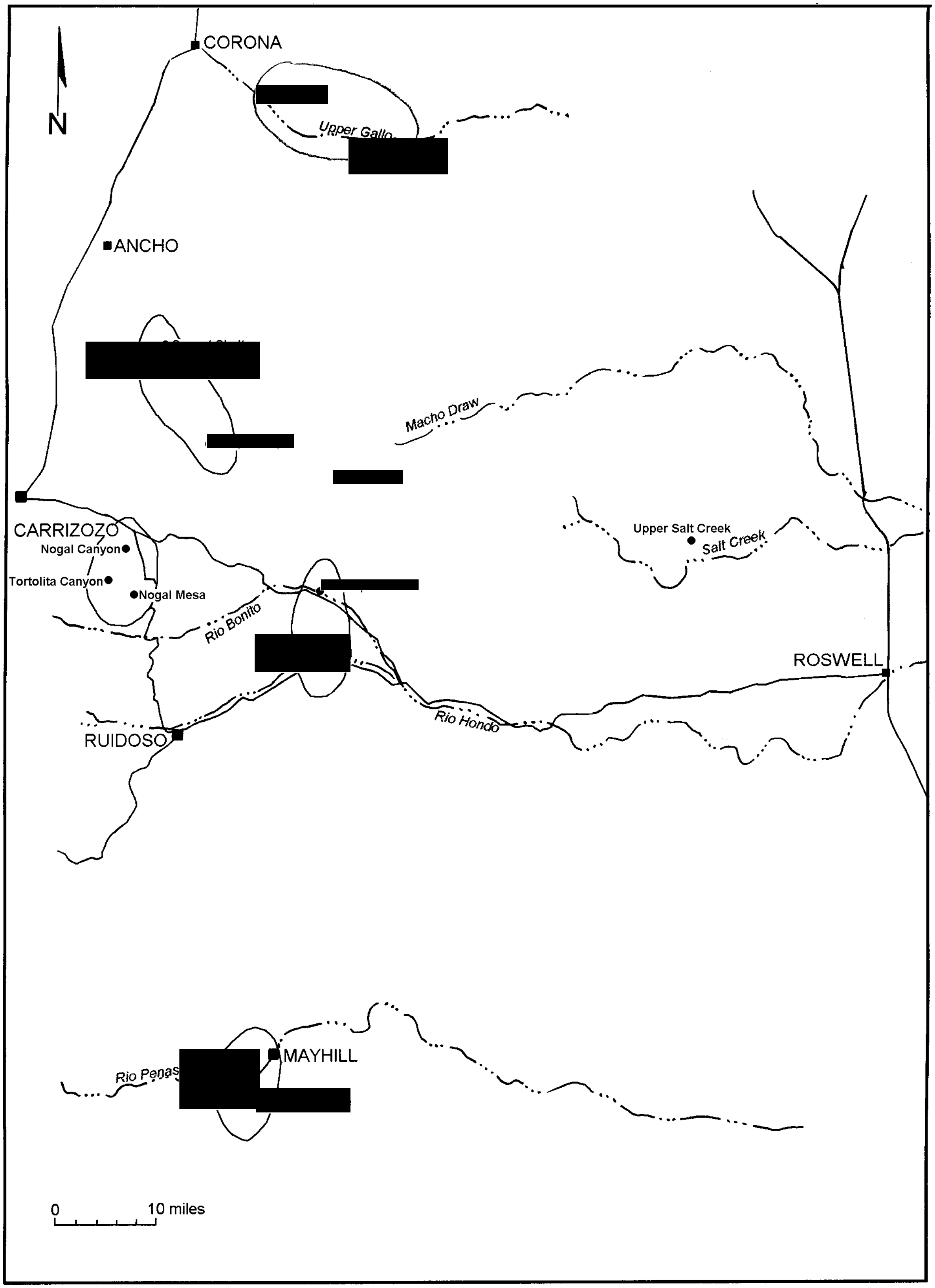


Figure 6. Type II sites (ca. A.D. 1000-1050) with the addition of Mimbres Wares, Red Mesa Black-on-white, and Chupadero Black-on-white.

Mesa ceramics are intrusive to the area at this time and are considered to have come from the northwest. Southern-derived ceramics (with the exception of the ubiquitous Jornada Brown Ware) do not appear until the next sequence.

Simple pit structures are characteristic of Type II occupations with no elaborate structures or ceremonial units reported during this time. In fact, architectural styles remain the same as for Type I. Because of the presence of Jornada Brown Wares on all of the sites, they would be classified by Kelley (1984) as part of the Glencoe phase. However, the sites in the Capitan Mountains and Corona area do not fit geographically into her definition, and so she considers the northern sites to be related to the Corona phase. But we see no distinctions other than placement on the landscape. One site, Nogal Canyon, does have some slab architecture, but no ceramic differences, making this possibly the earliest example of slab features, interestingly appearing first in the Rio Bonito area and not near Corona.

Type III ceramics include the addition of El Paso Polychrome, Gila Polychrome, and Three Rivers Red-on-terracotta (Fig. 7) with entry into the region ca. A.D. 1050-1150. Recorded sites with quantifiable ceramics increase slightly to 24. Of most importance is that we are seeing, for the first time, an influx of southern and southwestern wares. This may be reflected in continued occupation of the southern Peñasco Valley, some movement out of the mountains to lower elevations along the Rio Hondo, and peripheral sites appearing near Bent on the southwestern edge of the Sierra Blancas. The Rio Bonito Valley, however, continues to be a major focus of occupation.

Sites at this time are still classified as Glencoe phase in the southern part and Corona in the northern (Kelley 1984). However, the ceramics are the same throughout. Slab-lined features are supposedly an adjunct of Corona sites and 4 of the 24 sites do possess slab architecture; but, only 2 are in the Corona area, 1 is near the Rio Bonito, and 1 in the southwest corner near Bent. All have the same ceramic assemblages. All are also pit structures with some increasing complexity. Two sites, Abajo del Cruz near Bent and Hiner 2 near Corona, also contain some adobe-walled units for the first time. These sites are at opposite ends of the region.

It is obvious that some architectural and ceramic variation is becoming more prevalent at this time, and peripheral areas begin to show some occupation. Why the introduction of sherds from the south at this particular moment is not known.

Only 10 sites herald the beginning of Type IV ceramics at ca. A.D. 1150-1225 (Fig. 8). These include Ramos Polychrome, Playas Red Incised, St. Johns Polychrome, Mesa Verde Black-on-white, Galisteo Black-on-white, Santa Fe Black-on-white, and Corona Corrugated. The Corona Corrugated and the St. Johns Polychrome are the most dominant of the lot. These intrusive sherds exhibit a number of origins including Mexico, western and northern New Mexico, and the Chupadero area to the immediate west. Again, the Rio Bonito Valley receives the greatest influx of these types as well as a few sites near Corona and one near Roswell. The Roswell site (Garnsey Springs) is thought to be a camp site for Glencoe phase peoples utilizing the fringes of the Plains (Parry 1979). It is most interesting that no Mexican-derived sherds show up in the southern Peñasco Valley. However, occupation of this area is definitely waning with only one site appearing in the following time period.

Sites continue to cluster in the Rio Bonito Valley while they generally clear out of the Capitan area. Most have been labeled late Glencoe phase, but a few are called Lincoln phase, and one is Corona; however, the distinctions are unclear. Only Black Stump Canyon near Corona has a slab-lined feature. During this time, Corona Corrugated sherds are not limited to the Corona area, but rather are quite common in the Rio Bonito Valley.

The addition of Heshotauthla Glaze Polychrome and Lincoln Black-on-red to the ceramic categories creates Type V, which begins ca. A.D. 1275-1300 (Fig. 9). Nine sites fall into this classification and are concentrated in the Rio Bonito Valley. Only three outliers exist: one each to the north, south, and east. Lincoln Black-on-red (thought to be manufactured later in the Capitan Mountains) seems to first appear south of the Capitan Mountains, closer to the Rio Bonito and the Rio Ruidoso.

Most sites containing this ceramic complex are considered late Glencoe by Kelley (1984), although a few are ascribed to the Lincoln phase. Potential kivas show up for the first time in the region in the Rio Bonito drainage at Crockett Canyon and near Roswell at Rocky Arroyo. One site, LA 2945 near Corona, also contains adobe-walled structures. Slab-outlined features are found at three sites: one in the Rio Bonito Valley (Crockett Canyon), one in the Peñasco Valley (Site 2000), and one near Corona (LA 2945), suggesting no geographical preference for this attribute.

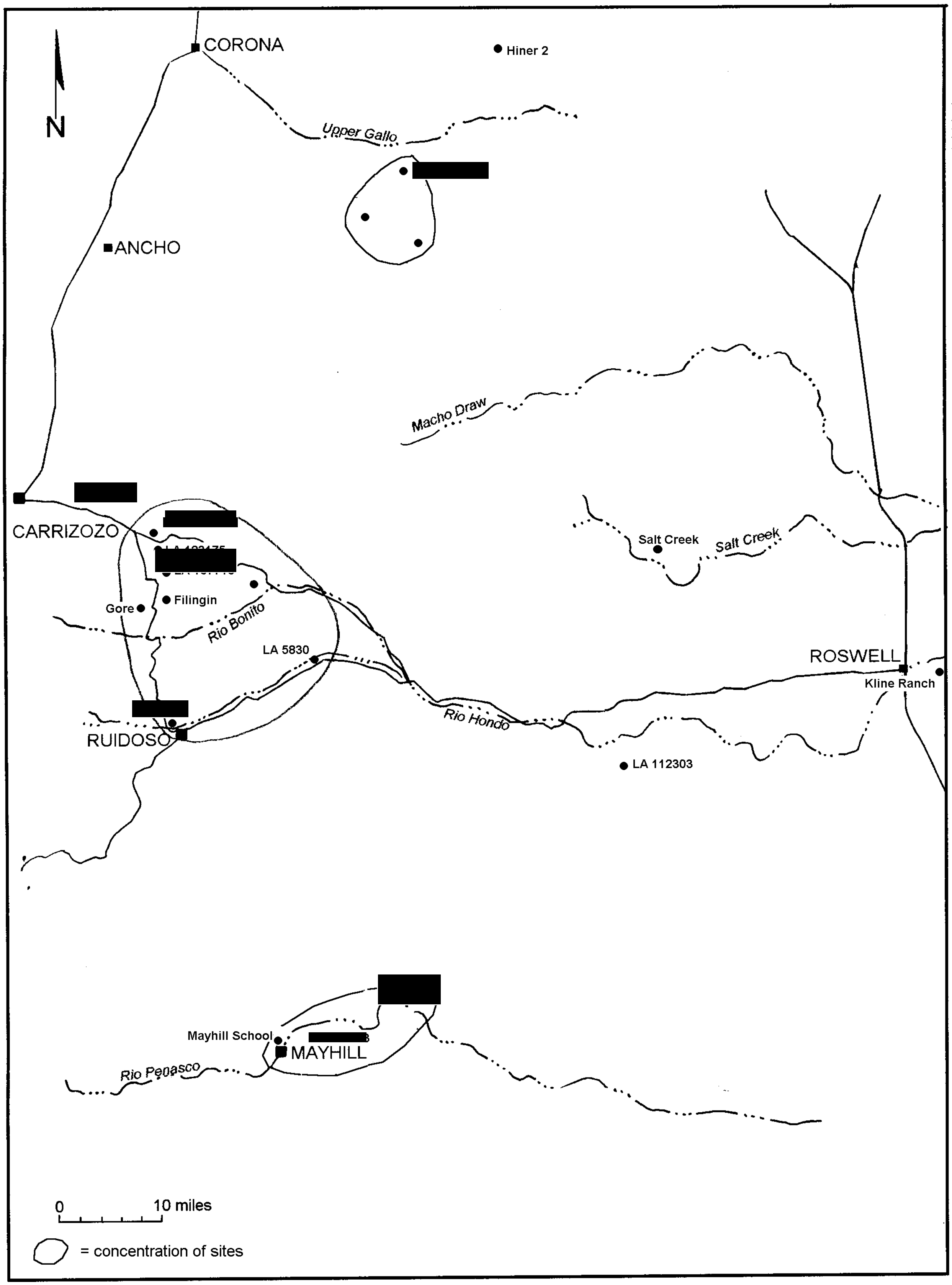


Figure 7. Type III sites (ca. A.D. 1050-1150) with the addition of El Paso Polychrome, Gila Polychrome, and Three Rivers Red-on-terracotta.

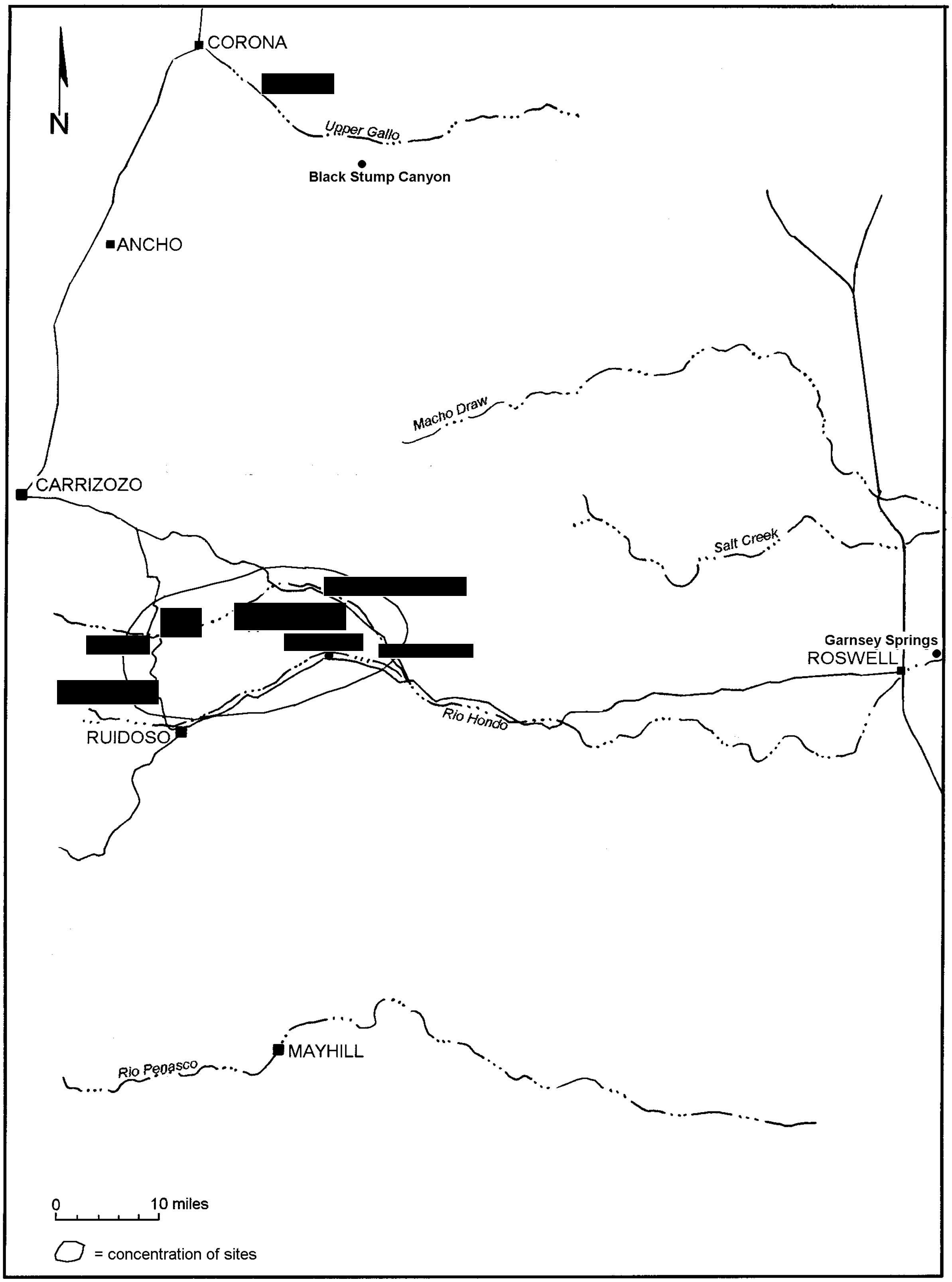


Figure 8. Type IV sites (ca. A.D. 1150-1225) with the addition of Ramos Polychrome, Playas Red Incised, St. Johns Polychrome, Mesa Verde Black-on-white, Galisteo Black-on-white, Santa Fe Black-on-white, and Corona Corrugated.

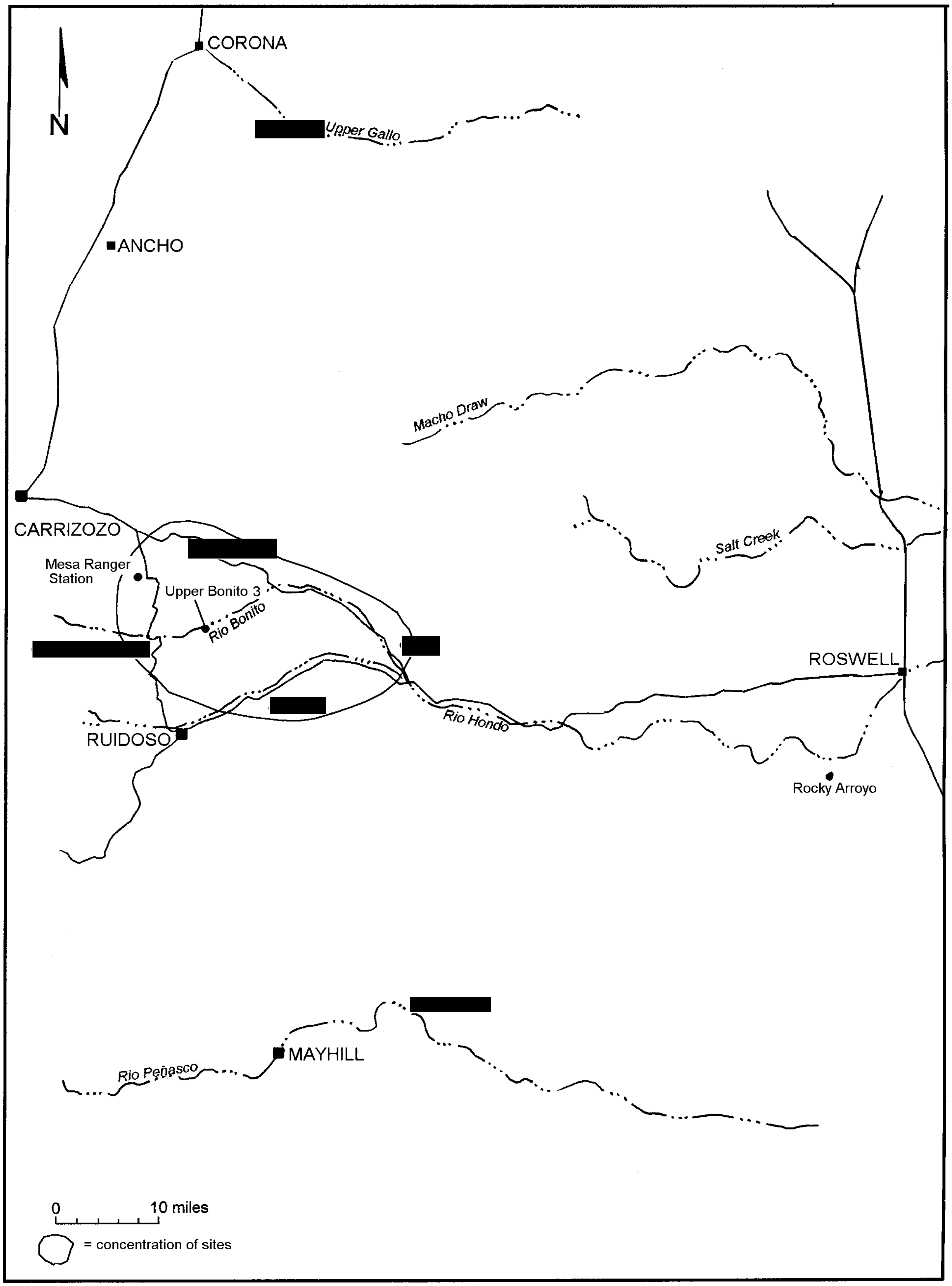


Figure 9. Type V sites (ca. A.D. 1275-1300) with the addition of Heshotauthla Glaze Polychrome and Lincoln Black-on-red.

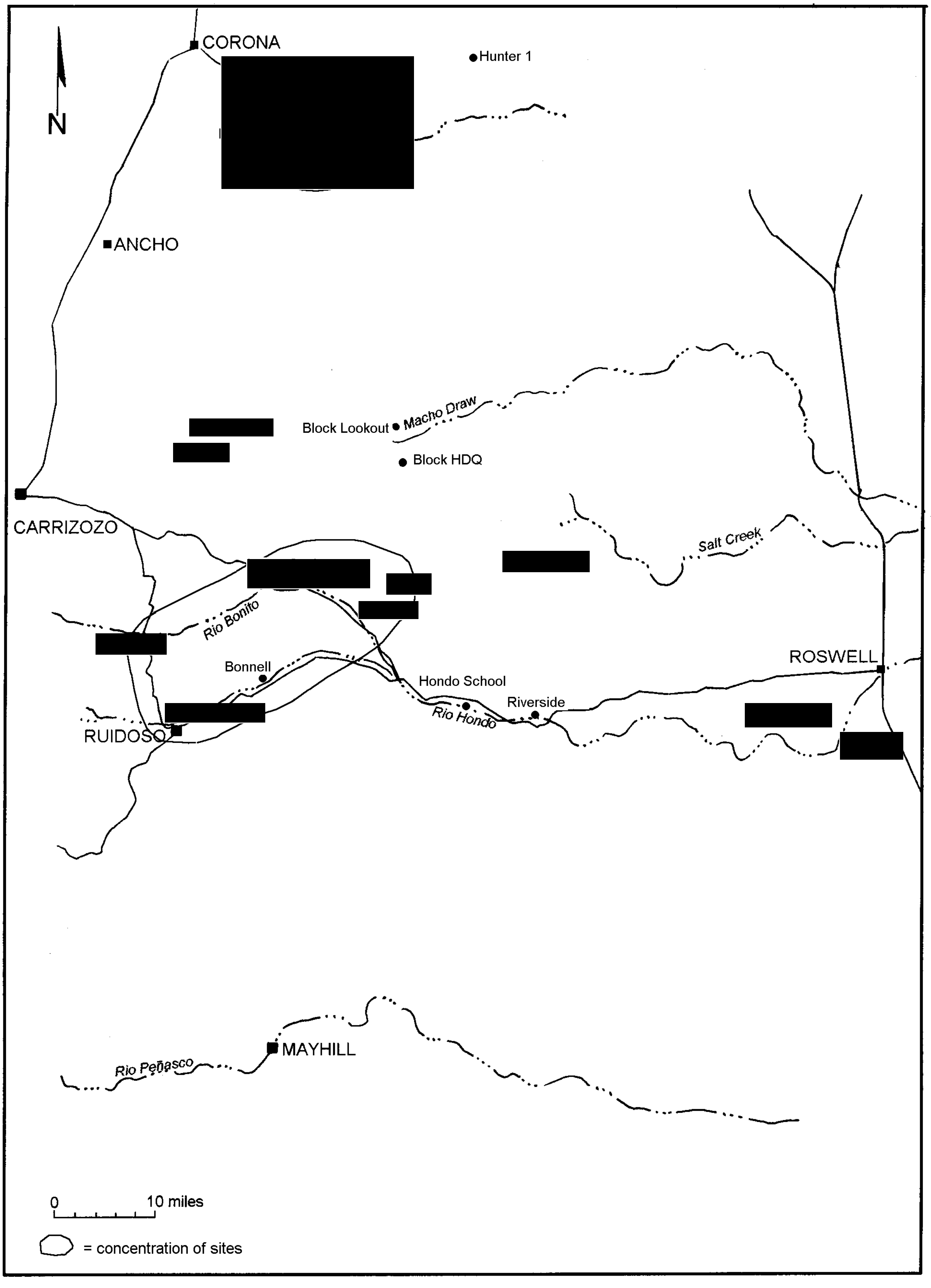


Figure 10. Type VI sites (ca. A.D. 1315+) with the addition of Rio Grande Glaze I.

The final ceramic category (Type VI) includes sites where Rio Grande Glaze I (or A) sherds appear (Fig. 10) at ca. A.D. 1315 or later. Glaze I is never a dominant presence but it is an excellent temporal marker. Its derivation is the Rio Grande Valley to the north. There are 24 sites in this classification, quite an increase from the previous period. It is clear that the Peñasco Valley is definitely abandoned by this time. Remaining sites are widely dispersed with major areas in the Rio Bonito Valley and Corona area. Some might suggest that there have been more of these late sites found because of their usually larger size and greater visibility. However, these are the same site areas previously surveyed where earlier sites have been recorded, there just does not seem to be as many early sites. So it appears we may be seeing evidence of site expansion in the Sierra Blancas.

Sites are mostly identified as Lincoln phase by Kelley (1984) and other researchers. Locations are scattered throughout the region, however. The architecture is any combination of pithouses, surface rooms, masonry walls, adobe walls, slab outlines, jacals, and plaza areas. Masonry rooms and plazas are new architectural features found at this time and one could speculate about the co-arrival of Rio Grande ceramics and masonry rooms at the same time, much as Cibola White Wares and masonry rooms show up together in the Mogollon Highlands (Oakes 1999). The architecture is a true hodgepodge as Kelley (1984) states, with no geographical pattern to the various styles.

The Rio Bonito Valley and the Corona area have strong occupations during this last period of utilization of the Sierra Blanca region. In fact, Ryberg 3, near Corona, also contains some late Glaze III sherds and may prove to be the last large site occupied in the region. This would also suggest that the Corona vicinity was the last area to be abandoned.

Brown Ware Geography

A major characteristic of the Glencoe phase is supposed to be the dominance of Jornada Brown Ware sherds (Kelley 1984). However, we suggest that Jornada Brown Ware is not limited to south of the Rio Bonito within what is considered the Glencoe area, but rather is ubiquitous throughout the Sierra Blanca region. Likewise, there is a question as to whether El Paso Polychrome and Corona Corrugated occur mainly in the northern area. To examine these premises, we simply looked at frequencies of brownwares and utility wares on sites to determine their relative percentages and then plotted those sites by their highest frequencies on base maps of the region.

Jornada Brown sherds are dominant on a broad number of sites from the Peñasco Valley to Corona to Roswell (Fig. 11). There does not seem to be any limitations on the dispersal of this popular ware. Its presence in the Corona area is particularly noted because this is the area that was supposed to have been dominated by El Paso Polychrome and Corona Corrugated. In Figure 12, the Corona area does show a clustering of these later utility types; however, Jornada Brown seems the more common in the area for earlier sites. Also, it can be seen in Figure 12 that El Paso Polychrome and Corona Corrugated ceramics *are* mainly in the north, but not exclusively–also reaching into the Peñasco Valley and the Roswell area.

Therefore, while the later utility wares are more prevalent in the northern Corona area, they are present to some degree in all locales. Also, it may be concluded that Jornada Brown Wares are common throughout the entire Sierra Blanca region and are not limited to the southern area and to the Glencoe phase. In sum, there is no line of demarcation for Jornada Brown Wares and only a vague one for later utility wares.

Upright Slab Ubiquity

A hallmark of the Corona phase and on into the Lincoln phase is the presence of upright slab-outlined features (Kelley 1984). Because the Corona phase is thought to occur only in the northern part of the Sierra Blanca region, we decided to site check slab feature locations to determine whether or not their inclusion in the Corona phase was warranted. Again, we plotted all sites of all time periods with upright slabs onto a base map of the area (Fig. 13). Results indicate that such features do concentrate in the northern region but also extend south to the Rio Bonito Valley and even further to Bent and the Peñasco Valley. It would be, therefore, somewhat misleading to say that upright slab features occur only on Corona/Lincoln sites. And, it should be noted that, frequently, Corona phase sites do not have upright slabs. The earliest appearance of such features is at Los Tablas in the Capitan Mountains, probably post-A.D. 1000.

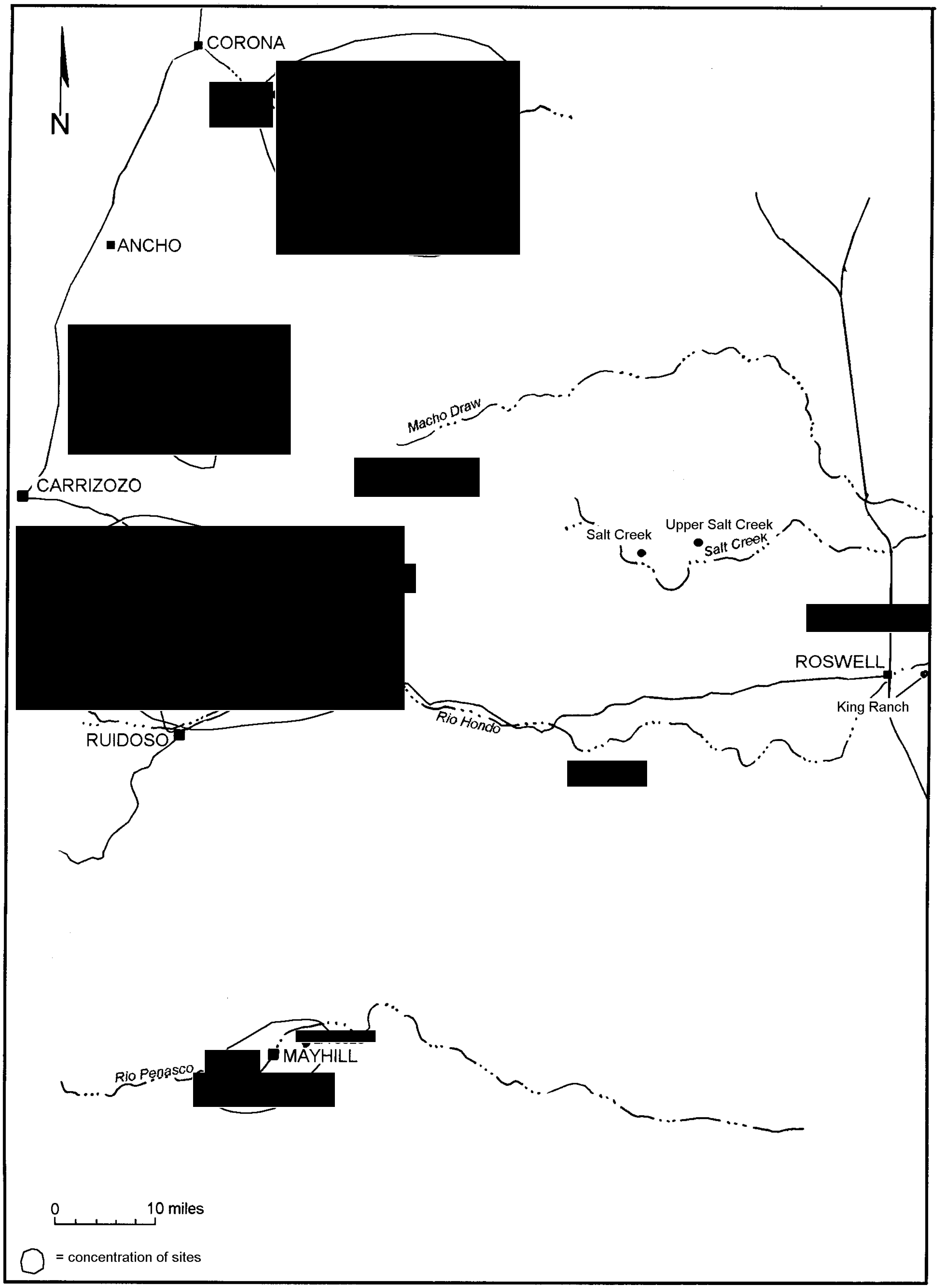


Figure 11. Jornada Brown Ware sites.

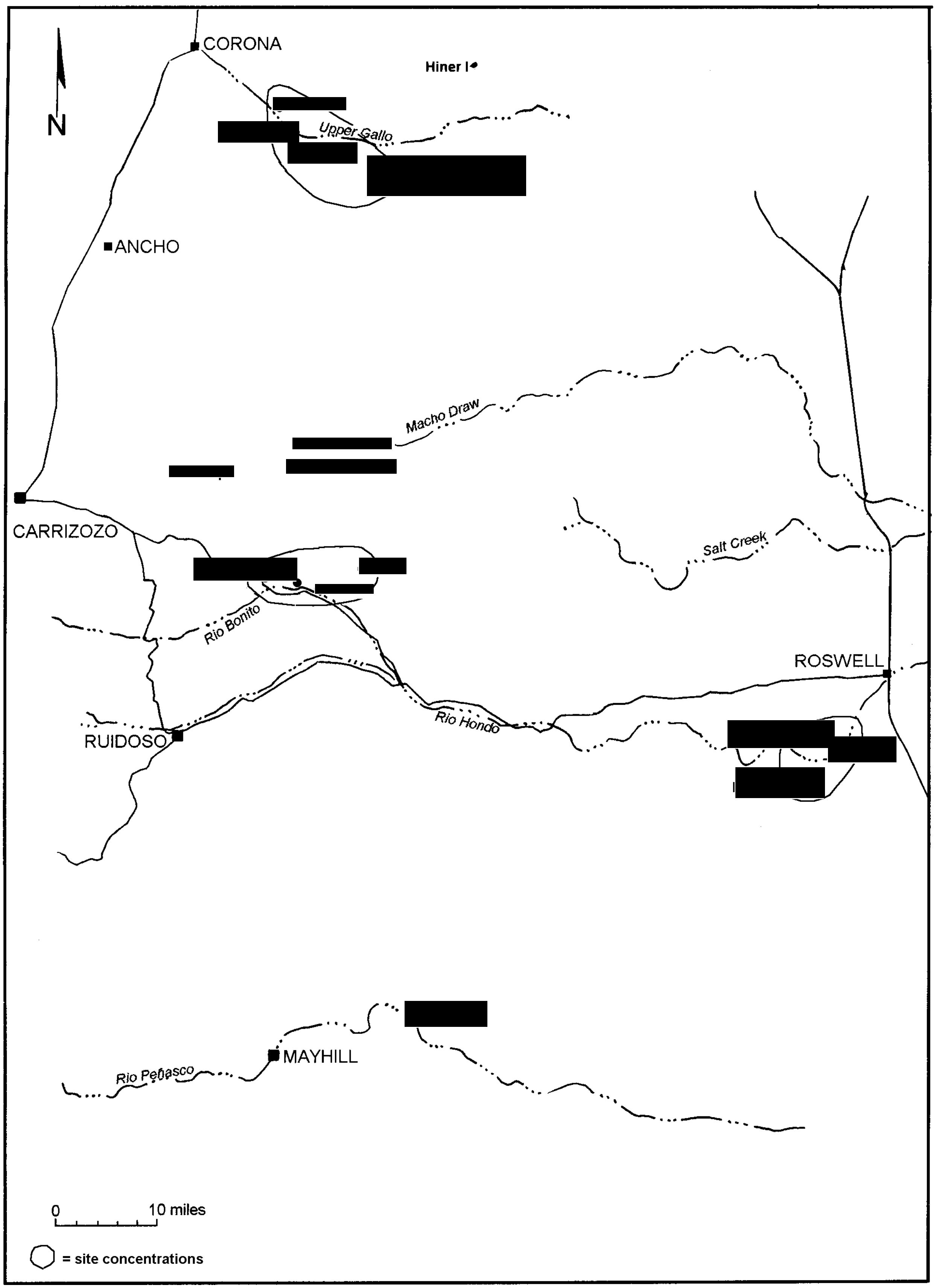


Figure 12. El Paso Polychrome and Corona Corrugated sites.

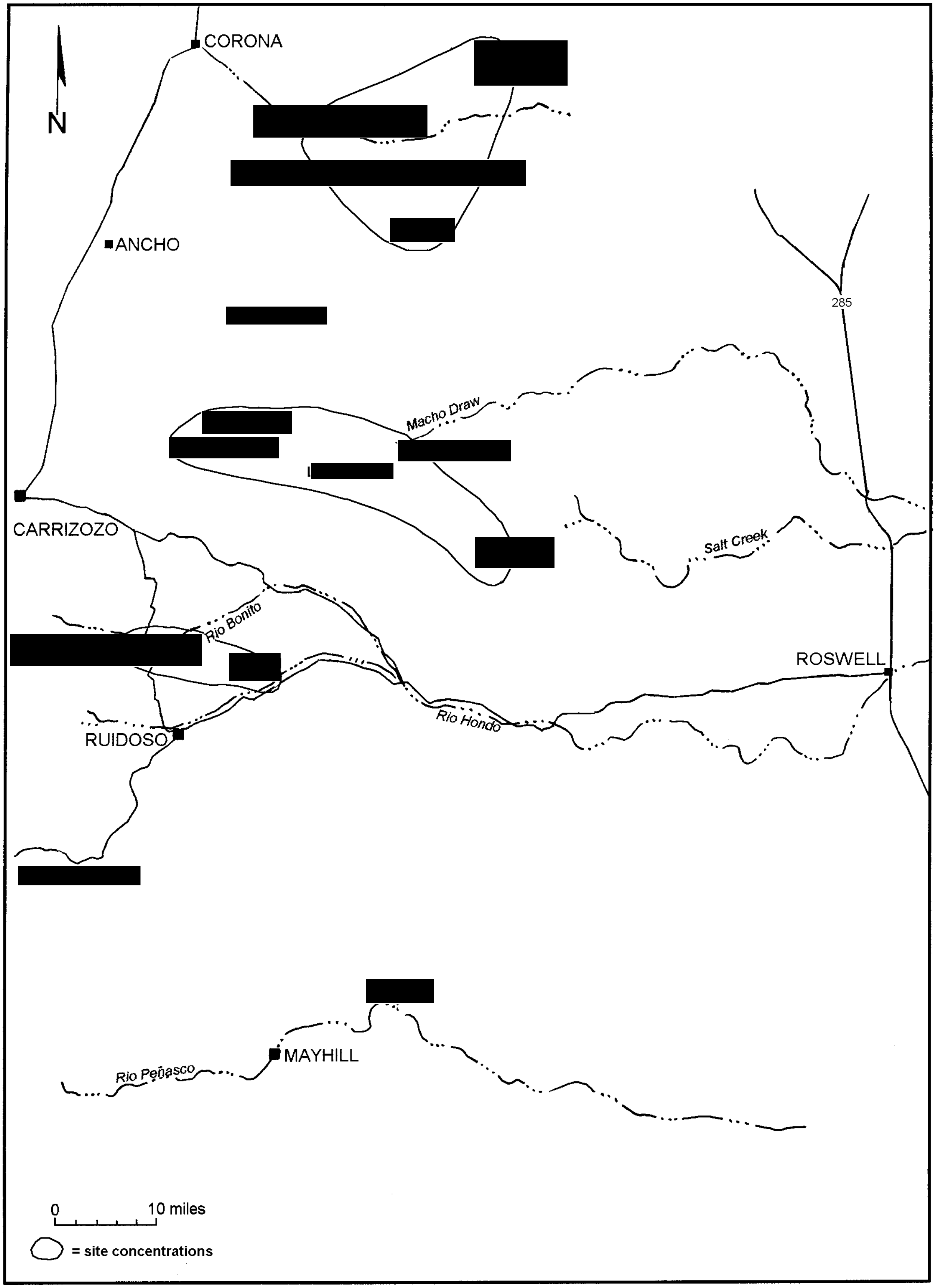


Figure 13. Sites with upright slabs.

Conclusions

The findings reached through this evaluation seem to indicate that there are some problems with the current classification scheme used today in the Sierra Blanca region. Our research, using updated revisions to the site data base, reveals that the breakdown of phases into geographic zones is somewhat ambiguous and creates a potentially serious problem for cultural interpretation. Overlapping of current phases, attendant ceramics, and their boundaries occurs in every zone, and phase locations do not always correlate with ceramic or time sequences. Most of our effort was concentrated on looking at sites free of their location or temporal limitations. This was accomplished through devising a working ceramic sequence for the region into which all usable site data was placed. Phase designations were not used. This type of system, rather than one that is based on location, is similar to what is in place today in other areas of New Mexico. Periods are defined by ceramic sequences with some necessary attention to architectural correlates. We suggest that some systematic classification similar to this be employed for the Sierra Blanca region.

Previous Work in the Area

Dorothy A. Zamora

Most of the archaeological work conducted within the study area has consisted of limited surveys. Excavations have been few. The most recent are those by OAS at the Angus and Little Creek sites and Hard and Nickels's (1994) test excavations at the Tortolita Canyon site near Nogal, which is not far from the Angus site. Recently, Desert West Archaeological Services excavated a site in Ruidoso at the location of the new post office. Farwell et al. (1992), Kelley (1984), Noyes (1988), and Vierra and Lancaster (1987) are others that have done excavations within the area.

The most recent surveys within the near vicinity of the Little Creek site were by Higgins (1984) and Dunham (1980) on the Fort Stanton Mesa for the Sierra Blanca Airport. The Lincoln National Forest has also surveyed several areas not far from the Angus site. These sites range from Archaic (5500 B.C. to A.D. 300) to historic (ca. 1845 to present) times. Many of these recorded sites in the Lincoln National Forest are unknown lithic artifact scatters that contain tools and bifaces but no diagnostic artifacts to aid in dating the sites. Many sites in the region were given general dates ranging from A.D. 900 to A.D. 1400, which place them into Kelley's three phases for the area: Glencoe, Corona, and Lincoln. The historic sites are mostly trash scatters, mine shafts, or the Bonito pipeline.

A total of 595 sq miles were site researched around the study area (Appendix 1). Within the ten quadrangles a total of 362 sites have been recorded (Table 5). These sites were then broken down into phases using the Sierra Blanca chronological sequence devised by Kelley (1984). There are a large amount of historic sites (n = 113), which include trash scatters, log cabins, mine shafts, homesteads, railroad beds, and the Bonito pipeline. The second largest category is listed as unknown (n = 71), which includes mostly unknown lithic artifact scatters that contain no diagnostic artifacts in their assemblages. The third listing is categorized as blank (n = 71) where the phase was left blank, although dates were given. A phase can be assigned, however they overlap in some instances making it difficult to place them within phases without some description of the ceramics on the site. Also, many of these sites have been recorded by individuals that are not familiar with the chronology of the area. This includes the sites that are labeled Late Pithouse, PIII, and Anasazi.

There is an overlapping of phases due to the use of both Lehmer's old chronological sequence (1948) and Kelley's (1984) redefined sequence for the Sierra Blanca area. The Capitan, Three Rivers, and San Andres phases are obsolete and are not used any more (Wiseman, pers.comm. 2000). Because of this, sites with any of the above phases were combined into the Sierra Blanca sequence, thus eliminating these phases.

Most of the excavated sites have been placed within the Glencoe phase. These include the Bonnell site excavated by Kelley (1984) and all of Farwell et al.'s (1992) sites, which date to the late portion of the Glencoe phase between A.D. 1150 and A.D. 1350. The two large sites excavated by Farwell et al. (1992) were Crockett Canyon (LA 2315) and the Filingin site (LA 16297). Crockett Canyon consisted of a pithouse village with an above-ground component. The archaeomagnetic date from Pithouse A was A.D. 1200 ± 16, which is consistent with the ceramic seriation. The Filingin site also consisted of pithouses with storage rooms. Ceramic cross-dating dated this site between A.D. 1150 and A. D. 1300; there was no other chronological source for dating the site.

Table 5. Recorded Sites and Quadrangles

PHASE	QUADRANGLES										TOTAL
	Angus	San Patricio	Lincoln	Fort Stanton	Ruidoso	Ruidoso Downs	Church Mountain	Nogal Peak	Capitan	Nogal	
Paleoindian										1	1
Archaic	2			1	1		1	2	1	1	9
Glencoe	9	1	3	4	4	2	-	-	-	9	32
Corona	-	1	3	-	1	-	-	-	-	5	10
Lincoln	3	2	1	-	7	-	-	-	4	9	26
P II	-	-	-	1	-	-	-	-	1	-	2
Late Pithouse	-	-	-	-	-	-	-	-	1	-	1
Anasazi	-	-	-	-	-	-	1	-	-	-	1
Apache	-	-	-	-	5	7	-	-	-	-	12
Historic	21	2	3	12	15	5	5	17	9	24	113
Unknown	7	-	2	26	14	14	6	5	10	-	84
Blank	10	1	-	5	7	6	-	-	1	41	71
TOTAL	52	7	12	49	54	34	13	24	27	90	362

The nearby small prehistoric sites consisted of a lithic and ceramic artifact scatter (LA 16300, Sikes site), a small portion of a possible pithouse village (LA 18436, Franklin site), and a pithouse site (LA 702, Nelson site). The Sikes site had no features; however, an infant burial was recovered. Ceramics recovered suggest a Glencoe phase occupation. The Franklin site consisted of two collared hearths on a possible living surface; however, no other methods of dating were mentioned except for the ceramics present on the site that places it within the Glencoe phase. The Nelson site was first recorded in 1941 by W. S. Stallings. It consists of several pithouses; however, Farwell et al. (1992) were restricted to the existing highway right-of-way leaving only a small portion of the site to investigate. Ceramic seriation places the Nelson site within the Glencoe phase at A.D. 1150 to A.D. 1300.

The Rio Bonito site excavated by Vierra and Lancaster (1987) is located along U.S. 380 and is on the eastern bank of the Rio Bonito. The site consisted of a pithouse that produced ^{14}C dates ranging between A.D. 900 and A.D. 1120, placing the site during the early Glencoe phase. Hard and Nickels's (1994) test excavations at the Tortolita Canyon site, located approximately 6 miles northwest of the Angus site, produced ^{14}C dates of A.D. 850 to A.D. 970 and A.D. 1190 to A.D. 1260, suggesting the site was occupied during the middle Glencoe phase.

Although there are a large number of sites recorded it is obvious that a limited amount of archaeological excavation has been conducted in this area. There needs to be some improvement in assigning cultural phases for the sites in this area, NMCRIS files need to be updated, and sites placed in the current chronological phases, making it easier for future researchers. Persons working in the area should know the chronological sequence for the area and this means knowing the ceramics that play a large role in identifying these sites. However, the previous section, Cultural Associations in the Sierra Blanca Region, offers a new method of looking at the often difficult chronological phases.

THE ANGUS SITE
(LA 3334)

Dorothy A. Zamora and Yvonne R. Oakes

Introduction

The Angus site is a late prehistoric settlement located along the banks of the Rio Bonito. It consists of five pueblo rooms, a large kiva, ramada area with associated hearths, two pit structures, and an outside storage pit. In 1956, the site was first excavated by Stewart Peckham who dug the kiva and portions of several rooms prior to the paving of NM 48. No report was produced; however, the ceramics were analyzed and will be discussed later. Notes from Peckham's excavations are used for comparative data in this report. The large rectangular kiva, excavated by Peckham (1956), was reexcavated by OAS personnel and included the hearth and one elongated pit within the structure. The site consists of seven major areas found during the excavation by OAS (Fig. 14).

A total of 29,769 artifacts were recovered from LA 3334 (Table 6). Of these, 58.9 percent or 17,563 were randomly selected for analysis except for formal tools, which were all analyzed. Selection was limited by whether or not cultural features were present in an area. Ceramics constitute the majority of artifacts (72.8 percent).

A total of 21 archaeological sites are present within a 4-sq-mile radius (25.7 km) of the Angus site. Eight of these sites were excavated in the late 1970s by Farwell et al. (1992). The rest of the sites were recorded during survey by Kelley (1984) and Lincoln National Forest personnel. There are seven Glencoe phase sites recorded within the area and all except one were excavated for the widening and paving of NM 37 in 1979 (Farwell et al. 1992).

Site Setting

Peckham's (1956) description of the Angus site is as follows: "The main part of the site is in an old orchard and is now partly overgrown with live oak. The site is actually on an alluvial fan from an arroyo which during the raining season empties into the Bonito. On the slopes above the site, the trees are mostly juniper and piñon with a scattering of pine. While closer to the river cottonwood is found. . . . Sherds were abundant on the surface as were chipped tools and occasional manos and large metate fragments."

The site is located where NM 37 intersects into NM 48 at an elevation of 2,088 (6,850 ft). It is situated in an abandoned pear orchard on the north bank of the Rio Bonito (Fig. 15). Not much has changed since 1956 except some of the site has been covered over by the two roads and the vegetation is a little more dense.

The site is 33.5-by-397.4 m covering a total of 13,313 sq m with approximately 90 percent of the site being within the existing highway right-of-way. It is surrounded by the Sierra Blanca Mountains to the southwest, the Capitan Mountains to the northeast, and the Carrizo Peak to the north. The Rio Bonito is immediately south of the Angus site at approximately 20 m. A small portion of the site is situated within private property owned by the Nazarene church in Angus, which is now a park used by church groups. The vegetation has not changed very much since 1956; however, it is now overgrown by wild roses, modern weeds, and grasses.

Research Objectives
(adapted from Oakes 1998)

Since very little work has been done in this area, our main objectives were (1) chronometric placement of the site, (2) determination of site function, and (3) understanding subsistence adaptation. Correct placement of the site within a regional settlement system is important for understanding temporal distinctions in ceramic usage, development of trade, fluctuation in subsistence resources, and general systemic change through time. Brown wares dominate the ceramic assemblages at most sites in south-central New Mexico and are often too broadly dated to accurately assign a site to a tight diachronic sequence. Because of this, sites may be broadly dated from A.D. 450 to A.D. 1400 in the Sierra Blanca region. Beginning phase dates are often not tied down with solid chronometric data and may overlap each other.

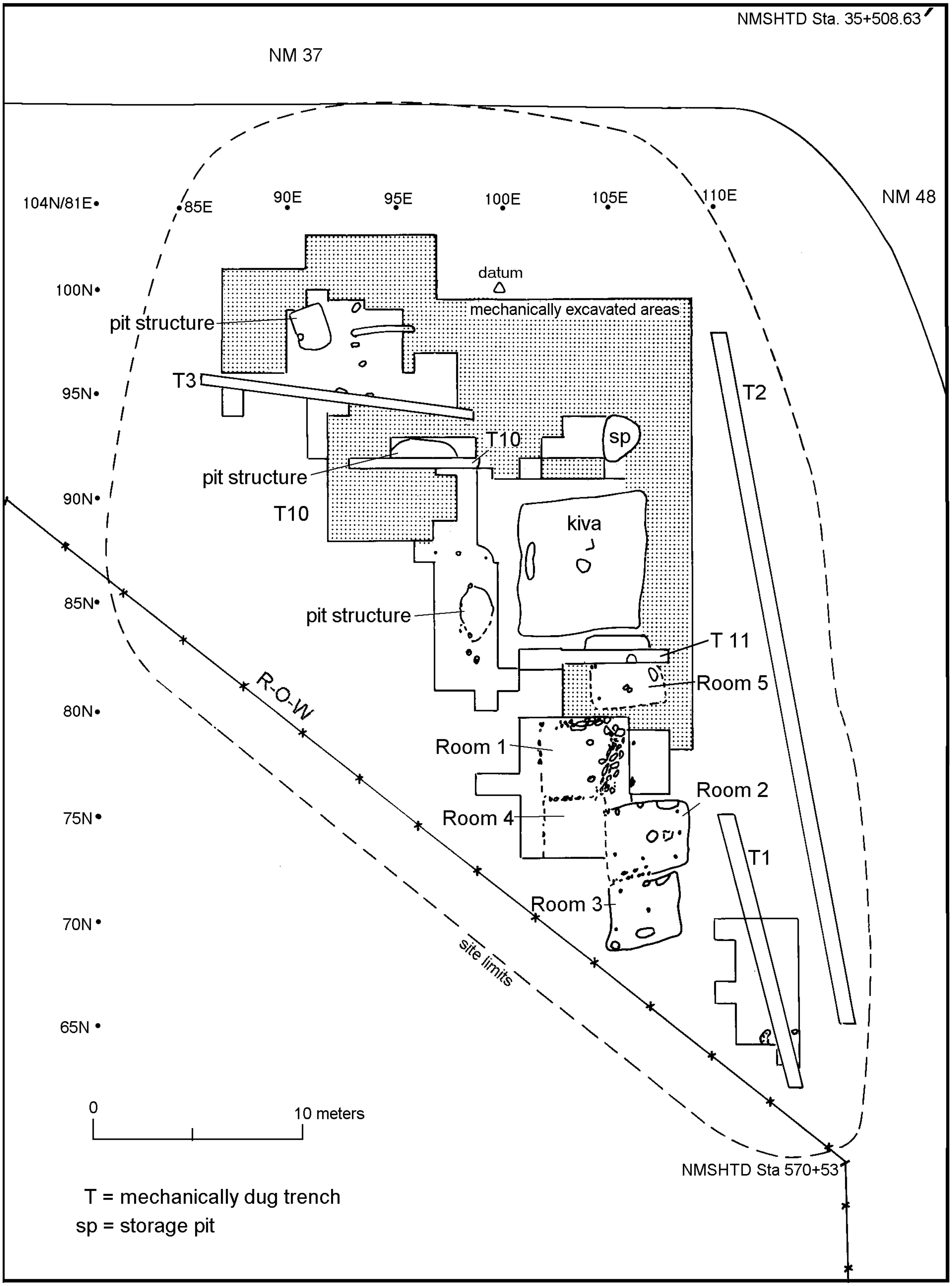


Figure 14. LA 3334 site map.

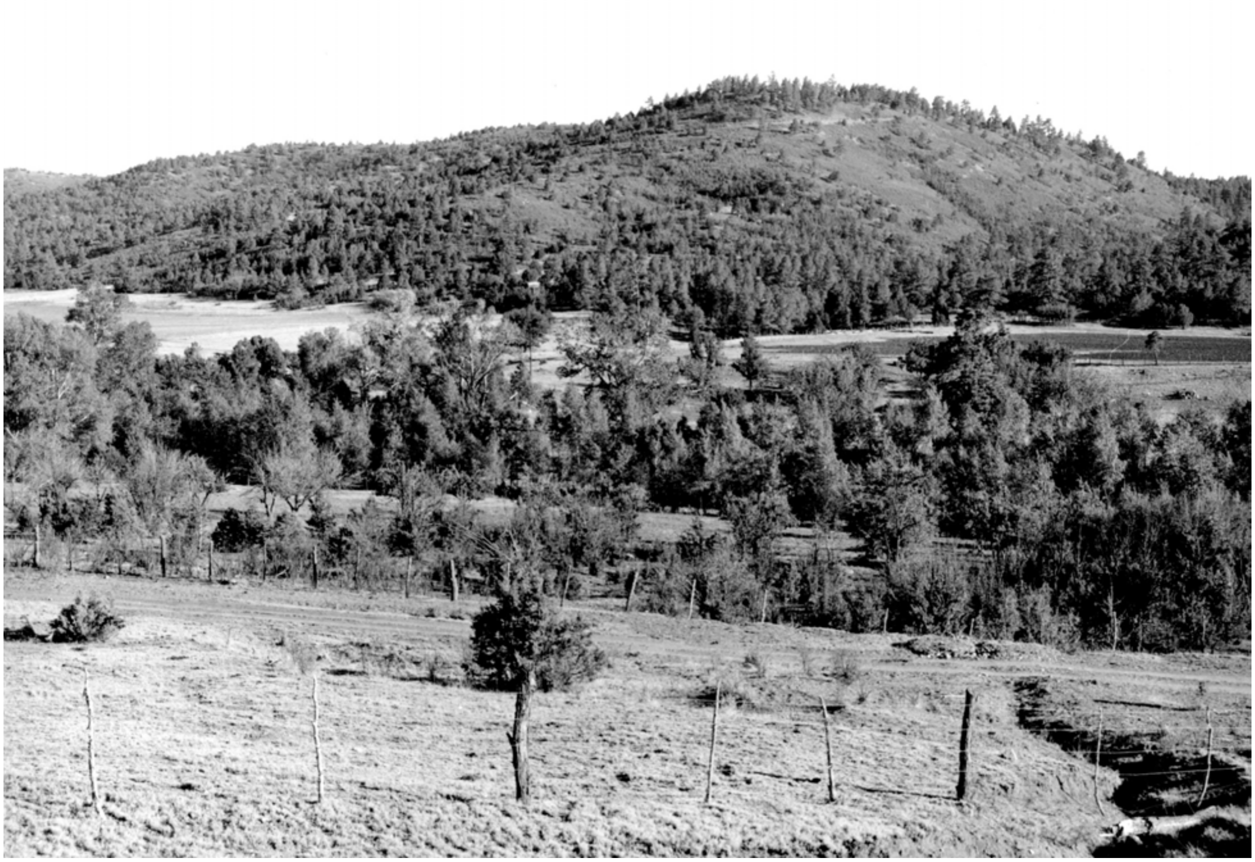


Figure 15. Location of LA 3334 with NM 37 between fence lines looking southeast. Photo taken by Peckham in 1956. (Courtesy of Museum of New Mexico, Laboratory of Anthropology negative #2.)

Sites in the area have produced only eight absolute dates: five from dendrochronological dates from Kelley's Rio Bonito work (1984), one from a Rio Bonito pueblo, and two archaeomagnetic dates from Farwell et al.'s (1992) excavations. Most of the dates derived for the Sierra Blanca area are from ceramic cross-dating. But because painted and white wares do evolve systematically, they provided a basis for chronometric site placement on this project. Architectural features as well as extramural features are present on the site and provided both charcoal and burned surfaces for radiocarbon and archaeomagnetic samples.

Site function was determined by type of artifacts and structures present, as well as the range of activities represented. Subsistence items such as floral and faunal species utilized, inform somewhat on availability of resources, their seasonality of use, and degree of processing. Types of existing features also aided in determining site function. Questions asked included, are there walled units for habitation with ancillary hearths, storage pits, and roasting ovens? Are the hearths interior or exterior to the rooms? Also, the analysis of structural diversity on other areal sites was used to reflect potential mobility strategies of site occupants. Expedient investment in labor in dwellings, hearths, and storage facilities should be indicative of a more mobile adaptation. Also, the types and amount of artifact debris can be used to determined what activities were carried out and for how long the site was occupied, based on amounts of debris accumulated (Varien and Mills 1997); however; there were no middens and only a run-off-induced trash area.

Length of occupation is critical when assessing activities that occurred on the site. Intensity of investment in architectural construction, variety and amount of ceramics, and multiplicity of lithic artifact types were examined in this regard.

Macrobotanical and palynological remains are the key to understanding subsistence utilization on the site. Flotation and pollen samples were taken from all obtainable cultural features. Comparing

Table 6. Recovered Artifacts from LA 3334

AREA	CERAMICS	LITHICS	BONE	BONE TOOL	GROUND STONE	MANOS	METATES	PROJECTILE POINTS	SHELL	MISCELL
Surface	76	62	1	1	1	6	2	1 (1)	1 (1)	
100	18 (18)	7	1				1 (1)			
200	335	22	2		1 (1)			2 (2)	1 (1)	
300	120 (1)	28	22 (22)	1 (1)	2 (2)	5 (5)	2 (2)	1 (1)		
1000	6378 (3375)	1498 (657)	90		1 (1)	1 (1)	1 (1)	5 (5)	5 (5)	1 (1)
2000	431 (352)	246 (185)	36					1 (1)	1 (1)	1 (1)
3000	4791 (2800)	1850 (614)	645 (645)	5 (5)	7 (7)	19 (19)	1 (1)	18 (18)	3 (3)	6 (6)
4000	115 (9)	25 (2)	7						1 (1)	
5000	1484 (815)	550 (346)	124 (43)	2 (2)	8 (8)	3 (3)		5 (5)	9 (9)	7 (7)
7000	3670 (1996)	566 (524)	142 (107)	4 (4)	1 (1)	2 (2)		2 (2)	4 (4)	22 (22)
7200	1635 (1204)	496 (372)	137 (115)	1 (1)	3 (3)	7 (7)	1 (1)	1 (1)	2 (2)	
7400	26									
7500	38	7	1 (1)					1 (1)		
7600	116 (36)	7 (7)	17 (17)	1 (1)			2 (2)			
7900	989 (989)	363 (243)	41 (19)		3 (3)	2 (2)		1 (1)		
8000	1471 (1132)	739 (590)	70 (61)		9 (9)	4 (4)	4 (4)	1 (1)		
TOTAL	21,693 (12,727)	6,466(3,540)	1,336(1,030)	15 (4)	36 (35)	47 (43)	14 (12)	39 (39)	27 (27)	37 (37)

these data and other excavated sites in the vicinity (Kelley 1984; Farwell et al. 1992) provided some characterization of adaptations through time. The morphology of ground stone implements and their relative abundance was compared with Hard's (1990) model of changing form and function through time as related to dependency on agriculture. Also of interest is whether or not site occupants relied solely on local resources or traded for subsistence goods with other areas.

There is evidence of agricultural dependency at the Angus site based on recovery of corn kernels found in the fill of the rooms and surrounding areas during testing. This degree of dependency on agriculture was explored.

Field Methods

A primary datum was established before work began. Trees and brush were cleared to expose the site before mechanical equipment was used. With the aid of mechanical equipment all of the backdirt and the tree stumps remaining from Peckham's excavations were removed. The portion of the site within the existing highway right-of-way was then scraped down approximately 10 cm. The scraping revealed burned oxidized soil in some areas, which generally indicated the presence of rooms. After the removal of dirt by mechanical means was completed, a series of five mechanical trenches were additionally placed on the site (Fig. 16) to assist in locating subsurface features. After the trenching was completed, north-south and east-west baselines were established. A 1-by-1- m grid system was laid over the site and each unit was given a north and east designation. Profiles of each trench were drawn; if there were no features present and the stratigraphy was the same throughout the length of the trench, only a 2-m segment was drawn. Where features were present in the profile, the whole feature was drawn.

After each trench and burned area was examined, excavation areas were assigned (Table 7). Hand tools such as trowels, shovels, picks, brushes, and dental tools were used during the excavation. Each unit was excavated in natural stratified levels; however, if the cultural fill was over 20-cm thick then it was excavated in 20-cm levels for better vertical control. All the soil was screened through a ¼-inch wire hardware cloth. The artifacts collected were bagged by artifact type with all proveniencing information noted, then a catalogue number was assigned.

Table 7. Assigned Feature Areas at the Angus Site

EXCAVATION AREA	FEATURES	SUBDATUM
100	Kiva with interior features	A
200	possible pit structure	F
300	Exterior storage pit	A
1000	remnants of structural walls	C
3000 to 5000	pit structure, storage pits, hearths, use surface	A and B
7000	4 rooms, possibly 5	D and G
7500	possible jacal	G
8000	pit structure, hearths, and ramada	F

Levels were assigned in order to keep materials separate by feature.

Level 1:	General fill	These are the areas where no features were found and includes the modern top soil over the features.
Level 2:	Feature fill	Fill within the rooms, pit structures, outside storage pits, and jacal structures.
Level 3:	Roof fall	The portion of the structural fill that contained roof remains.
Level 4:	Floor	Floor level of the living structures and jacal areas.
Level 5:	Subfloor	Any floor feature that has been dug below the floor level.

When features were encountered, a preexcavation plan was drawn and photographs taken. Then the feature was excavated by halves to expose the stratigraphic layering. A soil profile was taken only if there were stratigraphic breaks present. The soil from the unexcavated portion of hearths and storage pits was then collected for flotation samples,

Figure 16. Trench 3 placed along the eastern edge of LA 3334.

and if the feature was not burned, a pollen sample was collected as well. ^{14}C samples were collected from every feature that contained burned wood. Several archaeomagnetic samples from hearths and any heavily oxidized soil were also collected. After all the features were excavated, a plan and profile were drawn and another photograph was taken.

A total of 212 sq m of soil was removed by hand, 713 sq m by mechanical trenching (54.9 cubic m), and 92 sq m (41.4 cubic m) by mechanical scraping. Mean depth of the excavations was .59 m with a maximum depth of 1.62 m. Backhoe trenches reached a maximum of 1.53 m depth with a mean of 1.00 m. In all, 413.3 sq m (222.8 cubic m) of soil was excavated on the site.

LA 3334, the Angus site, consists of seven discrete areas, plus the kiva excavated in 1956. The site contained at least four and possibly five rooms (Area 7000-7900), two pit structures (Areas 5000 and 8000), an exterior surface (Area 3000), and areas of outside activity (200, 300, 7000, and 8000) with features such as hearths and storage pits (Fig. 17). It is worth mentioning that because of monetary and time constraints, the artifacts from the site were randomly sampled and analyzed. Because of this, the counts given will reflect only the analyzed artifacts, unless otherwise specified.

Kiva (Area 100)

The kiva as mentioned earlier was excavated by Peckham in 1956 (Fig. 18). It was reexcavated by OAS during this project (Fig. 19). Peckham describes it as being a rectangular structure dug into the natural sandy clay with an average depth of 2.2 ft (0.67 m) with no traces of the walls being above the ground surface (Peckham 1956). When the kiva was excavated again by OAS, the average depth was 0.63 m (2.0 ft), a very slight difference from the previous excavation.

Stratigraphy

There is no mention in Peckham’s notes about backfilling the kiva; however, there was no evidence of layering present within the kiva that would be expected from soils washing into the feature over time. It may have been left open. It was believed that the berm of dirt around the kiva prior to our excavations was from the 1956 excavations. The fill

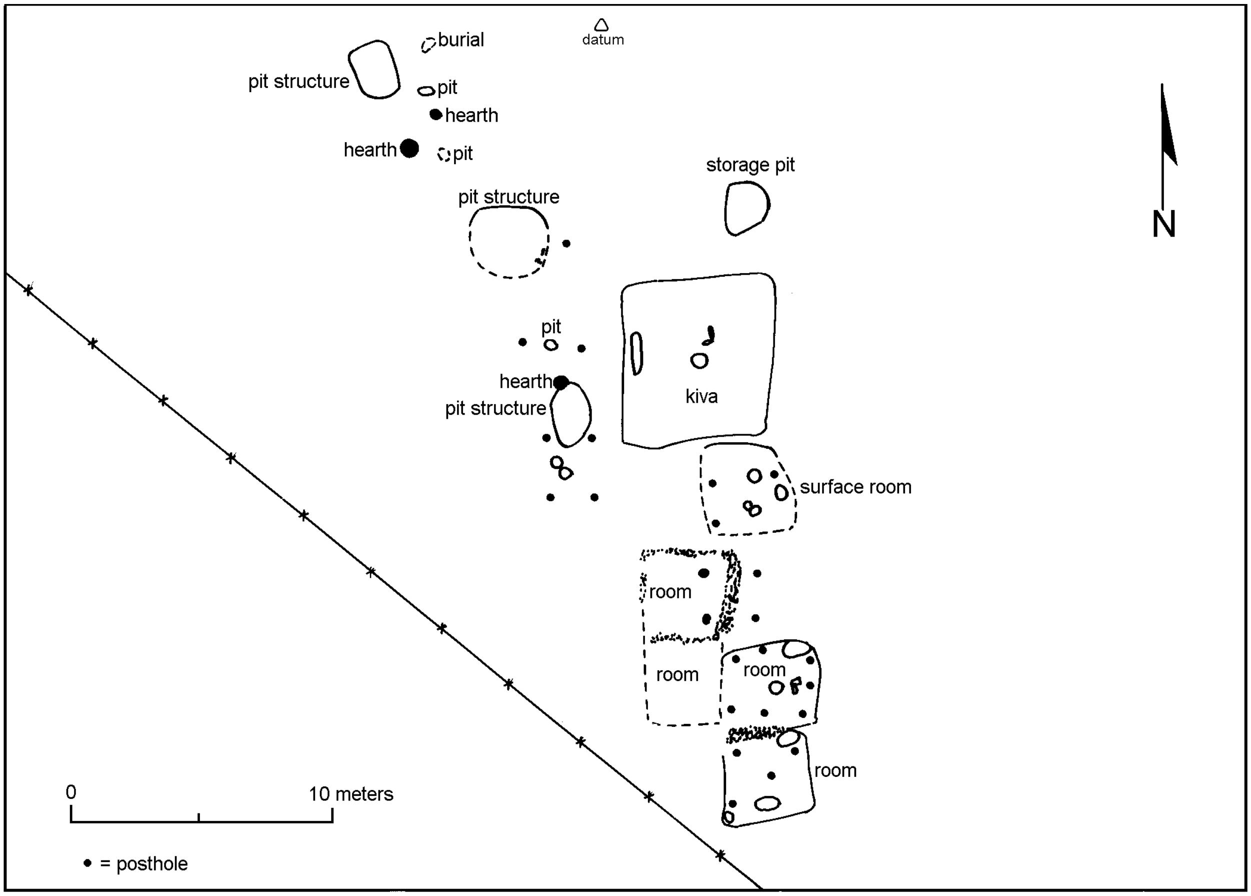


Figure 17. Cultural features at LA 3334.

of the structure was a sandy, brown clay, 10YR 5/3 on the Munsell color chart.

Peckham's notes comment that there was no evidence of a roof aside from the few timber fragments found in the fill. However, several large, rocker-type manos were found in the fill 1 ft above the floor (Peckham 1956). During our excavations the fill of the kiva was sterile, indicating it had undergone previous excavation. Only a few artifacts were found in the upper portion of the fill, probably eroding in from the dirt berm surrounding the kiva.

Architectural Details

Dimensions. The measurements taken from Peckham's excavations and by OAS are somewhat different. However, one has to take into consideration that, because of root and rodent disturbances, we may have not followed the same excavation line as he did. The floor area from Peckham's excavations was 36.9 sq m (397.9 sq ft) and the floor area for OAS was 38.8 sq m (418.0 sq ft; Fig. 20). The dimensions recorded by Peckham were 6.1 m (20.2 ft) by 6.0 m (19.7 ft) and OAS's was 6.3 m (20.0 ft) by 6.4 m (20.9 ft). As stated by Peckham ". . . there was an absence of clearly defined walls." This held true with our excavations.

Walls. The walls appeared much as Peckham describe them. He mentions that there were some areas where plastering was noted; however the re-excavation did not reveal this. He also says that the walls were finished by smoothing. This was evident only along the north wall. No wall features were present.

Table 8 contains the wall measurements as found by Peckham and OAS. There is a slight difference between the two excavations. It possible that we went through the walls in some areas; however, it is very unlikely since we were able to follow the floor once it was found, or perhaps using different measuring tapes may have caused some discrepancy. Peckham did not have any wall heights mentioned in his notes. Measurements from the OAS excavation are in Table 9.

Table 8. Wall Length Measurements from the Kiva at the Angus Site

WALL	PECKHAM EXCAVATIONS (1956)	OAS EXCAVATIONS (1999)
North	5.8 m (19.2 ft)	6.3 m (20.0 ft)
South	6.0 m (19.7 ft)	5.6 m (18.3 ft)
East	6.1 m (20.2 ft)	6.4 m (20.9 ft)
West	5.8 m (19.3 ft)	6.3 m (20.0 ft)

Table 9. Wall Height Measurements from the Kiva

WALL	HEIGHT
North	50 cm to 80 cm
South	30 cm to 45 cm
East	45 cm to 80 cm
West	30 cm to 50 cm

Floor. The floor was a very compact, brown clay with some charcoal staining. Peckham describes the floor as having a thin layer of plastered clay and noticed that the floor had been patched in areas where there was rodent activity. This layer of clay was not present during our excavation of the kiva.

Floor Features. Several floor features were excavated in the kiva by Peckham. These consisted of a central hearth, ash pit, foot drum, an anchor loom, ladder sockets, landing slab or stone step, four postholes, and a sipapu.

Ash Pit: The ash pit is located east of the hearth as seen on Peckham's photograph; however, there are no notes describing it. During the OAS excavations, a feature to the northeast of the hearth was found. It is still not certain if this is Peckham's ash pit or an anomaly. The feature consisted of an adobe rim that seems to have had slabs resting against it forming a squarish feature. It is 50 cm east-west by 35 cm north-south and is very shallow with the adobe standing 15 cm to 20 cm high. Oxidized soil was present around it; however, it is impossible to know if this was Peckham's ash pit.

Hearth: The hearth is circular in shape and measures 70 cm in diameter and is 31 cm deep. It contains an adobe collar around it which is 18 cm wide. The interior of the hearth has been lined with clay and is baked, creating rock-hard sides. The west edge has been disturbed by tree roots as has the bottom. The previous excavation mentions there were traces of an earlier, shallow fire area encircling the hearth, which was 0.73 m (2.4 ft) in diameter and 0.0 4 m (0.15 ft) deep. There is no description of the fill.

Foot Drum: A foot drum located along the west wall was reexcavated. It measured 1.80 m n/s by 0.52 m e/w and was 30 cm deep. The pit was dug into the underlying cobbles. No cultural materials were present. Peckham does not describe this feature.

Ladder Sockets: Two holes between the hearth and the east wall of the kiva were excavated by Peckham. There are no measurements for these features; however, he does mention that a small limestone slab that may have been used for stabilizing the ladder was present.

Landing Slab or Stone Step: Peckham describes this as an oval limestone slab set into the floor a few inches east of the ladder holes probably used as a solid step when climbing down from the ladder. No evidence of this was seen in OAS excavations.

Loom Anchor: This feature was found along the south wall of the kiva by Peckham in 1956. The feature contained a wood base with three holes and was placed in a pit in the floor (Wiseman, pers. comm. 1999). There are no measurements for this feature. However, according to Peckham's map, it is almost as long as the foot drum and a little narrower. Map measurements are difficult to define because there was no scale. It was not reopened.

Postholes: Four postholes were excavated in the kiva during the 1956 excavations. They were located at the four corners of the kiva set in approximately 1.2 m (4 ft) from the walls. Diameters of these postholes are given; however, there are no depths. Posthole 1 (northwest corner) is 0.30 m (1 ft) in diameter, Posthole 2 (northeast corner) is 0.51 m (1.7 ft), Posthole 3 (southwest corner) is 0.42 m (1.4 ft), and Posthole 4 (southeast corner) is 0.45 m (1.5 ft). They were not reopened but their locations were visible as subtle color changes.

Sipapu: The sipapu is a circular hole located on the west side of the hearth and is in alignment with the hearth, ash pit, and foot drum in an east-west orientation. There are no measurements for this feature.

Artifacts. Only a few artifacts were recovered from the kiva during the OAS excavations in 1999. These include two ground cobbles and one unidentified bone fragment. These artifacts probably eroded into the kiva from the backdirt berm formed

Figure 18. 1956 excavation of the kiva (Room 1) looking southwest. (Courtesy of the Museum of New Mexico, Laboratory of Anthropology neg. 4.)

Figure 19. Reexcavation of the kiva, looking northwest.

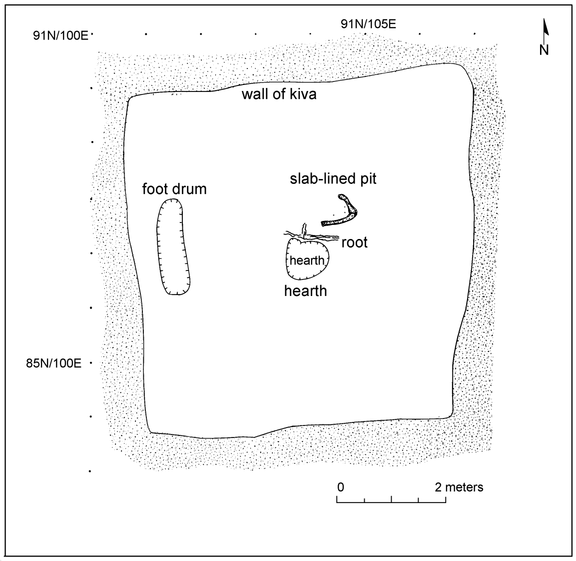


Figure 20. Plan of the kiva.

during Peckham's excavations. Peckham collected a large ceramic assemblage (n = 423) from the kiva and it is listed in Table 10. All of the ceramics from the OAS excavations presumably had washed in and collected in the hearth.

Table 10. Ceramics Recovered from the Kiva

CERAMIC TYPE	Peckham 1956	OAS 1999	TOTAL
Broadline Red-on-terracotta	21		21
Three Rivers Red-on-terracotta	13		13
Indeterminate Red-on-terracotta	6		6
Red-Slipped ware	27		27
Lincoln Black-on-red	21		21
Lincoln Glaze Black-on-red	3		3
Indeterminate Black-on-red	3		3
Glaze I Red	1		1
Corona Corrugated (Capitan Corrugated used by Peckham)	193		193
Ribbed Corrugated	4		4
Alma Neckbanded	1		1
Chupadero Black-on-white	78	4	82
White ware	33		33
Indeterminate Black-on-white	17		17
Gila Polychrome	1		1
Three Rivers Polychrome	1		1
El Paso Brown		1	1
Jornada Brown		13	13
TOTAL	423	18	441

Possible Pit Structure (Area 200)

Prior to excavation of cultural features on the site, the area to the north and west of the kiva was mechanically stripped. After excavations were completed on features found during earlier trenching and in test pits, this area, located near Grid 93N/95E, was trenched (Trench10) and the shallow profile of a possible pit structure was noted in the north wall of the trench. A shallow (5 to 35 cm) depression was traced on the north side (Fig. 21); however, mechanical stripping had removed too much of the already thin cultural fill on the south side of the trench and no remnant of a structure could be found here. No features were located inside of the partial structure and the floor was not burned or stained. One posthole lies approximately 1 m southeast of the unit, but may be associated with a ramada, as found just to the south of here.

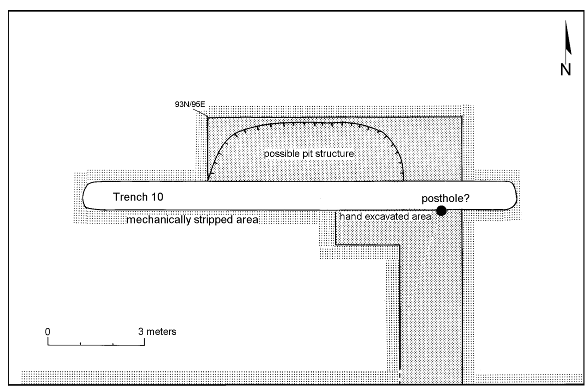


Figure 21. Area 200.

Stratigraphy

The fill of the possible pit structure consisted throughout of a dark, charcoal-filled soil (10YR 4/2, dark gray brown) with some artifacts in it (n = 363).

Architectural Details

Dimensions. This partial pit structure measures 2.1 m east-west by .9+ m north-south, cut by Trench 10. The overall size is at least 1.89 sq m.

Walls. The walls had been scooped out of the sterile clay and slope inward with no wall-to-floor seam.

Floor. The surface, if it is a floor, is unprepared and has simply been dug out of the clay substrate. There was no burning or staining of the floor.

Posthole. A single, probable posthole is located 1 m southeast of the structure. It measures 28-by-29-by-46 cm deep. No artifacts were within the feature.

Artifacts

While 363 artifacts were recovered from the pithouse area, none were directly on the floor.

Ceramics. A total of 335 ceramics were found in Area 200. However, none were submitted for analysis because of the very shallow nature of the feature and the likelihood that the artifacts may have washed into the area from the upslope area to the north.

Lithic Artifacts. Twenty-two lithic items were recovered; however, these were likewise not submitted for analysis. Two projectile points were also found and were analyzed. They consisted of an Archaic-like, medium-sized point and Fresno point, which is unnotched with a concave base.

Ground Stone. One piece of ground stone was recovered and submitted for analysis. It consisted of a small, indeterminate fragment.

Miscellaneous. One analyzed piece of freshwater mussel shell was found in the fill of the pit structure.

Ancillary Studies

Faunal Remains. Two pieces of faunal bone were found but were not analyzed.

<u>Large Storage Pit (Area 300)</u>

Area 300 is located immediately to the northeast of the kiva. It was discovered during mechanical scraping of the site surface. Two manos (two-hand types) were first found on an exterior utilized surface along with some burned oxidized soil concentrated in a large area. After the mechanical scraping, the area was staked in 1-by-1-m grids and a subdatum was established. The area where the burned soil was present was then stripped by hand to expose its limits. Once the outline was exposed, a grid was taken down in 20-cm arbitrary levels until the bottom of the feature was found. Then grids were expanded until the edges of the pit were exposed. Once these walls and floor were found, excavation continued until the pit was completely excavated. Several artifacts such as ceramics, lithic artifacts, a projectile point, ground stone, a charred corn cob, and a bone awl were recovered from this large pit. ^{14}C, pollen, and flotation samples were also collected.

Stratigraphy

The fill of the pit consisted of a yellowish brown clay (Munsel l 10YR 5/4) containing rocks and artifacts. The upper 40 cm was very hard and difficult to excavate, possibly because of previous vehicular traffic and deposits of road debris. The first grid unit was taken down in 20-cm increments to the floor to expose the profile in order to continue excavation of the feature in natural levels; however, no breaks were found and the removal of the fill continued in 20-cm arbitrary levels.

Two levels were identified in Area 300, these included Level 1 (general fill) and Level 2 (feature fill). General fill was the fill removed above the storage pit to find the outline. The fill within the pit was labeled feature fill.

Architectural Details

Dimensions. This large storage pit is D-shaped (Figs. 22 and 23) and has been dug into the sterile red clay (Munsell color 2.5YR 5/6). It measures 1.80 m north-south by 1.39 m east-west and is 1.31 m deep covering a floor area of 2.5 sq m.

Walls. The walls of the pit are unprepared, natural red sterile clay. Rodent burrowing is noticeable in the walls.

Floor. The floor, like the walls, are of unprepared, natural red clay. There is plenty of rodent and root activity present, causing the floor to be missing in several small areas.

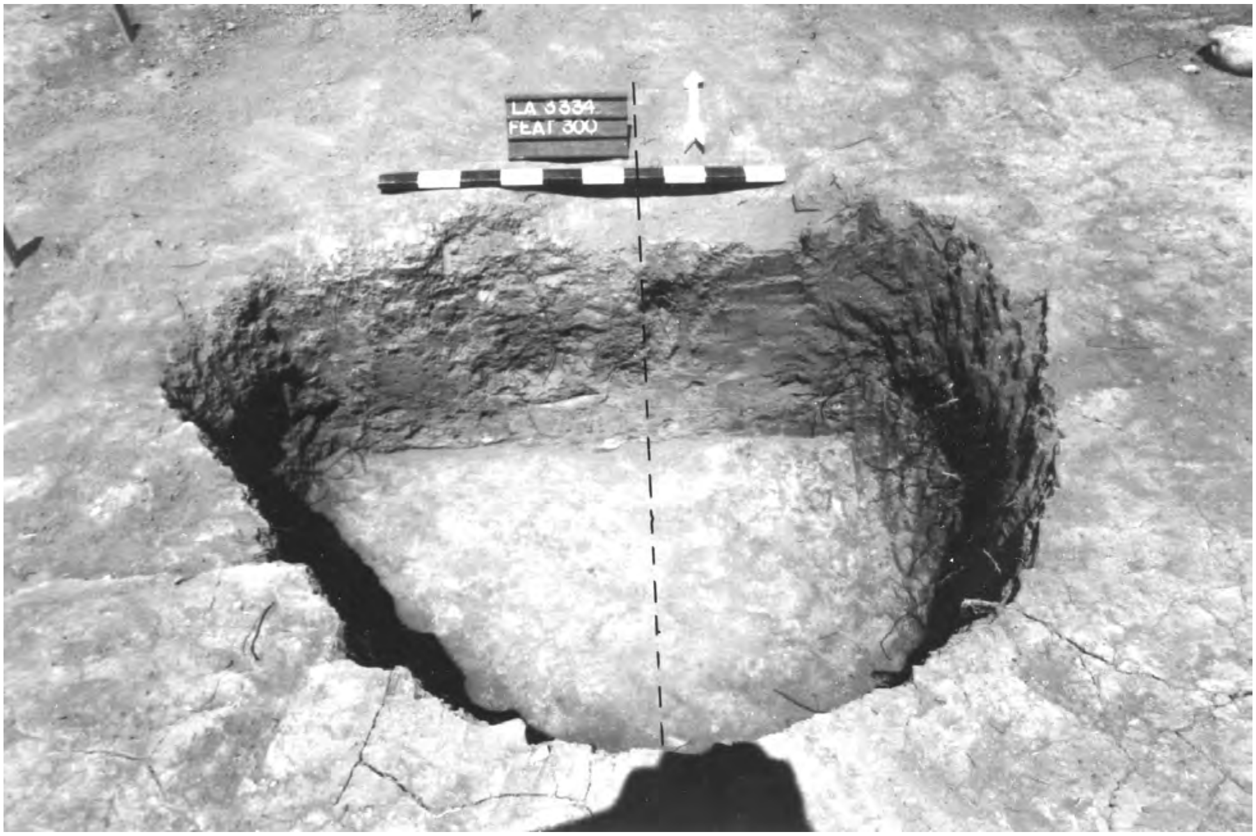


Figure 22. D-shaped storage pit, facing north.

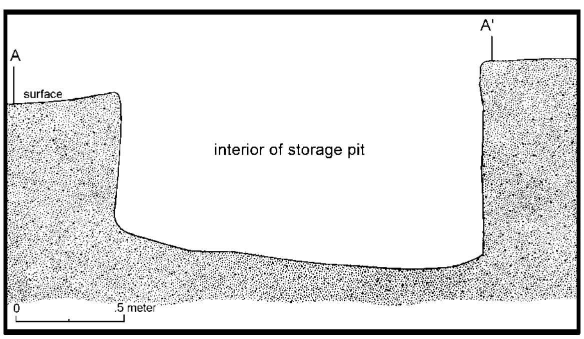


Figure 23. Profile of large D-shaped storage pit.

Artifacts

A number of artifacts were recovered from the storage pit (n = 184) including 120 ceramics, 28 lithic artifacts, 12 pieces of ground stone, and one projectile point. Twenty-two faunal remains were also found. A total of 37 artifacts were analyzed from the large storage pit. These included one Chupadero Black-on-white ceramic, a Fresno type projectile point,12 pieces of ground stone, 22 faunal remains, and 1 bone tool.

Ground Stone. The ground stone analyzed was recovered from inside the pit and on the utilized exterior (Table 11). Five were found on the surface north of the pit and the other seven were found in the pit fill. The items found in the pit are metate fragments, three manos, two-hand slab types, a shaft straightener, and an anvil. All the raw materials present in the ground stone are readily available, but the most common material type found in the large storage pit was granite.

Ancillary Studies

Faunal Remains. Twenty-two pieces of faunal bone were recovered and analyzed from the storage pit (Table 12).

<u>Area 1000</u>

This area was defined on the basis of the stratigraphy in Backhoe Trench 2. Some charcoal-flecked soil and artifacts were visible in the south end of the trench cut (Figs. 24 and 25). Possible wall remnants were found; however, there were no definite rooms or pits. Because a drainage channel was subsequently exposed in this area, we suspect flooding of the area may have scoured out the area

Table 11. Ground Stone Artifacts from Large Storage Pit and Surrounding Area

CELLS: Count Row Percent Column Percent	MATERIAL TYPE						ROW TOTAL
	Igneous	Basalt	Granite	Syenite	Sandstone	Serpentine	
Shaft straightener	1 10.0% 100.0%						1 100.0% 8.3%
Anvil		1 100.0% 100.0%					1 100.0% 8.3%
Lapstone			1 100.0% 16.7%				1 100.0% 8.3%
Hammerstone			1 100.0% 16.7%				1 100.0% 8.3%
Two-hand trough mano			1 50.0% 16.7%			1 50.0% 50.0%	2 100.0% 16.7%
Two-hand slab mano			1 33.3% 16.7%	1 33.3% 10.0%	1 33.3% 100.0%		3 100.0% 25.0%
Trough metate			1 100.0% 16.7%				1 100.0% 8.7%
Slab metate			1 100.0% 16.7%				1 100.0% 8.3%
¾ grooved axe						1 100.0% 50.0%	1 100.0% 8.3%
COLUMN TOTAL	1 8.3% 100.0%	1 8.3% 100.0%	6 50.0% 100.0%	1 8.3% 100.0%	1 8.3% 100.0%	2 16.7% 100.0%	12 100.0% 100.0%

Table 12. Fauna from Area 300

CELLS: Count Row Percent Column Percent	ROW TOTAL
Large Mammal	2 100.0% 9.1%
Prairie Dog	4 100.0% 18.2%
Pocket gopher	1 100.0% 4.5%
Cottontail rabbit	8 100.0% 36.6%
Jackrabbit	3
Deer	4 100.0% 18.2%
COLUMN TOTAL	22 100.0% 100.0%

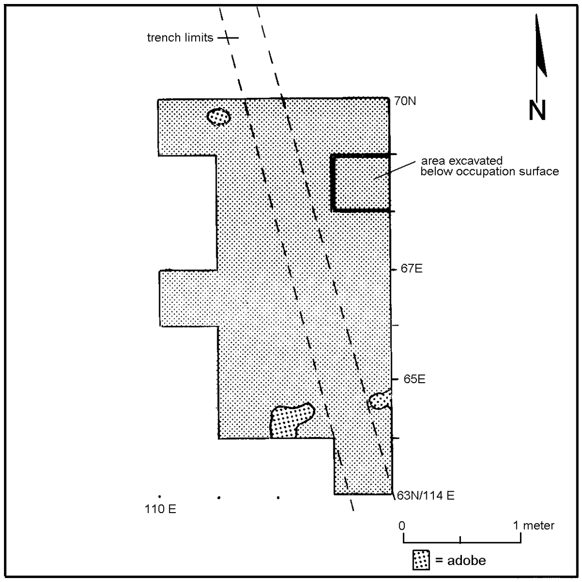


Figure 24. Plan of Area 1000.

leaving only deposits of artifact debris and remnants of walls. An area of 84 sq m was opened.

The occupational surface or bottom of the excavated area consisted of a very compact clay surface that was grayish brown in color (Munsell 10YR 2/2). The artifact density was extremely high to 0.80 m in depth and then decreased down to the sterile surface at a large area was opened, encompassing a 83 sq m area. A range of artifacts were recovered from this area. Remains of an artiodactyl were found at about 0.10 m in depth.

Artifacts

A total of 7,985 artifacts were recovered from Area 1000; these include 6,378 ceramics, 1,498 lithic artifacts, 13 pieces of ground stone, 90 animal bones, and 6 miscellaneous items. As mentioned earlier, the artifacts from the site were sampled and in this case the fauna was not analyzed, only counted.

Ceramics. A total of 3,375 sherds were analyzed out of 6,378 for a total of 53.0 percent of the assemblage (Table 13). Body sherds make-up 67.0 percent of the total assemblage and Jornada Brown Wares were the most common type found (63.2 percent).

Figure 25. Excavation of Area 1000, facing south, with possible wall remnant.

Table 13. Ceramics Recovered from Area 1000

CELLS: Count Row Percent Column Percent	VESSEL FORM									ROW TOTAL
	Bowl	Seed Jar	Jar	Jar Handle	Indeterminate Handle	Canteen	Cloud Blower	Body Sherds	Indeterminate Rim	
Unpainted	2 25.0% .7%		2 25.0% .1%					4 50.0% .2%		8 100.0% .2%
Glaze yellow-on-cream			1 100.0 % .1%							1 10.0% .0%
Glaze-on-red	1 50.0% .4%		1 50.0% .1%							2 100.0% .1%
El Paso Brown	3 1.1% 1.1%		26 9.5% 3.2%					244 89.4% 10.8%		273 100.0% 8.1%
El Paso Polychrome	10 14.9% 3.6%		57 85.1% 7.0%							67 100.0% 2.0%
Chupadero Black-on-white	53 15.2% 19.1%		288 82.8% 35.1%	1 .3% 50.0%	1 .3% 25.0%			5 1.4% .2%		348 100.0% 10.3%
Chupadero Black-on-white subglaze			2 100.0 % .2%							2 100.0% .1%
Plain slipped red	36 85.7% 13.0%		6 14.3% .7%							42 100.0% 1.2%
Indeterminate Red-on-terracotta	40 76.9% 14.4%	1 1.9% 25.0%	10 19.2% 1.2%			1 1.9% 100.0%				52 100.0% 1.5%
Wide Line Red-on-terracotta	31 86.1% .11.2 %	1 2.8% 25.0%	4 11.1% .5%							36 100.0% 1.1%
Three Rivers Red-on-terracotta	9 90.0% 3.2%								1 10.0% 25.0%	10 100.0% .3%
Lincoln Black-on-red	32 100.0 % 11.6%									32 100.0% .9%
Buff-on-cream floated/ slipped								3 100.0% .1%		3 100.0% .1%
Indeterminate Lincoln/Three Rivers	3 10.0% 1.1%									3 100.0% .1%
Jornada Brown	56 2.6% 20.2%	2 .1% 50.0%	120 5.6% 14.6%	1 .0% 50.0%	3 .1% 75.0%		1 .0% 100.0%	1947 91.3% 86.1%	2 .1% 50.0%	2132 100.0% 63.2%
South Pecos Brown	1 1.6% .4%		3 4.8% .4%					58 93.5% 2.6%		62 100.0% 1.8%
Corona Corrugated			296 99.3% 36.1%					1 .3% .0%	1 .3% 25.0%	298 100.0% 8.8%
Salado			4 100.0 % .5%							4 100.0% .1%

CELLS: Count Row Percent Column Percent	VESSEL FORM									ROW TOTAL
	Bowl	Seed Jar	Jar	Jar Handle	Indeterminate Handle	Canteen	Cloud Blower	Body Sherds	Indeterminate Rim	
COLUMN TOTAL	277 8.2% 100.0 %	4 .1% 100.0%	820 24.3% 100.0 %	2 .1% 100.0%	4 .1% 100.0%	1 .0% 100.0%	1 .0% 100.0%	2262 67.0% 100.0%	4 .1% 100.0%	3375 100.0% 100.0%

Table 14. Analyzed Lithic Artifacts for Area 1000

CELLS: Count Row Percent Column Percent	ARTIFACT MORPHOLOGY								ROW TOTAL
	Angular Debris	Core Flake	Core	Scallorn Projectile Point	Late Prehistoric Projectile Point	Cienega Projectile Point	Post 1400's Projectile Point	Unworked Cobble	
Chert	11 22.4% 4.8%	33 67.3% 7.8%		1 2.0% 100.0%	2 4.0% 100.0%	1 2.0% 100.0%	1 2.0% 100.0%		49 100.0% 7.5%
Calcedony		2 100.0% .5%							2 100.0% .3%
Obsidian		1 100.0% .2%							1 100.0% .2%
Igneous		1 50.0% .2%						1 50.0% 100.0%	2 100.0% .3%
Andesite	5 20.0% 2.2%	20 80.0% 4.7%							25 100.0% 3.8%
Rhyolite	1 33.3% .4%	2 66.6% .5%							3 100.0% .5%
Limestone		2 100.0% .5%							2 100.0% ..3%
Siltstone	3 42.9% 1.3%	4 57.1% .9%							7 100.0% 1.1%
Silicified shale	201 36.3% 88.5%	350 63.3% 82.9%	2 .4% 100.0%						553 100.0% 84.2%
Quartzite	6 42.2% 2.6%	7 53.8% 1.7%							13 100.0% 2.0%
COLUMN TOTAL	227 34.6% 100.0%	422 64.2% 100.0%	2 .6% 100.0%	1 .2% 100.0%	2 .6% 100.0%	1 .2% 100.0%	1 .6% 100.0%	1 .6% 100.0%	657 100.0% 100.0%

Lithic Artifacts. A high number of chipped stone artifacts (n = 657) were analyzed from this area (Table 14). The majority of the artifacts are core flakes and angular debris. Two cores, five projectile points, and one biface were also recovered. No utilized flakes or angular debris were found in the analyzed assemblage that would suggest expedient tool use or tool manufacturing. The most common material type is silicified shale, which is found throughout the region. Chert and andesite are the next material type most commonly used.

The chronological sequence for the projectile points ranges from400 B.C. to A.D. 1400, including types such as Cienega, Scallorn, late prehistoric, and post 1400s (see projectile point section).

Ground Stone. There was only a small amount of ground stone recovered from this area. Abraders and polishing stones are at the top of the list and the rest are evenly distributed within the assemblage (Table 15). The most common materials for the ground stone in Area 1000 are sandstone and syenite.

Table 15. Ground Stone from Area 1000

CELLS: Count Row Pct Column Pct	MATERIAL TYPE				ROW TOTAL
	Syenite	Lime-stone	Sand-stone	Quart-zite	
Indeter-minate	1 100.0% 50.0%				1 100.0% 12.5%
Polishing stone			1 50.0% 25.0%	1 50.0% 100.0	2 100.0% 25.0%
Abrading stone	1 33.3% 50.0%	1 33.3% 100.0%	1 100.0% 25.0%		3 100.0% 37.5%
Mano*			1 100.0% 25.0%		1 100.0% 12.5%
Trough metate*			1 100.0% 25.0%		1 100.0% 12.5%
COLUMN TOTAL	2 25.0% 100.0%	1 12.5% 100.0%	4 50.0% 100.0%	1 12.5% 100.0 %	8 100.0% 100.0%

* ground stone fragments.

Miscellaneous Artifacts. Five pieces of freshwater mussel shell were recovered and analyzed. Also recovered was a quartz crystal that had evidence of wear along its edge. Hematite residue was found adhering to the crystal.

Ancillary Studies

Faunal Remains. As mentioned above, a total of 90 faunal remains were counted for this area but not analyzed.

Area 2000

Backhoe Trench 3 (13 m in length) was placed in an east-west line across the northwest portion of the site. Along the trench wall, in the profile, cultural fill was noted to a depth of approximately 52 cm at the east end of the trench. It underlay a deposit of road gravel, 23 cm thick, laid down during initial construction of NM 37. It appears that the site surface in this area had been mechanically bladed prior to the road gravel being deposited. Excavations began in the eastern area along the north edge of the trench cut (Fig. 26). Theyreached a maximum depth of 58 cm before encountering sterile soil. Grids were expanded to the north, following the artifact deposit; however, no cultural features were found. The artifact deposit is probably eroding from other nearby cultural features.

Artifacts

A total of 718 artifacts were recovered from Area 2000. These include 431 ceramics, 246 lithic artifacts, 1 projectile point, 2 stone tools, 1 crystal, 1 shell, and 36 pieces of faunal bone. These were sampled for analysis.

Ceramics. A total of 81.7 percent (or 352 sherds) of the ceramic assemblage was analyzed

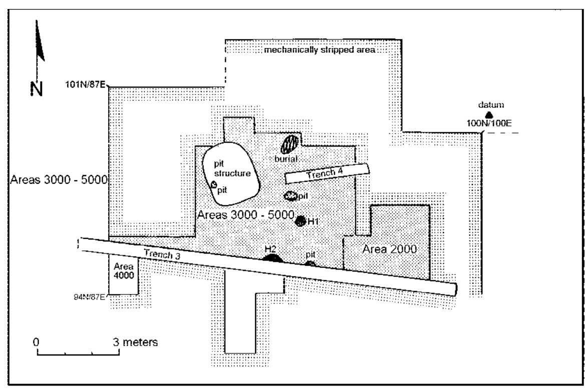


Figure 26. Areas 2000, 3000-5000, and 4000.

(Table 16). Jornada Brown sherds dominate the assemblage. The Lincoln Black-on-red and Glaze A sherds indicate occupation up to approximately A.D. 1315.

Table 16. Ceramics Recovered from Area 2000

CELLS: Count Row Percent Column Percent	VESSEL FORM					ROW TOTAL
	Bowl	Seed Jar	Jar	Miniature	Body Sherds	
Mineral Paint			1 10.0% 1.0%			1 100.0% .2%
Agua Fria Glaze A	1 100.0% 2.3%					1 100.0% .2%
El Paso Brown		1 7.6% 100.0%	2 15.3% 2.0%		10 76.9% 4.7%	13 100.0% 3.6%
Thin El Paso Brown			5 31.2% 5.1%		11 68.7% 5.2%	16 100.0% 4.5%
El Paso Polychrome			9 100.0% 9.2%			9 100.0% 2.5%
Chupadero Black-on-white	9 26.4% 20.9%		23 67.6% 23.7%	1 2.9% 100.0%	1 2.9% .4%	34 100.0% 9.6%
Plain Slipped Red	13 100.0% 30.2%					13 100.0% 3.6%
Red-on-terracotta	9 90.0% 20.9%		1 10.0% 1.0%			10 100.0% 2.8%
Three Rivers Red-on-terracotta	5 100.0% 11.6%					5 100.0% 1.4%
Lincoln Black-on-white	1 100.0% 2.3%					1 100.0% .2%
Buff/Cream Slipped					3 100.0% 1.4%	3 100.0% .8%
Jornada Brown	5 2.5% 11.6%		15 7.6% 15.4%		177 89.8% 84.2%	197 100.0% 55.9%
South Pecos Brown					8 100.0% 3.8%	8 100.0% 2.2%
Corona Corrugated			40 100.0% 41.2%			40 100.0% 11.3%
Ramos Polychrome			1 100.0% 1.0%			1 100.0% .2%
COLUMN TOTAL	43 12.2% 100.0%	1 .2% 100.0%	97 27.5% 100.0%	1 .2% 100.0%	210 59.6% 100.0%	352 100.0% 100.0%

Table 17. Lithic Artifacts Recovered from Area 2000

CELLS: Count Row Percent Column Percent	ARTIFACT FUNCTION				ROW TOTAL
	Angular Debris	Core Flake	Projectile Point	Hammerstone	
Chert	1 5.5% 1.4%	15 83.3% 12.7%	1 5.5% 100.0%	1 5.5^ 100.0%	18 9.5%
Obsidian	1 25.0% 1.4%	3 75.0% 2.5%			4 100.0% 2.1%
Andesite	1 100.0% 1.4%				1 100.0% .5%
Limestone	1 50.0% 1.4%	1 50.0% .8%			2 100.0% 10.6%
Silicified Shale	59 39.0% 86.7%	92 61.0% 77.9%			151 100.0% 80.3%
Quartzite	5 41.6% 7.3%	7 58.3% 5.9%			12 100.0% 6.3%
COLUMN TOTAL	68 36.1% 100.0%	118 62.7% 100.0%	1 .5% 100.0%	1 .5% 100.0%	188 100.0% 100.0%

Lithic Artifacts. A total of 246 lithic items were recovered. Of these, 188 (76.4 percent) were analyzed, including a projectile point and hammerstone (Table 17). Unutilized flakes constitute 62.7 percent of the assemblage. The locally available silicified shale was the most common material type (80.3 percent). The chert projectile point is a small, side-notched point with a concave base.

Ground Stone. No ground stone was recovered from Area 2000.

Miscellaneous Artifacts. One freshwater mussel shell and a piece of hematite were recovered from Area 2000.

Ancillary Studies

Fauna. Thirty-six pieces of animal bone were recovered but none was analyzed.

Area 3000

While excavations were ongoing at the eastern end of Trench 3, investigations were also underway in the middle of the trench, designated as Area 3000. Several small charcoal lenses were visible in the north wall of the trench with cultural fill above them. Excavations here involved removing the same road overburden from on top of the site (up to 28 cm thick). The work area extended from Area 2000 on the east to the end of the trench on the west. It was focused on the north side of the trench with one extension made to the south (see Figs. 16 and 26). Artifacts and charcoal flecks were plentiful throughout the fill which was 7.5 YR 25/3, very dark

Figure 27. Utilized surface in Area 3000 with Trenches 3 and 4, kiva; remainder of site lies to southeast. Facing southeast.

brown on the Munsell color chart. Excavations proceeded until a surface was uncovered at an average depth of 1.02 m. This surface was followed to the east and west; however, the extension south of the trench could not pick up the surface. On the north, the surface could only be traced for approximately 3 m. Then, a short, mechanically made trench (Trench 4) was dug in this area to determine exactly how far cultural material extended to the north. Limits of the utilized surface were reached within 1 m north of Trench 4. The utilized surface sloped upwards on the east and west sides and was more level to the north. The measurement of the utilized surface is 5.20 m east-west by 3.95+ m north-south (Fig. 27). Once excavations reached the depth of the utilized surface, a new designation, Area 5000, was given to the features and artifacts found on it and these are described later.

Artifacts

Many artifacts were recovered from the fill in Area 3000. A total of 7,362 items included 4,791 sherds, 1,850 lithic artifacts, 29 pieces of ground stone, 18 projectile points, 17 stone tools, 3 pieces of mussel shell, 1 crystal, 5 minerals, 645 pieces of faunal bone, and 5 bone tools. Bone, ground stone, projectile points, stone tools, and shell were fully analyzed. The ceramic and lithic assemblages were sampled.

Ceramics. A total of 2,800 sherds (58.4 percent) were analyzed (Table 18). Jornada Brown and Corona Corrugated (utility wares) together constitute 68.4 percent of the ceramic assemblage. Chupadero Black-on-white is the most prevalent decorated ware. Jars outnumber bowls almost 2 to 1.

Lithic Artifacts. Because so much of the lithic assemblage at LA 3334 is composed of silicified shale debris, the lithic artifacts from Area 3000 were heavily sampled. A total of 649 lithic items were analyzed, or 34.4 percent, including 18 projectile points, 12 cores, 2 bifaces, and a hammerstone (Table 19).

Silicified shale is, by far, the most commonly used raw material (86.5 percent) and is readily available locally. However, chert is definitely preferred for projectile points and bifaces. Six of the 18 projectile points are Late Archaic types, including

Table 18. Ceramics Recovered from Area 3000

CELLS: Count Row Percent Column Percent	VESSEL FORM								ROW TOTAL
	Bowl	Jar	Body	Canteen	Indeterminate	Miniature Jar	Seed Jar	Plate	
Undifferentiated White ware		2 100.0% .4%	100.0%	100.0%			100.0%	100.0%	2 100.0% .0%
Mineral Paint	1 100.0% .2%								1 100.0% .0%
Glazed Red	8 100.0% 19.2%								8 100.0% .2%
Agua Fria Glaze A	2 100.0% .4%								2 100.0% .0%
El Paso Brown		14 16.2% 1.8%	64 74.4% 3.9%	8 9.3% 44.4%					86 100.0% 3.7%
Thin El Paso Brown			57 96.6% 3.5%	2 3.3% 10.5%					59 100.0% 2.1%
El Paso Polychrome	6 10.5% 1.4%	49 85.9% 6.5%	2 3.5% .1%						57 100.0% 2.0%
Chupadero Black-on-white	80 30.8% 19.2%	171 66.0% 22.8%	5 1.9% .3%	3 1.1% 15.7%					259 100.0% 9.2%
Plain Slipped Red	64 84.2% 15.3%	12 14.4% 1.6%							76 100.0% 2.7%
Red-on-terracotta	103 88.0% 24.7%	13 11.1% 1.7%		1 .8% 5.2%					117 100.0% 4.1%
Three Rivers Red-on-terracotta	43 86.0% 10.0%	5 10.0% .6%		2 4.0% 10.5%					50 100.0% 1.7%
Lincoln Black-on-red	26 100.0% 6.2%								26 100.0% .9%
Buff/Cream Slipped		2 20.0% .2%	8 80.0% .4%						10 100.0% .3%
Lincoln/Three Rivers Red-on-terracotta	8 80.0% 1.9%	2 20.0% .2%							10 100.0% .3%
Jornada Brown	73 4.5% 17.5%	160 9.9% 21.3%	1367 85.0% 84.8%	2 .1% 10.5%	1 .0% 100.0%	1 .0% 100.0%	1 .0% 100.0%	2 .7% 100.0%	1607 100.0% 57.3%
South Pecos Brown		6 5.5% .8%	103 94.5% 6.3%						109 100.0% 3.8%
Corona Corrugated		310 99.6% 41.4%		1 .4% 5.2%					311 100.0% 11.1%
Alma Plain			3 100.0% .1%						3 100.0% .1%
Salado Polychrome		2 40.0% .2%	3 60.0% .1%						5 100.0% .1%
Gila Polychrome	2 100.0% .4%								2 100.0% .0%

CELLS: Count Row Percent Column Percent	VESSEL FORM								ROW TOTAL
	Bowl	Jar	Body	Canteen	Indeterminate	Miniature Jar	Seed Jar	Plate	
COLUMN TOTAL	416 14.8% 100.0%	748 26.7% 100.0%	1612 57.5% 100.0%	19 .6% 100.0%	1 .0% 100.0%	1 .0% 100.0%	1 .0% 100.0%	2 .0% 100.0%	2800 100.0% 100.0%

Table 19. Lithic Artifacts Recovered from Area 3000

CELLS: Count Row Percent Column Percent	ARTIFACT FUNCTION						ROW TOTAL
	Angular Debris	Core Flake	Projectile Point	Cores	Hammerstone	Biface	
Chert	4 9.7% 2.2%	18 43.9% 4.1%	17 41.4% 94.4%			2 4.8% 100.0%	41 100.0% 6.3%
Silicified Wood		1 100.0% .2%					1 100.0% .1%
Obsidian		1 100.0% .2%					1 100.0% .1%
Igneous	1 33.3% .5%	1 33.3% .2%			1 33.3% 100.0%		3 100.0% .4%
Andesite	5 35.7% 2.7%	9 64.2% 2.0%					14 100.0% 2.1%
Basalt			1 100.0% 5.6%				1 100.0% .1%
Limestone		2 100.0% .4%					2 100.0% .3%
Siltstone	1 33.3% .5%	1 33.3% .2%		1 33.3% 8.3%			3 100.0% .4%
Silicified Shale	164 29.1% 91.1%	387 68.8% 88.7%		11 1.9% 91.6%			562 100.0% 86.5%
Quartzite	5 23.8% 27.7%	16 76.1% 36.6%					21 100.0% 3.2%
COLUMN TOTAL	180 27.7% 100.0%	436 67.1% 100.0%	18 2.7% 100.0%	12 1.8% 100.0%	1 .1% 100.0%	2 .3% 100.0%	649 100.0% 100.0%

1 Cienega point, 2 Livermore-like, and 1 Clifton-like. Two are Mogollon Scallorn points, 1 is Fresno, 3 are Harrell, 5 are Desert Side-Notched, and 1 is Leslie's Type 2-F.

Ground Stone. Twenty-nine pieces of ground stone were recovered from Area 3000 and all were analyzed (Table 20). A variety of raw materials was used, particularly in the production of manos. This may relate to the desire for materials with differing degrees of hardness for grinding varied items. Granite seems to be the preferred material, however. Eight manos are two-hand, while six are one-hand, which also indicates that a number of different substances were being ground, requiring different-sized implements.

Miscellaneous Artifacts. Three pieces of freshwater mussel shell, one crystal, and five mineral specimens were found. The minerals included two each of hematite and limonite and one chrysocolla.

Ancillary Studies

Fauna. From Area 3000, 645 pieces of faunal bone were recovered and all were analyzed. These are shown in Table 21. Over half of the faunal assemblage consists of rabbits (58.7 percent), mostly cottontails. In fact, 84.8 percent of the assemblage is small mammal or rodent, many of which left rodent burrows throughout the fill. Few large mammal types were found in this area.

Table 20. Ground Stone Recovered from Area 3000

CELLS: Count Row Percent Column Percent	MATERIAL TYPE							ROW TOTAL
	Basalt	Granite	Syenite	Rhyolite	Limestone	Sandstone	Quartzite	
Indeterminate			1 50.0% 12.5%			1 50.0% 50.0%		2 100.0% 6.8%
Polishing stone	1 33.3% 33.3%		1 33.3% 12.5%				1 33.3% 100.0%	3 100.0% 10.3%
Abrading stone	2 100.0% 66.6%							2 100.0% 6.8%
Mano		11 57.8% 100.0%	4 21.0% 50.0%	2 10.5% 100.0%	2 10.5% 100.0%			19 100.0% 65.5%
Metate						1 100.0% 50.0%		1 100.0% 5.2%
Pestle			1 100.0% 12.5%					1 100.0% 5.2%
Shaped stone			1 100.0% 12.5%					1 100.0% 5.2%
COLUMN TOTAL	3 10.3% 100.0%	11 37.9% 100.0%	8 27.5% 100.0%	2 6.8% 100.0%	2 6.8% 100.0%	2 6.8% 100.0%	1 3.4% 100.0%	29 100.0% 100.0%

Table 21. Fauna Recovered from Area 3000

CELLS: Count Row Percent Column Percent	ROW TOTAL
Small Mammal	83 100.0% 12.8%
Small to Medium Mammal	8 100.0% 1.2%
Medium Mammal	6 100.0% .9%
Medium to Large Mammal	27 100.0% 4.1%
Large Mammal	19 100.0% 2.9%
Rock Squirrel	3 100.0% .4%
Prairie Dog	67 100.0%. 10.3%
Pocket Gopher	8 100.0% 1.2%
Mouse	2 100.0% .3.%
Woodrat	4 100.0% .6%
Muskrat	1 100.0% .1%
Cottontail	288 100.0% 44.6%
Jackrabbit	91 100.0% 14.1%
Dog/Coyote/Wolf	1 100.0% .1%
Medium Artiodactyl	13 100.0% 2.0%
Deer	6 100.0% .9%
Pronghorn	6 100.0% .9%
Bison	1 100.0% .1%
Bird	7 100.0% 1.0%
Hawk	3 100.0% .4%%
Falcon	1 100.0% .1%
COLUMN TOTAL	645 100.0% 100.0%

Bone Tools. Five bone tools were recovered from Area 3000. Three are awls, one is indeterminate, and one is a bone tube bead (described under Miscellaneous).

Macrobotanical Remains. Corn cupules were recovered from a flotation sample in Area 3000.

Area 4000

After finding a utilized surface in Area 3000 near the middle of Trench 3, it was decided to open an area on the far western end of the trench to insure that no further cultural features were present. Therefore, a 1-by-1.5-m unit was excavated down to sterile soil on the south side of this western area. While artifacts were found, their numbers dropped off considerably from the areas to the east. No utilized surfaces or cultural features were found and it was clear that the site limits had been reached. Excavations reached 70 cm in depth before the compact reddish, sterile soil was reached.

Artifacts

A total of 148 artifacts were collected from this limited test area. These include 115 ceramics, 25 lithic artifacts, 7 pieces of bone, and 1 piece of mussel shell. Only a few artifacts were analyzed.

Ceramics. One provenience lot was randomly selected and it included nine sherds comprised of one El Paso Brown body sherd, two Chupadero Black-on-white bowl rims, one red-on-terracotta bowl sherd, and five Jornada Brown body sherds.

Lithic Artifacts. Only two core flakes were randomly chosen from this area for analysis and they include one flake each of chert and silicified wood.

Miscellaneous Artifacts. One piece of mussel shell was analyzed.

Area 5000

Upon reaching the utilized surface in Area 3000, all subsequent excavation of features on this surface and expansion beyond the surface were designated as Area 5000. Features found include two small hearths, two small pits, one burial, and one pithouse.

Cultural Features

Hearths 1 and 2. Hearth 1 first appeared as a burned stain on the utilized surface. It proved to be a shallow, irregularly shaped basin hearth measuring 23 cm north-south by 21 cm east-west and 5 cm deep. Charcoal burning was evident on the bottom of the hearth. A few sherds (n = 12) were in or adjacent to the hearth including eight Jornada Brown, one South Pecos Brown, two Chupadero Black-on-white, and one red-on-terracotta sherd.

Hearth 2 was cut by Trench 3 and its dark, charcoal-burned soil was visible in the profile of the trench. It was first thought to be a pit, but burning on the bottom and the fill suggest it may have been a hearth or possibly a roasting pit. The bottom is flat but the sides are irregular. It measures 80 cm east-west by 24 cm north-south (cut by a trench) by 45 cm deep. Ten Jornada Brown sherds, two Chupadero Black-on-white, one ground stone fragment, and eight pieces of angular debris were within the fill of the feature. The cut hearth or roasting pit can be seen along the trench edge in Figures 16 and 26.

Pits. Two pits were found dug into the utilized surface of Area 5000. Pit 1 was oblong with sloping sides. It measured 1.05 m east-west by .33 m north-south and was 24 cm deep. Two sherds of Chupadero Black-on-white and a flake of silicified shale were within the pit. It had not burned.

Pit 2 was visible in the profile of Trench 3. It measured 48 cm east-west and 19 cm north-south (cut by a trench) by 26 cm deep and had sloping sides. Neither the bottom or sides had burned but the soil was charcoal-flecked. No artifacts were present.

Burial. An isolated burial was located along the north edge of Area 5000. It had been placed into a very small pit that had been dug into sterile soil just beyond the utilized surface (Fig. 28). The skeleton was that of an older adult male (age 50+) lying within the oval-shaped pit that measured 65 cm northeast-southwest by 35 cm northwest-southeast by 30 cm deep. The head was oriented to the northeast. The body was very tightly flexed on its back and was in poor condition because it was not far below the ground surface. Artifacts within the pit were all fragmentary and may have eroded into the burial. These included eight Jornada Brown and two buff/cream slipped sherds, three pieces of angular debris, six flakes, and one core.

Pithouse. Upon clearing the utilized surface of Area 3000, the above hearths and pits were noted. A persistent charcoal stain was also investigated and proved to be a small, shallow pithouse (Fig. 29). Its shape was subrectangular with rounded corners and it measured 2.67 m north-south by 1.86 m east-west with a maximum depth of .31 m for a floor area of 4.96 sq m. The floor and sides had been dug out of the existing clay base on the site and were not plastered. No postholes were found but a single small pit measuring 32-by-26-by-9-cm deep was located along the west side. It was not burned and its function is unknown. An area of charcoal floor staining with some ash was evident in the southeast quadrant. A single-use, expedient hearth may have been located here. In the northwest quadrant, a large, rounded cobble was embedded in the floor. It did not appear that the structure had burned. Outside of the pit structure immediately to the west lay three large, long manos, each of a different type (loaf, triangular, and slab), stacked together on the utilized surface.

Twenty-two sherds were found on the floor of the pit structure. These included fourteen Jornada Brown sherds, three Chupadero Black-on-white, two plain slipped red, two Three Rivers Red-on-terracotta, and one Three Rivers/Lincoln Black-on-red. Ten pieces of animal bone were also recovered from the floor and consisted of three jackrabbits, three cottontails, two medium-sized artiodactyls, one prairie dog, and one dog/coyote/wolf. Five lithic artifacts within the pit structure included three cores and two projectile points. One was a large, corner-notched point and the other a small, unnotched point with a concave base. Ground stone included two fragments, one from a mano and one indeterminate. The low number of artifacts and lack of interior hearth and post supports suggest a limited occupation span of not more than several weeks or months.

Figure 28. Burial pit in Area 5000. Pit is the smaller depression in center of photograph. Trench 4 is in front of pit on the right; facing north.

Figure 29. Pit structure in Area 5000. Manos lying just under dirt on west edge.

Artifacts

While the number and types of artifacts have been listed above for the various features within Area 5000, a complete tabulation including material recovered from the fill of Area 5000 is given below. A total of 2,202 artifacts were found in this area and included 1,484 sherds, 550 lithic artifacts, 124 animal bones, 2 bone tools, 11 pieces of ground stone, 10 stone tools, 5 projectile points, 9 pieces of shell, 5 minerals, and 2 miscellaneous items. All categories were sampled.

Ceramics. A total of 815 ceramics (54.9 percent) were analyzed (Table 22). Jornada Brown is, by far, the most common sherd type (66.2 percent). The most dominant decorated ware is Chupadero Black-on-white. The sherd assemblage includes Lincoln Black-on-red and glaze-on-red, bringing the date of occupation up to at least A.D. 1315.

Table 22. Ceramics from Area 5000

CELLS: Count Row Percent Column Percent	LEVEL				ROW TOTAL
	General Fill	Pithouse Fill	Floor	Burial Pit	
Glaze-on-red	7 77.7% 1.8%	2 22.2% .4%			9 100.0% 1.1%
El Paso Brown	5 35.7% 1.3%	9 64.3% 1.4%			14 100.0% 1.7%
Thin El Paso Brown	7 70.0% 1.8%	3 30.0% .7%			10 100.0% 1.2%
El Paso Polychrome	9 64.3% 2.3%	5 35.7% 1.2%			14 100.0% 1.7%
Chupadero Black-on-white	45 52.3% 11.9%	38 44.2% 9.3%	3 3.5% 13.6%		86 100.0% 10.5%
Plain Slipped Red	11 52.4% 2.9%	8 38.0% 1.9%	2 9.6% 9.0%		21 100.0% 2.5%
Red-on-terracotta	4 33.3% 1.0%	8 66.6% 1.8%			12 100.0% .1%
Three Rivers Red-on-terracotta	12 44.4% 3.1%	13 48.2% 3.2%	2 7.4% 9.0%		27 100.0% 3.3%
Lincoln Black-on-red	12 85.7% 3.1%	2 14.3% .5%			14 100.0% 1.7%
Buff/Cream Slipped	1 16.7% .3%	3 50.0% .7%		2 33.3% 20.0%	6 100.0% .7%
Lincoln/Three Rivers		1 50.0% .2%	1 50.0% 4.5%		2 100.0% .2%

CELLS: Count Row Percent Column Percent	LEVEL				ROW TOTAL
	General Fill	Pithouse Fill	Floor	Burial Pit	
Jornada Brown	237 43.9% 62.8%	281 52.0% 69.2%	14 5.6% 63.6%	8 1.5% 80.0%	540 100.0% 66.2%
South Pecos Brown	13 46.4% 3.4%	15 53.6% 3.7%			28 100.0% 3.4%
Corona Corrugated	14 43.7% 3.7%	18 56.3% 4.4%			32 100.0% 3.9%
COLUMN TOTAL	377 46.2% 100.0%	406 49.8% 100.0%	22 2.7% 100.0%	10 1.2% 100.0%	815 100.0% 100.0%

Table 23. Lithic Artifacts Recovered from Area 5000

CELLS: Count Row Percent Column Percent	PROVENIENCE				ROW TOTAL
	General Fill	Hearth 1	Burial Pit	Pit Structure	
Angular Debris	106 86.1% 33.9%	14 11.4% 40.0%	3 2.4% 30.0%		123 100.0% 33.9%
Core Flakes	197 87.9% 63.1%	21 9.4% 60.0%	6 2.7% 60.0%		224 100.0% 61.8%
Core	5 55.6% 1.6%		1 11.1% 10.0%	3 33.3% 60.0%	9 100.0% 2.5%
Biface	1 100.0% .3%				1 100.0% .3%
Projectile Point	3 60.0% .9%			2 40.0% 40.0%	5 100.0% 1.4%
COLUMN TOTAL	312 86.2% 100.0%	35 9.7% 100.0%	10 2.7% 100.0%	5 1.4% 100.0%	362 100.0% 100.0%

Lithic Artifacts. A total of 346 lithic artifacts were analyzed (62.9 percent) of the assemblage. These include 5 projectile points, 1 biface, 9 cores, and 1 piece of utilized debitage (Table 23). Unlike other areas of the site, there are more flakes here than debitage, suggesting a possible work station was located within the area, possibly on the utilized surface. Nine cores were also found, eight of which were of silicified shale and only one was chert. Raw materials are found in the same relative proportions as elsewhere on the site. Silicified shale was the most prevalent at 80.1 percent. Quartzite and chert follow with only 8.3 and 7.2 percent, respectively.

Ground Stone. Eleven pieces of ground stone were recovered and analyzed. These include three manos, six polishing stones, one abrading stone, and one indeterminate fragment. The polishing stones indicate that pottery may have been manufactured, or at least polished, in this area. No other evidence of this activity was found, however.

Miscellaneous Artifacts. Nine pieces of freshwater mussel shell were recovered. The five minerals found include three of limonite and one of calcium carbonate. A stone ring made of rhyolite and a sandstone concretion were also recovered.

Ancillary Studies

Fauna. A to tal of 43 faunal pieces w ere analyzed, or 34.7 percent of the assemblage. Most recovered pieces are rabbits and burrowing rodents (Table 24).

Table 24. Fauna Recovered from Area 5000

CELLS: Count Row Percent Column Percent	PROVENIENCE		ROW TOTAL
TAXA	General Fill	Burial	
Small Mammals	2 100.0% 6.0%		2 100.0% 4.6%
Medium to Large Mammal	2 66.6% 6.0^	1 33.3% 10.0%	3 100.0% 6.9%
Large Mammal	1 100.0% 3.0%		1 100.0% 2.3%
Prairie Dog	2 66.6% 6.0%	1 33.3% 10.0%	3 100.0% 6.9%
Pocket Gopher	1 100.0% 3.0%		1 100.0% 2.3%
Woodrat	1 100.0% 3.0%		1 100.0% 2.3%
Cottontail	12 70.5% 36.3%	5 29.5% 50.0%	17 100.0% 39.5%
Jackrabbit	5 100.0% 15.1%		5 100.0% 11.6%
Dog/Coyote/Wolf	1 100.0% 3.0%		1 100.0% 2.3%
Medium Artiodactyl	1 50.0% 3.0%	1 50.0% 10.0%	2 100.0% 4.6%
Deer	1 50.0% 3.0%	1 50.0% 10.0%	2 100.0% 4.6%
Pronghorn	2 100.0% 6.0%		2 100.0% 4.6%
Bird	1 50.0% 3.0%	1 50.0% 10.0%	2 100.0% 4.6%
Hawk	1 100.0% 3.0%		1 100.0% 2.3%
COLUMN TOTAL	33	10	43

Macrobotanical Remains. Four macrobotanical samples yielded cheno-ams, mustard, corn cupules and glumes, juniper, piñon shell, and goosefoot.

Room Block (Area 7000)

Area 7000 encompasses the south half of the site. This includes four to five rooms and a possible jacal area. The rooms have been dug into the red sterile clay, using the clay as walls. One room, however, has cobbled walls. Walls vary in depth and range from 14 cm to 60 cm. Descriptions for each room and the jacal structure follows.

Room 1

Room 1 was the first room excavated (Fig.30). It is 4.5 m south of the kiva and is the only room found during our excavations to have cobbled walls. A highly polished serpentine stone with a smooth rounded depression in the center, a possible portable sipapu was found on the floor near the southeast corner. Two large post holes with burned posts in situ were the only features found in the room.

Stratigraphy

The fill of the room consisted of burned adobe and burned wood, possibly roof beams, and numerous artifacts. The soil was very wet at the time of excavation and consisted of compact clay from the surface down to 20 cm. Below 20 cm, the soil changed to a wet sandy clay with adobe casts and charcoal. Artifacts increased within this cultural fill and a few burned corn kernels were also present. Besides the compaction of the soil there were no stratigraphic breaks present in the fill. Four levels were assigned, however, and are: Level 1, general fill; Level 2, feature fill; Level 4, floor; and Level 5, subfloor.

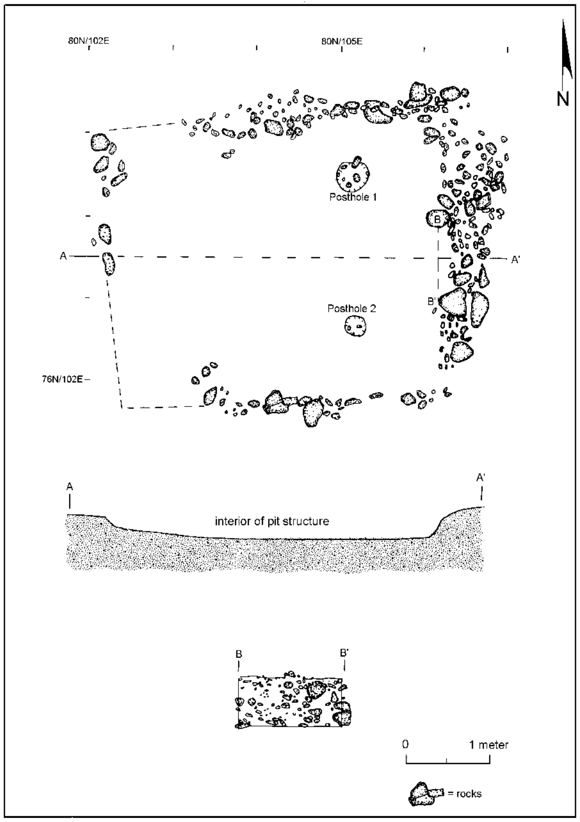


Figure 30. Room 1 plan, profile, and wall profile.

Architectural Details

Dimensions. Room 1 measures 3.5 m north-south by 4.2 m east-west with a depth of 41 cm, covering a floor area of 14.7 sq m.

Walls. As mentioned earlier, the walls are constructed of large to medium-sized river cobbles. It seems as though the room was constructed by removing existing natural cobbles to form the walls. They do not seem to be stacked, but are in their natural state (Fig. 30). The north and east walls are the only walls still standing. Only a few cobbles outline the west and south walls. The walls stand 40 cm in height and range from 30 cm to 75 cm in width depending on the size of the cobbles.

Along the east wall, the cobbles extended beyond the corner another 5 m indicating that the room was dug into the cobbles. Also, there are no straight vertical walls or uniform stacking that would suggest they were built up. There was no evidence of mortar between the rocks except the natural, small pea gravel and sand. No plastering of walls was noted.

Floor. A thin clay layer was placed over the cobbles to make an even surface. The clay was hard and compact with charcoal embedded in it. A possible portable sipapu was found near the southeast corner resting on the floor with burned corn around and under it. No other floor artifacts were recovered.

Floor Features. Counting the portable sipapu, a total of three features were found in Room 1 including two postholes.

Postholes: Posthole 1 was located in the northeast corner of the room approximately 75 cm from the corner. It was 45-by-34cm and 27 cm deep. The post was still in situ and was anchored by a large rock along the northwest edge. The post measured 37 cm long and 25 cm wide. The fill of the posthole consisted of silty, loose soil with small pebbles and rotting wood. Posthole 2 was in the southeast corner and was directly south of Posthole 1. It is smaller in size as was the post. It measured 28 cm by 24 cm and was 22 cm deep. The soil again was loose, silty, sand with decomposing wood. The sides and bottom of the posthole contained cobbles and the sides were not lined. The post was 32 cm long and 15 cm wide and was burned at the top only.

Sipapu: The portable sipapu or substitute sipapu, as Kelley (1984) refers to them, was found on the floor; however, it was not plastered over but was placed in a small depression on the floor that was heavily charcoal-stained with burned corn kernels around and under the serpentine artifact. Kelley (1984) mentions that most of the ones found have been placed into the floor and plastered over. Also, it was found in the southeast corner of the room near the south wall and not in alignment with any other feature, as found on other sites. Kelley (1984) suggests a possible ceremonial use for this type of artifact. Besides this stone sipapu, however, there was no other evidence that the room may have been used for ceremonial purposes. It is possible that the stone artifact was being stored in the room.

Hearth: None found.

Roof: Several burned wood fragments were found in the fill of Room 1. It is possible that some of these were from the roof; however, broken posts used for roof supports were also present. It was difficult to discern the roof remains from the support posts because they were too fragmented. Adobe casts were found throughout the fill of the room.

Artifacts

Artifacts from Room 1 consisted of 989 ceramics, 363 lithic artifacts, 1 projectile point, 5 pieces of ground stone, and 41 animal bones for a total of 1,399 artifacts.

Ceramics. All of the ceramics from this area were analyzed. A high percentage (56 percent) are body sherds and 54 percent of the types found were Jornada Brown Wares and 13 percent El Paso Brown Wares (Table 25). Three possible Athabaskan ceramics were also recovered from Room 1. Two of these sherds were found in the upper portion of the fill approximately 10 cm to 30 cm below the ground surface. The third one was recovered from Posthole 1 toward the bottom of the posthole near the cobbles. It is possible that this small ceramic may have been carried into the posthole by rodent activity, of which there was an enormous amount on the site. Several post-1400 ^{14}C dates were recovered from this room in addition to earlier ca A.D. 1300 dates, suggesting possible reuse of the room.

Table 25. Ceramics Recovered from Room 1

CELLS: Count Row Percent Column Percent	VESSEL FORM							ROW TOTAL
	Bowl	Seed Jar	Jar	Canteen	Miniature Pinch Pot	Body Sherds	Indeterminate Rim	
Unpainted			1 100.0% .4%					1 100.0% .1%
Pueblo II			1 100.0% .4%					1 100.0% .1%
Glaze-on-red	1 100.0% .9%							1 100.0% .1%
El Paso Brown			51 39.5% 18.1%			59 45.7% 10.6%	19 14.7% 55.9%	129 100.0% 13.0%
El Paso Polychrome			42 100.0% 14.9%					42 100.0% 4.2%
Thin red slipped	1 100.0% .9%							1 100.0% .1%
Chupadero Black-on-white	11 21.6% 9.4%		40 78.4% 14.2%					51 100.0% 5.2%
Chupadero Black-on-white Socorro-like subglaze	1 100.0% .9%							1 100.0%. 1%
Crosby Black-on-gray			10 100.0% 3.6%					10 100.0% 1.0%
Plain slipped red	20 79.9% 17.1%		3 11.5% 1.1%			3 11.5% .5%		26 10.0% 2.6%
Indeterminate Red-on-terracotta	44 62.9% 37.6%		12 17.1% 4.3%			5 7.1% .9%	9 12.9% 26.5%	70 100.0% 7.1%
Wide Line Red-on-terracotta	15 93.8% 12.8%		1 6.3% .4%					16 100.0% 1.6%
Three Rivers Red-on-terracotta	8 72.7% 6.8%		2 18.2% .7%	1 9.1% 100.0%				11 100.0% 1.1%

CELLS: Count Row Percent Column Percent	VESSEL FORM							ROW TOTAL
	Bowl	Seed Jar	Jar	Canteen	Miniature Pinch Pot	Body Sherds	Indeterminate Rim	
Lincoln Black-on-red	6 85.7% 5.1%		1 14.3% .4%					7 100.0% .7%
Buff-on-cream	7 58.3% 6.0%		2 16.7% .7%			3 25.0% .5%		12 100.0% 1.2%
Indeterminate Lincoln/Three Rivers	2 100.0% 1.7%							2 100.0% .2%
Jornada Brown	1 .2% .9%	1 .2% 100.0%	66 12.3% 23.5%		1 .2% 100.0%	462 86.2% 83.2%	5 .9% 14.7%	536 100.0% 54.2%
South Pecos Brown			5 19.2% 1.8%			20 76.9% 3.6%	1 3.8% 2.9%	26 100.0% 2.6%
Corona Corrugated			39 100.0% 13.9%					39 100.0% 3.9%
Brown Indented Corrugated			1 100.0% .4%					1 100.0%. 1%
Salado Polychrome			3 100.0% 1.1%					3 100.0% .3%
Athabaskan Plain			1 33.3% .4%			2 66.7% .4%		3 100.0% .3%
COLUMN TOTAL	117 11.8% 100.0%	1 .1% 100.0%	281 25.4% 100.0%	1 .1% 100.0%	1 .1% 100.0%	554 56.0% 100.0%	34 3.4% 100.0%	989 100.0% 100.0%

Lithic Artifacts. A total of 243 lithic artifacts, or 77.7 percent of the lithic assemblage, were analyzed from Room 1. Although there were fewer lithic artifacts than ceramics found in the fill of the room, there still was a high number. The chipped stone assemblage from Room 1 consisted of angular debris, core flakes and one projectile point (Table 26). The projectile point was identified as an Archaic Williams point. Silicified shale was the most common material type (78.3percent). Quartzite was used somewhat, but not often. All the selected materials for the chipped stone are found in the nearby area in outcrops or in the river in the form of cobbles. The silicified shale is very common in the nearby mountains and large outcrops are found in Carrizo Peak, 20 km north of the site and along Indian Divide, 8 km from the site along NM 380 to the northeast. The Indian Divide source was found by Adams (pers. comm. 1999) during a survey for the Lincoln National Forest. Kelley (1984) also found a large source of silicified shale in Carrizo Peak, north of Carrizozo.

Table 26. Lithic Artifacts Recovered from Room 1

CELLS: Count Row Percent Column Pct	ARTIFACT MORPHOLOGY			ROW TOTAL
	Angular Debris	Core Flake	Williams Projectile Point	
Chert	1 14.3% 1.2%	6 85.7% 3.8%		7 100.0% 2.9%
Obsidian		1 100.0% .6%		1 100.0% .4%
Igneous	5 62.5% 6.0%	3 37.5% 1.9%		8 100.0% 3.3%
Andesite	2 25.0% 2.4%	6 75.0% 3.8%		8 100.0% 3.3%
Rhyolite	2 50.0% 2.4%	2 50.0% 1.3%		4 100.0% 1.6%
Siltstone	1 25.0% 1.2%	3 75.0% 1.9%		4 100.0% 1.6%
Silicified shale	65 34.0% 77.4%	125 65.4% 78.6%	1 .5% 100.0%	191 100.0% 78.3%
Quartzite	8 38.1% 9.5%	13 61.9% 8.2%		21 100.0% 8.6%
COLUMN TOTAL	84 34.3% 100.0%	159 65.2% 100.0%	1 .4% 10.0%	244 100.0% 100.0%

Ground Stone. A small ground stone assemblage (n = 5) was recovered from Room 1. These include an abrader, portable sipapu (see Floor Feature above), two two-hand manos, and one indeterminate fragment. The substitute sipapu was made of serpentine that was highly polished. The other ground stone items were made of sandstone. The two-hand manos were large loaf types also found on the floor of Room 1 north of the sipapu. The other artifactswere recovered from the lower fill within the burned oxidized soil.

Ancillary Studies

Fauna Remains. There was a variety of faunal species recovered from Room 1 (Table 27). A total of 19 bone fragments were analyzed. Small mammals account for most of the assemblage (36.8 percent). Besides animals species, freshwater mussel shell was also found. Many were found in flotation samples taken from the subfloor features. The mussel shell was recovered from the flotation sample of Posthole 2.

Table 27. Fauna from Room 1

CELLS: Count Row Percent Column Percent	LEVEL		ROW TOTAL
	Feature Fill	Subfloor	
Small Mammal	2 28.6% 25.0%	5 71.4% 45.5%	7 100.0% 36.8%
Small to Medium Mammal		2 100.0% 18.2%	2 100.0% 10.5%
Medium to Large Mammal	1 25.0% 12.5%	3 75.0% 27.3%	4 100.0% 21.0%
Prairie Dog	2 100.0% 25.0%		2 100.0% 10.5%
Large Artiodactyl	3 100.0% 37.5%		3 100.0% 15.8%
Mussel		1 100.0% 9.1%	1 100.0% 5.3%
GROUP TOTAL	8 42.1% 100.0%	11 57.9% 100.0%	19 100.0% 100.0%

Macrobotanical Remains. Several flotation samples were collected from the fill, floor, and subfloor features in Room 1. The analyses show that corn was present along with pine, ponderosa pine, grasses, juniper, dicot, monocot, goosefoot, pigweed, and purslane.

Pollen Remains. Three palynological samples were analyzed from Room 1. They were pollen washes from two manos and the portable sipapu. Table 28 contains the types of taxa found on the artifacts. Although corn pollen was found on the artifacts, the counts were low. Pine, juniper, cheno-ams and low and high spine composites were found in larger quantities.

Table 28. Pollen Washes from Artifacts in Room 1

FIELD SPECIMEN NUMBER	ARTIFACT	LEVEL	TAXA
7294	Mano #1	Fill	Pine, juniper, cheno-am, low and high spine composites, cholla, Mormon tea, cattail, and indeterminate.
7294	Mano #2	Fill	Pine, mesquite, cheno-am, low and high composites, cattail, evening primrose, and indeterminate.
7013	Portable sipapu	Floor	Pine, cheno-am, low and high spine composites, cholla, and corn.

Room 2

Room 2 is located 1 m south of the southeast corner of Room 1. This room had been constructed by digging into the red sterile clay. Several postholes with wooden posts were found on the floor along with an adobe-collared hearth, stone-lined ash pit, and a burial pit (Fig. 31). The room was found by mechanical scraping, exposing a large, burned oxidized area on the surface of the site.

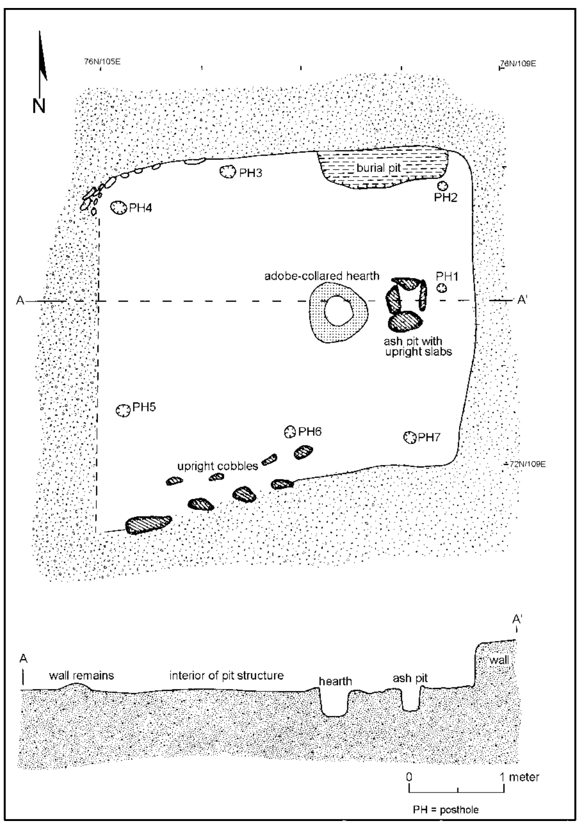


Figure 31. Room 2, plan and profile.

Stratigraphy

One stratigraphic break was identified in the fill of the room and consisted of a wet clay that had accumulated around the existing trees. The overburden was removed by mechanical means, exposing the room fill. The upper portion of the fill consisted of a wet clay containing charcoal flecking and oxidized soil. Below this level of the room the roof fall began and contained burned adobe, roof beam fragments, and burned corn in a very loose, ashy clay. There was an abundant amount of artifacts also found in the upper fill and roof fall. Only a few rocks were found in the fill, compared to Room 1. Large amounts of burned corn were recovered from the roof fall indicating that it was probably stored on the roof. The large amounts of burned wood along with oxidized adobe casts would suggest that the room burned.

Four levels were identified during the excavation of the room. These are as follows:

Level 1 General fill - upper soil where the feature was not visible yet. Artifacts from this level were found on the surface or below the surface after the soil was removed by mechanical stripping.

Level 2 Feature fill- the fill within the room, but not the roof fall.

Level 3 Roof fall - the level in which all the roofing material from the structure was present. Usually it is above the floor. It was very thick, approximately 30 cm to 40 cm, depending on the slope of the land.

Level 4 Floor - the floor or surface of the room.

Architectural Details

Dimensions. The measurements of the room are 3.75 m by 3.75 m with a floor area of 14.0 sq m (Fig. 31). The depth of the room ranges from 5 cm to 40 cm. The shallow depth is the result of mechanical stripping removing most of the fill except for a small portion near the floor.

Walls. The walls of the room are composed of the sterile red clay. There is no evidence of plastering. Some areas did exhibit smoothing but these were very small areas. There are three standing walls with the west wall mostly missing except for a 5 cm portion where the floor met the wall (Table 29). The south wall consists of two different types of construction. The east half is constructed of red clay and the west half is made of upright cobbles. Wall width was difficult to assess except for the south wall which was 80 cm thick. The exterior surface is immediately found along the north and east walls. Soil oxidation was also found along the north and east walls.

Table 29. Wall Measurements for Room 2

WALL	LENGTH	WIDTH	HEIGHT
North	4.0 m		40 cm
South	4.0 m	80 cm	20 cm
East	3.5 m		40 cm
West	3.2 m		5 cm

Floor. The floor of Room 2 was even and well prepared with a clay layer that had been plastered, giving it a rock-hard finish. Charcoal staining was evident near the hearth and ash pit. Minute charcoal flecks were embedded into the floor and oxidized soil was also present in a few areas.

Floor Features. A total of 10 floor features were excavated. These include seven postholes, an adobe-collared hearth, a stone-lined ash pit, and a burial pit (Fig. 32). Because the floor was well preserved, the features were easily found.

Hearth: This is a circular, adobe-collared hearth. The interior of the hearth is 33-by-30 cm in diameter and 32 cm deep (Fig. 33). With the adobe collar it is 60 cm in diameter. The interior of the hearth had been plastered with clay and was heavily oxidized making the pit edge very hard. Rodent and root activity have removed portions of the walls and bottom. The fill consisted of a silty, sandy clay with charcoal and very little ash. A hammerstone was recovered from the fill of the hearth.

Ash Pit: This feature is a squarish, stone-lined pit with large upright cobbles (Fig. 34). It measures 26-by-26 cm and is 29 cm deep. The fill of the pit was mostly ash with some charcoal and sand. The bottom of the pit was not lined and rodent activity was evident.

Postholes: A total of seven post holes were excavated in Room 2. The postholes were placed along the north, south, and east walls. The pattern consists of four corner posts with a post in the center of each wall except no center posthole was found along the west wall. The post holes are fairly consistent in size and depth (Table 30). Every posthole had portions of a wooden post in situ. Dendrochronological samples were collected; however, a date could not be obtained because the wood was juniper and the rings were not definable. All the posts were burned up to 5 cm below the floor level. The remaining portions were unburned but rotted at the bottom; however, the mid-sections were well preserved.

In Posthole 7, rocks were jammed along the sides of the post toward the bottom to secure it. Posthole 6 may have been used as a supporting rather than a main post as suggested by the size of the post. No center post or ladder holes were found.

Table 30. Posthole Measurements for Room 2

POST-HOLE	DIAMETER	DEPTH	FILL
1	10 cm	13	Fine sand with decomposing wood
2	8 cm	15 cm	Fine sand with wood fragments
3	32 cm	30 cm	Fine sand, rocks at bottom to anchor post.
4	19 cm	36 cm	Loamy sand with decomposing wood
5	13 cm	32 cm	Loamy sand with decomposing wood. Adobe lined
6	13 cm	32 cm	Fine sand with charcoal and decomposing wood. Adobe lined
7	13 cm	13 cm	Fine sand with pea gravel and wood fragments.

Figure 32. Room 2 with floor features.

Figure 33. Adobe-collared hearth in Room 2.

Figure 34. Stone-lined ash pit.

Figure 35. Burial pit in Room 2.

Burial Pit: A large, oval-shaped pit was found near the northeast corner of the room (Fig. 35). The pit measured 1.20 m east-west by 0.45 m north-south. The pit had been dug into the cobble layer that underlies the site. The walls and bottom of the pit were of natural cobbles and had no evidence of plastering and slightly undercut the north wall. A body of a female 50+ years old (Akins, this volume) was placed in the pit and plastered over. Several artifacts were recovered from the pit, mostly in the upper fill, and included ceramics (n = 68) and lithic artifacts (n = 30). The chipped stone consisted of core flakes and angular debris.

Roof: The fill of the room contained many burned wood fragments. Some of them probably were from the roof. Adobe casts were also recovered from the fill and were also probably from the roof. The average diameter of the larger pieces was 5 cm. Because the wood was so fragmented it was impossible to determined the pattern of the roof beams.

Artifacts

The artifacts from Room 2 totaled 4,213 items. This includes 3,670 ceramics, 566 lithic artifacts, 2 projectile points, 3 pieces of ground stone, 142 faunal remains, 4 bone tools, 22 minerals, and 4 mussel shells. It is important to mention that most of the artifacts were recovered within the roof fall of the room. Only one artifact, a hammerstone, was found in the hearth and several in the burial pit. One El Paso Polychrome sherd was found on the floor in Room 2.

Ceramics. A total of 1,996 artifacts were analyzed or 54.3 percent of the assemblage. The ceramics recovered from Room 2 consisted of numerous ceramic types (Table 31). The feature fill contained over half (59 percent) of the artifacts recovered from the room followed by the roof fall level (36.8 percent). Also shown in Table 31 are the ceramics recovered in the general fill surrounding Room 2 prior to the room being defined.

The most common ceramic type within the room assemblage is Jornada Brown (61.5 percent). El Paso Brown (9.3 percent), Chupadero Black-on-white (6.6 percent), and Corona Corrugated (4.8 percent) are the other ceramics with moderate densities. Both brown wares (Jornada and El Paso) are found throughout all phases and are not good indicators for determining phases.

Table 31. Ceramics Recovered from Room 2

CELLS: Count Row Percent Column Percent		LEVELS				ROW TOTAL
	Exterior Room	General Fill	Feature Fill	Roof Fall	Floor	
Unpainted white ware	1 25.0% .1%		1 25.0% .1%	2 50.0% .3%		4 100.0% .1%
Mineral paint white ware	1 33.3% .1%		1 33.3% .1%	1 33.3% .1%		3 100.0% .1%
Glazed red unpainted	3 30.0 .3%		6 60.0% .5%	1 10.0% .1%		10 100.0% .3%
Glaze yellow/cream slipped unpainted	1 25.0% .1%			4 75.0% .5%		5 100.0% .2%
Glaze-on-red	1 20.0% .1%		3 60.0% .3%	2 40.0% .3%		6 100.0% .2%
El Paso Brown	80 30.4% 9.5%	14 5.3%. 17.1%	66 25.1% 5.6%	103 39.1% 14.0%		263 100.0% 9.3%
El Paso Polychrome	1 1.8% .1%	8 14.5% 9.8%	20 36.3% 1.7%	25 45.5% 3.4%	1 1.8% 100.0%	55 100.0% 1.9%

CELLS: Count Row Percent Column Percent		LEVELS				ROW TOTAL
	Exterior Room	General Fill	Feature Fill	Roof Fall	Floor	
Chupadero Black-on-white	58 31.0% 6.9%	6 3.2% 7.3%	32 17.1% 2.7%	91 48.7% 12.4%		187 100.0% 6.6%
Plain slipped red	18 33.3 2.1%	1 1.9% 1.2%	14 25.9% 1.2%	21 38.9% 2.9%		54 100.0% 1.9%
Red-on-terracotta	21 32.3% 2.5%	2 3.0% 2.4%	27 41.6% 2.3%	15 23.1% 2.0%		65 100.0% 2.3%
Wide Line Red-on-terracotta	16 41.0% 1.9%	1 2.6% 1.2%	1 2.6% .1%	21 53.8% 2.9%		39 100.0% 1.4%
Three Rivers Red-on-terracotta	5 29.5% .6%	4 23.5% 4.9%	4 23.5% .3%	4 23.5% .5%		17 100.0% .6%
Lincoln Black-on-red	7 28.0% .8%	1 4.0% 1.2%	8 32.0% .7%	9 36.0% .5%		18 100.0% .6%
Buff/Cream floated/slipped	5 29.4 .6%		5 29.4% .4%	7 52.9% 1.0%		17 100.0% .6%
Lincoln/Three Rivers	1 25.0% .1%	1 25.0% 1.2%	1 25.0% .1%	1 25.0% .1%		4 100.0% .1%
Jornada Brown	518 29.7% 61.6%	20 1.1% 24.4%	898 51.4% 76.2%	308 17.7% 42.0%		1744 100.0% 61.5%
South Pecos Brown	43 31.3% 5.1%	7 5.1% 8.5%	44 32.1% 3.7%	43 31.3% 5.9%		94 100.0% 3.3%
Corona Corrugated	45 30.8% 5.3%	16 10.9% 19.5%	29 19.7% 2.5%	56 38.3% 7.6%		137 100.0% 4.8%
Alma Plain	4 30.8% .5%		2 15.4% .2%	7 53.8% 1.0%		13 100.0% .4%
Salado Polychrome	5 29.4% .2%	1 5.9% 1.2%	6 35.3% .5%	5 29.4% .7%		17 100.0% .6%
Gila Polychrome	7 28.0% .8%		11 44.4% .9%	7 28.0% 1.0%		18 100.0% .6%
COLUMN TOTAL	841 29.6% 100.0%	82 2.9% 100.0%	1179 41.6% 100.0%	734 25.9% 100.0%	1 .0% 100.0%	2837 100.0% 100.0%

Lithic Artifacts. A total of 526 lithic artifacts were recovered and analyzed from Room 2 (Table 32). Core fl akes are t he m ost com mon at 59.8 percent followed by angular debris (39.5 percen t). Also included in the assemblage are a hammerstone (.2 percent) and two projectile points (.3 percent). None of t he debitage recovered exhibited any use wear. All the lithic artifacts were recovered from the room fill with th e ex ception o f th e h ammerstone, which was found in the hearth.

The projectile points recovered from Room 2 were small unidentifiable basal fragments. One had a base t hat was slightly eared an d the other had a concave base. Both w ere recovered from the room fill.

Table 32. Lithic Artifacts from Room 2

CELLS: Count Row Percent Column Pct	FEATURE			ROW TOTAL
	Room Fill	Hearth	Burial	
Hammerstone		1 100.0% 100.0%		1 100.0% .2%
Angular debris	192 92.3% 38.7%		16 7.7% 53.3%	208 100.0% 39.5%
Core flake	301 95.6% 60.8%		14 4.4% 46.7%	315 100.0% 59.8%
Indeterminate projectile point	2 100.0% .4%			2 100.0% .3%
COLUMN TOTAL	495 94.2% 100.0%	1 .2% 100.0%	30 5.7% 100.0%	526 100.0% 100.0%

Ground Stone. The ground stone assemblage is very sm all and consi sts of onl y three i tems. They include one pol ishing st one, one i ndeterminate mano, and a one- hand m ano. A ll art ifacts w ere recovered from t he roof fal l. The pol ishing s tone would suggest t hat pot tery m ay hav e been manufactured or at least polished here. Grinding was present as suggest ed by t he m anos; how ever, t he grinding scars were not intensive.

Miscellaneous A rtifacts. A to tal o f 2 6 miscellaneous items were recovered from Room 2. These include 4 pieces of fresh w ater mussel shell and 22 mineral fragments. Of these, 20 are hematite, 1 is chrysocolla, and 1 is limonite.

Table 33. Fauna Recovered from Room 2

CELLS: Count Row Percent Column Percent	LEVEL		ROW TOTAL
	Feature Fill	Roof Fall	
Small Mammals	55 100.0% 56.7%		55 100.0% 51.4%
Small to Medium Mammal	8 100.0% 8.2%		8 100.0% 7.4%
Medium Mammal	2 100.0% 2.1%		2 100.0% 1.8%
Medium to Large Mammal	9 90.0% 9.2%	1 10.0% 10.0%	10 100.0% 9.3%
Large Mammal	3 33.3% 3.1%	5 66.7% 50.0%	8 100.0% 7.5%
Very Large Mammal		2 100.0% 20.0%	2 100.0% 1.9%
Prairie Dog	1 50.0% 1.0%	1 50.0% 10.0%	2 100.0% 1.9%
Pocket Gopher	1 100.0% 1.0%		1 100.0% .9%
Kangaroo rat	1 100.0% 1.0%		1 100.0% .9%
Woodrat	2 66.7% 2.1%	1 33.3% 10.0%	3 100.0% 2.8%
Cottontail	8 100.0% 8.2%		8 100.0% 7.5%
Jackrabbit	1 10.0% 1.0%		1 100.0% .9%
Medium Artiodactyl	2 100.0% 2.1%		2 100.0% 1.9%
Deer	3 100.0% 3.1%		3 100.0% 2.8%
Egg Shell	1 100.0% 1.0%		1 100.0% .9%
COLUMN TOTAL	97 90.7% 100.0%	10 9.3% 100.0%	107 100.0% 100.0%

Ancillary Studies

Faunal Remains. Most of the 107 analyzed faunal remains were recovered from the fill of Room 2. However; a small percentage was recovered from the roof fall level (Table 33). Small mammals were the most common species found at 66.3 percent. Medium to large mammals made up 23.3 percent of the assemblage. The other taxa were present in lesser amounts. Four bone tools were also analyzed. These included three bone awls made from large mammal and a small mammal bone bead or tube. These tools were recovered from the roof fall and the bone awls exhibit burning.

Macrobotanical Remains. Items recovered include goosefoot, cheno-ams, purslane, corn kernels and cupules, piñon shell, juniper, and pine.

Pollen Remains. One pollen sample was taken from the burial of Room 2. It was taken from the pelvic area of the individual. Several different types of taxa were identified. They are pine, knotweed/smartweed, agave, grass, cheno-am, low and high spine composites, sagebrush, cholla, and Mormon tea. Corn was absent from the burial.

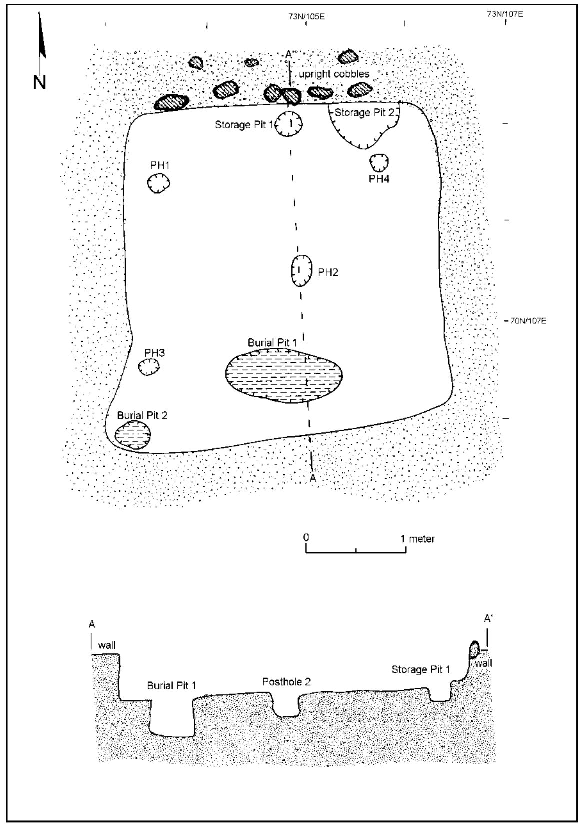


Figure 36. Room 3, plan and profile.

Room 3

Room 3 is immediately south of Room 2 and probably served as a storage room (Fig. 36). The two rooms are separated by a double row of large upright cobbles. A series of postholes were excavated in the room along with storage pits and two burial pits. The room did not have an interior hearth but a trough metate and mano were found in situ on the floor along with a large reconstructible El Paso Polychrome vessel. The fill of the room contained an abundant amount of burned corn. The corn had been removed from the cob and probably stored on the roof. No corn cobs were found in the fill of the room.

Stratigraphy

The fill of the room consisted of two definite stratigraphic breaks, feature fill and roof fall; however, four levels were identified.

Level 2 Feature fill–consisted of the upper 10 cm to 20 cm of sandy clay containing charcoal, rocks and charcoal.

Level 3 Roof fall–was below the feature fill was 30 cm to 40 cm thick and consisted of ash, burned wood fragments, burned adobe, burned corn, ceramics, lithic artifacts, ground stone, and bone. The burned posts, possibly the cross roof supports, were 20 cm to 35 cm in diameter and ranged in length between 8 cm and 24 cm. Smaller twig-like, charred fragments were also present.

Level 4 Floor–was a compact reddish clay that has been smoothed.

Level 5 Subfloor–floor features dug below the floor level.

Architectural Details

Dimensions. The room is 3.40 m north-south by 3.10 east-west and is 60 cm deep covering a floor area of 10.5 sq m (Fig. 37).

Walls. The walls of the room are made from the sterile red clay that underlies the site. The room was dug into the clay. There was no evidence of wall preparation such as plastering or smoothing. All walls were intact and ranged between 22 cm and 73 cm in height (Table 34). Rodent and root activity were very heavy and large portions of the wall were

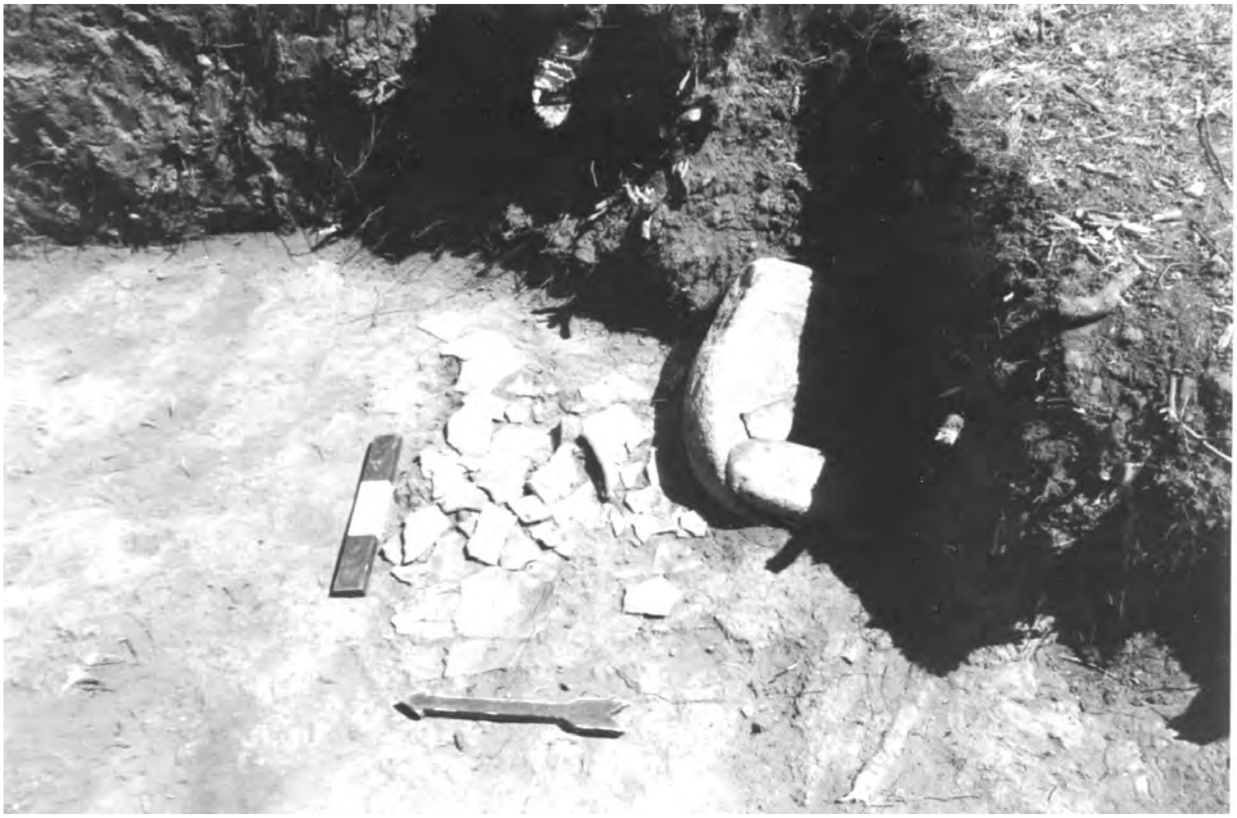


Figure 37. Large El Paso Polychrome broken vessel with mano and metate on the floor of Room 3.

missing, especially around the corners near the features.

The north wall contained two rows of large upright cobbles averaging 25 cm in width and 20 cm in height (the portion above the floor level of Room 2). They are spaced 20 cm to 30 cm apart and continue from the northwest corner 50 cm to the east. These rocks may have served as footings for the wall for Room 2. The height of the walls vary because of the slope of the site.

Table 34. Wall Measurements for Room 3

WALL	LENGTH	HEIGHT
North	3.00 m	25 cm to 34 cm
South	3.40 m	37 cm to 40 cm
East	2.87 m	43 cm to 73 cm
West	3.21 m	22 cm to 47 cm

Floor. The floor is uneven reddish clay with embedded charcoal. The floor was prepared; however, rodent and root activity has removed most of the preparation. Only a few areas of the floor were still intact especially where the El Paso Polychrome vessel and metate were found on the floor at the southeast corner of the room (Fig. 37). The northern half of the floor contained many large roots and rodent burrowing especially along the northwest corner where the floor was completely missing.

Floor Features. Several floor features were excavated in Room 3 (Fig. 38). These include three postholes, two burials, and two storage pits. Descriptions for each feature is given below.

Postholes: Three postholes were placed generally within the room corners, with the southwest one missing and a fourth one in the center of the room (Table 35). The posts have been set inward from the corners 40 cm. Each posthole contained wooden posts, which were burned on top and unburned below the floor level. The diameter of the corner postholes are almost the same and the depth of each is 29 cm. The center posthole is larger and shallower by 4 cm.

Figure 38. Room 3, floor features.

Table 35. Measurement of the Postholes in Room 3

LOCATION	POSTHOLE NUMBER	DIAMETER	DEPTH	Fill
Northwest corner	21	18 cm	29 cm	Loose charcoal stained sandy clay and decomposing wood.
Northeast corner	27	17 cm	29 cm	Decomposing wood and little loamy sand.
Southeast corner	24	19 cm	29 cm	Decomposing wood. Post burned at the bottom.
Center	23	30 cm by 19 cm	25 cm	Loose sandy clay with charcoal.

It should be noted that the central post may have been 19 cm in diameter; however, a large root was growing in the posthole making the top of the posthole larger in its north-south dimension than it was originally.

Storage Pits: Two storage pits located along the north wall were excavated. Storage Pit 28 is situated at the northeast corner of the room. It is an irregular-shaped pit measuring 50 cm north-south by 65 cm east-west with a depth of 23 cm. The fill consisted of a loose, charcoal-stained sand. The bottom of the pit contained cobbles; probably the natural cobbles existing below the red clay. Storage Pit 22 is oval in shape measuring 27 cm north-south by 30 cm east-west and a depth of 19 cm. The fill of the pit was a blackened sandy clay with small fragments of charcoal. The sides and bottom of the pit were smooth red clay with no rocks. Macrobotanical samples were taken from the pit and the analysis shows that goosefoot, cheno-ams, purslane, corn cupules, kernels, and glumes, monocot, pine, ponderosa, and spurge were in the pit.

Burials: Two burials were excavated in Room 3. One, a young female, 18 to 22 years of age, and a fetus were found in the south half of the room 40 cm north from the center of the south wall (Fig. 38). The pit was dug into the red sterile clay with the fill being a loose sandy clay and it measured 51 cm north-south by 1.17 m east-west and 40 cm deep. Several artifacts were recovered with the burial, including ceramics, lithic artifacts, shell, and burned corn. The floor metate was resting on the east edge of the burial. Because of all the floor disturbance near the burial it was difficult to know if the pit had been sealed over with clay.

The second burial pit was located along the southwest corner of the room. When first exposed it was believed to be a posthole, until excavation began. The pit was dug into the sterile red clay forming a basin type pit. Several ribs, teeth, and a jaw fragment from an infant were also recovered from this area in the room fill outside of the burial pit. The pit is circular in shape and measures 28 cm north-south by 30 cm east-west and 27 cm deep. The fill was a loose sandy clay that exhibited charcoal staining. Rodent and root disturbance was very heavy and is probably why some of the remains were found in the room fill. Artifacts found in the fill of the pit consisted of ceramics (n = 3) and nonhuman bone (n = 5).

Artifacts

A total of 2,289 artifacts were recovered from Room 3. These include ceramics (n = 1,635), lithic artifacts (n = 496), projectile point (n = 1), ground stone (n = 17), fauna (n = 137), bone tool (n = 1), and miscellaneous objects (n = 2).

Ceramics. A total of 1,204 ceramics were analyzed (73.6 percent). A large number of the ceramics found in Room 3 consisted of brown wares (Table 36). These include El Paso Brown, Jornada Brown, and South Pecos Brown (53.1 percent of the assemblage). However, there is a greater amount of El Paso Polychrome present than in Rooms 1 and 2. A large reconstructible El Paso Polychrome vessel was found on the floor of the room, which probably accounts for most of the sherds. There is only one type of corrugated ware, Corona Corrugated, in the assemblage.

Table 36. Ceramics from Room 3

CELLS: Count Row Percent Column Percent	PROVENIENCE				ROW TOTAL
	Room Fill	Roof Fall	Burial Pit 25	Infant Burial Pit 26	
Unpainted white ware	9 69.2% 2.3%	3 23.1% .4%	1 7.7% 2.2%		13 100.0% 1.1%
Mineral paint white ware		2 100.0% .3%			2 100.0%.2%
Glaze yellow/cream slipped	1 100.0% .3%				1 100.0% .1%
Glaze-on-red		2 100.0% .3%			2 100.0% .2%
El Paso Brown	56 44.4% 14.1%	64 50.8% 8.4%	6 4.8% 13.0%		126 100.0% 10.5%
El Paso Polychrome	15 5.4% 3.8%	265 94.6% 35.0%	6 4.8% 13.0%		280 100.0% 23.3%
Thin red slipped	3 100.0% .8%				3 100.0% .2%
Chupadero Black-on-white	41 43.6% 10.3%	50 53.2% 6.6%	3 3.2% 6.5%		94 100.0% 7.8%
Plain slipped red	10 66.7% 2.5%	2 13.3% .3%	3 20.0% 6.5%		15 100.0% 1.2%

CELLS: Count Row Percent Column Percent	PROVENIENCE				ROW TOTAL
	Room Fill	Roof Fall	Burial Pit 25	Infant Burial Pit 26	
Red-on-terracotta	20 40.8% 5.0%	25 51.0% 3.3%	4 8.2% 8.7%		49 100.0% 4.1%
Wide line Red-on-terracotta	14 87.5% 3.5%	2 12.5% .3%			16 100.0% 1.3%
Three Rivers Red-on-terracotta	2 15.4% .5%	10 76.9% 1.3%	1 7.7% 2.2%		13 100.0% 1.1%
Lincoln Black-on-red	1 12.5% .3%	7 87.5% .9%			8 100.0% .7%
Buff/Cream floated/slipped	4 44.4% 1.0%	5 55.5% .7%			9 100.0% .7%
Slipped cream	2 66.7% .5%	1 33.3% .1%			3 100.0% .2%
Jornada Brown	174 35.9% 43.8%	289 59.6% 38.1%	20 4.1% 43.5%	2 .4% 66.7%	485 100.0% 40.3%
South Pecos Brown	16 57.1% 4.0%	12 42.9% 1.6%			28 100.0% 2.3%
Corona Corrugated	23 47.9% 5.8%	16 333.3% 2.1%	8 16.7% 17.4%	1 2.1% 33.3%	48 100.0% 4.0%
Alma Plain	2 66.7% .5%	1 33.3% .1%			3 100.0% .2%
Salado Polychrome	2 50.0% .5%	2 50.0% .3%			4 100.0% .3%
Gila Polychrome	2 100.0% .5%				2 100.0% .2%
COLUMN TOTAL	397 33.0% 100.0%	758 63.0% 100.0%	46 3.8% 100.0%	3 .2% 100.0%	1204 100.0% 100.0%

Lithic Artifacts. A total of 373 lithic artifacts were analyzed from Room 3 (83.4 percent of the assemblage). The chipped stone recovered from Room 3 is mostly core flakes (64 percent) and mainly from silicified shale (Table 37). Angular debris is also high (34.5 percent) from the same material type. Burial Pit 25 contained pieces of debitage all from silicified shale. Although there are other material types in the assemblage, the silicified shale was the most commonly used. One projectile point dating to the post 1400s was also recovered from the fill of the room. Besides the hammerstone and projectile point, no other formal tools were recovered from the room. A total of eight cores were recovered and all were also from the silicified shale material.

Table 37. Lithic Artifacts from Room 3

CELLS: Count Row Percent Column Percent	ARTIFACT FUNCTION							ROW TOTAL
	Core Flake		Angular Debris		Projectile Point	Hammerstone	Core	
MATERIAL TYPE	Room Fill	Burial Pit 1	Room Fill	Burial Pit 1	Room Fill	Room Fill	Room Fill	
Chert	7 63.6% 3.0%		2 18.2% 1.7%		1 9.1% 100.0%	1 9.1% 50.0%		11 100.0% 2.9%
Andesite	9 64.3% 3.9%		4 28.6% 3.3%			1 7.1% 50.0%		14 100.0% 3.8%
Rhyolite	2 10.0% .9%							2 100.0% .5%
Limestone	1 100.0% .4%							1 100.0% .3%
Siltstone	2 100.0% .9%							2 100.0% .5%
Silicified shale	202 60.7% 87.4%	8 2.4% 100.0%	113 33.9% 93.4%	2 .6% 100.0%			8 2.4% 100.0%	333 100.0% 89.3%
Quartzite	8 80.0% 3.5%		2 20.0% 1.7%					10 100.0% 2.7%
COLUMN TOTAL	231 61.9% 100.0%	8 2.1% 100.0%	121 32.4% 100.0%	2 .5% 100.0%	1 .3% 100.0%	2 .5% 100.0%	8 2.1% 100.0%	373 100.0% 100.0%

Ground Stone. The ground stone assemblage in Room 3 has a small sample of 17 artifacts (Table 38). Besides food processing implements, several shaft straighteners were found along with a mortar, paint grinder, and polishing stone. A trough metate with a two-hand mano were found next to the burial (Pit 27) on the floor in situ with the mano resting on the metate. Pollen washes found only small amounts of corn pollen present on the surfaces of the mano and metate. With the large amount of burned corn present in the room, we would have expected larger corn pollen counts present on these surfaces.

Miscellaneous Artifacts. Two pieces of freshwater mussel shell were recovered from Room 3.

Ancillary Studies

Faunal Remains. A total of 115 faunal remains were analyzed from Room 3 with small to medium mammals dominating the assemblage (Table 39). Six were recovered from the floor and 76 from the features. The rest of the fauna (n = 33) were found in the fill of the room. One indeterminate bone tool fragment was recovered and made from the bone of a medium to large mammal.

Table 38. Ground Stone Recovered from Room 3

CELLS: Count Row Percent Column Percent	LEVEL					ROW TOTAL
	Room Fill				Floor	
FUNCTION	Granite	Syenite	Sandstone	Quartzite	Syenite	
Polishing Stone			1 50.0% 10.0%	1 50.0% 100.0%		2 100.0% 11.8%
Shaft Straightener		1 33.3% 50.0%	2 33.7% 20.0%			3 100.0% 17.6%
Palette			1 100.0% 10.0%			1 100.0% 5.9%
Mortar			1 100.0% 10.0%			1 100.0% 5.9%
Hammerstone			1 100.0% 10.0%			1 100.0% 5.9%
Mano	1 33.3% 100.0%	1 33.3% 50.0%		1 33.3% 10.0%		3 100.0% 17.6%
Two-hand trough mano					2 100.0% 66.7%	2 100.0% 11.8%
Two-hand slab mano			2 100.0% 20.0%			2 100.0% 11.8%
Trough metate					1 100.0% 33.3%	1 100.0% 5.9%
Paint grinder			1 100.0% 10.0%			1 100.0% 5.9%
COLUMN TOTAL	1 5.9% 100.0%	2 11.8% 100.0%	3 17.6% 100.0%	10 58.8% 100.0%	1 5.9% 100.0%	17 100.0% 100.0%

Table 39. Faunal Remains Recovered from Room 3

CELLS: Count Row Percent Column Percent	Features					ROW TOTAL
	Room Fill	Floor	Burial Pit 1	Burial Pit 2	Storage Pit 2	
Small Mammal	5 26.3% 15.1%	2 10.5% 33.3%	6 31.6% 10.0%	3 15.8% 60.0%	3 15.8% 27.3%	19 100.0% 16.5%
Small to Medium Mammal			36 90.0% 60.0%	1 2.5% 20.0%	3 7.5% 27.3%	40 100.0% 34.8%
Medium Mammal			2 66.7% 3.3%	1 33.3% 20.0%		3 100.0% 2.6%

CELLS: Count Row Percent Column Percent	Features					ROW TOTAL
	Room Fill	Floor	Burial Pit 1	Burial Pit 2	Storage Pit 2	
Medium to Large Mammal	6 38.1% 18.2%	2 9.5% 33.3%	9 42.9% 15.0%		2 9.5% 18.2%	21 100.0% 18.2%
Large Mammal	2 100.0% 6.1%					2 100.0% 1.7%
Prairie Dog	3 60.0% 9.1%		1 20.0% 1.7%		1 20.0% 9.1%	5 100.0% 4.3%
Pocket Gopher	2 50.0% 6.1%		1 25.0% 1.7%		1 20.0% 9.1%	4 100.0% 3.4%
Permyscus sp.	2 100.0% 6.1%					2 100.0% 1.7%
Woodrat			1 100.0% 1.7%			1 100.0% .9%
Cottontail	5 55.5% 15.1%		4 44.4% 6.7%			9 100.0% 7.8%
Jack Rabbit	2 66.6% 6.1%	1 33.3% 16.7%				3 100.0% 2.6%
Mule Deer	4 100.0% 12.1%					4 100.0% 3.4%
Pronghorn	2 100.0% 6.1%					2 100.0% 1.7%
Medium to Large Bird					1 100.0% 9.1%	1 100.0% .9%
Passerine		1 100.0% 16.7%				1 100.0% .9%
COLUMN TOTAL	33 28.7% 100.0%	6 5.2% 100.0%	60 52.2% 100.0%	5 4.3% 100.0%	11 9.6% 100.0%	115 100.0% 100.0%

Table 40. Pollen Results from Room 3

FIELD SPECIMEN NUMBER	FEATURE A	RTIFACT	LEVEL	TAXA
7272		Trough metate	Floor	Pine, cheno-am, low and high spine composites, and Mormon tea.
7303	Burial Pit 1		Fill	Pine, juniper, acacia, grass, cheno-am, low and high spine composites, and corn.
7306	Posthole 4		Fill	Pine, juniper, cheno-am, low and high spine composites, and indeterminate.
7309	Storage Pit 2		Fill	Pine, cheno-am, low and high spine composites, sagebrush, fir, corn, and indeterminate.

Macrobotanical Remains. Remains found in Room 3 include corn cupules, kernels, and glumes, monocot pine, piñon shell, ponderosa, juniper, goosefoot, cheno-ams, purslane, and common reed.

Pollen Remains. The pollen wash from Room 3 was from a trough metate found on the floor of Room 3. Pollen samples were also collected fromthe fill of Burial Pit 1, Posthole 4, and Storage Pit 2. The results of the pollen analyses are shown in Table 40. The taxa with the highest counts were pine, cheno-ams, and low and high spine composites. There was an abundance of corn present in the fill; however the features and artifacts contained small amounts.

Surface Room 5

This room was found on the last day of excavation by a mechanically dug trench that exposed oxidized clay and charcoal (Figs. 39 and 40). Removal of the backdirt from around the southern portion of Peckham's excavation also revealed that an area of burned oxidized soil and ceramics was present. It is located 40 to 50 cm south of the southeast corner of the kiva. The trench cut through a large roasting pit and destroyed a small portion of the east and west walls. When removing the overburden, the shallow walls were probably removed leaving only the north wall and small portions of the east and west walls. Several features were excavated in the room, which include a large roasting pit, a large storage pit, three postholes, and a remodeled hearth with adobe collars present in both hearths, giving the feature a double-hearth appearance.

Stratigraphy

The fill of the room was very shallow and contained loose sandy clay with charcoal, burned oxidized adobe, and ash. Because it was so shallowthere were no stratigraphic breaks noted with the exception of the burned roasting pit found in the trench.

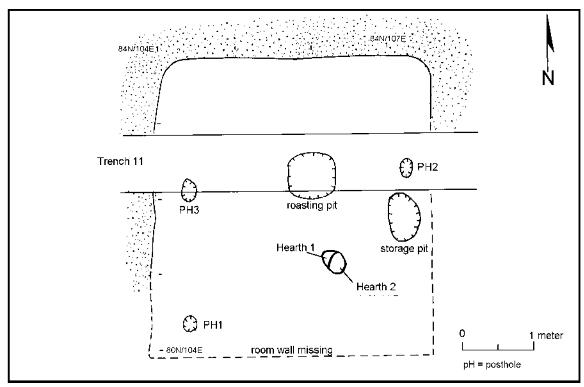


Figure 39. Surface Room 5, plan.

Architectural Details

Dimensions. Since most of the walls were missing, a projected measurement is given for this room at 3.0 m north-south by 3.65 m east-west and a depth of 14 cmwith a potential area of 10.95 sq m

Walls. The only complete standing wall is the north wall. A small portion of the east and west walls is also present; however, the south wallis completely missing (Table 41).

Figure 40. Room 5 in foreground with Rooms 1, 2, and 3 in the background.

Figure 41. Room 5, floor features.

Figure 42. Remodeled hearth in Room 5.

Table 41. Wall Measurements from Room 5

WALL	LENGTH	HEIGHT
North	3.0 m	40 cm
South	Missing	Missing
East	55 cm (partial)	6 cm
West	1.95 (partial)	5 cm

The room was dug into the red clay that formed the walls and exhibited no evidence of any smoothing or plastering.

Floor. The floor consisted of a rock-hard surface that showed oxidization from burning. It has been overlain by a 2-cm-thick clay mud, smoothed and hardened plaster. Charcoal flecks were embedded into the floor and charcoal staining was evident in some areas.

Floor Features. Seven floor features were excavated in Room 5 and include three postholes, a large roasting pit, a large storage pit, and a remodeled hearth that had two collars around it. This hearth has been described as a double hearth. The floor features are described in detail below (Fig. 41).

Hearth: The hearth has been remodeled and made smaller than it was originally (Fig. 42). Hearth 1 was the original hearth with an adobe collar. The pit had been plastered and the clay baked to a very hard surface. The measurements for the original hearth are 26 cm north-south by 40 cm east-west and 17 cm in depth. The fill consisted of mostly ash with very little soil and the depression may have served as an ash pit for Hearth 2. There was minute charcoal flecking, but not enough for a radiocarbon sample.

Hearth 2 was smaller because of remodeling the west side of the original hearth. A new adobe collar was constructed that incorporated the initial collar into it. The inside of the west side of the hearth was plastered over with clay mud and baked to a very hard surface. Measurements for Hearth 2 are 26 cm north-south by 23 cm east-west and 17 cm deep. The fill of the hearth consisted of a very ashy sandy clay. Only minute charcoal flecks were present in the fill. No artifacts were recovered from the hearth.

Roasting Pit: This feature was cut by the mechanical trench removing the northern portion and a part of the east side. The roasting pit is basin shaped and measures 60 cm in diameter with a depth of 15 cm. The fill was a sandy clay with charcoal, burned corn, and burned adobe.

Storage Pit: This storage pit is along the projected east wall. It is large and oval in shape with measurements of 65 cm north-south by 46 cm east-west and 15 cm deep. The fill consisted of charcoal-stained, sandy clay. A ground stone fragment was found within the pit.

Table 42. Posthole Measurements, Room 5

Posthole Number	North/ South	East/ West	Depth	Fill
1	23 cm	20 cm	39 cm	sandy clay with decomposing wood.
2	23 cm	20 cm	35 cm	mostly decomposing wood with small amount of sandy clay.
3	36 cm	32 cm	32 cm	sandy clay with decomposing wood.

Postholes: Three post holes were excavated in the room. Postholes 1 and 2 were cut by the trench; however the wooden posts were still in situ. The measurements for the postholes are very similar; however, Posthole 3 is slightly larger because of rodent activity (Table 42). Each posthole contained a wooden post in which the wood was completely rotted and not good for dendrochronological samples. The tops of each post were burned above the floor surface.

Artifacts

The artifact assemblage recovered from Room 5 is small compared to the other rooms on the site. It is very likely that a large number of the artifacts present in this room were removed during mechanical scraping. A total of 64 artifacts were analyzed from this room and include ceramics, lithic artifacts, ground stone, and fauna. One polished bone fragment from possibly an awl, made from a medium to large mammal, was recovered.

Ceramics. Thirty-six ceramics were analyzed from Room 5 (Table 43). Brown ware ceramics are predominant at 72.3 percent. Some ceramics were found in the large roasting pit and in Posthole 1; however, they were among the artifacts that were not analyzed because of time and money constraints. Another 80 ceramics were recovered from the fill of Room 5, which included a partial brown ware reconstructible vessel.

Lithic Artifacts. The chipped stone assemblage in Room 5 was small and all recovered artifacts were analyzed. The analyses produced seven items of which four were core flakes, two angular debris, and one hammerstone. The most common material type was silicified shale and the only other materials represented were rhyolite and quartzite. No other formal tools were recovered.

Table 43. Ceramic Assemblage, Room 5

CELLS: Count Row Percent Column Percent	ROW TOTAL
El Paso Brown	6 100.0% 16.7%
El Paso Polychrome	2 100.0% 5.6%
Chupadero Black-on-white	1 100.0% 11.1%
Plain slipped red	1 10.0% 2.8%
Red-on-terracotta	2 100.0% 5.6%
Lincoln Black-on-red	1 100.0% 2.8%
Jornada Brown	20 100.0% 55.6%
COLUMN TOTAL	36 100.0% 100.0%

Ground Stone. Two ground stone artifacts were recovered. Both are end fragments from a slab metate. One was recovered from the large storage pit and the other was recovered outside the pit area in the room fill. Both fragments were from the same material type, metamorphic schistose.

Ancillary Studies

Faunal Remains. Several different types of taxa were identified from Room 5 (Table 44). All the faunal remains (n = 17) were recovered from the fill of the room. Usually the flotation samples contained some bone; however, the samples from the roasting pit and hearth did not contain any.

Table 44. Fauna from Room 5

CELLS: Count Row Percent Column Percent	TOTAL
Small Mammal	7 100.0% 41.2%
Small to Medium Mammal	3 100.0% 17.6%
Medium to Large Mammal	1 100.0% 5.9%
Prairie Dog	2 100.0% 11.8%
Woodrat	1 100.0% 5.9%
Dog, Coyote, Wolf	2 100.0% 11.8
Medium to Large Bird	1 100.0% 5.9%
COLUMN TOTAL	17 100.0% 100.0%

Macrobotanical Remains. A single monocot was recovered from a flotation sample within the room.

Pollen Remains. No pollen samples were collected because all the fill from the features exhibited burning.

Possible Jacal Area (Area 7500)

Outside of Room 2 and immediately to the east, two postholes with wooden posts were excavated in an area covering 6 sq m. There were no walls present and the surface consisted of the red claylayer on the site. The fill of the postholes ranged between 11 cm and 56 cm deep, depending on how much of the overburden was removed by mechanical means. The fill consisted of charcoal and burned adobe mixed in a loose, sandy clay. Several ceramics, lithic artifacts, one projectile point, and a bone fragment were recovered; however, most artifacts recovered from this area were not selected for analysis. The projectile point was analyzed and was identified as a Scallorn type and the bone fragment was identified as being from a small mammal.

Two postholes were excavated and are 1 m east of the east wall of Room 1. Posthole 1 is 20 cm north-south by 18 cm east-west and 28 cm deep. The fill consisted of mostly decomposing wood and very little sandy clay soil. Cobbles were placed around the wooden post for support. Posthole 2 is identical to Posthole 1. It measures 20 cm north-south by 18 cm east-west and 27 cm deep. The fill consists of a decomposing wooden post; however the cobbles for support are missing. Both posts were burned at the top and unburned below the utilized surface.

The function of this area is unknown since no walls were found. It is possible that it served as an exterior work area with an overhead cover, or the posts are related to Room 1. However, no other postholes were found outside the other rooms suggesting that they were two separate features.

Area 8000

Upon initial blading of the site to clear brush and accumulated topsoil, an area to the west of the kiva revealed several concentrations of red oxidized soil and charcoal staining. Excavation of this area uncovered a utilized surface almost directly beneath the blading. On this surface were three outside hearths, nine post holes, a pit, and a shallow pit structure (Fig. 43). It was determined, through overlapping features, that the pithouse was constructed first and one of the hearths was constructed later. The postholes suggest one or two ramada-like structures were probably present and covered the three outside hearths.

Architectural Details

Hearths. Three hearths, all very similar, were located on the utilized surface of Area 8000. All three were adobe-collared, cylindrical firepits. Hearths 1 and 2 are only 25 cm apart (Fig. 44). Hearth 1 measured 21 cm in diameter with an 8 cm encircling collar. Depth was 34 cm. The fill consisted of charcoal-flecked soil with some ash covering the bottom 2 cm.

Hearth 2 was also collared and measured 30-by-25 cm with an 8 cm collar. Depth of the hearth was 17 cm. Within the fill was minimal charcoal flecking and a few artifacts. Unlike Hearth 1, this one seemed to have been cleaned out and then filled in naturally. Hearth 3 was collared and measured 28-by-21 cm with a 10-cm collar. Depth of the hearth was 16 cm.

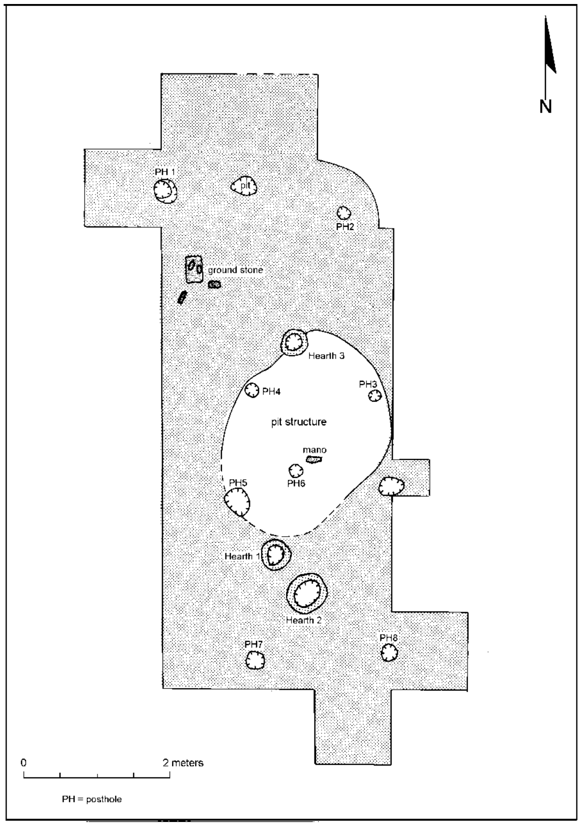


Figure 43. Plan view of Area 8000. Pit structure lies beneath all features shown.

The fill was all ash with a slight bit of silty loam. The hearth had burned extensively and the soil exhibited an orange-tinted oxidation.

Pit. A single, small pit was located at the north end of Area 8000. It had not burned and measured 22-by-19 cm and was 11 cm deep.

Postholes. Nine postholes were uncovered in Area 8000. All are believed to be supports for one or more ramada structures, which would have covered the hearths. They seem to have formed basically rectangular patterns (see Fig. 43). Seven of the nine postholes contained wood fragments or complete posts (usually rotted). Some were burned. Posthole 1 was dug into a previously made pit while Posthole 6 may be an ancillary support post. Measurements are given in Table 45.

Pit Structure. Testing the soft soil near Hearth 3 resulted in finding a shallow pit structure. The structure had been built prior to construction of the hearth as it undercut a portion of the hearth. The pit structure measured 2.57 m north-south by 2.20 m east-west by 21 cm deep with an area of 5.19 sq m (Figs. 45 and 46). It had been extensively disturbed by rodent activity and tree roots. The structure had been dug into the native clays on the site and the floor was slightly concave with sloping sides. The

Figure 44. View of Area 8000 with hearths and postholes prior to excavation of pit structure.

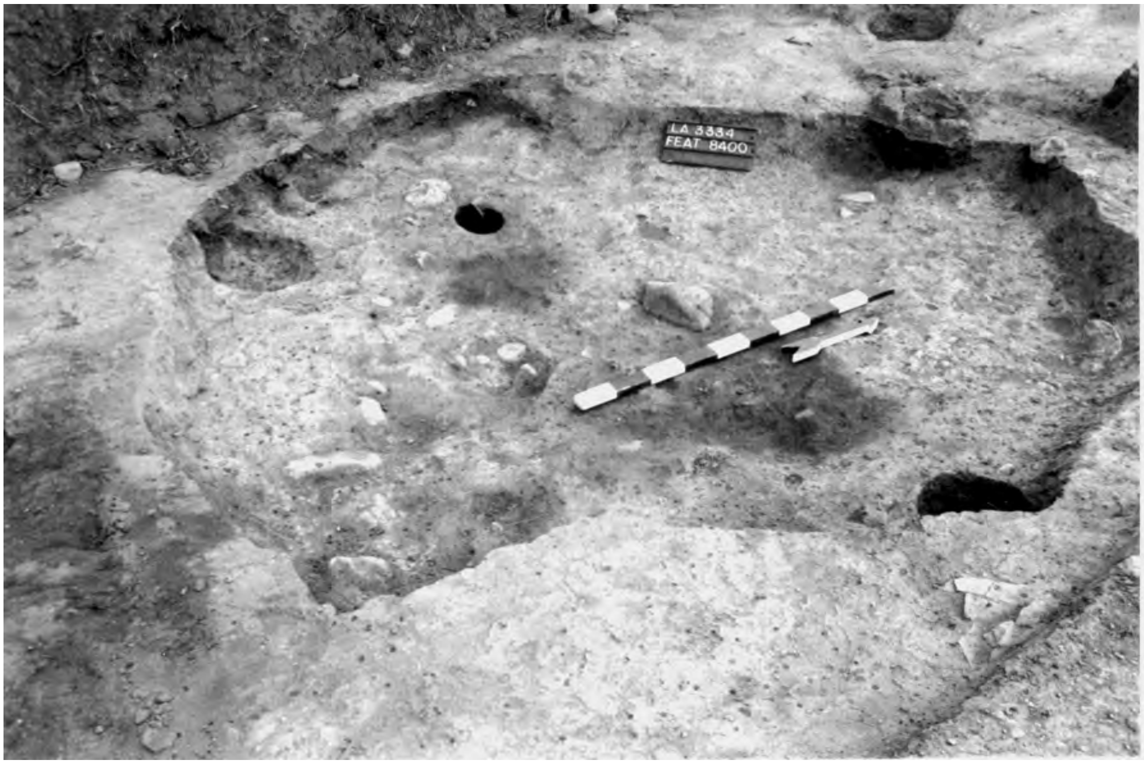


Figure 45. Pit structure in Area 8000.

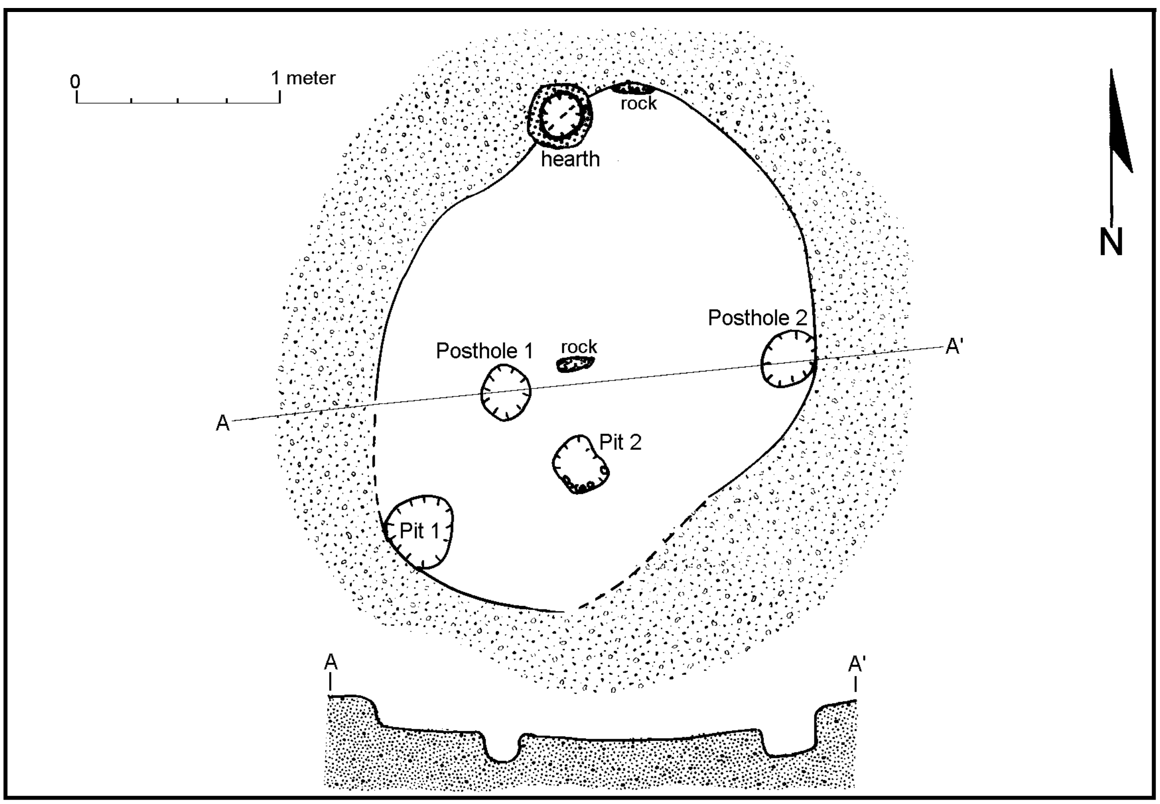


Figure 46. Plan view and profile of pit structure, Area 8000.

walls and floor had not been plastered. No hearth was found in the pit structure and it was undoubtedly a short-term, good weather habitation.

Within the structure were two postholes and two pits. No hearth was found. Posthole 1 is off-center to the west and Posthole 2 was along the east wall. Posthole 1 measured 17 cm in diameter and was 15 cm deep. Posthole 2 contained an in situ post with the upper portion burned. Several rocks lined the sides and bottom of the hole that measured 23 cm in diameter and was also 15 cm deep. There is no pattern to the posthole placement and it is possible that the superstructure had a domed or conical roof because of the limited number post supports.

Both pits lie in the southern end of the pit structure. Pit 1 was 30 cm in diameter and 8 cm deep. Charcoal flecks were present in the fill. Pit 2 was also shallow and contained several cobbles. It measured 30-by-28-by-5 cm deep. The fill was clayish with a few flecks of charcoal.

Artifacts

A total of 2,313 artifacts were recovered from this outside work area and shallow habitation unit. They include 1,471 ceramics, 739 lithic artifacts, 70 pieces of animal bone, 17 ground stone, 1 projectile point, and 15 stone tools.

Ceramics. A total of 1,132 sherds were analyzed (76.9 percent, Table 45). Jornada Brown dominates (48.3 percent) the ceramic assemblage. Other utility wares are well represented, however, by El Paso Brown and Corona Corrugated. The most common decorated ware is Chupadero Black-on-white. Jars outnumber bowls by not quite 2 to 1. Most jars are Corona Corrugated and Chupadero Black-on-white. Most bowls are derived from decorated wares. The number of glazed sherds suggest this may be the last occupied area on the site.

Table 45. Ceramics Recovered from Area 8000

CELLS: Count Row Percent Column Percent	VESSEL FORM						ROW TOTAL
	Bowl	Jar	Seed Jar	Canteen B	ody Sherd	Indeterminate	
Mineral Paint		3 10.0% 1.4%					3 100.0 % .3%
Glaze-on-red	1 100.0% .6%						1 100.0 % .0%
Glaze-on-yellow	1 100.0% .6%						1 100.0 % .0%
Agua Fria Glaze A	1 100.0% .6%						1 100.0 % .0%
El Paso Brown		16 16.7% 5.6%			77 80.2% 11.4%	3 3.1% 30.0%	96 100.0 % 8.5%
Thin El Paso Brown		8 15.1% 2.8%			45 84.9% 6.6%		53 100.0 % 4.7%
El Paso Polychrome	3 10.7% 1.9%	25 89.3% 8.7%					28 100.0 % 2.5%

CELLS: Count Row Percent Column Percent	VESSEL FORM						ROW TOTAL
	Bowl	Jar	Seed Jar	Canteen B	ody Sherd	Indeterminate	
Chupadero-black-on-white	32 27.1% 20.7%	83 70.3% 28.9%		2 1.7% 100.0%		1 .9% 10.0%	118 100.0 % 10.4%
Plain slipped Red	20 68.9% 12.9%	1 3.4% .0%			8 27.6% 1.2%		28 100.0 % 2.8%
Red-on-terracotta	41 74.5% 26.6%	6 10.9% 2.1%			5 9.1% .7%	3 5.4% 30.0%	55 100.0 % 4.8%
Three Rivers Red-on-terracotta	23 95.8% 14.9%		1 4.2% 50.0%				24 100.0 % 2.1%
Lincoln Black-on-red	17 100.0% 11.0%						17 100.0 % 1.5%
Sub-glaze	1 100.0% .6%						1 100.0 % .0%
Buff/Cream Slipped	2 12.5% 1.3%	2 12.5% .7%			12 75.0% 1.8%		16 100.0 % 1.4%
Lincoln/Three Rivers	1 100.0% .6%						1 100.0 % .0%
Jornada Brown	9 1.6% 5.8%	52 9.5% 18.1%			483 88.3% 71.3%	3 .5% 30.0%	547 100.0 % 48.3%
South Pecos Brown	2 4.0% 1.3%		1 2.0% 50.0%		47 94.0% 6.9%		50 100.0 % 4.4%
Corona Corrugated		90 100.0% 31.3%					90 100.0 % 7.9%
Salado Polychrome		1 100.0% .3%					1 100.0 % .0%
COLUMN TOTAL	154 13.6% 100.0%	287 25.3% 100.0%	2 .2% 100.0%	2 .2% 100.0%	677 59.8% 100.0%	10 .9% 100.0%	1132 100.0 % 100.0 %

Lithic Artifacts. A total of 590 lithic artifacts were analyzed (79.8 percent of the assemblage, Table 46). Most rawmaterial is silicified shale (81.9 percent), commonly available in the region. The better-grade materials of chert and chalcedony are used primarily for flakes, points, and bifaces. The single projectile point is an Archaic, Cienega-like point with a serrated blade. One core of silicified shale was found in the pit structure, all others were from the general fill of Area 8000.

Ground Stone. There were 21 pieces of ground stone recovered from Area 8000 and all were analyzed (Table 47). Many artifacts are indeterminate fragments, but 23.8 percent are manos with fewer metates. This area was undoubtedly an outside processing area. The most common material used was syenite at 33.3 percent. Manos were of three different materials and metates of two, suggesting that a variety of hardnesses were desired for different degrees of grinding.

Table 46. Lithic Artifacts Recovered from Area 8000

CELLS: Count Row Percent Column Percent	FUNCTION						ROW TOTAL
	Angular Debris	Core Flake	Core	Hammerstone	Biface	Projectile Point	
Chert	8 28.5% 3.6%	17 60.7% 7.7%	1 3.5% 8.3%		1 3.5% 100.0%	1 3.5% 100.0%	28 100.0% 4.7%
Chalcedony		1 100.0% .3%					1 100.0% .2%
Igneous	1 16.7% .4%	5 83.3% 1.4%					6 100.0% 1.0%
Andesite	2 28.6% .9%	4 57.1% 1.1%	1 14.3% 8.3%				7 100.0% 1.2%
Limestone	1 33.3% .4%	2 66.6% .6%					3 100.0% .5%
Siltstone	1 33.3% .4%	1 33.3% .3%	1 33.3% 8.3%				3 100.0% .5%
Silicified Shale	181 37.4% 82.2%	292 60.4% 82.2%	9 1.9% 75.0%	1 .2% 100.0%			483 100.0% 81.9%
Quartzite	26 44.1% 11.8%	33 55.9% 9.2%					59 100.0% 10.0%
COLUMN TOTAL	220 37.3% 100.0%	355 56.8% 100.0%	12 2.0% 100.0%	1 .2% 100.0%	1 .2% 100.0%	1 .2% 100.0%	590 100.0% 100.0%

Table 47. Ground Stone Recovered from Area 8000

CELLS: Count Row Percent Column Percent	FUNCTION						ROW TOTAL
	Indeterminate	Abrading Stone	Shaft Straightener	Lapstone	Mano	Metate	
Basalt	1 25.0% 12.5%		1 25.0% 25.0%		2 50.0% 40.0%		4 100.0% 19.0%
Granite	1 33.3% 12.5%			1 33.3% 100.0%	1 33.3% 20.0%		3 100.0% 14.9%
Syenite	3 42.8% 37.5%				2 28.6% 40.0%	2 28.6% 50.0%	7 100.0% 33.3%

CELLS: Count Row Percent Column Percent	FUNCTION						ROW TOTAL
	Indeterminate	Abrading Stone	Shaft Straightener	Lapstone	Mano	Metate	
Rhyolite	2 75.0% 25.0%	1 25.0% 50.0%					3 100.0% 14.9%
Andesite	1 100.0% 12.5%						1 100.0% 4.8%
Limestone		1 100.0% 50.0%					1 100.0% 4.8%
Sandstone						2 100.0% 50.0%	2 100.0% 9.5%
COLUMN TOTAL	8 38.0% 100.0%	2 9.5% 100.0%	1 4.8% 100.0%	1 4.8% 100.0%	5 23.8% 100.0%	4 19.0% 100.0%	21 100.0% 100.0%

Ancillary Studies

Fauna. Sixty-one animal bones were analyzed (Table 48). The assemblage is not large and most bone is from small mammal. The pit structure contained two bones: one from a cottontail and the other a medium-to-large mammal. All others were from the general fill.

Table 48. Fauna Recovered From Area 8000

CELLS: Count Row Percent Column Percent	ROW TOTAL
Small Mammal	24 100.0% 39.3%
Small to Medium Mammal	2 100.0% 3.3%
Medium to Large Mammal	3 100.0% 4.9%
Large Mammal	2 100.0% 3.3%
Prairie Dog	5 100.0% 8.2%
Pocket Gopher	2 100.0% 3.3%
Woodrat	1 100.0% 1.6%
Cottontail	12 100.0% 19.7%
Jackrabbit	1 100.0% 1.6%
Dog/Coyote/Wolf	1 100.0% 1.6%
Medium Artiodactyl	1 100.0% 1.6%
Deer	3 100.0% 4.9%
Bird	1 100.0% 1.6%
Egg Shell	2 100.0% 3.3%
Mussel Shell	1 100.0% 1.6%
COLUMN TOTAL	61 100.0% 100.0%

Macrobotanical Remains. Three flotation samples yielded goosefoot, cheno-ams, purslane, corn cupules, grass, common reed, monocot, juniper, and piñon shells.

THE LITTLE CREEK SITE
(LA 111747)

Yvonne R. Oakes

Introduction

Previous testing by OAS revealed the presence of 66 artifacts scattered throughout the fill of the site (recorded on survey by Woodbury [1952] within the NM 48 highway right-of-way) to a depth of 30 cm. A data recovery plan was prepared (Oakes 1998) and excavations proceeded. Although more artifacts were recovered, no cultural features were found. Through conversations with a local resident, we learned that many artifacts had once been located diagonally across the highway from LA 111747. This area was subsequently bladed to break ground for a now-existing condominium. Because this area is upslope from LA 111747, it is likely that the artifacts from this apparently large pithouse community located here eroded into the portion examined by OAS.

A total of 500 artifacts were recovered from the Little Creek site. All were analyzed.

Site Setting

The Little Creek site is located in a forested area at the intersection of NM 48 and the Fort Stanton Road at an elevation of 2,210 m (7,250 ft). Vegetation is primarily tall ponderosa, piñon, and high grasses. An unnamed drainage flowing into Little Creek runs .1 km to the southeast. A small, unrecorded roomblock lies on top of a high knoll immediately to the northwest on private land. An underground natural gas line runs through the eastern edge of the site and another one cuts east-west through the south end of the site.

The site is small, measuring 26 m north-south by 19.5 m east-west and covers 392 sq m. Approximately 90 percent of the site on the west side of the highway is within the existing highway right-of-way.

Research Objectives

This is a very light scatter of ceramic and lithic artifacts. Based on the ceramics, Woodbury (1952) suggested it is a Glencoe phase site. The limited testing revealed no cultural features and excavations were planned to determined if they existed in this site area. Research plans, then, focused on basic areas of concern, including accurate chronological placement of the site, assessment of site function, and examination of subsistence adaptations. Because no cultural features were found, the research goals were not able to be met.

Field Methods

A primary datum was established and became Grid 100 North/100 East in a 1-by-1-m grid system that was laid out over the site (Fig. 47). Hand tools, including trowels, shovels, picks, brushes, and dental picks, were used to excavate the site. Each grid was to be excavated in natural stratified levels; however, no stratification was present and 10-cm arbitrary levels were used. Surface soil consisted of loam with much pine duff. Munsell color was 10YR 2/2, very dark brown. The soil gradually changed to 10YR 6/6, brownish yellow, as the sterile substrate was reached. All soil was screened through ¼-inch wire mesh. The artifacts were collected and bagged by artifact type with all provenience information noted. After excavations revealed that cultural features did not seem to exist on the site and artifacts lessened as we proceeded to the south, a backhoe was brought in to further explore the site. Two trenches (1 and 2) were dug to the sterile substrate. Trench 1 was 9.5 m long and .71 m deep, while Trench 2 was 10.5 m long and .66 m deep. The trenching confirmed our conclusion that no cultural features existed within the site limits.

Excavations revealed that artifacts were mostly recovered between ground level and 10 cm depth and no lower than 30 cm. The site sits on a slope that falls away to the south and depth of fill lessened as excavations proceeded from north to south. Artifacts also decreased as work moved to the south.

A total of 45 sq m were excavated on the site with an average depth of 18.1 cm and a maximum depth of 40 cm. Combined with the two trenches, a total of 17.6 cu m of dirt was removed on the site.

Artifacts

Five hundred artifacts were recovered from the Little Creek site. Of these, 60.2 percent were ceramics.

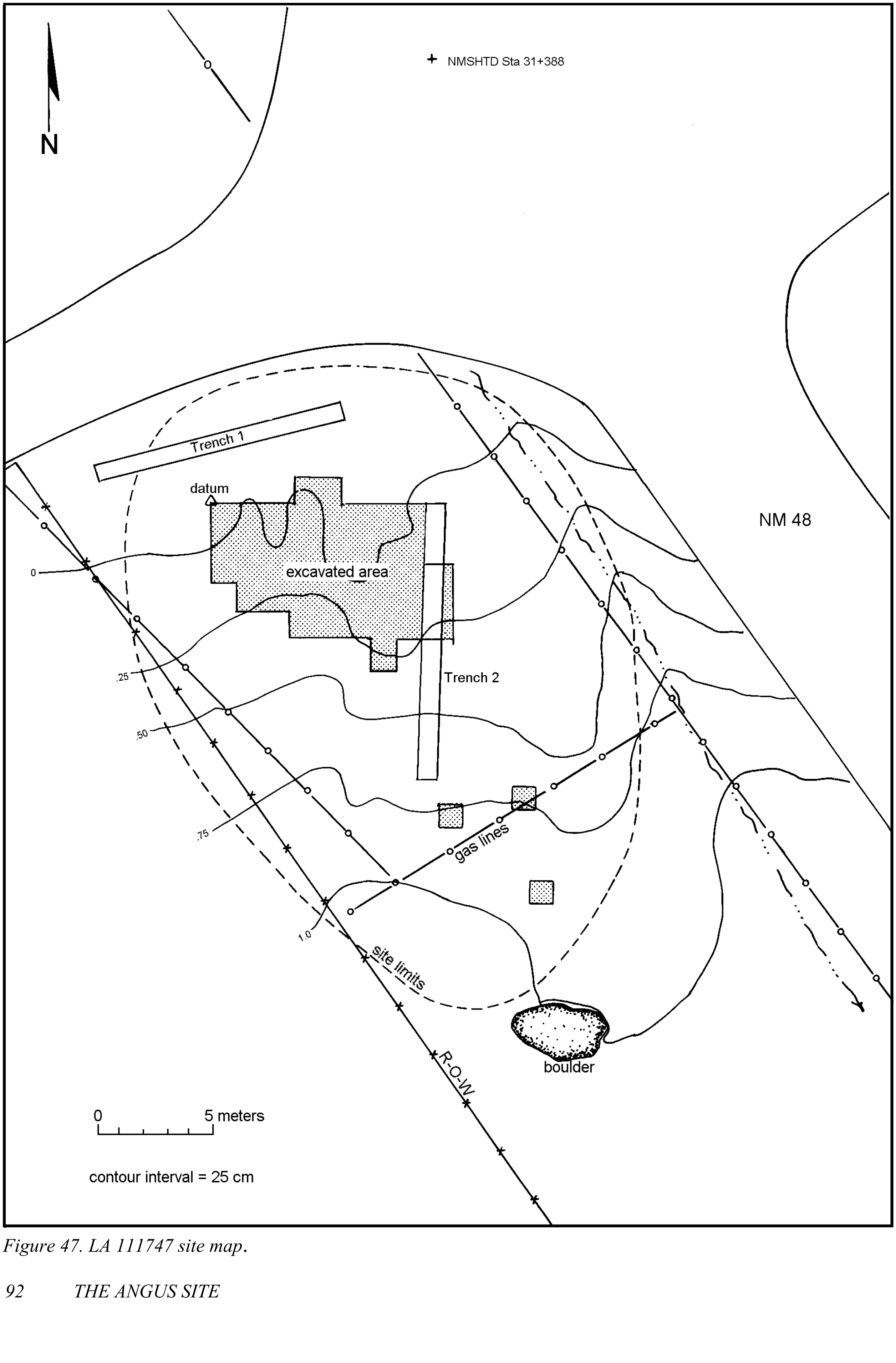


Figure 47. LA 111747 site map.

Ceramics

The recovered ceramics are shown in Table 49. Most are Jornada Brown Wares (65.9 percent). El Paso Brown sherds are the only other well-represented ceramic type. The latest type represented is Corona Corrugated (with only one sherd), which is dated around A.D. 1225. However, the more prevalent Three Rivers Red-on-terracotta and Wide Line Red-on-terracotta suggest a time for the site between A.D. 1150 and 1175.

Table 49. Ceramics from the Little Creek Site

CELLS: Count Row Percent Column Percent	VESSEL TYPE				ROW TOTAL
	Bowl	Jar	Miniature Pinch Pot	Body Sherds	
El Paso Brown		3 5.1% 6.7%		56 94.9% 24.8%	59 100.0% 19.6%
El Paso Smudged				1 100.0% .4%	1 100.0% .3%
Chupadero Black-on-white	10 43.5% 37.0%	11 47.8% 24.4%		2 8.7% .9%	23 100.0% 7.6%
Red-on-terracotta	1 100.0% 3.7%				1 100.0% .3%
Wide Line Red-on-terracotta	10 62.5% 37.0%	6 37.5% 13.3%			16 100.0% 5.3%
Three Rivers Red-on-terracotta	2 100.0% 7.4%				2 100.0% .7%
Jornada Brown	3 1.6% 11.1%	21 11.4% 46.7%	3 1.6% 100.0%	157 85.3% 69.5%	184 100.0% 61.1%
Jornada Scraped		2 18.2% 4.4%		9 81.8% 4.0%	11 100.0% 3.7%
Jornada Corrugated		1 100.0% 2.2%			1 100.0% .3%
Jornada Smudged	1 50.0% 3.7%			1 100.0% .4%	2 100.0% .7%
Corona Corrugated		1 100.0% 2.2%			1 100.0% .3%
COLUMN TOTAL	27 9.0% 100.0%	45 15.0% 100.0%	3 1.0% 100.0%	226 75.1% 100.0%	301 100.0% 100.0%

Lithic Artifacts

The lithic artifact assemblage numbers 192 items (Table 50). The artifacts are fairly evenly divided between core flakes and angular debris. No formal tools were recovered and only one core of chert was recoverd. Quartzite and chert are the dominant raw material types present. Silicified shale onlyaccounts

Table 50. Lithic Artifacts Recovered from the Little Creek Site

CELLS: Count Row Percent Column Percent	ARTIFACT FUNCTION			ROW TOTAL
	Angular Debris	Core Flake	Core	
Chert	30 38.5% 33.0%	46 59.0% 46.9%	2 2.6% 66.7%	78 100.0% 40.6%
Obsidian	1 33.3% 1.1%	2 66.7% 2.0%		3 100.0% 1.6%
Rhyolite		1 100.0% 1.0%		1 100.0% .5%
Limestone	4 80.0% 4.4%	1 20.0% 1.0%		5 100.0% 2.6%
Silicified Shale	12 48.0% 13.2%	13 52.0% 13.3%		25 100.0% 13.0%
Quartzite	44 55.0% 48.4%	35 43.8% 35.7%	1 1.3% 33.3%	80 100.0% 41.7%
COLUMN TOTAL	91 47.4% 100.0%	98 51.0% 100.0%	3 1.6% 100.0%	192 100.0% 100.0%

Table 51. Fauna from Little Creek, LA 111747

CELLS: Count Row Percent Column Percent	ROW TOTAL
Medium to Large Mammal	2 100.0% 28.6%
Large Mammal	1 100.0% 14.3%
Pocket Gopher	1 100.0% 14.3%
Bobcat	1 100.0% 14.3%
Mule Deer	2 100.0% 28.6%
COLUMN TOTAL	7 100.0% 100.0%

for 13.0 percent of the material, a much different representation than at the Angus site where shale was predominant.

Fauna

There were only seven pieces of faunal bone recovered from the Little Creek site (Table 51). These include mule deer, bobcat, and pocket gopher plus medium-to-large mammals. The bobcat was a surface find and is very likely roadkill.

CHRONOLOGICAL PLACEMENT OF SIERRA BLANCA SITES

Yvonne R. Oakes

Introduction

Placement of sites within a chronological framework can be a difficult task within the Sierra Blanca region. The most obvious problem is the lack of absolute dating for the entire area. A more worrisome dilemma is how to interpret architectural variations and ceramic associations. Kelley (1984) attempted to resolve some of the confusion by placing sites into phases based on their geographic location and composition of their ceramic assemblages. This was very commendable work; however, much ambiguity remains when trying to define correct temporal categories. These problems have been discussed earlier in this report (see Cultural Associations) and a new system of categorization was put forth. Using this method of classification together with radiocarbon dates, we attempt to place the Angus sites within a usable chronological framework. Other sites in the region that have been dated by absolute means are then examined and compared to sites that we have dated by our suggested ceramic categories.

Dating of the Angus Sites

A series of 19 radiocarbon dates were obtained for LA 3334, the Angus site. If these had not been available, it would have been extremely difficult to place the site in the correct temporal phase. Architecture on the site ranged from shallow pit structures, to a room block with a combination of masonry walls, clay walls, and walls of upright cobbles. According to current classifications, some parts of the site fit the Glencoe phase while others suit a contemporary Corona or later Lincoln phase. The presence of glaze ware sherds, Corona Corrugated, Lincoln Black-on-red, El Paso Polychrome, and Jornada Brown Wares could put the site into either the Glencoe, Corona, or Lincoln phases. The problem is the vast mixing of architectural styles and ceramics associated with particular phases. The acquisition of ^{14}C dates for the site eliminates the temporal guesswork but does not resolve the phase question. We examine the radiocarbon and ceramic dating process to see if there is an obtainable fit.

Radiocarbon Dates

The 19 radiocarbon dates acquired for the Angus site are presented in Figure 48. All dates are calibrated and corrected and the chart displays the 1- and 2-sigma ranges. From the chart, it can be seen that the dates fall into three basic time divisions at ca. A.D. 1015, A.D. 1310, and A.D. 1425.

The early radiocarbon dates for the site range from about A.D. 975 to 1035 with a mean at A.D. 1015. They are centered in Areas 3000 and 5000, which are overlapping. The dates focus on the pit structure and nearby Hearth 1 and Pit 1. The dates are reasonable considering that the pit structure would be expected to be earlier than the roomblock on the site. The A.D. 1015 date actually predates the currently defined Glencoe phase by approximately 85 years. Pithouses of this time (ca. A.D. 1000) are some of the earliest recorded in the Sierra Blanca region and are characterized by only Jornada Brown Wares and some Mimbres Black-on-white. Jornada Brown is plentiful in Areas 3000 and 5000 but is also ubiquitous on sites of all time periods in the region. So pottery alone would not have identified this pit structure as an early unit. The basic configuration of the structure with no hearth or postholes, however, does suggest an earlier architectural style.

Two radiocarbon dates fall between the early dates of ca. A.D. 1000 and the later post-A.D. 1300s dates. The Area 5000 date of A.D. 1205 is considered an anomaly, not matching the rest of the dates. The A.D. 1265 date for the shallow pit structure in Area 8000 may be correct. It is the only date obtained for the unit and may indicate a slightly earlier construction prior to the building of the roomblock. The other features in Area 8000 lie above the pit structure and are later as shown in the remaining ^{14}C dates.

The middle and main occupation of the site occurs at ca. A.D. 1310 with the construction of Rooms 2 and 3 within the roomblock, the storage pit, and Exterior Hearth 1 in Area 8000. No dates were obtained for the kiva but we believe it should align with the adjoining roomblock dates. Hearth 2 in Area 8000 is immediately adjacent to Hearth 1 and is identically constructed and may be presumed to have the same use date. Hearth 3, while further to

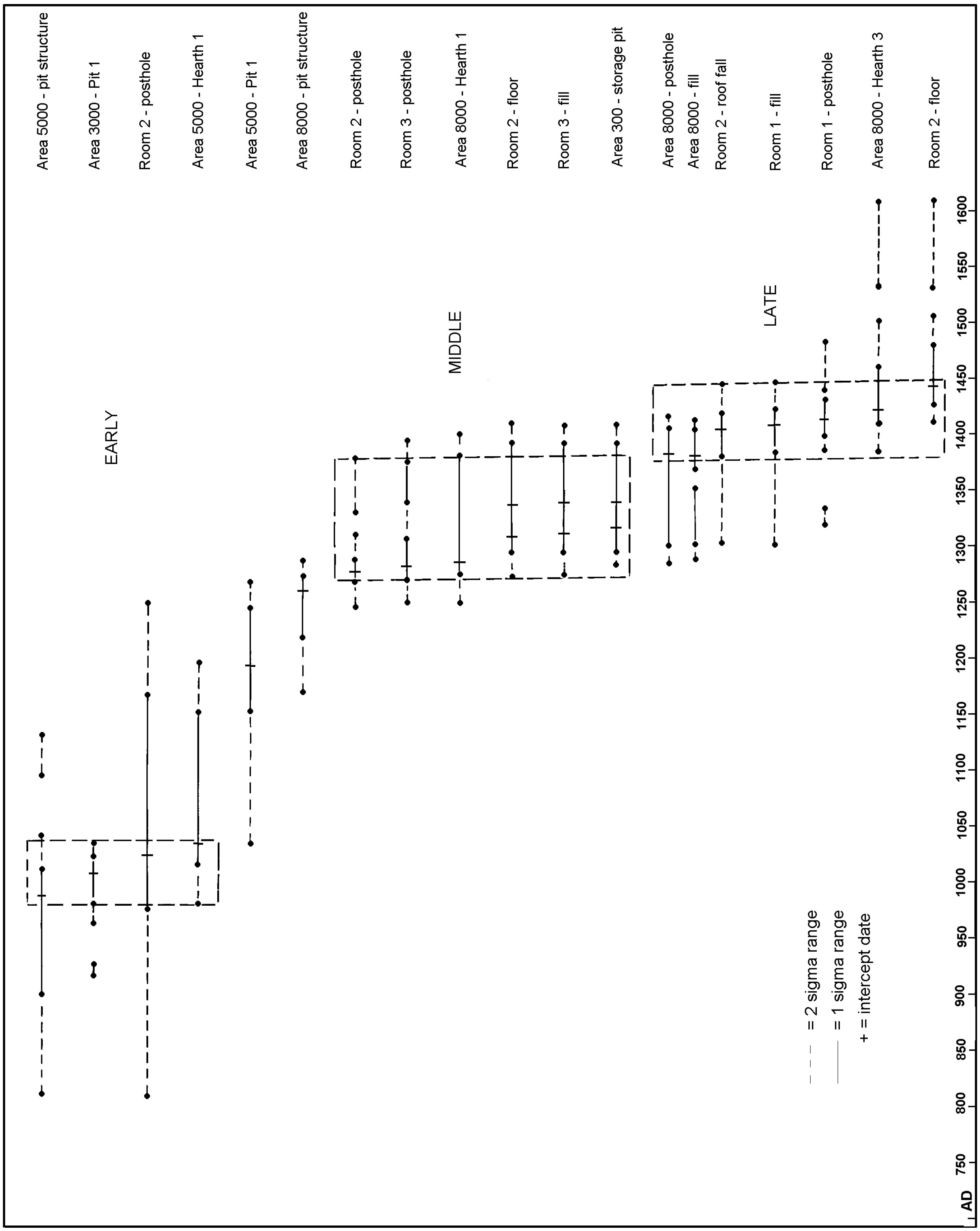


Figure 48. Radiocarbon dates for LA 3334.

the north, is of the same adobe-collared construction as the other two and is probably contemporary. No A.D. 1300s dates were obtained for Room 1 but it most likely was constructed at the same time. The early A.D. 1300s dates for the roomblock are corroborated by the pottery on the site, which extends up to the beginning use of Lincoln Black-on-red and Glaze 1 at ca. A.D. 1300.

The most surprising radiocarbon dates are seven that date between A.D. 1400 and 1450. These dates are from Rooms 1 and 2 and Exterior Hearth 3 in Area 8000. The pottery on the site does not date beyond the early A.D. 1300s, so these later dates would seem to be anomalous. However, the presence of seven of these dates in three different areas of the site suggests that there was some use activity occuring on the site at this time. A clue may be found in the finding of three possible Athabaskan Plain and Textured sherds (Brugge 1982) in Room 1 and three possible post-1400 projectile points from Room 1, the pit structure area in Area 5000, and the redeposited Area 1000. Were Athabaskans or Plains nomads reusing the site at ca. A.D. 1425? A compelling argument could be made for just such a scenario. A group of Athabaskans could have reoccupied Rooms 1 and 2, which had stood empty for approximately 100 years, replacing a post in Room 1, the roof in Room 2, and reusing the earlier constructed Hearth 3 in the ramada area while also replacing a ramada post here. Occupation could have occurred at a time when shelter was needed such as during the heavy rains of summer or chilly nights of autumn. So many dates so close together cannot be ignored and we suggest that, because of the possible Athabaskan sherds, an early Athabaskan group did occupy the Angus site for a short period in the early 1400s. The possibility of a post-1400s Pueblo group occupying the site at this time is considered unlikely because of the lack of Glaze II sherds, which come into use about A.D. 1375.

Ceramic Dates

The three potential occupation periods of the Angus site could not have been distinguished through ceramic cross-dating. As mentioned above, the A.D. 1000 ceramics are not discernable because of the ubiquity of Jornada Brown Wares, a defining ceramic marker for that time. The ceramic dates on the site, however, do confirm a ca. AD. 1300 date of occupation. The later A.D. 1400s dates are only hinted at by three Athabaskan sherds, which easily could be discounted when looking at the entire ceramic assemblage (see Ceramics, this report).

Therefore, because so many early occupations have the potential of being obscured by later ones due to the long-running nature of many of the regional sherds, the use of ceramic cross-dating for Sierra Blanca sites probably misses many of these early occupations. Likewise, any Athabaskan use of sites in the region may also be overlooked because of the usually very few sherds of this association found in comparison to Jornada Mogollon types.

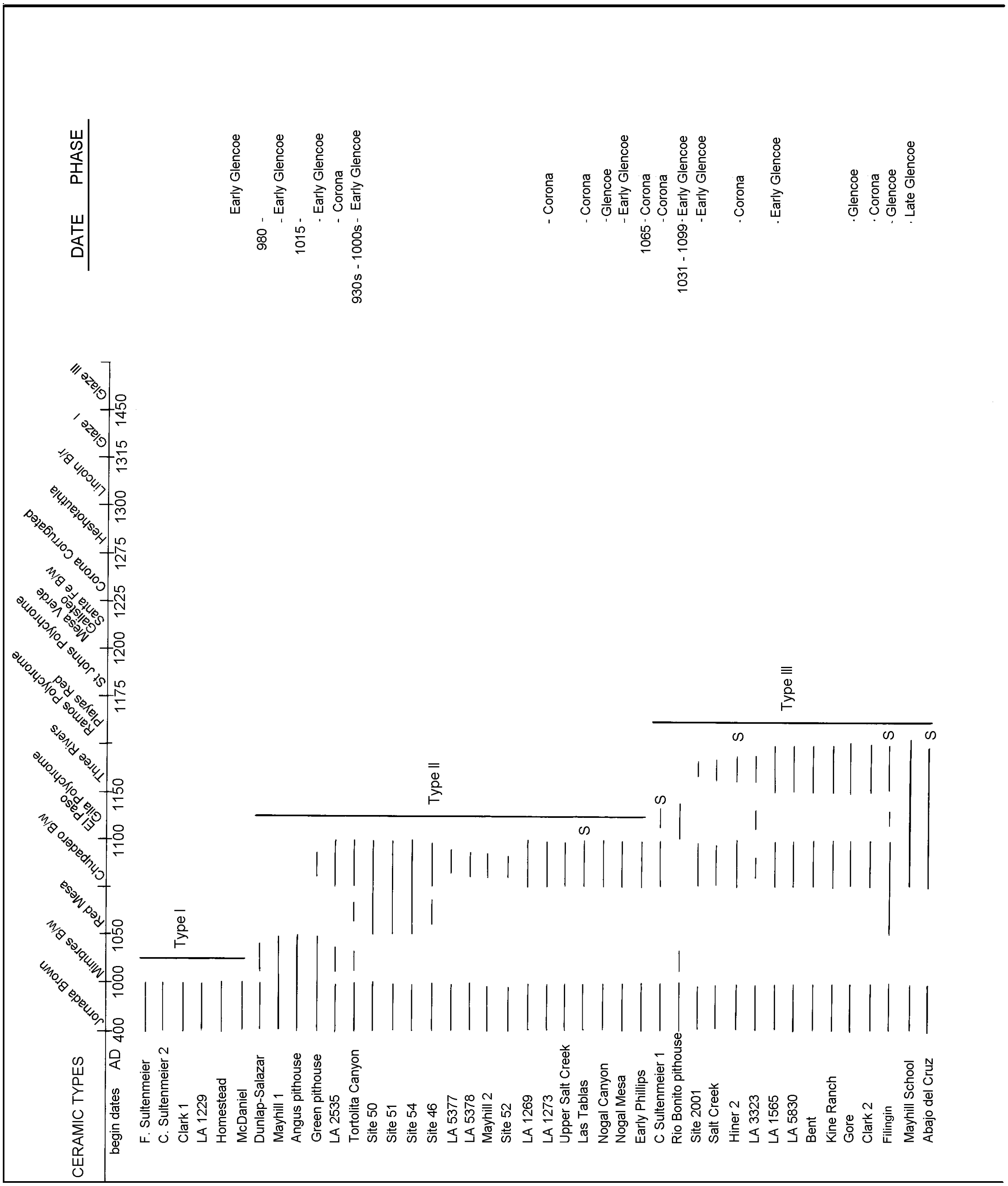
We have not assigned the Angus site a temporally associated phase designation because of the ambiguity of the current classificatory system. We have rather chosen to assign the main utilization of the site to a generalized late prehistoric Pueblo (Type VII) occupation.

Dating of Other Sierra Blanca Sites

Because of the problem of placing sites accurately into temporal phases in the Sierra Blanca region, as described in a previous chapter, sites studied on this project were classified by the ceramic types present on them. While this method also has its faults, such as obscuring earlier occupations as mentioned above, it may contribute to the formulation of a more usable dating scheme.

All known sites from Corona to the Peñasco Valley and from Carrizozo to Roswell were researched and those with ceramic types recorded were organized into type categories as presented in the chapter on Cultural Associations. The begin dates for these sites were then charted from earliest to latest by ceramic dates (Fig. 49). If only a few sherds of a particular type were noted for a site, it is so indicated on the chart, as the presence of minor amounts of a ceramic may refine the dates for that site. However, while these sites have been sequentially ordered within ceramic types, and thus inferentially by time, percentages often were lacking in site reports and so exact ordering of sites may not have occurred. Also, end dates for sites are not shown. Glaze I is the last time period represented on all sites except Ryberg 3 and, therefore, we would place an ending occupation in the Sierra Blanca region at no later than A.D. 1375, just prior to the beginning of Glaze II. However, subsequent refinement of this initial attempt at dating sites is, therefore, certainly possible.

If stated in reports, assigned phases and absolute dates are also shown in Figure 49. There are remark-



CERAMIC TYPES
Jornada Brown
Mimbres B/W
Red Mesa
Chupadero B/W
El Paso
Gila Polychrome
Three Rivers
Ramos Polychrome
Playas Red
St Johns Polychrome
Mesa Verde
Galisteo
Santa Fe B/W
Corona Corrugated
Heshotauthla
Lincoln B/r
Glaze I
Glaze III
begin dates AD 400 1000 1050 1100 1150 1175 1200 1225 1275 1300 1315 1450
DATE PHASE
F. Sultenmeier
C. Sultenmeier 2
Clark 1
LA 1229
Homestead
McDaniel Early Glencoe
Dunlap-Salazar 980 -
Mayhill 1 - Early Glencoe
Angus pithouse 1015 -
Green pithouse - Early Glencoe
LA 2535 - Corona
Tortolita Canyon 930s - 1000s - Early Glencoe
Site 50
Site 51
Site 54
Site 46
LA 5377
LA 5378
Mayhill 2
Site 52
LA 1269 - Corona
LA 1273
Upper Salt Creek
Las Tablas - Corona
Nogal Canyon - Glencoe
Nogal Mesa - Early Glencoe
Early Phillips 1065 - Corona
C Sultenmeier 1 - Corona
Rio Bonito pithouse 1031 - 1099 - Early Glencoe
Site 2001 - Early Glencoe
Salt Creek
Hiner 2 - Corona
LA 3323
LA 1565 - Early Glencoe
LA 5830
Bent
Kine Ranch
Gore - Glencoe
Clark 2 - Corona
Filingin - Glencoe
Mayhill School - Late Glencoe
Abajo del Cruz
Type I
Type II
Type III
S

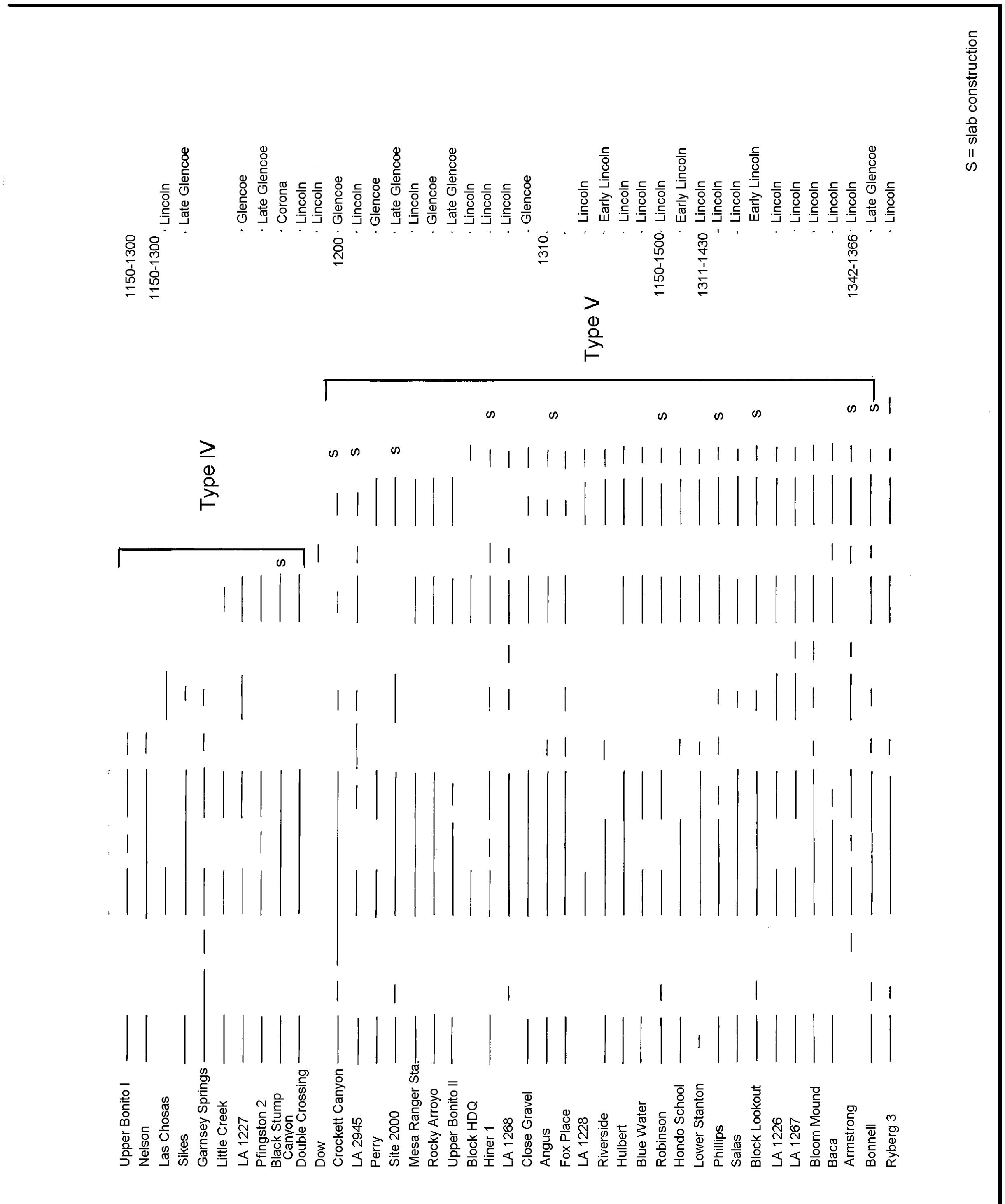


Figure 49. Sierra Blanca sites dated by ceramic types.

ably few absolute dates for the sites on the figure (9 of 83 sites, or 10.8 percent). There were at least 7 less when Kelley did her 1984 study of Sierra Blanca phases. It can be seen that phase designations have been commonly applied in the past but were not generally based on ceramic differences. It would seem that geographic location was the leading determinant of phase, followed by architectural characteristics, such as upright slab walls. Sites with slabs dating prior to A.D. 1300 have been placed in the Corona phase by researchers; however, after A.D. 1300, they are considered either Glencoe or Lincoln phase sites. And yet, ceramics on these Corona sites are frequently exactly like those on sites labeled Early Glencoe or Lincoln.

Early pithouse sites (Type I) are few and none have been dated. These could be important sites for examining the transition from Archaic to ceramic sites and for determining the dates of that transition. Even earlier pithouse sites exist that lack pottery altogether and may be Archaic but have not been dated either. Type I-IV sites (to A.D. 1275) are mostly all pithouse occupations and have been designated as Glencoe or Corona phase sites by earlier workers. We believe, however, that Figure 49 displays temporal distinctions that may be valid for refining this broad dating of sites.

By the time of Type V sites, beginning ca. A.D. 1275, masonry pueblos are present, either as individual units or as roomblocks. Type V could be divided further into sites with or without glaze ware sherds, but the time differential between the appearance of Lincoln Black-on-red and glaze sherds is so minimal that it was not considered temporally significant. Kivas may appear for the first time during the Type V period, with Crockett Canyon having perhaps the earliest example.

In conclusion, it is apparent that there is a huge lack of dates for Sierra Blanca sites of all time periods. Breaking down sites by phases is a flawed procedure at this point. We have presented sequential ceramic dating as one way to resolve the problem of ordering undated sites.

ANGUS CERAMIC ANALYSIS

C. Dean Wilson

Introduction

Analysis of pottery from the Angus sites resulted in recording data for 13,869 sherds. This includes 13,568 sherds from LA 3334 and 301 sherds from LA 11747 (Tables 52 and 53). Not all ceramics recovered during this excavation were analyzed, although all sherds recovered from LA 11747 and about two-thirds of all pottery recovered during OAS investigations of LA 3334 were analyzed. In order to compare trends noted during the present study to those documented during other investigations, analytical strategies and categories similar to those previously defined in other studies in the general area were utilized (Jelinek 1967; Kelley 1984; Runyon and Hedrick 1987; Levine 1992; Wiseman 1996a; Wilson 1999a).

Descriptive Attributes

Recording ceramic types and descriptive attribute categories allows for an examination of various ceramic patterns and trends that will be discussed later in this chapter. Ceramic attributes recorded during this study include temper type, pigment, surface manipulation, slip, vessel form, and refired color.

Temper Categories

Temper categories were identified through the examination of freshly broken sherd cross-sections using a binocular microscope. While a large number of different temper categories were recognized during the present study (Tables 54 and 55), the great majority of the sherds are tempered with some form of crushed igneous rock indicative of production somewhere in the Jornada Mogollon region (Jelinek 1967; Kelley 1984; Runyon and Hedrick 1987; Wiseman 1991; Warren 1992; Hill 1999a, 1999b).

In cases where temper particles were visible, but could not be attributed to a known category, they were assigned to an indeterminate category. Pastes that were too vitrified to determine the associated tempering material were placed into a highly vitrified category.

The most common temper group identified consisted of very small and profuse, clear to dark fragments, which is referred to here as fine Jornada crystalline igneous rock. Larger grains, when present, are usually roundish and crystalline in structure. These fragments appear to be crystalline or sugary in appearance. This group may represent the use of Capitan aplites (Wiseman 1991). Petrographic analysis of sherds with similar tempering material indicates a granite aplite. A few sherds containing this temper along with crushed potsherd fragments were assigned to a fine Jornada with sherd category. In addition, temper exhibiting extremely fine fragments with similar crystalline particles and occasional dark fragments were assigned to a very fine crystalline category. This temper is usually associated with Corona Corrugated, and may represent a distinct tempering source, although it is similar to the temper common in Jornada Brown Ware vessels.

Sherds were assigned to a leucocratic igneous rock category based on the presence of light feldspar and quartz fragments that may represent the use of crushed granites or monzonites. This group is dominated by white or gray grains probably representing feldspar along with some quartz. In addition, large rounded quartz fragments are often present. Dark fragments representing hornblende may be present in extremely low amounts. Fragment size appears to be relatively small as compared to other tempering material occurring in Jornada region pottery. Such fragments are commonly visible on the sherd surface. This temper is particularly common in brown wares produced in the El Paso area, where it appears to reflect the utilization of crushed granites from the Franklin Mountains. It is also possible, however, that some of the examples assigned to this temper represent the utilization of crushed igneous rock sources occurring in the Sierra Blanca region.

Another temper group identified is represented by dark feldspar fragments from syenites presumably from areas of the Sierra Blanca region (Wiseman 1991), although some examples could also represent part of the variation associated with sources normally assigned to the leucocratic igneous category. Feldspar fragments tend to be similar in appearance, angular, and sparsely scattered. These

Table 52. Distribution of Ceramic Types from Angus Project Sites

CERAMIC TYPE	LA 111747		LA 3334		TOTAL	
	Number	Percent	Number	Percent	Number	Percent
Unpainted undifferentiated white ware			31	.2	31	.2
Mineral paint undifferentiated			8	.1	8	.1
Jornada Brown rim	5	1.7	284	2.1	289	2.1
Jornada Brown body	179	59.5	6815	50.2	6994	50.4
Jornada brushed	11	3.7	467	3.4	478	3.4
Jornada incised			3	0.0	3	0.0
Jornada clapboard			4	0.0	4	0.0
Basket impressed			1	0.0	1	0.0
Jornada smudged	2	.7	15	.1	17	.1
South Pecos Brown			426	3.1	426	3.1
Jornada Corrugated	1	.3	1	0.0	2	0.0
Corona Corrugated	1	.3	1177	8.7	1178	8.5
Corona Plain Corrugated			3	0.0	3	0.0
Plain red slipped			273	2.0	273	2.0
Red-on-terracotta (undifferentiated)	1	.3	336	2.4	337	2.5
Broadline Red-on-terracotta	16	5.3	210	1.5	226	1.6
Three Rivers Red-on-terracotta	2	.7	146	1.1	148	1.1
Lincoln Black-on-red			132	1.0	132	1.0
Subglaze Lincoln Black-on-red			1	0.0	1	0.0
Lincoln-Three Rivers indeterminate			22	.2	22	.2
Buff cream (floated/slipped)			75	.6	75	.6
Cream painted			4	0.0	4	0.0
Unpainted Chupadero Black-on-white	6	2.0	386	2.8	392	2.8
Chupadero Black-on-white (indeterminate design)	5	1.7	148	1.1	153	1.1
Chupadero Black-on-white (solid design)	4	1.3	471	3.5	475	3.4
Chupadero Black-on-white (hatchured design)	2	.7	104	.8	106	.8
Chupadero Black-on-white (hatch and solid design)	6	2.0	86	7.1	92	.7
Socorro-like Chupadero Black-on-white (subglaze)			3	.1	3	0.0
Crosby-like Black-on-gray			10	.1	10	0.0
El Paso Brown Ware rim			118	.9	118	.9
El Paso Brown Ware body	59	19.6	574	4.2	633	4.7
El Paso smudged surface	1	.3	5	0.0	6	0.0
El Paso Polychrome			581	4.3	581	4.2
Thin Red slipped from El Paso Polychrome			4	0.0	4	0.0
Unpainted Cibola White Ware			1	0.0	1	0.0

CERAMIC TYPE	LA 111747		LA 3334		TOTAL	
	Number	Percent	Number	Percent	Number	Percent
Cibola mineral paint undifferentiated			3	0.0	3	0.0
Cibola Pueblo II-like style			1	0.0	1	0.0
Late Cibola Black-on-white			4	0.0	4	0.0
Unpainted glaze red			12	.1	12	0.0
Unpainted glaze yellow			6	0.0	6	0.0
Glaze-on-red			29	.2	29	.2
Glaze-on-yellow			1	0.0	1	0.0
Agua Fria glaze-on-red			4	0.0	4	0.0
Alma Plain body			15	.1	15	.1
Mogollon indented corrugated			1	0.0	1	0.0
Ramos Polychrome			1	0.0	1	0.0
Unpainted Salado Polychrome			7	0.0	7	0.0
Salado Polychrome			20	.2	20	.1
Undifferentiated red slipped Salado			2	0.0	2	0.0
Gila Polychrome			23	.2	23	.2
Athabaskan plain			2	0.0	2	0.0
Athabaskan plain unpolished			1	0.0	1	0.0
TOTAL	301	100.0	13568	100.0	13869	100.0

Table 53. Comparison of Ceramic Groups by Site

CERAMICS	LA 111747		LA 3334		TOTAL	
	Number	Percent	Number	Percent	Number	Percent
Indeterminate white ware			39	.3	39	.3
Jornada Brown Ware	197	65.4	8015	59.1	8212	59.2
Corona Corrugated	2	.7	1181	8.7	1183	8.5
Three Rivers Red Ware	19	6.3	1199	8.8	1218	8.8
Chupadero Black-on-white	23	7.6	1208	8.9	1231	8.9
El Paso Brown Ware	60	19.9	1208	8.9	1268	9.1
El Paso Polychrome			585	4.3	585	4.3
Cibola White Ware			9	.1	9	.1
Rio Grande Glaze Ware			52	.4	52	.4
Mogollon Brown Ware			16	.1	16	.1
Chihuahua Polychrome			1	0.0	1	0.0
Salado Polychrome			52	.4	52	.2
Athabaskan Utility			3	0.0	3	0.0
TOTAL	301	100.0	13568	100.0	13869	100.0

Table 54. Temper Type by Ceramic Group, LA 111747

CELLS: Count Row Percent Column Percent	GROUP					Row Total
	El Paso Brown Ware	Chupadero Black-on-white Paste	Three Rivers Red Ware	Jornada Brown Ware	Corona Corrugated	
Leucocratic igneous (El Paso area)	58 47.9% 96.7%		6 5.0% 31.6%	57 47.1% 28.9%		121 100.0% 40.2%
Fine Jornada	2 1.3% 3.3%	1 .6% 4.3%	13 8.3% 68.4%	139 88.5% 70.6%	2 1.3% 100.0%	157 100.0% 52.2%
Dark igneous and sherd (Chupadero)		22 100.0% 95.7%				22 100.0% 7.3%
Dark feldspar				1 100.0% .5%		1 100.0% .3%
COLUMN TOTAL	60 19.9% 100.0%	23 7.6% 100.0%	19 6.3% 100.0%	197 65.4% 100.0%	2 .7% 100.0%	301 100.0% 100.0%

fragments are large compared to other temper fragments, and are often readily visible even without the aid of a binocular microscope. These feldspar fragments tend to be opaque and gray to off-white in color. Smaller mineral grains are rare if present.

It should be noted that distinction of the basic temper groups common in Jornada Brown Ware pottery is often difficult. Differences in characteristics of other temper categories is often gradational and may be dependant on slight differences in size, color, and composition. Despite considerable overlap between these categories, the distributions noted may still be statistically important, and various trends concerning such distributions, particularly between ceramic types and sites, may prove to be insightful.

Temper occurring in the Chupadero Black-on-white sherds was fairly similar consisting of combinations of dark igneous and sherd particles. Both sherd and rock particles tend to be small and dark, and these can be difficult to distinguish, particularly in vitrified pastes commonly found in Chupadero Black-on-white. Crushed rock particles appear to include white to gray feldspar and quartz. The sherd fragments are recognized by their dull appearances and range from dark gray to brown. Rock particles are very fine and consist of isolated fine mineral grains mainly of quartz and weathered feldspar (Hill 1999a). Similar dark, small igneous fragments without crushed sherd were assigned to a dark igneous category.

Calcium carbonate refers to temper dominated by buff to ivory- colored fine caliche fragments. This temper is primarily associated with Chupadero Black-on-white and sometimes associated with sherd fragments and assigned to a sherd and calcium carbonate category.

Sand refers to the presence of rounded or subrounded, white to translucent, well-sorted medium to coarse quartz grains. Small angular fragments sometimes occur along with these grains and indicate the use of sands weathered from sandstone outcrops. Temper derived from crushed sandstone is similar, but rounded sand grains present

Table 55. Temper Type by Ceramic Group, LA 3334

CELLS: Count Row Percent Column Percent	GROUP										
	Indeterminate White Ware	Cibola White Ware	Rio Grande Glaze Ware	El Paso Brown Ware	El Paso Polychrome	Chupadero Black-on-white Paste	Three Rivers Red Ware	Jornada Brown Ware	Corona Corrugated	Mogollon Brown Ware	Chihuahuan Polychrome
Indeterminate	9 81.8% 23.1%								2 18.2% .2%		

CELLS: Count Row Percent Column Percent	GROUP													ROW TOTAL
	Indeterminate White Ware	Cibola White Ware	Rio Grande Glaze Ware	El Paso Brown Ware	El Paso Polychrome	Chupadero Black-on-white Paste	Three Rivers Red Ware	Jornada Brown Ware	Corona Corrugated	Mogollon Brown Ware	Chihuahuan Polychrome	Salado Polychrome	Athabaskan Utility	
Sand	3 21.4% 7.7%	9 64.3% 100.0%				2 14.3% .2%								14 100.0% .1%
Highly micaceous paste				14 63.6% 1.2%				3 13.6% .0%	2 9.1% .2%				3 13.6% 100.0%	22 100.0% .2%
Fine Tuff and Sand	1 20.0% 2.6%	4 80.0% 7.7%												2 100.0%. 0%
Leucocratic igneous (El Paso area)				1108 49.6% 91.7%	581 26.0% 99.3%	17 .8% 1.4%	36 1.6% 3.0%	436 19.5% 5.4%	57 2.6% 4.8%					2235 100.0% 16.5%
Fine sandstone						2 100.0% .2%								2 100.0% .0%
Fine Jornada temper				79 .9% 6.5%	4 .0% .7%	239 2.6% 19.8%	1142 12.3% 95.2%	7129 76.7% 88.9%	697 7.5% 59.0%	1 .0% 6.3%				9291 100.0% 68.5%
Gray crystalline basalt	1 4.0% 2.6%		24 96.0% 46.2%											25 100.0% ..2%
Dark igneous and sherd (Chupadero)						537 100.0% 44.4%								537 100.0% 4.0%
Latite (Keres area)			16 100.0% 30.8%											16 100.0% .1%
Ant hill sand									7 100.0% .6%					7 100.0% .1%
Dark feldspar				6 1.3% .5%		1 .2% .1%	21 4.6% 1.8%	425 93.6% 5.3%	1 .2% .1%					454 100.0% 3.3%
Sherd and calcium carbonate						5 100.0% .4%								5 100.0% .0%
Very fine crystalline igneous				1 .2% .1%		49 10.0% 4.1%		22 4.5% .3%	415 85.2% 35.1%					487 100.0% 3.6%
Dark igneous (southern origin)						282 100.0% 23.3%								282 100.0% 2.1%
Calcium carbonate						55 100.0% 4.5%								55 100.0% .4%

CELLS: Count Row Percent Column Percent	GROUP													ROW TOTAL
	Indeterminate White Ware	Cibola White Ware	Rio Grande Glaze Ware	El Paso Brown Ware	El Paso Polychrome	Chupadero Black-on-white Paste	Three Rivers Red Ware	Jornada Brown Ware	Corona Corrugated	Mogollon Brown Ware	Chihuahuan Polychrome	Salado Polychrome	Athabaskan Utility	
Fine Jornada sherd						19 100.0% 1.6%								19 100.0% .1%
Latite			7 100.0% 13.5%											7 100.0% .1%
Sand and Mogollon volcanics										15 22.7% 93.8%		52 77.3% 100.0%		67 100.0% .5%
Vitrified	25 92.6% 64.1%		1 3.7% 1.9%											26 100.0% .2%
Casas Grandes igneous											1 100.0% 100.0%			1 100.0% .0%
COLUMN TOTAL	39 .3% 100.0%	9 .1% 100.0%	52 .4% 100.0%	1208 8.9% 100.0%	585 4.3% 100.0%	1208 8.9% 100.0%	1199 8.8% 100.0%	8015 59.1% 100.0%	1181 8.7% 100.0%	16 .1% 100.0%	1 .0% 100.0%	52 .4% 100.0%	3 .0% 100.0%	13568 100.0% 100.0%

may contain a matrix that may still be holding together sand grains. In addition, some sand temper was mixed with crushed potsherds and recorded as sherd and sand.

Another temper category employed was sand and Mogollon volcanic rock, consisting of fine, shiny white to gray quartz and tuff particles and reflects the use of weathered volcanic-clastic rocks with rounded particles derived from volcanic-clastic particles. These inclusions are similar to those noted in self-tempered clays used in the production of Mogollon Brown Ware and Mimbres White Ware types in various areas of the Mogollon Highlands in southwest and south-central New Mexico (Hill 1999a; Wilson 1999b). In some cases similar temper was assigned to a fine tuff and sand category.

Pastes mainly consisting of dense micaceous particles were assigned to a highly micaceous category. In New Mexico, such pastes are most common in historic pottery produced by Pueblo and Athabascan potters. Because the mica content of these ceramics is much higher than that noted in prehistoric mica-bearing types, they were assigned to a distinct temper category, indicative of the use of distinct highly micaceous clays.

Mica schist is recognized by the presence of small to large white to gray fragments with mica. Fragments tend to be long and platy with mica sometimes occurring inside and outside of fragments.

A few sherds exhibited large distinct vitreous subangular to rounded grains and are similar to temper informally referred to as anthill sand. These grains are often transparent or crystalline in structure and generally occur in a nonmicaceous paste. This temper appears to be common in utility wares found in some areas of the Pajarito Plateau, and represent quartz phenocrysts occurring in tuff particles sorted and carried by ants. The few sherds assigned to this category were corrugated, and could represent items from a vessel produced in the Pajarito Plateau, although it is possible that the resemblance between them is purely coincidental.

Gray crystalline basalt was recognized by the presence of dark angular rock fragments of similar size and dark color. This temper occurred mostly in glaze ware sherds, and appears to be indicative of pottery originating near Zia Pueblo.

Latite or andesite was almost exclusively represented in glaze wares, where similar temper is known to have been produced in a number of localities. As used here, it refers to rocks from a number of source areas in the Rio Grande region, and consists of crystalline porphyries with quartz, feldspar, and hornblende (Shepard 1965).

Casas Grandes igneous is here used to describe the temper from a single Ramos Polychrome sherd. It consists of very fine angular white quartz and some dark fragments.

Pigment Type

The presence, type, and color of paint pigments were recorded for all decorated sherds. A number of distinct paint categories associated with prehistoric and historic Southwest decorative pottery traditions were noted. Sherds without evidence of painted decorations were simply placed into a "none" category. Those for which the type of pigment could not be determined were placed into an indeterminate category.

Matte mineral paint refers to the use of ground minerals such as iron oxides as pigments. These decorations are applied as powdered compounds, usually along with an organic binder. Mineral pigment is present as a distinct physical layer, and rests on the vessel surface. Such pigments are usually thick enough to exhibit visible relief when viewed through a binocular microscope. Mineral pigments usually obscure surface polish and irregularities. The firing atmospheres to which mineral pigments were exposed affect color. Mineral pigment categories include mineral black, mineral red, and mineral brown. Sherds containing mineral paint with a combination of colors were assigned to mineral black or mineral red categories.

Organic paint refers to the use of vegetal pigment only. Organic paint is soaked into rather than deposited on a vessel surface. Thus, streaks and polish are often visible through the paint. The painted surface is generally lustrous, depending on the degree of surface polishing. The pigment may be gray, black, bluish, and occasionally orange in color. The edges of the painted designs are often fuzzy, and there may be slight ghosting beyond the painted area.

Glaze paint refers to the use of a lead as a fluxing agent to produce vitreous decorations. Glaze pigments are often very thick and runny, and bubbles may protrude through the surface. The glaze may weather off, leaving a thin organic layer. Pigment color ranges from brown, black, orange, to green. Pigments on glaze polychrome types were described as glaze and red mineral.

Surface Manipulation

Attributes relating to surface manipulations reflect the presence and type of surface texture, polish, and slip treatments. Surface manipulation categories were recorded for both interior and exterior vessel surfaces. Distributions of interior and exterior surface treatments are illustrated in Tables 56-59.

Surfaces that have been too heavily worn to determine the original surface treatments were classified as surface missing. Plain unpolished refers to surfaces where coil junctures have been completely smoothed, but surfaces were not polished.

Some sherds were assigned to categories based on the presence and type of surface texture. Plain striated denotes the presence of a series of long, shallow parallel grooves resulting from brushing with a fibrous tool on an unpolished surface. Basket impressed refers to impressions resulting in a vessel being made or pressed against another vessel while it was still wet.

Surfaces with wide unobliterated coils or fillets were classified as wide coils. Wide neckbanded wiped are similar to wide neckbanded, but the junctures between the coils have been partially obliterated. Wide banded incised refers to forms similar to those noted for wide neckbanded, where the coil juncture has been incised, emphasizing the space between coils. Narrow coil includes neckbanded forms with narrow rounded coils. Clapboard refers to overlapping coils or fillets. Sherds belonging to this category are similar to plain corrugated sherds although sherds assigned to this category tend to be more narrow and limited to neck sherds.

Other categories reflect variations of corrugated treatments associated with Corona Corrugated. Indented corrugated refers to the presence of fine exterior coils with regular indentations on the exterior surface. Plain corrugated refers to gray wares with similar coil treatments and relief described for indented corrugated but without regularly spaced indentations. This category differs from similar neckbanded groups by thinner coils and coiled manipulations along the vessel body. Smeared indented corrugated refers to similar treatments but with low relief and without visible indentations.

Polished surfaces are those that have been intentionally polished after smoothing. Polishing implies intentional smoothing with a polishing stone to produce a compact and lustrous surface. Surfaces exhibiting polished treatments were assigned to a plain polished category. Polished striated denotes the presence of parallel striated lines on a polished surface.

A few sherds also exhibit distinct slipped surfaces that had been polished over. Slips represent intentional applications of distinct clay, pigment, or organic deposits over an entire vessel surface. Such applications are used to achieve black, white, or red surface colors, not obtainable using paste clays or firing methods normally employed. Surfaces over which high iron slip clay was applied to create a red ware were assigned to a polished red slipped or unpolished red slip category. Those to which a low iron slip was applied as represented in some white wares were classified as polished white slipped, polished thin white slip, or unpolished white slip. Surfaces to which a black layer of soot appears to have been applied during the later stages of firing were assigned to a polished smudged category.

Refired Color

Clips from selected sherds were fired in controlled oxidation conditions at a temperature of 950 degrees C in order to standardize ceramic pastes. This provided for common comparisons of pastes based on the influence of mineral impurities (particularly iron) on paste color, and may be used to identify pottery that could have derived from the same source clays (Shepard 1956). The color of each refired sample was recorded using a Munsell Color Chart.

Vessel Form

Sherd-based vessel form categories reflect the shape and portion of the vessel from which a sherd derived. Categories used during the present study are based on rim shape or the presence and location of polish and painted decorations.

While it is often easy to identify the basic form (bowl versus jar) of body sherds from many Southwestern regions by the presence and location of polishing, such distinctions are not as easy for Jornada Brown Ware types. This is because Jornada Brown Ware bowl and jar sherds are both often polished or smoothed on either or both surfaces or none at all. Thus, during the present study most of the plain brown ware body sherds were assigned to a series of descriptive categories representing combinations of surface treatments (Tables 60 and 61).

Table 56. LA 111747 Interior Surface Manipulation by Ceramic Group

CELLS: Count Row Percent Column Percent	GROUP					
	EL PASO BROWN WARE	CHUPADERO BLACK-ON-WHITE PASTE	THREE RIVERS RED WARE	JORNADA BROWN WARE	CORONA CORRUGATED	ROW TOTAL
Plain Unpolished	53 58.9% 88.3%	2 2.2% 8.7%	3 3.3% 15.8%	30 33.3% 15.2%	2 2.2% 100.0%	90 100.0% 29.9%
Plain Polished	3 1.9% 5.0%	3 1.9% 13.0%	6 3.8% 31.6%	147 92.5% 74.6%		159 100.0% 52.8%
Polished White Slip		8 57.1% 34.8%	6 42.9% 31.6%			14 100.0% 4.7%
Polished Smudged	1 25.0% 1.7%			3 75.0% 1.5%		4 100.0% 1.3%
Plain Striated		10 45.5% 43.5%	4 18.2% 21.1%	8 36.4% 4.1%		22 100.0% 7.3%
Surface Missing	3 25.0% 5.0%			9 75.0% 4.6%		12 100.0% 4.0%
COLUMN TOTAL	60 19.9% 100.0%	23 7.6% 100.0%	19 6.3% 100.0%	197 65.4% 100.0%	2 .7% 100.0%	301 100.0% 100.0%

Table 57. LA 3334 Interior Surface Manipulation by Ceramic Group

Cells: Count Row Percent Column Percent	INTERIOR MANIPULATION									ROW TOTAL
	Plain Unpolished	Plain Polished	Polished White Slip	Polished Red Slip	Polished Smudged	Plain Striated	Surface Missing	Polished Cream Slip	Polished Striated	
Indeterminate White Ware	28 71.8% .9%	7 17.9% .1%	2 5.1% 2.0%			2 5.1% .2%				39 100.0% .3%
Cibola White Ware	1 11.1% .0%	1 11.01% .0%				3 ..3.% .3%	4 11.4% .9%			9 100.0% .1%
Rio Grande Glaze Ware	1 1.9% .0%	41 78.8% .5%		8 15.4% 3.5%				2 3.8% 7.4%		52 100.0% .4%
El Paso Brown Ware	1021 84.5% 33.5%	154 12.7% 1.8%	2 .2% 2.0%	2 .2% .9%	1 .2% 3.8%	1 .2% .2%	25 2.1% 5.8%		1 .1% .7%	1208 100.0% 8.9%
El Paso Polychrome	257 43.9% 8.4%	322 55.0% 3.8%		1 .2% .4%	1 .2% 3.8%	1 .2% .1%	1 .2% .2%		2 .3% 1.4%	585 11.0% 4.3%
Chupadero Black-on-white Paste	121 1.01% 4.0%	242 20.0% 2.9%	56 4.6% 57.1%		4 .3% 15.4%	775 64.1% 70.9%	2 .2% .5		8 .7% 5.6%	1208 100.0% 8.9%
Three Rivers Red Ware	46 3.8% 1.5%	828 69.1% 9.8%	37 3.1% 37.8%	215 17.9% 94.7%	10 .8% 38.5%	34 2.8% 3.1%	2 .2% .5%	24 2.0% 88.9%	3 .3% 2.1%	1199 100.0% 8.8%
Jornada Brown Ware	913 11.4% 29.9%	6398 79.8% 75.5%			9 .1% 34.6%	276 3.4% 25.3%	291 3.6% 68.0%		128 1.6% 90.1%	8015 100.0% 59.1%
Corona Corrugated	620 52.5% 20.3%	457 38.7% 5.4%			1 .1% 3.8%		103 8.7% 24.1%			1181 100.0% 8.7%
Mollogon Brown Ware	10 62.5% .3%	6 37.5% .1%								16 100.0% .1%
Chihuahuan Polychrome		1 100.0% .0%								1 100.0% .0%
Salado Polychrome	30 56.9% 1.0%	19 37.3% .2%	1 2.0% 1.0%	1 2.0% .4%				1 2.0% 3.7%		52 100.0% .4%
Athabaskan Utility	3 100.0% .1%									1 100.0% .0%

Cells: Count Row Percent Column Percent	INTERIOR MANIPULATION									ROW TOTAL
	Plain Unpolished	Plain Polished	Polished White Slip	Polished Red Slip	Polished Smudged	Plain Striated	Surface Missing	Polished Cream Slip	Polished Striated	
COLUMN TOTAL	3051 22.5% 100.0%	8476 62.5% 100.0%	98 .7% 100.0%	227 1.7% 100.0%	26 .2% 100.0%	1093 8.1% 100.0%	428 3.2% 100.0%	27 .2% 100.0%	142 1.0% 100.0%	13568 100.0% 100.0%

Table 58. LA 11747 Exterior Surface Manipulation by Ceramic Group

CELLS: Count Row Percent Column Percent	EXTERIOR MANIPULATION								ROW TOTAL
	Plain Unpolished	Plain Polished	Polished White Slip	Plain Striated	Surface Missing	Indented Corrugated	Smeared Indented Corrugated	Polished Striated	
El Paso Brown Ware	56 93.3% 60.2%	3 5.0% 1.7%			1 1.7% 20.0%				60 100.0% 19.9%
Chupadero Black-on-white	2 8.7% 2.2%	8 34.8% 4.5%	5 21.7% 45.5%	8 34.8% 72.7%					23 100.0% 7.6%
Three Rivers Red Ware		12 63.2% 6.7%	6 31.6% 54.5%	1 5.3% 9.1%					19 100.0% 6.3%
Jornada Brown Ware	35 17.6% 17.8%	155 78.7% 87.1%		2 1.0% 18.2%	4 2.0% 80.0%			1 .5% 100.0%	197 100.0% 65.4%
Corona Corrugated						1 50.0% 100.0%	1 50.0% 100.0%		2 100.0% .7%
COLUMN TOTAL	93 30.9% 100.0%	178 59.1% 10.0%	11 3.7% 100.0%	11 3.7% 100.0%	5 1.7% 100.0%	1 .3% 100.0%	1 .3% 100.0%	1 .3% 100.0%	301 100.0% 100.0%

Table 59. LA 3334 Exterior Surface Manipulation by Ceramic Group

CELLS: Count Row Percent Column Percent	CERAMIC GROUP													ROW TOTAL
	Indeterminate White Ware	Cibola White Ware	Rio Grande Glaze Ware	El Paso Brown Ware	El Paso Polychrome	Chupadero Black-on-white Paste	Three Rivers Red Ware	Jornada Brown Ware	Corona Corrugated	Mogollon Brown Ware	Chihuahuan Polychrome	Salado Polychrome	Athabaskan Utility	
Plain Unpolished	26 1.0% 66.7%		3 .1% 5.8%	967 28.5% 80.0%	167 6.6% 28.5%	186 7.4% 15.4%	334 13.3% 27.9%	824 32.8% 10.3%				4 .2% 7.8%	2 .1% 66.7%	2513 100.0% 18.5%
Plain Polished	11 .1% 28.2%	9 .1% 100.0%	43 .5% 82.7%	214 2.4% 17.7%	414 4.6% 70.8%	661 7.3% 54.8%	754 8.3% 62.9%	6948 76.4% 86.7%		15 .2% 93.8%	1 .0% 100.0%	21 .2% 39.2%		9091 100.0% 67.0%
Polished White Slip	2 .7% 5.1%			2 .7% .2%		248 82.1% 20.5%	30 9.9% 2.5%					20 6.6% 39.2%		302 100.0% 2.2%
Polished Red Slip			4 6.5% 7.7%		4 6.5% .7%		46 75.8% 3.9%					8 11.3% 13.7%		62 100.0% .5%
Polished Smudged				8 47.1% .7%				9 52.9% .1%						17 100.0% .0%
Plain Striated				4 1.9% .3%		90 41.7% 7.4%	19 8.8% 1.6%	103 47.7% 1.3%						216 100.0% 1.6%
Surface Missing				10 21.3% .8%		1 2.1% .1%		34 72.3% .4%	2 4.3% .2%					47 100.0% .3%
Wide Coils (fillet)						2 25.0% .2%	1 12.5% .1%	3 37.5% .0%	2 25.0% .2%					8 100.0% .1%
Clapboard						1 20.0% .1%		4 80.0% .0%						5 100.0% .0%
Indented Corrugated									5 83.3% .4%	1 16.7% 6.3%				6 100.0% .0%
Plain Corrugated							1 16.7% .1%		5 88.3% .4%					6 100.0% .0%
Smeared Indented Corrugated							1 .1% .1%	1 .1% .0%	1156 99.8%					1158 100.05 8.5%
Smeared Plain									2 100.0% .2%					2 100.0% .0%
Wide Neck Banded Wiped Undulated						1 50.0% .1%	1 50.0% .1%							2 100.0% .0%

CELLS: Count Row Percent Column Percent	CERAMIC GROUP													ROW TOTAL
	Indeterminate White Ware	Cibola White Ware	Rio Grande Glaze Ware	El Paso Brown Ware	El Paso Polychrome	Chupadero Black-on-white Paste	Three Rivers Red Ware	Jornada Brown Ware	Corona Corrugated	Mogollon Brown Ware	Chihuahuan Polychrome	Salado Polychrome	Athabaskan Utility	
Wide Banded Incised								2 100.0% .0%						2 100.0% .0%
Indented Corrugated Incised						1 10.0% .1%			9 90.0% .8%					10 100.0% .1%
Unpolished White Slip						2 100.0% .2%								2 100.0% .0%
Basket Impressed				1 25.0% .1%		1 25.0% .1%	1 25.0% .1%	1 25.0% .0%						4 100.0% .1%
Vegetable Impressed													1 100.0% 33.3%	1 100.0% .0%
Polished Cream Slip			2 100.0% 3.8%											2 100.0% .0%
Polished Striated				2 1.8% .2%		14 12.6% 1.2%	10 9.0% .8%	85 76.6% 1.1%						111 100.0% .8%
Fingernail Incised								1 100.0% .0%						1 100.0% .0%
COLUMN TOTAL	39 .3% 100.0%	9 .1% 100.0%	52 .4% 100.0%	1208 8.9% 100.0%	585 4.3% 100.0%	1207 8.9% 100.0%	1199 8.8% 100.0%	8015 59.1% 100.0%	1181 8.7% 100.0%	16 .1% 100.0%	1 .0% 100.0%	52 .4% 100.0%	3 .0% 100.0%	13568 100.0% 100.0%

Table 60. Vessel Form by Ceramic Group for LA 111747

CELLS: Count Row Percent Column Percent	GROUP					ROW TOTAL
	El Paso Brown Ware	Chupadero Black-on-white Paste	Three Rivers Red Ware	Jornada Brown Ware	Corona Corrugated	
Bowl rim		1 16.7% 4.3%	2 33.3% 10.5%	3 50.0% 1.5%		6 100.0% 2.0%
Bowl body		9 42.9% 39.1%	11 52.4% 57.9%	1 4.8% .5%		21 100.0% 8.3%
Jar neck	3 12.0% 5.0%	3 12.0% 13.0%	1 4.0% 5.3%	18 72.0% 9.1%		25 100.0% 8.3%
Jar rim				4 80.0% 2.0%	1 20.0% 50.0%	5 100.0% 1.7%
Jar body		8 53.3% 34.8%	5 33.3% 26.3%	1 6.7% .5%	1 6.7% 50.0%	15 100.0% 5.0%
Miniature pinch pot body				3 100.0% 1.5%		3 100.0% 1.0%
Body sherd polished interior/exterior	2 1.7% 3.3%	2 1.7% 8.7%		111 96.5% 56.3%		115 100.0% 38.2%
Body sherd unpolished	52 83.9% 86.7%			10 16.1% 5.1%		62 100.0% 20.6%
Body sherd unpolished interior/polished exterior	1 3.3% 1.7%			29 96.7% 14.7%		30 100.0% 10.0%
Body sherd polished interior/unpolished exterior	2 10.5% 3.3%			17 89.5% 8.6%		19 100.0% 6.3%
COLUMN TOTAL	60 19.9% 100.0%	23 7.6% 100.0%	19 6.3% 100.0%	197 65.4% 100.0%	2 .7% 100.0%	301 100.0% 100.0%

Table 61. Vessel Form by Ceramic Group, LA 3334

CELLS: Count Row Percent Column Percent	CERAMIC GROUP													ROW TOTAL
	Indeterminate	Cibola White Ware	Rio Grande Glaze Ware	El Paso Brown ware	El Paso Polychrome	Chupadero Black-on-white	Three Rivers Red ware	Jornada Brown ware	Corona Corrugated	Mogollon Brown	Chihuahua Polychrome	Salado Polychrome	Athabaskan Utility	
Indeterminate	2 9.0% 5.1%			2 9.0% .2%		2 9.0% .2%	2 9.0% .2%	14 63.6% .2%						22 100.0% .2%
Bowl Rim	2 .4% 5.1%	1 .2% 11.1%	5 1.1% 9.6%	3 .7% .3%	6 1.3% 1.1%	49 11.0% 4.1%	210 47.3% 17.5%	167 37.6% 2.1%				1 .2% 1.9%		444 100.0% 3.3%
Bowl Body	5 .5% 12.8%		44 4.1% 84.6%		23 2.1% 3.9%	208 19.5% 17.2%	752 70.6% 62.7%	32 3.0% .4%				1 .1% 1.9%		1065 100.0% 7.8%
Seed Jar				1 25.0% .1%			2 50.0% .2%	1 25.0% 0.0%						4 100.0% 0.0%
See Jar Rim									5 100.0% .1%					5 100.0% 0.0%
Olla Rim						7 100.0% .6%								7 100.0% .1%
Jar Neck	14 4.3% 35.4%			87 26.9% 7.2%	147 45.5% 23.9%	68 21.0% 5.6%				2 .6% 12.5%		4 1.2% 7.8%		323 100.0% 23.8%
Jar Rim	1 .2% 2.6%			28 4.6% 2.3%	27 4.4% 4.6%	18 2.9% 1.5%	47 7.7% 3.9%	385 63.4% 4.8%	63 10.4% 5.3%			38 6.3% 74.5%		607 100.0% 4.5%
Jar Body	11 .7% 28.2%		3 .2% 5.8%	189 12.0% 15.6%	379 24.1% 64.7%	828 52.6% 68.5%	7 .4% .5%	108 6.8% 1.3%	47 2.9% 4.0%		1 0.0% 100.0%			1573 100.0% 11.6%
Jar Body with Strap Handle		8 .6% 88.9%				2 .2% .2%	82 6.2% 6.8%	182 13.7% 2.2%	1067 80.3% 90.3%	7 .5% 43.8%				1328 100.0% 9.8%
Jar Body with Lug Handle						6 60.0% .5%	2 20.0% .2%	2 20.0% 0.0%						10 100.0% .1%
Indeterminate Strap Handle						5 55.6% .4%	1 11.1% .1%	3 33.3% 0.0%						9 100.0% .1%
Canteen Rim						1 33.3% .1%	2 66.7% .2%							3 100.0% 0.0%
Miniature Jar								1 100.0% 0.0%						1 100.0% 0.0%

CELLS: Count Row Percent Column Percent	CERAMIC GROUP													ROW TOTAL
	Indeterminate	Cibola White Ware	Rio Grande Glaze Ware	El Paso Brown ware	El Paso Polychrome	Chupadero Black-on-white	Three Rivers Red ware	Jornada Brown ware	Corona Corrugated	Mogollon Brown	Chihuahua Polychrome	Salado Polychrome	Athabaskan Utility	
Miniature Pinch Pot Rim							1 33.3% .1%	2 66.7% 0.0%						3 100.0% 0.0%
Miniature Pinch Pot Body								5 100.0% .1%						5 100.0% 0.0%
Cloud Blower								1 100.0% 0.0%						1 100.0% 0.0%
Fired Coil						5 71.4% .4%	1 14.3% .1%	1. 14.3% 0.0%						7 100.0% .1%
Body Sherd Polished Interior/Exterior				50 .9% 4.1%		10 .2% .8%	64 1.2% 5.3%	5362 97.5% 66.9%		6 .1%		4 .1% 7.8%	2 0.0% 66.7%	5498 100.0% 40.5%
Body Sherd Unpainted	4 .4% 10.3%			720 71.9% 59.6%	2 .2% .4%			270 26.9% 3.4%	1 .1% .1%	1 .1% 6.3%		3 .3% 5.8%		1001 100.0% 7.4%
Body Sherd Unpolished Interior/Polished Exterior				36 3.6% 3.0%				972 96.4% 12.1%						1008 100.0% 7.4%
Body Sherd Polished Interior/ Unpolished Exterior				4 66.7% .3%			2 33.3% .2%							6 100.0% 0.0%
Indeterminate Rim				88 16.6% 7.3%			5 .9% .4%	485 83.5% 6.1%	3 .5% .3%					581 100.0% 4.3%
Dipper Handle							19 35.8% 1.6%	34 64.2% .4%						53 100.0% .4%
Pitcher Rim								1 100.0% 0.0%						1 100.0% 0.0%
Tray					1 33.3% .2%			2 66.7% 0.0%						3 100.0% 0.0%
COLUMN TOTAL	39 .3% 100.0%	9 .1% 100.0%	52 .4% 100.0%	1208 8.9% 100.0%	585 4.3% 100.0%	1207 8.9% 100.0%	1199 8.8% 100.0%	8015 59.1% 100.0%	1181 8.7% 100.0%	16 .1% 100.0%	1 0.0% 100.0%	51 .4% 100.0%	3 0.0% 100.0%	13563 100.0% 100.0%

Sherds with surfaces for which the treatment could not be determined were placed into an indeterminate category. Small rim sherds from which the associated form could not be determined were assigned to an indeterminate rim category. Body sherds not exhibiting polished treatments on either surface were classified as unpolished body. Body sherds exhibiting roughly equal amounts of polishing on both sides were simply assigned to a polished body category. Other body sherds were assigned to a category based on the presence of a distinct polish on one surface, and include exterior polished body and interior polished body.

In most cases, a bowl body category was limited to body sherds from decorated vessels with heavier polish, slip, or painted decoration on the interior surface. Bowl rim refers to sherds exhibiting inward rim curvature characteristic of bowls, regardless of associated surface manipulations. Jar body was mainly limited to decorated sherds exhibiting higher polished, slipped or painted decoration on the exterior surface. Cooking/storage jar neck sherds were identified by the presence of distinct curves associated with the neck area. Cooking/storage jar rim sherds exhibit the distinct curves of a jar neck along with a relatively wide rim diameter. Such vessels also commonly contain wear and sooting indicative of cooking or boiling over a fire.

Olla rim refers to necked jar sherds with relatively narrow rim diameters. Such forms are assumed to mainly reflect liquid storage. Seed jar rim refers to spherical-shaped vessels with openings near the top. Rim sherds with an outward slope from the rim were classified as seed jars. The rims are characterized by constriction but exhibit no curvature indicative of a distinct neck.

Canteen refers to small spherical shaped vessels, with lug handles near the top and very narrow necks. Cloud blower refers to sherds derived from conical shaped pipes. A few sherds represent very small miniature forms produced through hand molding or pinching. Examples of such forms were placed into either a miniature pinch pot rim or miniature pinch pot body category.

Dipper handle refers to long, coil-shaped handles attached to bowls to form ladles. Another form represented by a single item was a fired coil apparently not attached to a ceramic vessel.

Ceramic Types

Ceramic types refer to convenient categories that can be used to accumulate and relay information about the distribution of sherds with combinations of traits of temporal, spatial, and functional significance. Types recognized during the present study were lumped into one of seven basic groups indicative of the basic regional tradition and ware group represented. Ceramic groups recognized during the present study include indeterminate white ware, Jornada Brown Ware, Corona Corrugated, Three Rivers Red Ware, Chupadero Black-on-white, El Paso Brown Ware, El Paso Polychrome, Cibola White Ware, Rio Grande Glaze Ware, Mogollon Brown Ware, Chihuahua Polychrome Ware, Salado Polychrome Ware, and Athapaskan Utility Ware. The following section will describe characteristics of these various groups as well as types recognized for each category. These descriptions are followed by discussions of trends indicated by the characteristics and distributions of various types and attributes. Distributions of ceramic types for both sites are illustrated in Table 52, while that for ceramic groups is illustrated in Table 53.

A small (39 or .3 percent of the total) number of sherds lacked regionally distinct temper or other criteria that could be used to assign them to types of a specific regional tradition. All of these sherds were white wares and were assigned to one of two types based on the presence or absence of painted decorations and include unpainted undifferentiated white (31 sherds) and mineral painted undifferentiated (eight sherds). Most of these sherds were placed into this category because the paste was too vitrified to identify associated temper. A few contained indeterminate tempers, and some were tempered with sand. Most of these sherds assigned to this tradition appear to have derived from jars, although others appear to have derived from bowls or represent indeterminate forms. Given the associated paste and surface characteristics, it is likely some of these sherds could have derived from Chupadero Black-on-white.

Plain Brown Wares

Plain Brown Ware types are the most common pottery at both sites, and are represented by 8,212 (or 59.2 percent of all) sherds (Fig. 50). Similar plain brown ware vessels appear to have been produced in the Jornada region possibly as early as A.D. 200. Plain brown ware was the dominant utility ware in assemblages covering the entire Glencoe phase, and dating as late as the middle fourteenth century. Plain brown ware pottery from various areas of the Jornada region has been long divided into types based on combinations of attributes thought to be of spatial significance. The placement of sherds into various brown ware types is based on postulated areal differences in surface color, polish, and temper noted for plain brown wares from different areas of the Jornada Mogollon region (Jennings 1940; Lehmer 1948; Jelinek 1967; Whalen 1994; Wiseman, in progress). Recent studies indicate considerable overlap in the attributes associated with brown ware pottery common in different areas of the Jornada Mogollon region (Whalen 1994; Hill 1996b). Both visual and petrographic examinations indicate strong similarities in both pastes and manipulations of brown ware pottery dominating ceramic assemblages at sites in the riverine and mountainous areas of the Jornada Mogollon. Therefore, some researchers have simply lumped plain brown ware sherds previously assigned to regional specific types such as El Paso Brown, Jornada Brown, or South Pecos Brown into a single Plain Brown Ware category, and have attempted to document variation in pottery from different areas through the distribution of various paste and technological attributes (Whalen 1994; Hill 1996a, 1996b).

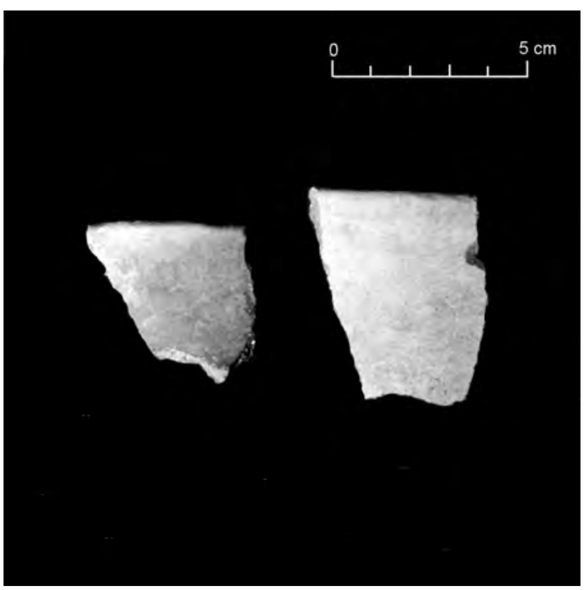


Figure 50. Plain brown ware.

Others have noted that subdividing brown ware pottery from sites scattered through the Jornada Mogollon region may be useful, while also recognizing such distribution is complicated (Wiseman 1996a). During the present study, plain brown ware sherds were placed into modified versions of brown ware types originally distinguished by Jelinek (1967). Problems in the recognition of different plain brown ware types stem from the wide range of characteristics of pastes and surfaces resulting in a very high number of possible mixes of various traits. For example, some sherds may contain a temper class commonly used to define one variety along with a surface manipulation frequently used to define another (Wiseman 1996a). Still, the use of such categories may allow for the monitoring of types of variability within assemblages that may be of spatial or temporal significance. Relaying this type of information through such categories is often less cumbersome than continual reference to combinations of attribute categories. The major brown ware division utilized during the present study involved the distinction of Jornada Brown Ware and El Paso Brown Ware types. Traits and types associated with Jornada Brown Ware are described immediately below while those associated with El Paso Brown are described later in this report.

Jornada Brown Ware

Jornada Brown, as defined here, was first described by Jennings (1940) based on the excavation of sites along the Peñasco River. Jennings referred to the dominant pottery recovered as common or unnamed brown. Mera (1943) proposed the name Jornada Brown to describe similar pottery. Some problems have resulted from the application of this type to such a wide variety of brown ware pottery that it has become largely meaningless. As such, Wiseman (in progress) refers to Jornada Brown, as defined here, as Sierra Blanca variety of Jornada Brown. This type is described as usually having well-polished surfaces that obscure temper grains. Temper fragments are often very small, consisting of a profusion of small equally sized grains. Jornada Brown ware is usually thick (6 to 8 mm). Jornada Brown as described here is very similar to Alma Plain, the dominant type produced in most areas of the Mogollon Highlands (Mera 1943; Wiseman 1991). The lack of sherds assigned to Alma Plain may reflect difficulties in distinguishing this type from Alma rather than the absence of brown wares derived from the Mogollon Highlands.

During the present study, 8,212 sherds (or 59.2 percent of all pottery examined) were assigned to one of eight types placed into the Jornada Brown Ware group. Most of the sherds assigned to Jornada Brown Ware types were characterized by high polish on at least one surface, small temper, and brown, light brown, or tan surface color. The majority of Jornada Brown Ware sherds exhibited plain undecorated surfaces and included 289 sherds classified as Jornada Brown rim and 6,994 sherds as Jornada Brown body.

As expected, most of the Jornada Brown Ware sherds are tempered with the fine igneous material characteristic of this pottery, while the remaining sherds are tempered with a variety of igneous tempers employed in the Jornada Mogollon region. Jornada Brown Ware sherds were also placed into a variety of vessel form classes. Most of these sherds were polished on both sides, and the specific vessel form from which they derived could not be determined. For rim sherds, roughly even mixtures of jars and bowls are represented.

Some sherds with typical Jornada Brown Ware pastes were assigned to distinct types based on textured or slipped treatments. The 478 brown ware sherds exhibiting distinct striations resulting from brushing during the final stages of construction, were assigned to a Jornada brushed category. These characteristics are similar to those noted in pottery occurring at sites in the Plains of Texas and presumably produced by Caddoan groups to the east (Suhm and Jelks 1962). It is also possible that these characteristics may simply reflect variation of the Jornada Mogollon technology, as brushed and striated treatments also occur occasionally on Jornada Mogollon pottery and are common on Chupadero Black-on-white. A single sherd exhibiting exterior impressions, resulting from forming the vessel in a basket while it was still wet, was assigned to a Jornada basket impressed category. Three sherds exhibiting fingernail-shaped, incised lines were classified as Jornada incised. The 17 sherds with local pastes, which were also highly polished and intentionally sooted, were assigned to a Jornada smudged category. Four sherds with overlapping coils along the exterior neck were assigned to a Jornada clapboard.

A total of 426 sherds were classified as South Pecos Brown. As is the case for El Paso Brown, this type is differentiated by temper and paste characteristics. This type is classified as a variety of Jornada Brown Ware. South Pecos Brown is usually described as well smoothed, and polishing may be strong to absent. Temper is represented by sparse, large gray feldspar fragments that appear to indicate syenite from the Sierra Blancas that frequently shows through the surface. This temper results in blocky to tabular paste cross sections. Protruding temper cracks are surrounded by very small radial cracks. Because this type is often separated from other plain brown wares on the basis of temper alone, a wide range of surface manipulations and treatments are represented and include those with paste and treatments more similar to El Paso Brown and others identical to that noted in Jornada Brown.

Corona Corrugated

Corona Corrugated was assigned to 1,183 (8.5 percent of the total) sherds with corrugated exteriors (Figs. 51 and 52). Corrugated pottery assumed to have been produced in the northern Jornada region was classified as Corona Corrugated. This type is the primary utility ware found at some Lincoln phase sites and is best described for contexts from Gran Quivira (Hayes et al. 1981). After A.D. 1300, this became the dominant utility ware type in some areas of the Jornada Mogollon, while in other areas Jornada Plain or El Paso Polychrome dominated fourteenth-century assemblages (Wiseman 1991a).

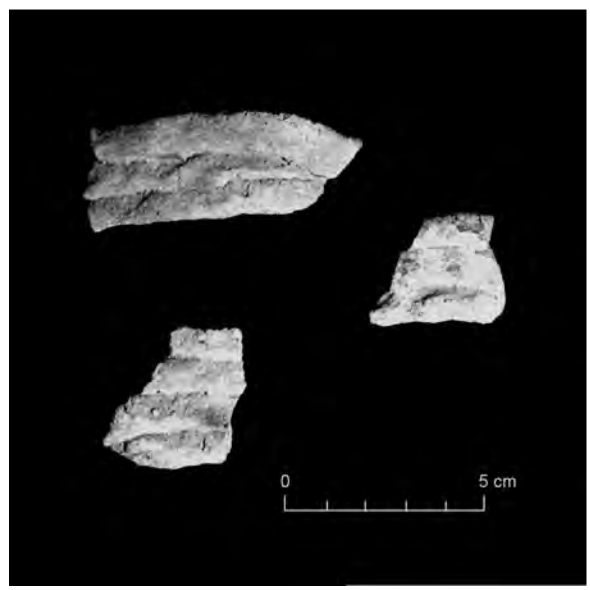


Figure 51. Corona Corrugated.

One problem commonly encountered with Jornada Mogollon assemblages involves differentiating Corona Corrugated from Mimbres Corrugated. The degree and type of similarities shared by Mimbres Corrugated and Corona Corrugated are still poorly understood. This distinction is important since Mimbres Corrugated is dated from the early eleventh century to the end of the twelfth century while Corona Corrugated appears

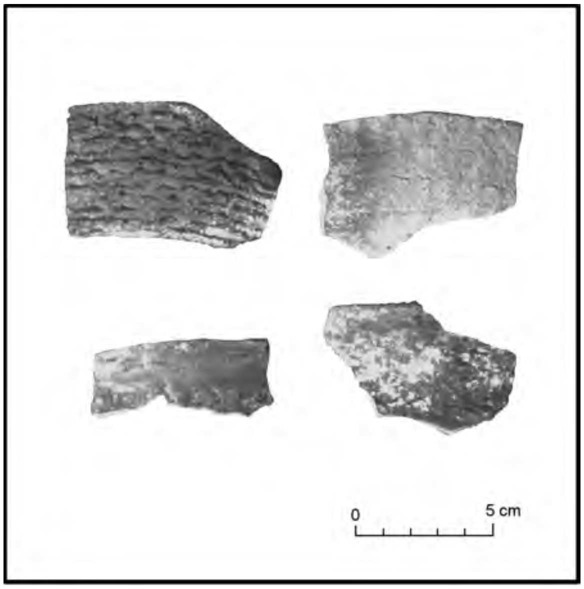


Figure 52. Corona Corrugated.

to date from the beginning of the thirteenth to the middle of the fifteenth century.

The majority of sherds with exterior corrugations appear to exhibit characteristics indicative of Corona Corrugated. Pastes tend to be crumbly and range from tan, buff, or reddish in color. Surfaces tend to brown, gray, or black. Exterior surfaces exhibit plain corrugated or unindented corrugated textured treatments. Interior surfaces are smoothed and polished and are commonly smudged. While there is some overlap between Corona Corrugated and Jornada Brown–as the majority of Corona Corrugated is tempered with a similar igneous temper as Jornada Brown–a very fine and unique temper is also represented in significant numbers of the Corona Corrugated sherds.

Corrugated sherds that may have been produced in the Jornada Mogollon country were assigned to one of three types. Most (n = 1,178) sherds exhibited relatively shallow corrugations, and were simply classified as Corona Corrugated. Two sherds exhibiting corrugated treatments were classified as Jornada Corrugated, although it is possible they represent a variation of either Mimbres Corrugated or Corona Corrugated. Three sherds exhibiting more pronounced coils without distinct indentations were assigned to a Corona Plain Corrugated category.

Three Rivers Red Ware

Pottery with combinations of Jornada Brown pastes and red slips or painted decorations was assigned to types of the Three Rivers Red Ware tradition (Wimberly and Rogers 1977). During the present study 1,218 sherds were assigned to this tradition. The initial use of a red slip is thought to have been inspired by San Francisco Red, a type produced at the onset of pottery production in the Mogollon Highlands (Haury 1936a). Temper and pastes of Three Rivers Red Ware types were similar to that noted on plain brown wares, although surfaces tended to be more polished and bowls are the dominant vessel form. Unslipped or unpainted sherds were generally not assigned to Three Rivers Red Ware types, and the number of sherds derived from Three Rivers Red Ware vessels is probably higher than indicated by sherd frequencies discussed here.

A total of 273 sherds with a bright red slip covering at least one surface was assigned to plain slipped red. These sherds exhibit thin to moderately thick red slips without any painted decorations. Some of the slipped red sherds identified could have derived from slipped versions of Jornada Brown Ware vessels, although most are probably derived from unpainted red-on-terracotta or black-on-red vessels. Distinct intrusive red ware types such as Playas Red found sometimes in contemporaneous sites in the Jornada Mogollon region were not identified. Unslipped areas are often visible in examples with thin slips, resulting in distinct red streaks and contrasts. Forms are mainly represented by bowls with slipped interiors. While both the slipped and unslipped surfaces were polished, polishing on the slipped surface is usually more intensified.

A range of forms reflecting the application of painted decorations over Jornada pastes was identified. This decorated pottery was assigned to type categories based on paint type or color and pottery styles. These types appear to represent a continuum of decorated pottery that reflects the wide range of pottery forms associated with Three Rivers Red Ware. While there appears to be considerable temporal overlap between types, there may be a sequence of development that begins with San Andres or Broadline Red-on-terracotta, which developed into Three Rivers Red-on-terracotta, and finally into Lincoln Black-on-red (Mera and Stallings 1931; McCluney 1962; Wiseman 1991). Sherds exhibiting painted decorations, but without styles or attributes clearly indicative of a specific type, were assigned to descriptive types. Sherds exhibiting decorations in red paint without designs indicative of specific types were assigned to a red-on-tan undifferentiated (335 sherds) category. Misfired sherds exhibiting painted decoration that reflect the use of either red or black pigments were assigned to a Lincoln/Three Rivers indeterminate (24 sherds) category.

Most of the painted sherds of this tradition from the Angus site displayed red painted decoration over an orange to light brown unslipped surface. This paint is described as an iron pigment and is red to dark red in color. Painted areas exhibit a similar appearance as the slip clay noted in previously described slipped red wares.

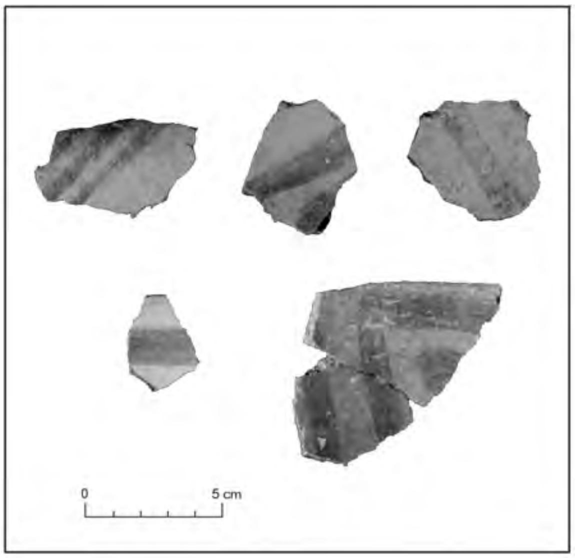


Figure 53. Broadline or San Andres Red-on-terracotta.

The first red-on-terracotta pottery produced in the Jornada regions is thought by some to have been decorated with wide lines similar to those found in Mogollon Red-on-brown, and may represent a local version of this type (McCluney 1961). Mera and Stalling (1931) note the existence of a red-on-terracotta pottery with wide line designs that they thought may have been antecedent to Three Rivers Red-on-terracotta. Based on investigations at the Hatchet site, McCluney (1961, 1962) placed pottery with lines between 5 and 8 mm wide into San Andres Red-on-terracotta. During the present study, 226 red-on-terracotta sherds with lines thicker than 5 mm were assigned to a Broadline or San Andres Red-on-terracotta (Fig. 53). These lines are usually executed fairly crudely and begin just under the rim. These wide lines radiate downward and terminate above the bottom of a vessel. Joining of the lines may occur below the rim to produce triangle or diamond shapes. The rim is usually painted red. Vessel forms are mainly represented by deep and shallow bowls although wide mouth jars and pitchers are also present. Temper is also described as larger than in Three Rivers Red-on-terracotta (McCluney 1962).

Although this type is assumed to represent the first of the Three Rivers painted red ware sequence, there is very little stratigraphic or dating evidence to support this view. The early date usually assigned to this type is A.D. 1100 (McCluney 1962; Runyon and Hedrick 1987) which appears to be much too late to indicate a development out of Mogollon Red-on-brown. Thus, it has been suggested that Broadline or San Andres Red-on-terracotta may not necessarily reflect the early stage of the Three Rives Red Ware developmental sequence, but instead a variation in the range of Three Rivers Red-on-terracotta (Wiseman 1991). It is still possible, however, that the Broadline form may have appeared earliest, after which it continued to be made along with Three Rivers Red-on-terracotta, and even later with Lincoln Black-on-red.

Other painted pottery examined exhibited the range of characteristics used to define the 147 sherds assigned to Three Rivers Red-on-terracotta (Fig. 54). The paste is similar to that noted in Jornada Brown sherds although it tends to be harder (Mera and Stallings 1931; Mera 1943; Kelley 1984). Surface color tends to be light orange or terracotta, although some examples display light gray, tan, brown, or buff surfaces.

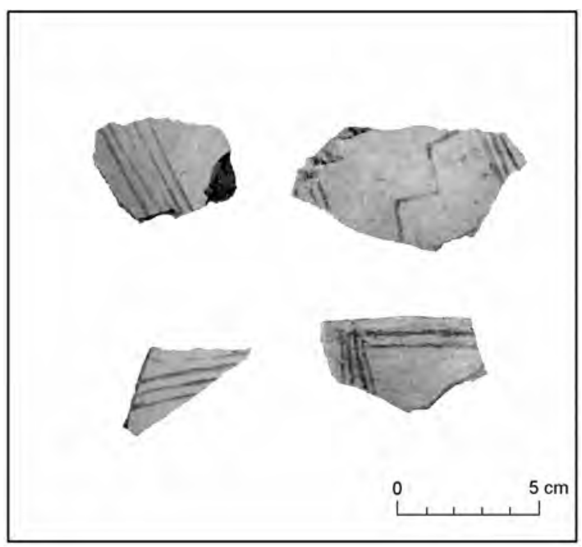


Figure 54. Three Rivers Red-on-terracotta.

Three Rivers Red-on-terracotta was almost exclusively distinguished from other red-on-terracotta categories by designs executed in very thin lines. Primary designs consist of a series of two to five narrow lines that are 2 to 4 mm in width applied directly below the rim. These lines usually occur in rectilinear patterns although curvilinear and scroll-shaped patterns are sometimes represented. Secondary designs are sometimes incorporated into these lines and include small solid triangles. This type is generally represented by bowl forms. Three Rivers Red-on-terracotta is thought to have been produced sometime between A.D. 1150 and 1350.

The last type of the Three River Red Ware sequence is Lincoln Black-on-red, which is represented by 132 sherds and two complete vessels (Figs. 55-57). Lincoln Black-on-red is similar to, and appears to have developed out of, Three Rivers Red-on-terracotta (Mera and Stallings 1931; Wiseman 1991). Red-on-terracotta types, however, commonly occur along with and, in the case of LA 3334, outnumber Lincoln Black-on-red. Pastes and surfaces are similar to those noted for Three Rivers Red-on-terracotta, although they tend to be a redder color. The red color is usually a reflection of an oxidizing firing atmosphere rather than the application of a slip. Vessels forms appear to be almost exclusively represented by round-bottomed bowls.

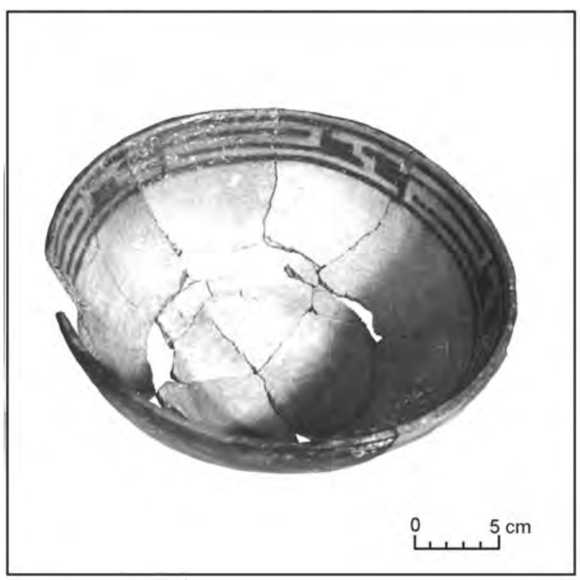


Figure 55. Lincoln Black-on-red.

Obviously, paint color is the attribute most commonly used to differentiate Lincoln Black-on-red from Three Rivers Red-on-terracotta (Mera and Stallings 1931). Examination of sherds assigned to various types of the Three Rivers Red Ware tradition indicates a good but not absolute correlation between paint color, paste color, and design style. Wiseman (1991) notes that Lincoln Black-on-red in the Roswell area commonly displays designs common in Three Rivers Red-on-terracotta. The distinction of this type based on paint is further complicated by the occasional terracotta sherd with decorations in both

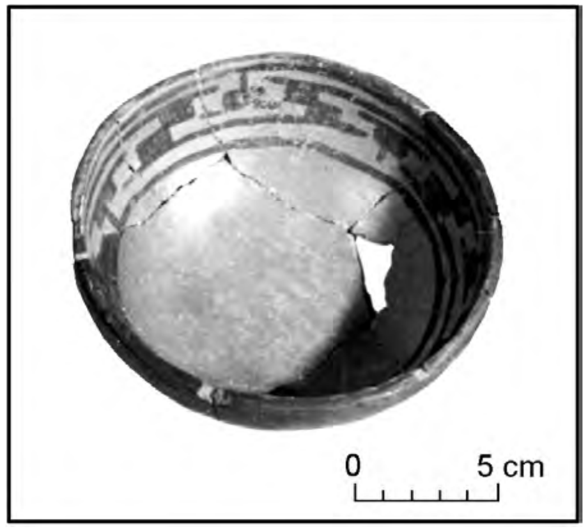


Figure 56. Lincoln Black-on-red.

red and black lines.

Painted decorations tend to be limited to bowl interiors. Designs most closely resemble those noted on Glaze A forms such as Agua Fria Glaze-on-red from the Rio Grande region. Lincoln Black-on-red is characterized by a limited decorative repertoire and a remarkable degree of uniformity over a wide area. Rims are usualy solidly painted. Decorations usually consist of narrow lines and connecting triangles. Later Lincoln Black-on-red exhibits increased vertical and diagonal segments oriented uniformly over the vessel. Wide lines occasionally occur on vessel exteriors. As part of a stylistic study, Stewart (1979) sorted Lincoln Black-on-red from a variety of sites in the Sierra Blanca region, placing this pottery into one of three broad classes labelled as A, B, or C based on overall layout and symmetry of design. Class A includes band designs usually organized within horizontal lines just below the bowl rims. Class B refers to designs spread over much of the bowl interior in radially symmetrical layouts. Class C includes designs with rotational layout structure with decorative fields on opposite portions of the vessel.

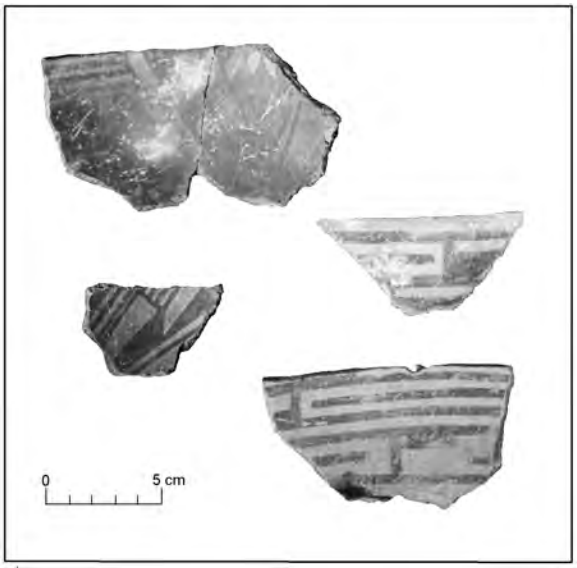


Figure 57. Lincoln Black-on-red.

A final variety may reflect the development of Lincoln into a glaze form that represents a local copy of Agua Fria Red-on-glaze (Mera and Stallings 1931; Kelley 1984; Wiseman 1991), and this type may be sometimes confused with Rio Grande glazed forms. One sherd exhibited Jornada pastes and decoration in subglaze and was placed into a Lincoln Black-on-red subglaze Rio Grande style category. Wiseman (1991) notes that the subglaze effect in Lincoln Black-on-red may have mainly been the result of intentional overfiring of these vessels. Characteristics contributing to this interpretation include distorted surface colors and surface crackling.

A small number of sherds exhibiting Jornada pastes with either cream-colored pastes or floats were assigned to distinct categories. The characteristics of this pottery are fairly distinct. The paste cross section tends to be very silty dark gray but is sometimes a dark brown or brown with a gray core. White igneous temper fragments are usually readily visible in cross sections. Surfaces are usually moderately to well polished on both interior and exterior surfaces, although a few examples are unpolished and unslipped on the exterior surface. Cream-colored slipped or floated surfaces are usually relatively thick and cover the entire surfaces. Analysis indicates that many sherds initially thought to have a distinct slip actually did not, and the slip effect was due to a lighter colored layer of floated surfaces composed of the same clay. Surfaces are fairly consistent in surface finish, color, and range from cream to tan. Sherds exhibiting the combination of pastes and slips described were assigned to one of two descriptive categories. A total of 75 sherds were placed into a slipped cream category. In addition, four similar sherds exhibited decorations in red mineral paint and were assigned to a slipped cream painted category. This pottery is included here in the Three Rivers Red Ware tradition since, despite the presence of cream or tan surfaces, it appears to represent an extension of the Three Rivers tradition. One possibility is that cream-slipped surfaces reflect a local innovation involving a shift toward light firing clays. A similar change is reflected in the much earlier shift from Mogollon Red-on-brown to Three Rivers Red-on-white in the Mogollon Highlands to the west. It is also possible that pottery assigned to slipped cream types may simply represent part of the variation occurring in Three Rivers Red-on-terracotta and related types. In other studies, similar sherds appear to have been placed into an unpainted Three Rivers category. Another possibility is that this shift reflects influence from the glaze ware technology of the Rio Grande region where glaze-on-yellow was first produced at about the same time as the Angus site was occupied. This scenario is partly supported by the occurrence of glaze ware pottery including glaze-on-yellow. Further support for influence from the Three Rivers Red Ware and Rio Grande Glaze Ware includes the strong similarity of design styles on Lincoln Black-on-red and Agua Fria Glaze-on-red, and the presence of subglazed Lincoln Black-on-red.

Chupadero Black-on-white

A total of 1,231 (8.9 percent of the total) sherds and a single partial vessel exhibit traits indicating they derived from Chupadero Black-on-white vessels. This type was first named and described by Mera and Stallings (1931). Chupadero Black-on-white is described from sites scattered over a wide area of the Jornada Mogollon (Mera 1931; Vivian 1964; Hayes et al. 1981a; Kelley 1984; Wiseman 1986; Farwell et al. 1992). Chupadero Black-on-white was first manufactured sometime between A.D. 1050 and 1100 and continued to have been produced to about 1550. Through most of this period, Chupadero Black-on-white was the dominant decorated type at sites scattered over wide areas of central and southeastern New Mexico (Mera 1931).

Chupadero Black-on-white, found over a wide area, exhibits very similar characteristics. Chupadero Black-on-white sherds usually have dense light gray to white pastes reflecting the use of a low iron clay, firing to buff colors and a low-oxidizing or neutral

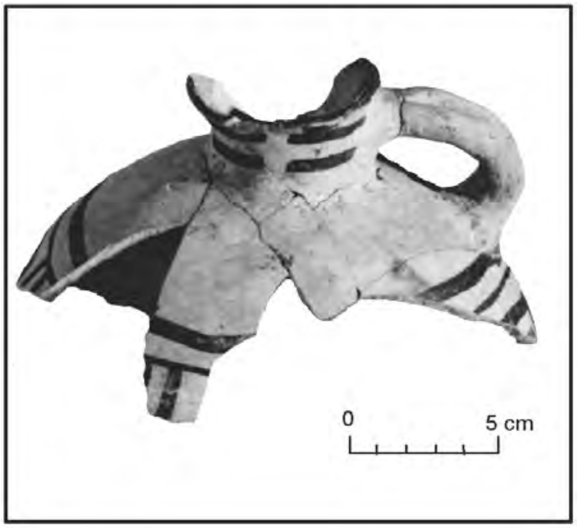


Figure 58. Chupadero Black-on-white, indeterminate design.

atmosphere. Thus, most of the Chupadero Black-on-white sherds from this site correspond to the "white paste type" as defined by Wiseman (1986). Chupadero sherds consistently fired to similar buff colors in an oxidizing atmosphere, in contrast to the red colors for sherds associated with other ceramic traditions. Temper is often dark and includes fine sherd and rock fragments. The undecorated surfaces of Chupadero Black-on-white are often unpolished with striated or scored treatments resulting from scraping. While Jelinek (1967) divided Chupadero Black-on-white sherds into several types thought to be temporally sensitive primarily based on the presence of slips, surface color, and temper type, these

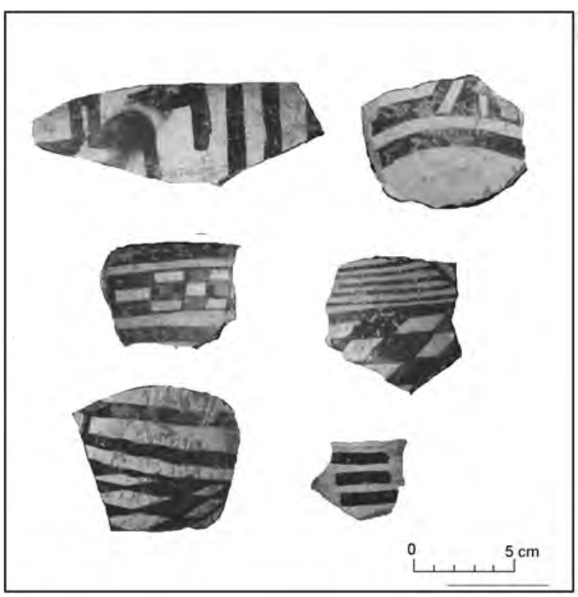


Figure 59. Chupadero Black-on-white, solid design.

distinctions do not appear to be warranted. Chupadero Black-on-white sherds display a wide range of characteristics. Striated treatments are common on vessel surfaces. Most surfaces are light gray in color with moderate polish. While most sherds are not slipped, a significant proportion display a white slip over a gray paste. Most Chupadero sherds are tempered with dark igneous rocks and sherds, although a wide variety of tempers are represented and may indicate Chupadero vessels were derived from a number of sources.

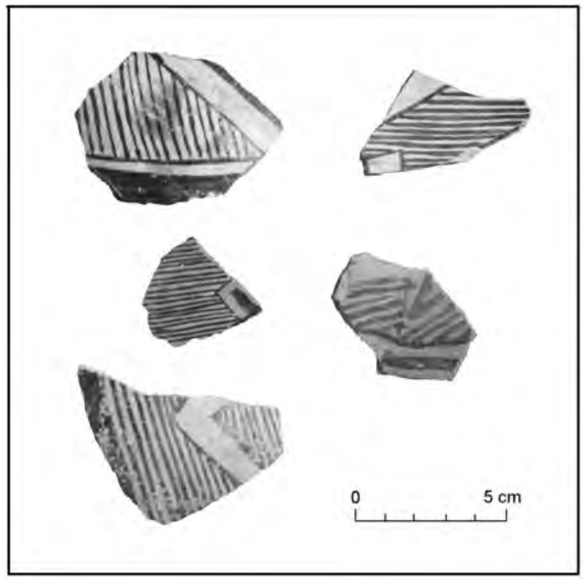


Figure 60. Chupadero Black-on-white, hatchured design.

Painted designs of Chupadero Black-on-white vessels often consist of combinations of hatchured and solid motifs. Designs were executed in a series of panels where the basic design was repeated every one or two sections. At least four and as many as eight panels may be represented.

Sherds thought to have derived from Chupadero Black-on-white were assigned to a series of categories based on the presence of painted decoration or style. These stylistic categories do not appear to have any spatial or temporal significance, but simply reflect a range of styles associated with this type. A total of 392 sherds had no painted decoration and were classified as unpainted Chupadero Black-on-white. Painted sherds were placed into a specific category by the type of design, and categories recognized include 153 Chupadero Black-on white indeterminate design sherds, 475 sherds and 1 vessel of solid design (Figs. 58 and 59), 106 hatchured design sherds (Fig. 60), and 92sherds of hatchured design. A total of 3 sherds exhibiting Chupadero pastes were assigned to one of two categories based on distinct paint or surface characteristics. A Socorro-like subglaze category was assigned to 3 sherds and exhibited vitrified paint and subglazed mineral paint common in Socorro Black-on-white (Sundt 1979). A total of 10 sherds exhibited a dark paste and mostly unpolished surfaces and were assigned to a black-on-gray (Crosby-like) category.

El Paso Brown Ware

El Paso Brown Ware types were mostly distinguished from Jornada Brown Ware by the absence of a distinct polished surface and the presence of large temper fragments, which included rounded quartz fragments, often protruding through the surface. This type was assigned to 1,268 (or 9.1 percent of the total) sherds. El Paso Brown sherds also tend to be soft and have less luster and more scraping marks on interior surfaces. Pastes tend to be dark or brown with a dark core, and surfaces are gray to chocolate brown.

Most sherds displaying El Paso Brown Ware pastes exhibited plain surfaces without textured or slipped treatments. These sherds were placed into either an El Paso Brown rim (117 sherds) or El Paso Brown body (626 sherds) category. Body and rim sherds were assigned to distinctive types, as El Paso Polychrome sherds are more likely to be painted or have other distinct decorative treatments near the rim.

Unpainted sherds less than 4 mm in thickness were assigned to a thin El Paso Brown (511 sherds) category. Smudged El Paso Brown as defined here, was assigned to 5 sherds, and was distinguished from other El Paso Brown Ware sherds by the presence of thick black sooted deposits that are usually highly polished.

While all unpainted and unslipped sherds were assigned to El Paso Brown Ware, many of these sherds probably derived from El Paso Polychrome vessels. This appears to be supported by the high frequency of thin El Paso Brown, which is a common characteristic of sherds derived from El Paso Polychrome.

El Paso Polychrome

During the present study, 585 (or 4.3 pecent of the total) sherds were assigned to El Paso Polychrome (Figs. 61 and 62) pastes similar to that described for El Paso Brown but with decorations in black or red mineral pigments. Despite the presence of painted

Figure 61. El Paso Polychrome.

decorations, surfaces tend to be crudely smoothed or scraped. Vessels are commonly represented by very large and thin jars, although some examples are derived from bowls. Surfaces may be brown and unslipped or contain a thin red slip. Painted decorations often consist of combinations of red slip and black mineral paint. Of the sherds assigned to this group, 581 exhibited painted decoration and were classified as El Paso Polychrome. Four thin red slipped sherds, clearly from an El Paso Polychrome vessel were assigned to an El Paso thin red slipped category.

In some schemes, sherds thought to have derived from vessels exhibiting painted decoration in pigments of only one color were classified as El Paso Bichrome, while those with decorations in both black and red were classified as El Paso Polychrome (Mills 1988). It is likely, however, that many smaller sherds previously classified as El Paso Bichrome may have derived from El Paso Polychrome vessels. All painted brown ware sherds were assigned to El Paso Polychrome, although information regarding pigment color combinations was recorded separately. El Paso Polychrome is characterized by large geometric motifs executed in red and black paint (Stallings 1931). Designs are often fairly crude, and often include alternating lines in black and red. Since decoration on jars is often limited to the rim or neck areas, unpainted body sherds from El Paso Polychrome may be classified as El Paso Brown body.

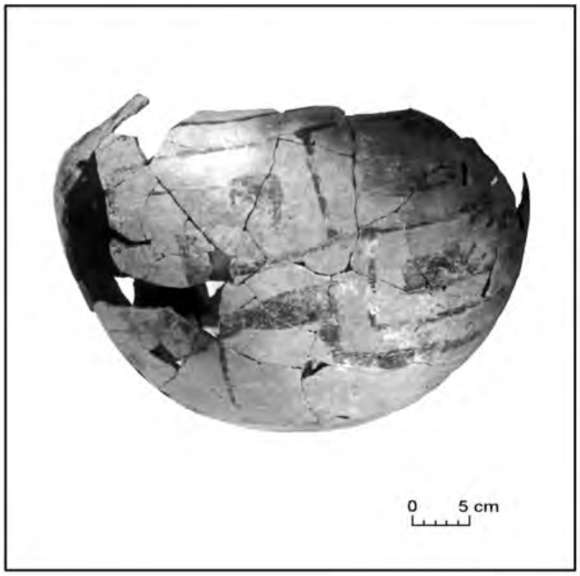


Figure 62. El Paso Polychrome.

Cibola White Ware

A total of nine sherds exhibited low iron pastes and sand temper similar to that noted in Cibola White Ware pottery from the Colorado Plateau. At this point, it is impossible to determine if these represent trade wares from the Cibola region or a closer manufacturing area where similar resources were located. These sherds were placed into one of three descriptive types based on the presence or type of painted decoration. These categories include unpainted undifferentiated (1 sherd), mineral paint undifferentiated (3 sherds), and mineral paint thick parallel lines (1 sherd), and Late Cibola White (4 sherds). While some of these sherds may represent trade wares from the Cibola region, other examples may represent resource variation within the area where Chupadero Black-on-white was produced.

Glaze Ware Tradition

A total of 52 sherds (.4 percent of all sherds) exhibited a distinctive lead glaze paint and paste characteristics indicative of glaze ware types thought to have been produced at sites in the Rio Grande region. Glaze wares were produced in the middle Rio Grande from about A.D. 1325 to the early 1700s (Mera 1933; Kidder and Shepard 1936; Franklin 1997). The production of glaze ware pottery appears to have extended into the western Jornada region where, at Gran Quivira, ceramics belonging to this ware group represent about a third of the pottery recovered from the pueblo of Las Humanas and is represented by types covering the entire range of the glaze ware sequence (Hayes et al. 1981b). Given such connections, it is not surprising that low amounts of glaze ware sherds were noted at LA 3334.

Most of the glaze ware sherds represent body sherds, which could not be assigned to a specific type, and were placed into descriptive categories based on surface treatments. Descriptive type categories identified include glazed red unpainted (12 sherds), glazed yellow unpainted (6 sherds), glaze-on-red, glaze-on-yellow undifferentiated (29 sherds), and glaze-on-yellow (1 sherd).

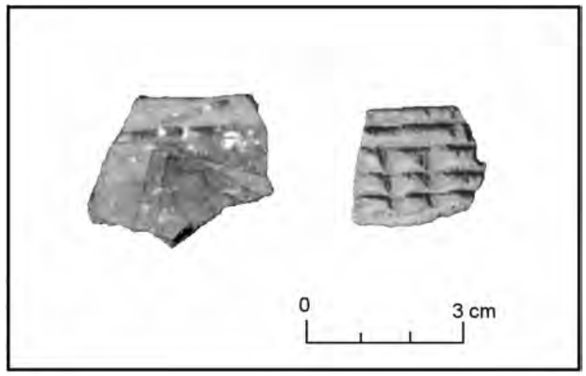


Figure 63. (Left) Agua Fria Glaze-on-red, (right) Mogollon Brown Ware.

All four of the typeable rim sherds represent Agua Fria Glaze-on-red and appear to be similar to early glaze ware pottery recovered over a wide area (Kidder and Shepard 1936; Lambert 1954; Habicht-Mauche 1993; Franklin 1997). Figure 63a shows a single Agua Fria Glaze-on-red sherd. This type is only identified by bowl rim sherds, which are characterized by even wall thickness in the rim profile. Wall thickness ranges from about 4 to 7 mm. Paste profiles are usually oxidized and are usually orange or red in color. Bowls interiors are usually covered with a deep red slip. Surfaces are smoothed and well polished.

The glaze paint is usually black, varying from a thin matte-looking paint with limited evidence of vitrification to a distinct glaze. While some bubbling may be present, the paint tends to be well executed as compared to later glaze forms, and on initial perusal often resembles earlier matte pigment. In addition, designs are usually even and well executed and dripping, while other defects common in later glazed types tend to be absent.

The design in Agua Fria most typically consists of a narrow band below the rim. This is composed of a series of solid triangles and rectangles, with some squiggle hatchure. A common element is a long triangle which may extend from a fifth to a third of the circumferences of a bowl, and merges with a single line to complete the circle.

Mogollon Brown Ware

A very small number of sherds had pastes, temper, and manipulations indicative of Mogollon Brown Wares produced in the Mogollon Highlands to the west. Sherds exhibiting polished surfaces like that noted for Jornada Brown but with a fine volcanic and sand temper similar to that used in the Mogollon Highlands were assigned to Alma Plain (15 sherds). Given their temporal association, it is likely that the sherds assigned to this type actually represent utility ware associated with Salado period occupation; during which time, plain ware vessels very similar to those manufactured during the Mogollon occupation, were produced (Wilson 1998). A single sherd exhibited Mogollon temper along with very fine coil treatments characteristic of the Mogollon regionand was assigned to a Mogollon indented corrugated category (Fig. 63).

Salado Polychrome

A total of 51 sherds show pastes, treatments, and decorations indicative of Salado Polychrome, known to have been produced over a very wide area in southwest New Mexico and southern Arizona. Painted decorations are executed in a black organic paint over a low iron slip buff or cream and red-colored slip. The combination of a black organic paint and creamand red surfaces produced adramatic effect that would have required a unique combination of clay paste, slip, and pigment resources. Salado Polychrome types are differentiated based on temporally sensitive differences in painted styles and the additional presence of painted designs applied in a red slip. Salado Polychrome was most widely produced during the fourteenth century, during which time they were among the widest distributed Southwestern pottery type (Young 1967, 1982; Lindsay and Jennings 1968; Wood 1987; Crown 1994).

Ceramics exhibiting characteristics typical of Salado Polychrome types, but without distinct designs indicative of previously described types, were classified as either unpainted Salado cream slip (6 sherds), undifferentiated painted Salado Polychrome (20 sherds), and unpainted red slipped Salado Polychrome (2 sherds). A total of 23 sherds exhibiting paste characteristics indicative of Salado polychrome sherds also had distinct design styles characteristic of Gila Polychrome (Fig. 64). Painted designs on Gila Polychrome vessels usually begin as bands or lifelines directly below the rim. These may occur as wide isolated lines or a series of connected triangles or squares, or thin lines incorporated into a group of solid motifs. These lines occur on jar exteriors at the bottom of the neck or below the design band. Design motifs are usually large and fairly simple. Solid design elements predominate, although hatched designs may be present. Areas between painted designs and the unpainted base are often covered by unpainted bands of red slips. Most of the surfaces of bowl interior and jar exteriors are painted, and negative designs are common. Design motifs on Gila Polychrome include triangles and scrolls, stepped triangles, checked squares, lines of adjoining squares and triangles, hatchured triangle panels, thick horizontal lines, and stylized anthropomorphic designs of birds and serpents. Solid designs often included ticked lines or scalloping along the edges. These designs often include a negative area with a dot or series of dots, often resulting in an eye effect. Elements may include hatched, straight, or cross-hatched lines or a series of small connecting lines or triangles. Several motifs are usually present and decorations often consist of bands of lines and solid motifs.

A single sherd exhibiting very distinct surfaces and manipulations was assigned to Ramos Polychrome (Fig. 65) of Casa Grandes or Chihuahuan Polychrome tradition (DiPeso et al. 1974). This sherd belonged to a jar body sherd that

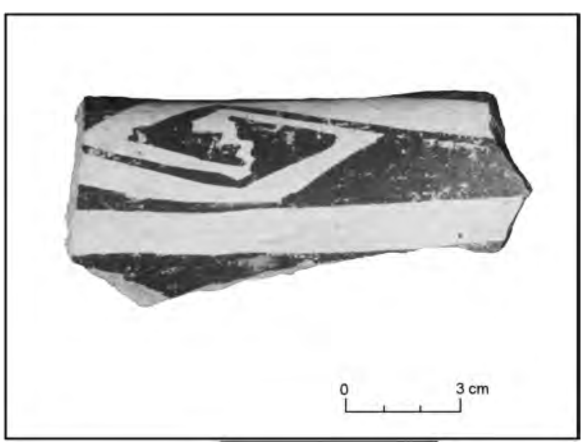


Figure 64. Gila Polychrome.

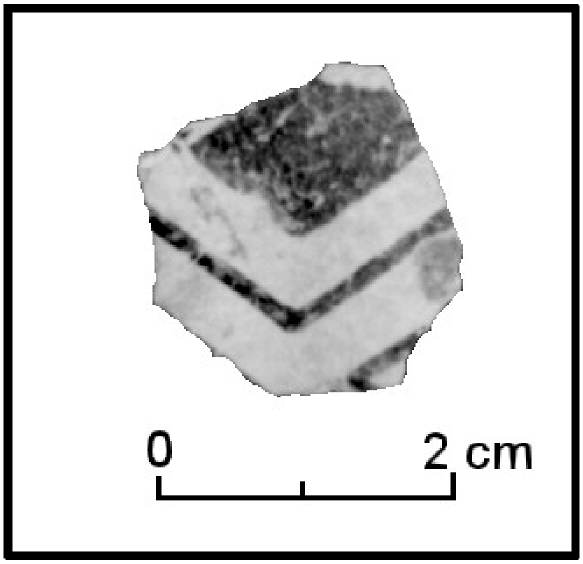


Figure 65. Ramos Polychrome.

was polished on both sides. Surface color was tan-brown. The exterior had been decorated with black mineral paint with a design consisting of thin parallel chevron lines. Temper consisted of a distinct fine igneous rock.

A total of three sherds were very similar to pottery known to have been produced by protohistoric Athabascan groups (Brugge 1982). This pottery tended to exhibit unpolished surfaces, dark pastes, and sand temper in slightly micaceous paste. Two sherds exhibiting this paste were classified as Athabascan plain unpolished while one exhibiting corrugated-like textures was assigned to Athabascan textured. Despite the similarity of these sherds to late Athabascan pottery, given their context of recovery and low numbers, it is more like they simply represent a variation of Jornada Brown Ware technology actually contemporaneous with the other pottery from this site.

Examination of Ceramic Patterns

Ceramic data from the two sites investigated during the Angus project provided an opportunity to characterize assemblages from late Jornada Mogollon sites in the Sierra Blanca region as well as to examine associated trends. The following discussions focus on patterns noted for sherds recovered during investigations by the Angus project. Distributions of various ceramic types and attribute categories are first used to determine the potential time of occupation of various sites and components. Next, distributions of various attributes are used to examine a number of issues including patterns of vessel production, exchange, and use.

Dating of Sites

While archaeologists still know very little about the dating of prehistoric sites in this area of the Sierra Blanca region, a fairly long occupation by ceramic-using groups seems to be indicated. The unique nature of the prehistoric occupations of this area was first noted by Jennings (1940), based on his excavations in the Peñasco Valley. Lehmer (1948) defined three phases for what he termed the Northern Sequence of the Jornada Mogollon. The earliest of these was the Capitan phase which was described as similar and contemporaneous with the Mesilla phase to the south, and was postulated to date from about A.D. 900 and 1100 (Lehmer 1948). Jornada Brown was characterized as the overwhelmingly dominant pottery type at Capitan phase sites, which were associated with lower frequencies of Mimbres Black-on-white and Broadline Red-on-terracotta. Next in this sequence was the Three Rivers phase, which was described as similar to the Doña Ana phase to the south, and postulated to date between A.D. 1100 and 1200. In addition to the continuation of similar Jornada Brown pottery and other types associated with the previous phase, ceramic types of the Three River phase included El Paso Polychrome, Chupadero Black-on-white, and St. Johns Polychrome. The last phase in this sequence was the San Andres phase, which was described as contemporaneous with the El Paso phase and thought to date from A.D. 1200 to 1400. Local pottery types noted for this phase included Jornada Brown along with El Paso Polychrome, Three Rivers Red-on-terracotta, and Lincoln Black-on-red. Intrusive pottery types defined for this phase included Chupadero Black-on-white, Gila Polychrome, Ramos Polychrome, Playas Red Incised, Agua Fria Glaze-on-red Polychrome, Arena Glaze Polychrome, St. Johns Polychrome, and Heshotauthla Polychrome (Lehmer 1948).

Kelley (1966, 1979, 1984) introduced a new phase system for both the northern and southern localities of the northern Jornada based on extensive field work conducted in the 1950s. This phase system has since largely replaced the earlier southern Jornada phase sequence by Lehmer (Stuart and Gauthier 1981; Wiseman 1985, 1996a; Sebastian and Larralde 1989; Farwell et al. 1992). The Angus project is located in the northern part of the area assigned to phases of the southern localities of the Sierra Blanca region. Kelley (1984) placed all ceramic period occupations defined at the time of her study into the Glencoe phase. This was further subdivided into the early and late Glencoe phase. While the Glencoe phase was assumed to date about A.D. 1100, the probable existence of earlier occupations was noted and are usually referred to simply as undefined ceramic period remains (Sebastian and Larralde 1989). The assignment of all known ceramic occupations for the southern occupations of the Sierra Blanca regions into a single phase appears to have been based on the conservative nature of the occupation, as occupations dating to various spans appear to represent pithouse sites with ceramic assemblages dominated by plain Jornada Brown Ware sherds.

While Kelley characterized the Glencoe phase as spanning the Early Pueblo III to Pueblo IV periods, there is evidence of a very long ceramic tradition in this area of the Jornada Mogollon country that began much earlier. The earliest ceramic occupations are characterized by plain brown ware as the dominant if not sole ceramic type at about A.D. 500 to 700. Small sites are often represented by scattered or shallow pithouses and appear to have been introduced into areas of the Jornada Mogollon by the fifth century and spread across most of this region by the eighth century. Sites dating to the tenth century are very similar but may also contain low frequencies of either Mimbres Boldface Black-on-white in the southern locality (Wiseman 1991), while a local variety of Red Mesa Black-on-white is the dominant white ware at contemporaneous sites in the northern localities of the Sierra Blanca region (Levine 1992). Components dating to the twelfth century may be characterized by a combination of Mimbres Classic, El Paso Polychrome, early forms of red-on-terracotta, and Chupadero Black-on-white (Jennings 1940; Green 1956; Kelley 1984; Wilson 1997). While earlier occupations certainly are represented in this area of the Mogollon region, most sites previously assigned to the Glencoe phase exhibit similar ceramic traits and appear to date between A.D. 1100 and 1350, as do both sites examined during the Angus project. The Glencoe occupation, as normally defined, is characterized by the dominance of Jornada Brown Ware along with Chupadero Black-on-white, and Three Rivers Red-on-terracotta, with very little, if any, Corona Corrugated (Kelley 1984; Farwell et al. 1992). The presence of this combination of pottery is used to define early Glencoe phase occupations. Late Glencoe phase occupations are characterized by similar assemblages along with Lincoln Black-on-red and low but significant portions of Corona Corrugated. Other types occurring in late Glencoe phase assemblages include Gila Polychrome and early Rio Grande Glaze Ware types.

A comparison of ceramic distributions from the two Angus sites indicate that while they both date to the Glencoe phase as generally described, they were probably not occupied contemporaneously (see Tables 52 and 53). Despite the very small number of sherds (301) from LA 111747, ceramic distributions indicate it is the earlier of the two sites. Ceramic data from this site indicate an occupation prior to A.D. 1300, and thus this site dates sometime during the early or middle Glencoe phase (Farwell et al. 1992). Of particular importance is the absence of Lincoln Black-on-red as well as other later pottery types such as Rio Grande Glaze Wares that were produced after A.D. 1300. Also, absent at this site are sherds clearly derived from El Paso Polychrome and Salado Polychrome vessels, which also occur on late Glencoe and Lincoln phase sites. Painted pottery from LA 111747 is mainly represented by Chupadero Black-on-white and Broadline (Andres) Red-on-terracotta. Textured pottery in the form of Corona Corrugated is present but extremely rare, making up less than 1 percent of pottery. The frequency of plain brown ware sherds (about 85.3 percent of all ceramics) is also relatively high, and is a reflection of the low frequency of painted types and Corona Corrugated at this site. Most of the brown wares are represented by Jornada Brown Ware types, which include 65 percent of all pottery. El Paso Brown Ware types are represented by 8.9 percent of all pottery.

Along with the absence of Lincoln Black-on-red, of interest is the occurrence of Broadline (San Andres) Red-on-terracotta as the overwhelmingly dominant Three Rivers Red Ware type. While Three Rivers Red-on-terracotta was present, it occurred in very low frequencies as compared to the Broadline form. While Broadline Red-on-terracotta commonly occurs at sites containing Three Rivers Red-on-terracotta and Lincoln Black-on-red, it has also been postulated that this type forms the earliest part of the sequence that later includes other Three Rivers Red Ware types (McCluney 1962). Thus, the dominance of Broadline Terracotta and absence of Lincoln Black-on-red indicate an occupation during the early Glencoe phase, and may indicate an occupation sometime between A.D. 1100 and 1300 (Farwell et al.

1992).

While many of the same types noted at LA 111747 were also in the assemblage from LA 3334, both overall ceramic frequencies and the presence of additional late types appear to indicate that LA 3334 was occupied later. While the additional presence of several rarer types at LA 3334 may partly be a reflection of the much larger size of this ceramic assemblage, it also appears to reflect an occupation during a later period when a wider range of forms was produced. Of particular significance is the additional presence of significant frequencies of Lincoln Black-on-red. Sherds derived from Lincoln Black-on-red are still outnumbered by red-on-terracotta forms exhibiting earlier design styles. Chupadero Black-on-white is also present in similar frequencies as noted at LA 111747. Late intrusive types noted at this site include Rio Grande Glaze Ware types, El Paso Polychrome, Ramos Polychrome, and Gila Polychrome.

A total of 67.80 percent of the pottery analyzed from LA 3334 is represented by plain brown ware types, of which 8.9 percent is El Paso Brown and 59.1 percent represents Jornada Brown Ware types. Corona Corrugated forms consist of 8.4 percent of the pottery from this site.

The occurrence of Lincoln Black-on-red, Corona Corrugated, and other late types indicates an occupation after A.D. 1300, contemporaneous with the span sometimes defined for the Lincoln phase. Other characteristics such as pithouse architecture at this site, sherds from Lincoln Black-on-red making up a minority of the Three Rivers Red Ware pottery, the presence of earlier Three Rivers Red-on-terracorra forms, and plain Jornada Brown Ware being much more common than Corona Corrugated, appear to contradict a Lincoln phase as generally defined. Thus, this site appears to date to the late Glencoe phase as defined for the northern Jornada Mogollon (Kelley 1984). Such a designation is based on the strong similarities in ceramic distributions from LA 3334 and those associated with the 200,000 sherds recovered from the Bonnell site which formed the basis for the definition of the late Glencoe phase (Kelley 1984).

The main occupation at LA 3334 then dates from about A.D. 1300 to 1350, and although containing some earlier characteristics, it appears to be contemporaneous with the early part of the Lincoln phase as defined in adjacent areas to the north. Such a date is largely supported by ^{14}C dates recovered during recent investigations of LA 3334, although midpoints of these dates cover a longer span.

Thus, while many of the same types occur at both sites, LA 3334 appears to be later. This is also indicated by the presence of additional late decorated types which include Lincoln Black-on-red, El Paso Polychrome, Chihuahua Polychrome types, glaze ware types, and Salado Polychrome. Rim shapes associated with El Paso Polychrome from LA 3334 are dominated by jars with flaring rims and wide mouths characteristic of later forms of El Paso Polychrome (Whalen 1994). Such forms are thought to have been common from A.D. 1300 to 1400. Earlier, straighter forms of El Paso Polychrome, thought to have been produced between A.D. 1200 and 1300 are absent. Painted types common to both sites are Broadline Red-on-terracotta and Chupadero Black-on-white. While Corona Corrugated is present at both sites, it is much rarer at LA 111747.

In order to determine if some areas of LA 3334 were earlier than others, ceramic distributions of ceramic types and groups were compared between the various areas (Table 62). For most of the areas, ceramic distributions were very similar and indicate that the occupations associated with these different contexts were roughly contemporaneous. Almost all the units contain the wide variety of types characteristic of LA 3334 as a whole. The only exception to this appears to be the small ceramic sample from the location of the kiva, which is characterized by a lower range of types and frequencies more similar to those noted at LA 111747. While some of these differences may reflect the fairly small number of sherds (n = 396) recovered from LA 111747, the fact that differences are reflected in a number of different ceramic types or groups appears to reflect more than chance alone. Such differences, however, are contradicted by information recorded by Peckham (1956) during his earlier excavation of areas of this site. Distributions noted by Peckham from the area he refers to as Room 1, which is the kiva, contain Lincoln Black-on-red, glaze wares, and high frequencies of corrugated wares. Tabulations of ceramic types from the kiva made by Peckham include Lincoln Black-on-red and are very similar in distribution noted at other contexts during the present study. It is possible the later excavations exposed an earlier component, but the dating of this area is difficult to substantiate using presently available data. Thus, further discussions concerning ceramic change and trends are limited to comparisons of data from LA 111747 and LA 3334.

Ceramic Trends

The overall distributions and trends of ceramic types documented during the present study appear similar to those noted in other studies of contemporary sites in this region assigned to various spans of the Glencoe phase (Kelley 1984; Wiseman 1991; Farwell et al. 1992). Thus, data from the two sites provide an opportunity to examine potential ceramic trends for this area during the Glencoe phase.

One difficulty in documenting ceramic change in the Sierra Blanca country stems from the accumulative nature of ceramic change at sites in this region. For example, almost all of the pottery forms associated with earlier periods tend to persist until the end of the Jornada Mogollon occupation of this area. Such tendencies have resulted in the placement of almost all sites in this area of the Jornada Mogollon into a single (Glencoe) phase.

Such trends are certainly indicated in the comparison of ceramic data from the two sites. Both sites had similar frequencies of plain brown ware pottery as well as Chupadero Black-on-white and Three Rivers Red Ware. Sites dating to the late Glencoe phase are simply distinguished from those associated with the earlier spans of this phase by the additional occurrence of Lincoln Black-on-red and other types known to date after A.D. 1300. Similar observations were noted for the ceramics from the Bonnell site where the persistence of earlier traits was noted (Kelley 1984). Such persistence includes a much higher frequency of plain brown ware and a conservatism of designs styles as compared to other sites in the Sierra Blanca region of equivalent age (Kelley 1984).

Such trends contrast with changes noted for the Corona to Lincoln phases of the northern localities that were largely occupied during the same time span. Ceramic assemblages associated with the roughly contemporaneous Lincoln phase are distinguished by higher frequencies of Lincoln Black-on-red and Corona Corrugated (Kelley 1984). The very conservative nature of ceramic change contrast with some areas of the Southwest where, during the same time, ceramic changes were more dramatic and included the sudden appearance and disappearance of certain types. Thus, the Angus area appears to be characterized by a long-lived and conservative tradition of ceramic production.

Ceramic and geological data seem to indicate long-term local production of pottery at Angus and other Glencoe phase sites. Distributions of refired paste color and temper indicate that the great majority of pottery from both sites could have been produced locally or at nearby sites. Fine reddish clay from local alluvial deposits amd soil horizons and igneous rock outcrops exhibit characteristics similar to those noted in pottery dominating Angus project sites. It should be noted, however, that pottery with similar temper and pastes was produced over a very wide area of the Sierra Blanca region. Given the nature of distributions of geological sources, potential sources for Chupadero Black-on-white in this area are much rarer, although Mancos shale outcrops occurring in this region represent potential sources. Temper distributions indicate that at least some of the Corona Corrugated pottery represents vessels produced elsewhere. While the majority of sherds assigned to both Jornada Brown Ware and Corona Corrugated are tempered with similar material, a relatively high frequency (35.1 percent) of Corona Corrugated sherds contain a distinct temper composed of extremely fine and varied particles. This temper is almost completely absent in plain Jornada Brown Ware sherds, indicating that some of the Corona Corrugated was probably not produced locally. This assumption is supported by the distinct characteristics and the fairly low frequencies of Corona Corrugated. Interestingly, the fine temper common in Corona Corrugated from other areas of the Jornada Mogollon region was almost completely absent at sites examined during the present study.

The refired paste color of much of the Three Rivers Red Ware sherds are similar to those noted in Jornada Brown Wares, although a wider range of characteristics is represented. Similarities in pastes and tempers may indicate an overlap in the production of these two wares, although the wider range in paste variability may indicate that the different forms of Three Rivers Red occurring at most sites were produced at several distinct sources. Paste variation in Three Rivers Red Ware tends to correlate with some of the pastes associated with red-on-terracotta and tends to be lighter and those associated with Lincoln Black-on-red tend to be slightly redder than those noted in Jornada Brown Ware pottery. These differences could reflect areal specialization in different Three River Red Ware types, where potters at separated locations produced different forms of red ware pottery using different clays, paint types, and decorative styles. These different red ware forms could represent either production of different classes of red wares in different communities and associated trade of various forms, or the production of different classes of red wares by the same potters in a community.

It is possible that the production of similar Broadline and Three Rivers Red-on-terracotta pottery, which co-occur throughout the Glencoe phase, may reflect the production of similar pottery over long periods of time by Glencoe phase groups. Kelley (1984) describes the Ruidoso Valley as the last stronghold of the Glencoe phase, during which traits from the Lincoln phase were accepted. In contrast, the contemporaneous production of Lincoln Black-on-red may reflect pottery that developed out of the Three Rivers Red Ware tradition but diverged from this tradition as potters combined this tradition with influences from the west as indicated by the similarity in designs with Rio Grande Glaze-on-red forms. Wiseman (1992) suggests that Glencoe phase and Corona/Lincoln phase sequences reflect different ethnic populations. Thus, the Lincoln Black-on-red may reflect pottery produced by distinct Lincoln phase groups in the northern localities of the Sierra Blanca region. The presence of a wide range of Three Rivers Red Ware types may reflect both the local production of earlier forms of red-on-terracotta forms and trade with Lincoln phase communities in other areas of the Sierra Blanca region.

Similar types of changes appear to have occurred in other regions of the Southwest during the fourteenth century, as regional traditions diverged and became much more distinct. Similar processes may be reflected by the production of distinct glaze ware and Tewa White Ware in the Rio Grande region over an area where similar forms were produced during earlier periods. Such developments may reflect the establishment of ethnic boundaries at a time when populations were moving and intermingling.

Sherds derived from Chupadero Black-on-white occur in similar frequencies as Three Rivers Red Ware. It is difficult to determine if any of the Chupadero Black-on-white was locally produced. The buff clay sources appear to represent the use of low-iron shale clay. Clay samples collected in the Lincoln area from gray shale outcrops fired to similar buff colors and exhibited similar textures as noted in Chupadero Black-on-white. While I have not collected clays from the Angus project area, geological maps indicate the presence of Mancos shale exposures (V. Kelley 1971) which in other areas does yield low iron clays. Thus, it is possible that some of the Chupadero Black-on-white pottery may have been produced locally. If Chupadero Black-on-white was locally produced, the utilization of technology and designs is very distinct from those reflected in types of the local Three River tradition and may reflect long-lived production of pottery belonging to two very distinct traditions. This could reflect distinct ethnic groups residing in the same general area and may reflect further divisions similar to that reflected by different Three Rivers Red Ware types. Another possibility is that Chupadero Black-on-white was not locally produced, but instead was distributed over a very wide area.

Given the distinct decorations and technology represented, it is likely that many Chupadero Black-on-white vessels were not produced by the same potters as Three Rivers Red Ware types. If this is the case, it would imply a great deal of regional specialization with a wide distribution of these white ware vessels. A similar situation has been postulated for the northern Mogollon country to the west where Cibola White Ware types produced in the southern Anasazi country were distributed over wide areas of the Mogollon Highlands where Mogollon Brown Ware vessels were produced (Wilson 1999b). For the Mogollon region, I (Wilson 1999b) have argued that the very wide dispersal of white ware vessels may have ultimately facilitated long-term exchange between separated groups in very different environmental settings, associated with the varying elevations. At times of shortages such interactions may have been critical to the survival of various groups. Many of the parallels in the white wares from these two regions may indicate that Chupadero Black-on-white may have played a similar role. The wide range of tempers and pastes represented in Chupadero Black-on-white from Angus phase sites indicates that even if some of it was produced locally, these vessels originated from a wide range of sources. These include pastes that may indicate production in various areas of the Sierra Blanca region as well as the Gran Quivira area. Pastes and temper are very distinct from brown wares. In contrast to the stylistic variability noted in the Three Rivers Red Ware, Chupadero Black-on-white produced over a wide area appears to display very similar characteristics.

Other interaction or influences may be indicated by the presence and distribution of both El Paso Brown and El Paso Polychrome, presumably associated with the southern Jornada Mogollon region to the southwest. The total frequency of El Paso pottery is similar at both sites, although slightly higher at LA 11747. Characteristics of pottery from LA 11747 assigned to El Paso Brown and the lack of

El Paso Polychrome indicate that these sherds derived from El Paso Brown vessels. In contrast, characteristics of pottery from LA 3334 assigned to El Paso Brown and the presence of relatively high frequencies of pottery assigned to El Paso Polychrome may indicate that most of these sherds derived from El Paso Polychrome. Thus, while pottery from the southern Jornada region was present throughout the Glencoe phase, earlier it seems to have involved the El Paso Brown vessels and later that of decorated El Paso Polychrome vessels.

Other nonlocal types recovered from LA 3334 may provide further evidence concerning interaction with groups in other regions. Exchange with groups in the Mogollon Highlands and in southwest New Mexico may be reflected by the recovery of 16 Mogollon Brown Ware sherds and 52 Salado Polychrome sherds.

The presence of 52 glaze ware sherds also may reflect exchange with groups along the Rio Grande. The presence of a single Ramos Polychrome sherd reflects exchange with groups in the Casas Grandes region in Mexico. A general lack of interaction with the Casas Grandes region, however, is indicated by both the low frequencies of Casas Grandes Polychrome types and complete lack of Playas Red and Playas Incised.

Functional Trends

Pottery distributions from both sites indicate fairly similar distributions of ceramic wares and forms (Table 62). Plain brown ware dominates both sites, although they are higher at LA 11747. The lower frequency of plain brown wares at LA 3334 is the result of increases in the overall frequency of Corona Corrugated as well as all painted types. The majority of the sherds assigned to plain brown ware types and Corona Corrugated appear to have derived from wide mouth jars, presumably used for cooking or storage. Corona Corrugated tends to be smaller and was better fired than plain brown wares and would have been superior in activities involving the cooking and storage of liquids. The increase in this type may reflect the increased importance of such activities. Sherds assigned to both El Paso Brown and El Paso Polychrome also appear to have derived from similar vessel forms. El Paso Brown jars are particularly large and well-formed vessels that may represent specialized storage forms. Most of the Chupadero Black-on-white from both sites appears to be derived from jars that appear to have relatively thin rim diameters, although a fairly significant frequency of this type also derived from bowls. The widespread exchange and distribution of Chupadero may partially reflect its apparent superiority to brown ware jars in a number of activities related to liquid storage. Chupadero pastes tend to be hard and not porous, particularly when compared to other types commonly occurring in the Jornada Mogollon country. These vessels would have been particularly well suited for activities involving transportation of goods, food serving, and the storage of liquids.

Most of the sherds assigned to the various Three River Red Ware types were derived from deep polished bowls. Most of the Rio Grande glazed sherds identified were probably derived from similar forms.

Thus, different ceramic groups recognized during the present study appear to have served different functions. The wide range of groups ultimately reflects the utilization of this pottery in a wide range of activities.

Table 62. Comparison of Ceramic Ware Distributions by Site

CERAMIC WARE	LA 111747		LA 3334	
	Number	Percent	Number	Percent
Brown Ware	257	85.4	10420	76.8
White Ware	23	7.6	1256	9.3
Red and Polychrome Ware	21	7.0	1889	13.9
Other Ware			3	0.0
TOTAL	301	100.0	13568	100.0

PETROGRAPHIC ANALYSIS OF SELECTED CERAMICS

David V. Hill

Introduction

Eleven surface treated and plain ceramics were submitted for petrographic analysis from the Angus site, a late prehistoric settlement located near Ruidoso, New Mexico. Analysis of the ceramics was oriented towards the identification of locally produced and imported ceramics.

Methodology

The ceramics were analyzed by the author using a Nikon Optiphot-2 petrographic microscope. The sizes of natural inclusions and tempering agents were described in terms of the Wentworth Scale, a standard method for characterizing particle sizes in sedimentology. These sizes were derived from measuring a series of grains using a graduated reticle built in to one of the microscope optics. The percentages of inclusions in untempered ceramics were estimated using comparative charts (Matthew et al. 1991; Terry and Chilingar 1955). Studies have been conducted regarding the reproducibility of determinations using these charts (Mason 1995). Given the limited amount of inclusions that may be present or identifiable in ceramics and the variable size of the sherds in the sample, the comparative method for assessing the amount and size of materials found in ceramics has been found as useful for archaeological ceramic petrography as counting projectile points (Mason 1995).

Analysis was conducted by first examining the ceramic collection and generating a brief description of each of the sherds. A second phase created classification groups based on the similarity of the paste and temper between sherds. This process also allowed for the examination of the variability within each paste grouping. Additional comments about the composition of individual sherds were made at this time.

Description of the Ceramics

Jornada Brown (FS 3012)

The paste of this sherd is a light brown color and contains about 10 percent silt to fine-sized isolated mineral grains and a few rock fragments. Ubiquity decreases with increasing particle size. The largest particles consist primarily of aggregate masses of potassium feldspar. A few of the rock fragments contain, in addition to the feldspar, brown biotite or quartz, indicative of a granite aplite. The potassium feldspar, whether in the rock fragments or present as isolated grains, are slightly altered to sericite and clay minerals. Three subrounded, medium-sized grains of extrusive rock were also present. These three rock fragments consist of highly weathered plagioclase, magnetite, and brown biotite. This rock is classifiable as a trachyte. The magnetite and biotite have weathered, leaving black opaque inclusions and staining the rock fragments a reddish brown color. One rock fragment contains fragments of this highly weathered syenite within a dark grayish aphanitic groundmass. A single grain of chalcedony was also present in the paste.

The silt-sized and very fine-sized isolated mineral grains give this sherd a sandy appearance. Isolated mineral grains include in order of abundance: potassium feldspar, plagioclase, brown biotite, and quartz. The biotite flakes are frequently weathered to hematite and clay minerals resulting in black opaque spots. Due to the small size of the inclusions present and the degree of weathering of the feldspars, it is likely that the ceramic clay contained the minerals observed as natural inclusions rather than having an added temper.

Jornada Brown (FS 3170)

The paste of this sherd is a medium brown color and is slightly birefringent. The paste contains about 15 percent very fine to coarse-sized mineral grains and rock fragments derived from a fine-grained granite. The rock fragments consist of potassium feldspar, occasionally in the form of microcline, plagioclase, and quartz. The potassium feldspar grains within the rock fragments and those that occur as isolated grains display slight alteration to sericite and clay minerals. Four rock fragments display granophyric texture consisting of the intergrowths of quartz and potassium feldspar. Two medium-sized angular fragments of trachyte are also present. Quartz grains within the sherd display undulose extinction. Sparse, fine brown biotite, green hornblende, and black opaque inclusions that likely represent weathered biotite are also present in the ceramic paste.

Corona Corrugated (FS 70148)

The paste of this sherd is a dark brown color. The paste contains about 40 percent very fine to fine mineral grains with a few medium-sized rock fragments. The continuous size distribution of inclusions and the abundance of very fine particles indicate that the mineral grains and rock fragments observed in the sherd were natural constituents of the ceramic paste. The fine-textured rock fragments and isolated mineral grains were derived from a fine-grained granite or aplite. The granite consists of equi-granular subhedral laths of potassium feldspar with plagioclase and occasionally quartz. The feldspars appear fresh with only a few grains displaying slight weathering. A few fragments of brown biotite are also present in the paste along with two fine-sized fragments of caliche.

Corona Corrugated (FS 3092)

The paste of this sherd is a dark brown color. The paste contains about 35 percent silt-sized to fine isolated mineral grains, predominantly potassium feldspar. Less common are grains of plagioclase with only a trace amount of quartz present. The potassium feldspar grains are slightly altered to sericite and clay minerals, usually along their crystallographic axes. One coarse and two very coarse-sized grains of aggregate masses consisting of two to ten potassium feldspar grains were also present.

Broadline Red-on-terracotta (FS 3108)

The paste of this sherd is a dark brown color. The paste contains rock fragments and isolated mineral grains that make up about 30 percent of the paste. The inclusions range in size from silt-sized to medium. The medium-sized inclusions consist of aggregate masses of potassium feldspar. Potassium feldspars make up the majority of the isolated mineral grains followed by plagioclase, brown biotite, and a trace amount of quartz. Two grains of epidote were also observed. One of the rock fragments contains titanite. The potassium feldspars are slightly weathered presenting a clouded appearance. Sericitization has also slightly altered the appearance of most of the potassium feldspars. Like the previous sherds it is likely that this sample did not contain an added temper, but rather sediments derived from a fine-grained granite or aplite.

Three Rivers Red-on-terracotta (FS 8245)

The paste of this sherd ranges in color from reddish brown to light grayish brown. The paste contains about 25 percent silt-sized to fine isolated grains derived from an intrusive igneous source. Sparse isolated grains are also present.The small size of the particles and their continuous size distributions is indicative of the use of a sandy clay for the manufacture of the vessel. The mineral inclusions are predominantly feldspars. The optical characteristics of the feldspar grains are obscured through sericitization and alteration to clay minerals. In the few cases where optical determinations could be made of the feldspars, orthoclase, less commonly plagioclase, and one microcline grain could be identified. Also present in the paste were sparse grains of brown-green hornblende, brown biotite, and black opaque inclusions that most likely represent biotite that has altered to hematite and clay minerals. A single medium-sized rounded grain is a very fine-grained trachyte.

Lincoln Black-on-red (FS 3120)

The paste of this sherd is a medium yellowish brown color. Two types of inclusions are present in the paste, calcium carbonate (caliche) and fragments of intrusive igneous rock and isolated mineral grains derived from the same intrusive igneous source as the rock fragments. The caliche fragments make up about 15 percent of the paste and range in size from silt-sized to medium. A few of the caliche grains contain sparse potassium feldspar and quartz sands. The rock fragments make up an additional 10 percent of the paste and range from silt-sized to medium size with a few coarse rock fragments also present. The rock fragments consist of potassium feldspar, plagioclase, and occasionally quartz. The two largest rock fragments have a seriate texture with fine-grained quartz containing angular potassium feldspar, brown biotite, and magnetite. One rock fragment displays micrographic texture consisting of the intergrowths of quartz and potassium feldspar. The feldspars mostly present a fresh appearance, however a few display slight weathering of the clay minerals and sericite. The presence of the caliche particles and the abundance of mostly mineral grains argues for the use of untempered clay in forming the vessel from which this sherd was derived.

Agua Fria Glaze-on-red (FS 2006)

The paste of this sherd is bright brownish red in color. Two types of inclusions are present in this sherd: crushed potsherds and fragments of biotite schist. The sherd particles make up about 7 percent of the ceramic paste and range in size from fine to medium-sized. Most of the sherd particles have a similar appearance to the paste of the sherd that contains them. A few sherd particles have a dark brown color.

Fragments of biotite gneiss are also present in the sherd which represent natural inclusions within the ceramic clay. A few biotite gneiss grains are also present in some of the sherd temper fragments. The biotite gneiss makes up less than 5 percent of the ceramic body. Some of the biotite grains have altered to hematite and clay minerals.

Chupadero Black-on-white (FS 2105)

The paste of this sherd is a light gray color. Two types of inclusions are present in the paste of this sherd: crushed potsherds and very fine sand grains. The sherd particles make up about 3 percent of the ceramic paste and range in size from fine to medium sized. The sherd particles do not contrast with the paste and are likely to have been produced using the same clay body as in the current specimen.

The sand grains make up about 10 percent of the ceramic paste and are also present in the paste of the particles of the sherd temper. Potassium feldspar appears to be the major constituent of the sands. However, the particle size of the grains is for the most part too small to make accurate optical determinations of the sand mineralogy. Sparse, isolated medium-sized grains of caliche, green biotite, and potassium feldspar make up the rest of the inclusions present in this sherd.

Chupadero Black-on-white (FS 7237)

The paste of this sherd is a very light gray color. The paste contains about 3 percent fine to medium-sized black or reddish brown particles of crushed potsherds. Occasional particles of plagioclase or potassium feldspar are present in the paste of some of the largest sherd fragments. The paste is dominated by silt-sized to fine, with a few medium-sized grains, of an intrusive igneous that constitutes about 10 percent of the ceramic paste. The groundmass of the igneous rock is composed of fine-grained plagioclase laths. Plagioclase is contained porphyritically within a few of the rock fragments. Sparse magnetite and brown biotite are also present in the groundmass of the rock fragments. The magnetite and biotite are usually altered, staining the rock fragment a reddish brown color. Fragments of the groundmass and isolated grains of plagioclase are also present in the paste. The intrusive rock fragments and isolated mineral grains range from fine to medium-sized. Sparse, fine, rounded quartz sand grains are also present in the paste.

El Paso Polychrome (FS 7370)

The paste of this sherd is a light yellowish brown color and is slightly birefringent. The paste contains about 10 percent fine to coarse-sized intrusive igneous rock consisting primarily of plagioclase of andesine or bytownite composition. The larger rock fragments display trachyitic or pilotaxitic textures classifiable as syenite. Intergranular brown biotite is contained within the rock fragments. The biotite is often weathered to clay minerals usually occurring along their crystallographic axes. A few magnetite cubes are present in some of the igneous rock fragments. Based on the difference in the size of the plagioclase laths observed within the rock fragments and occurring as isolated mineral grains, the source rock for the ceramic temper was porphyritic in texture. Sparse, less than 1 percent, rounded fine to coarse-sized fragments of caliche are also present in the paste of this sherd. A single very coarse caliche fragment was also present. The caliche grains are very fine-grained with only one containing a few very fine particles of quartz sand. One rock fragment consisting of five grains of potassium feldspar was also observed in the paste as were a few isolated potassium feldspar grains. Like the plagioclase, the potassium feldspars are also slightly weathered to sericite and clay minerals. A single medium-sized grain of biotite gneiss was also present.

Discussion

Based on the differences in terms of color and amount of inclusions, the two samples of Jornada Brown represent different vessels, but were produced using similar resources. The sediments contained within the sherds were derived from weathered intrusive and extrusive igneous rocks. It is likely that these ceramics were produced outside of the Rio Bonito drainage since the Rio Bonito drains an extensive area of extrusive volcanic rock (Moore et al. 1991). Volcanic rock fragments were observed in the two samples. The two samples also contained fine to medium-grained sediments derived from rock of a highly texturally variable, granitic composition. The presence of extrusive igneous rocks contained within the sediments would have been produced within the drainage divide of the Capitan Pluton (Allen and McLemore 1991). Sediments containing clays with granitic sediments are present in the piedmont surrounding the Capitan Mountains (Sidwell 1946b).

The two sherds of Corona Corrugated were made from clays that contained fine-grained granite or aplite. Differences in the percentage of sediments in the two ceramics are likely to have come from different vessels. The presence of aplite of a similar composition in the two sherds indicates that the sherds were produced from sediments derived from such a material. Like the two Jornada Brown sherds examined, the Corona Corrugated sherds came from a source with similar composition and could also have been produced from a source closer to the Capitan Mountains.

The Broadline Red-on-terracota sherd contains sediments derived from a fine to medium-grained intrusive igneous rock of granitic or aplitic composition. Previous analysis of five Broadline Red-on-terracotta sherds from LA 4921 (Three Rivers site) also observed granitic rocks in the paste (Southward 1979). These granites appear to display greater evidence for metamorphism than observed in the current samples indicating multiple production loci.

The paste of the sherd of Three Rivers Red-on-terracotta contains fine to medium-sized sediments derived from a fine-grained, weathered granitic rock. The Three Rivers Red-on-terracotta sherds from LA 4921, the Three Rivers Red-on-terracotta type site, found a similar equigranular granitic composition. However, the predominant feldspar was perthite. Another Three Rivers Red-on-terracotta sherd was examined from LA 107602, located in the southeastern Sacramento Mountains (Hill 1999b). A sherd of Three Rivers Red-on-terracotta from a disturbed context had an almost identical granitic paste to the current specimen (Hill 1999c). In this sherd, syenite predominated as an inclusion in the paste. Syenite and quartz monzonite were also reported for Three Rivers Red-on-terracotta from the Capitan North Project (Garrett 1991). Considerable variation exists within Three Rivers Red-on-terracotta indicating that this type was produced over a wide area of the Lincoln County porphyry belt (Kelley and Thompson 1964).

The sherd of Lincoln Black-on-red contains a mixture of fragments of either very fine-grained limestone or caliche and also fragments of fine-grained intrusive igneous rock of a granitic composition. The sherd also represents a vessel produced using sediments derived from the Lincoln County porphyry belt. Previous analysis of Lincoln Black-on-red were tempered using quartz monzonite (Garrett 1991).

The sample of Agua Fria Glaze-on-red contained rock fragments derived from a metamorphic rock source within a ceramic body containing crushed sherds. The sherds appear to have the same paste as the surrounding ceramic body. Sherd-tempered Glaze A has been found to be widely distributed in the Albuquerque area (Shepard 1942). No mention is made in Shepard's report of additional inclusions in the paste. High-grade metamorphic rocks are present throughout the Sandia and Manzano mountains (Fitzsimmons 1961).

Both sherds of Chupadero Black-on-white contain crushed potsherds that have the same paste as the body. It is possible that FS 7237 could have been produced within the Lincoln County porphyry belt. In addition to the sherd temper, the paste contains fragments of intrusive igneous rock of syenitic composition similar to rocks in the Capitan Pluton (Allen and McLemore 1991). A sherd of Chupadero Black-on-white from the southeastern edge of the Sacramento Mountains (LA 107600) has a syenitic component to its paste in addition to the distinctive brown-orange sherd temper of the specimen from LA 3334 (Hill 1999c).

The other Chupadero Black-on-white sherd (FS 2105) in addition to the sherd temper, contains fine-sized, highly weathered mineral grains and rock fragments derived from an intrusive rock source. No similar fabrics for Chupadero Black-on-white have yet been reported.

The sherd from an El Paso Polychrome vessel contains abundant fragments of a slightly weathered syenite along with fragments of other textures of plutonic rocks. The paste of this sherd is quite different from the microcline granite and porphyritic granite in a reddish brown birefringent paste that was produced along the eastern flanks of the Franklin Mountains near El Paso, Texas (Hill and Peterson 1999). Apparently this sherd represents a vessel of El Paso Polychrome that was made somewhere within the Lincoln County porphyry belt.

With the possible exception of the sherd of Agua Fria Glaze-on-red and one Chupadero Black-on-white sherd, all of the rest of the ceramics examined from the Angus site could have been produced within the Lincoln County porphyry belt and thus could have been using resources that are located within a few kilometers from LA 3334. Without information regarding the types of inclusions present in clays available with in the vicinity of the site, exactly which ceramics could have been produced there is unknown.

LITHIC ARTIFACT ANALYSIS

James Quaranta and Phil Alldritt

Introduction

A total of 6,658 lithic artifacts, including projectile points and tools, were collected from the Angus excavations. However, because of the redundancy in material type (83.6 percent at LA 3334 is silicified shale) and form, few formal or expedient tools, and limited budget, the lithic assemblage was sampled. Fifty-six percent of the recovered artifacts were analyzed including all formal tools and all material from the small site of LA 111747. All collection bags were first screened for potential tools and then sorted by excavation areas. All floor or utilized surface proveniences were selected for analysis and then remaining fill areas from each excavation unit were randomly sampled.

Methodology

The lithic materials collected from the systematic field excavation of LA 3334 and LA 111747 were analyzed in the OAS laboratory with the aid of binocular microscopes at 10 power magnification. The suite of attributes employed during the analysis was designed to standardize analysis techniques and to increase comparability between assemblages and projects, as well as to address site-specific questions. The variables discriminated by material types, morphological and functional attributes, the types and percentages of cortical cover, and the remaining portions of the artifacts. Metric dimensional data were also compiled for all lithic artifacts. All data was entered into an SPSS Statistical Package on computers and used to formulate tables and develop statistical inferences.

Lithic Debitage Analysis of LA 3334

Geology/Raw Materials

The Angus site is located high up in the valley of the Rio Bonito, which drains the northeastern flanks of the Sierra Blanca Mountains. San Andres limestone forms the uppermost geologic bed over the entire eastern slopes of these mountains. Much of the exposed limestone is weathered and soft (Kelley 1984:2).

Silicious rocks such as quartz, quartzite, and chert may be found as pebbles in Glorieta sandstone, Santa Rosa conglomerate, and the Chinle Formation in the Sierra Blancas. Good quality, nodular silicious materials such as cherts and chalcedonies were, however, probably difficult to locate (Kelley 1984:2). Kelley's review of the geological literature available at the time of her research indicated that no major chert sources had been recognized in the study area. However, from an intensive survey of the Two Rivers Dam and Reservoir Area in nearby Chaves County, Phillips et al. (1981) report extensive quarries of San Andres chert. Vierra and Lancaster (1987) find these quarries to be about 45 km east of the Rio Bonito sites, or 55 km east of the Angus site.

Igneous rocks are most abundant in the higher elevations while rhyolite is common in dikes but is a raw material that is not easily worked (Kelley 1984:2). The Sierra Blanca volcanic complex, divided into four formations (Thompson 1972), consists of Walker andesite breccia, Church Mountain latite, Nogal Peak trachyte, and Godfrey Hills trachyte. Intrusive rocks include Rialto monzonite, Chavex Mountain syenite, Three Rivers syenite, and the Bonito Lake stock of biotite syenite, andesite porphyry, quartz monzonite, and aplite dikes (Griswold 1959).

Shale and siltstone are also most abundant in the higher elevations where older geologic beds are exposed (Kelley 1984:2). Sidwell (1946a) reports extensive alteration of sedimentary rocks up to 9 m thick on either side of dikes in the region. One documented area of altered shale deposits is located in the mixed oak-pine zone of Carrizo Peak. This is on a ridge that trends north-northeast within the Lincoln National Forest at an elevation of approximately 2,134 m (7,000 ft). Three prehistoric quarry sites have been found along this ridge of steeply-bedded, silicified shale deposits. The shale is bedded so that slabs ½ inch to 5 inches thick might be easily broken off (Kelley 1984: 251-252). According to Kelley, this area is the source of the great quantities of black shale found in the Hondo and Ruidoso valleys.

The highest quality lithic material in the region, which evidently outcrops in quantity over a large area, is this silicified shale. Local people familiar with the area have stated that this material is also to be encountered near Nogal Peak and in the vicinity of Ancho, besides Carrizo Peak. Although the silicified shale is only a medium-grade material, it is reported from experimental knapping to obtain and maintain fairly sharp edges reasonably well (Kelley 1979:117). However, it appears that it cannot be modified easily in to small tool forms due to its fracturing properties within bedding planes. Additionally, experimentation resulted in the suggestion that the decided preference for better grade siliceous materials for small tools reflected a degree of cultural preference (Kelley 1979:118).

Flake Material Types

Within the sample of debitage, 2,301 flakes were analyzed (Table 63). The most prominent material types encountered were silicified shale, quartzite, chert, and andesite. These basically correspond to their general availability in the local environment. Only obsidian is from nonlocal sources.

Table 63. Flake Assemblage Composition by Material Type

MATERIAL	NUMBER	PERCENT
Chert	122	5.3
Chalcedony	3	0.1
Obsidian	7	0.3
Igneous	11	0.3
Andesite	78	3.4
Rhyolite	6	0.3
Limestone	9	0.4
Siltstone	19	0.8
Silicified Shale	1923	83.6
Quartzite	123	5.3
TOTAL	2301	100.0

The vast majority of flakes are derived from silicified shale (83.6 percent). This material does not have the consistent conchoidal fracturing properties of a high-quality siliceous material. The main characteristic of this material is that it tends to break along a bedding plane. The impression is that this stone was probably difficult to work (Hard and Nickels 1994:9). The indications from the LA 3334 debitage are that the shale was not greatly reduced on site and that the intended end-products of the shale materials did not transcend expedient flake tools. Only one formal tool, a biface, has been encountered in this material class. No biface thinning flakes of this material type were found.

Cortex Type

The majority of artifacts had nonwaterworn cortex (95.7 percent; Table 64). About one-quarter of the chert and andesite materials, however, had waterworn cortex and were likely obtained from fluvial deposits, possibly from the Rio Bonito, which runs adjacent to the site. Only 1.6 percent of the silicified shale with cortex was tabulated as having waterworn cortex, consistent with the impression that it was generally obtained nearby, possibly in the Carrizo Peak area. Only small amounts of this material were likely obtained from drainages. The silicified shale occurs as stream pebbles in the Macho and Ruidoso-Bonito-Hondo drainages (Kelley 1979:116).

Table 64. Frequencies of Cortex Type for Lithic Material Classes

MATERIAL	WATER-WORN	NON-WATER-WORN	TOTAL
Chert	11	33	44
Igneous	7	4	11
Andesite	14	37	51
Rhyolite	2	3	5
Limestone	2	3	5
Siltstone	2	8	10
Silicified Shale	21	1312	1333
Quartzite	8	97	105
TOTAL	67	1497	1564

Flake cortex data is presented in Table 65. As can be seen in the table, a substantially higher proportion of the chert assemblage is devoid of cortex than that of any of the other material types in the assemblage. This is likely related to the greater use of chert in the reduction continuum than other materials. Conversely, andesite and quartzite were the least reduced materials, likely resulting in larger flakes.

Table 65. Cumulative Percentages of the Flake Assemblages in the Ranked Cortical Classes (by Principal Materials)

PERCENT OF CORTEX	CHERT	ANDESITE	SILICIFIED SHALE	QUARTZITE
0	87.7	64.1	69.8	61.8
10	4.1	.0	7.7	5.7
20	.8	5.1	4.8	3.2
30	0.0	3.9	4.0	5.7
40	.8	.0	2.4	4.1
50	.9	3.8	1.1	.0
60	1.6	1.3	1.8	3.2
70	.0	1.3	1.1	3.3
80	.8	1.3	2.4	4.1
90	0.0	3.8	2.0	1.6
100	3.3	15.4	2.9	7.3
TOTAL FLAKES	122	78	1923	123

Flake Portions

An examination of flake portion percentages for each of the main material classes (Table 66) shows that the silicified shale, andesite, and quartzite have fairly equal proportions of whole flakes, nearly half of their respective assemblages. The chert has a noticeably lower proportion of whole flakes, about a third of the assemblage. Sullivan and Rozen (1985) state that debitage assemblages resulting from an emphasis on core reduction generally tend to be dominated by complete flakes and debris. Therefore, the data may imply that only chert deviates from the primary-stage reduction emphasis on site. The fact that 84.6 percent of projectile points found at LA 3334 are made of chert may substantiate this hypothesis. Overall, however, the lithic assemblage presents little clear evidence of late-stage reduction. On site, it appears to be rare, especially in regards to the lower quality, nonchert materials.

Table 66. Flake Portion Data by Percent of for Principal Material Types, LA 3334

MATERIAL	WHOLE	PROXIMAL	MEDIAL	DISTAL	LATERAL	TOTAL
Chert	31.1	39.3	14.8	13.9	0.8	100.0
Andesite	48.7	19.2	12.8	14.1	5.1	100.0
Silicified shale	45.8	28.0	11.5	13.7	1.0	100.0
Quartzite	45.5	36.6	7.3	9.8	0.8	100.0

Flake Length

Table 67 displays the percentages in each length class for the whole flakes of the principal materials. As can be seen, a much greater proportion of the chert flake assemblage lies in the lesser length rankings. Notably, 39.5 percent of the whole chert flake assemblage is less than 1.5 cm in length as compared to 15.8 percent for andesite, 20.5 percent for silicified shale, and 8.9 percent for quartzite. Flake length data provide a further indication that the chert was more exhaustively, though not more intensively, used than other materials on the site. Casual observation and controlled experiments have indicated that waste flakes systematically decrease in size from initial to final stages of manufacture (Newcomer 1971). The relatively larger proportion of small chert flakes from the site may thus indicate that this material was used during a later stage in the reduction continuum compared to the other materials.

Table 67. Cumulative Percentages of Whole Flakes in Length Classes

LENGTH CLASS	CHERT	ANDESITE	SILICIFIED SHALE	QUARTZITE
<=1 cm	7.9	5.3	3.4	0.0
<=1.5 cm	31.6	10.5	17.1	8.9
<=2 cm	28.9	13.1	23.2	19.7
<=2.5 cm	13.2	15.8	18.5	26.8
< 3 cm	10.5	10.6	14.3	10.7
< 3.5 cm	5.3	15.8	9.3	10.7
< 4 cm	0.0	10.5	5.8	12.5
< 4.5 cm	2.6	5.2	3.6	3.6
< 5 cm		2.7	2.0	5.3
< 5.5 cm		0.0	1.3	0.0
< 6 cm		2.6	.8	0.0
< 6.5 cm		2.6	.5	0.0
< 7 cm		0.0	0.0	0.0
< 7.5 cm		0.0	0.0	1.8
< 8 cm		5.3	.1	
< 8.5 cm			.1	
TOTAL FLAKES	38	38	881	56

Platform Types

Of all the principal material classes, more than half of the platform-bearing flakes have single-facet platforms (Table 68). Also of note is that only in the chert material is there a fairly high proportion of multifaceted platform flakes, more than double the percentages of the other material classes. The chert platform flakes exhibit an almost inverse relationship to the other material classes with regard to cortical platforms.

The chert, although only comprising 5.6 percent of the flake assemblage, appears to have been the most exhaustively worked material on the site, as can be attested by its relatively greater proportion of multifaceted platforms and its relatively lower proportion of cortical platforms. The cortex and angular debris data appear to corroborate this inference. The low percentage of whole chert flakes also hints at this conclusion.

Table 68. Platform Type Percentages for All Platform Remnant-Bearing Flakes in the Principal Material Classes, LA 3334

MATERIAL	CORTICAL	SINGLE-FACET	MULTI-FACET
Chert	23.1	53.8	23.1
Andesite	34.8	63.0	2.2
Silicified shale	40.4	48.6	10.8
Quartzite	37.1	52.6	10.3

Angular Debris

The ratio of angular debris to flakes across all material types is 0.54:1. This ratio is quite high and is similar to the ratio obtained from replicative knapping experiments during primary core reduction. In the knapping experiments, 48 percent of the debitage from reducing a core was classed as shatter, whereas only 22 percent of the debitage from reducing a blank was shatter (Pokotylo 1978).

As could be expected, the highest quality lithic material, the obsidian, has the lowest ratio of angular debris to flakes (Table 69), although only eight obsidian artifacts were obtained from the sample. Nonetheless, the low angular debris to flake ratio and the fact that so few artifacts of this material were found, all lacking cortex, appear to indicate that this material was brought to the site in a much reduced state.

The next highest quality material, chert, has the next to lowest ratio of angular debris to flakes. This is the second most prominent material type on the site and the ratio may indicate that this material was reduced throughout a greater range of the reduction continuum than most other materials, most notably the silicified shale. (It could be reasoned that the higher quality siliceous materials have better knapping properties. Table 69 presents the frequencies of angular debris and core flakes, as well as the ratios between these artifact classes by material type.

Table 69. Angular Debris and Core Flake Frequencies and Ratios

MATERIAL	ANGULAR DEBRIS	CORE FLAKES	RATIO
Chert	42	122	0.34:1
Obsidian	1	7	0.14:1
Igneous	6	11	0.55:1
Andesite	30	78	0.38:1
Rhyolite	5	6	0.83:1
Limestone	5	9	0.56:1
Siltstone	7	19	0.37:1
Silicified Shale	1060	1923	0.55:1
Quartzite	85	123	0.69:1

Formal Tools

Formal tools show purposeful flaking to produce a specific shape or edge for use. Flaking patterns are either unifacial or bifacial. Artifacts are classed as either early, middle, or late-stage tools based on the extent of flaking and edge condition. Early-stage tools have an irregular outline with variable and widely spaced flake scars. Generally, these scars do not extend completely across the surface of the artifact. Middle-stage tools have a semi-regular outline and semi-regularly spaced scars that sometimes extend completely across the surface of the artifact. Late-stage tools have a regular outline and closely, regularly spaced scars that usually extend completely across the surface of the artifact. Excepting the projectile points, only four formal tools were obtained from the lithic assemblage (Table 70).

Table 70. Formal Tools from LA 3334

AREA	FLAKE PORTION	MATERIAL	MORPHOLOGY	DIMENSION (mm)
8000	Distal	Chert	Early-stage biface	8 by 12 by 4
3000	Whole	Chert	Middle-stage biface	24 by 8 by 3
3000	Proximal	Chert	Early-stage biface	15 by 11 by 3
5000	Whole	Silicified shale	Undifferentiated biface	48 by 13 by 4

Informal Tools

Informal tools are pieces of debitage used without purposeful modification. Conservative standards have been applied when defining edge damage as evidence of use. Only when scar patterns are consistent along an edge and the edge margin is quite regular were artifacts classed as informal tools.

Thirteen informal tools were encountered in the debitage sample. These were all core flakes. Eleven of these were derived from silicified shale. Seven were whole flakes, two were distal, one a proximal, and one a lateral flake. The two remaining pieces of utilized debris were a medial fragment of a chert flake and the distal portion of an obsidian flake. Table 71 presents mean measurements for these flakes.

The mean values are slightly greater when only the silicified shale is considered. The mean length, width, and thickness values are then: 26.18, 25.73, and 8.3 mm, respectively.

Table 71. Mean Measurements for Informal Tools, LA 3334

MEASUREMENTS (mm)	MINIMUM	MAXIMUM	MEAN	STD. DEV.
Length	7	67	23.77	15.11
Width	10	5.5	24.15	13.15
Thickness	2	14	7.46	3.93

Hammerstones

Eight hammerstones were analyzed from the lithic assemblage (Table 72). Two of these were chert, two others were of an undifferentiated igneous material, two were andesite, and two were silicified shale. Most of these (n = 6) had over 70 percent cortical cover. The silicified shale hammerstones and one of the undifferentiated igneous hammerstones were exceptions, all with only 30 percent cortex. All were derived from river cobbles.

Table 72. Hammerstone Metric Data, LA 3334

MATERIAL	LENGTH (mm)	WIDTH (mm)	THICKNESS (mm)
Chert	87	64	52
Chert	82	80	54
Andesite	108	94	80
Andesite	95	73	51
Igneous	95	78	62
Igneous	71	57	48
Silicified shale	92	82	65
Silicified shale	61	44	43

Cores

At the Angus site, 46 cores were recovered, making up 1.2 percent of the total lithic assemblage. Core materials are varied and range from the commonly available black silicified shale (86.9 percent of the cores) to two each of chert, andesite, and siltstone. Analysis shows that most (63.0 percent) are multidirectional in their flaking (Table 73).

Table 73. Core Morphology for the Angus Site

CORE TYPE	NUMBER	PERCENT
Unidirectional	10	21.7
Bidirectional	5	10.9
Multidirectional	29	63.0
Undifferentiated	2	4.4
TOTAL	46	100.0

Generally, the black silicified shale was being worn down (through flaking) into very small nodules with a good deal of shattering occurring in the process due to the inferior quality of the material. The shale could not have been very durable and that may explain the great amount of shale debitage. At the nearby Crockett Canyon site, 140 cores were recovered suggesting much more reduction activity was taking place there. Material choice was, however, the same as for the Angus site with black silicified shale (identified as dull chert at Crockett Canyon) at 81.5 percent. The only other material at this site was metamorphic rock. Only two chert cores were found at Angus and these were greatly reduced. The lack of chert cores at Crockett Canyon and their almost lack at Angus might suggest that the high percentage of chert projectile points from the two sites were not manufactured there, but elsewhere.

Conclusions

It appears from the sampled lithic assemblage that LA 3334 employed large quantities of silicified shale. This is a medium-grade material but it is the best quality material that outcrops in quantity in the nearby Carrizo Mountains. The San Andres chert that Phillips et al. (1981) report should be about 55 km from the site. The fact that chert materials only comprised a very small percentage of the sampled population may be indicative of increased sedentism of the site inhabitants or a lack of trading contacts for whatever reason. It appears that the silicified shale was ubiquitous at sites in the region from this time period. The prominence of this local material type in area assemblages may also be indicative of the increased sedentism of the inhabitants. Kelley (1984) felt this material was likely traded throughout the region. If this is the case, it represents a tight network of interaction, as higher quality siliceous materials are to be found at only slightly greater distance. Evidently, most site tasks could be achieved with this lower grade material. Only in formal tools is there a preference for the better grade of siliceous materials.

Data regarding flake portion, angular debris, and platform types appear to indicate that late-stage reduction was very rare on the site for all material types. Chert, however, appears to have been more exhaustively worked than the other materials. This is evident through the angular debris to flake ratios and the greater percentages of whole chert flakes in the smaller-sized categories. The greater proportion of these flakes bearing little or no cortex, as well as the lower percentage of cortical platforms encountered on flakes of this material also contribute to this notion. Nonetheless, late-stage bifacial reduction appears to have been very rare on this site.

Expedient flake tools likely served most site needs. Many of these may have gone unnoticed in the analyses, as coarse-grained materials do not readily exhibit wear damage and the criteria for determining this utilization is, of necessity, quite rigorous. Expedient flake tools, then, could be underrepresented in the analyses.

Formal tools in the assemblage were very rare. Except for the projectile points, only four bifaces were obtained. The dearth of formal tools may be corroborative of the assumption that expedient flake tools served most needs. The preponderance oflocal, medium-grade lithic material obtained from this site, which is ubiquitous on sites in this region and time period, and the nonexhaustive nature of the lithic manufacturing process employed, appear to indicate a high degree of sedentism within a tight network of communities in the region.

Lithic Debitage Analysis of LA 111747

Although in close proximity to the Angus site, LA 111747 exhibits some interesting deviations from the patterns in the lithic sample from that later site, as well as some similarities. A total of 192 artifacts were recovered and analyzed from this small site.

Material Type

Of the 192 artifacts recovered from LA 111747, the two most prominent material types are silicified shale and chert (Table 74). These materials are locally available. Silicified shale is not the most workable material, being subject to planing and fracturing. Its majority use has resulted in the production of much debris and in difficulty in defining wear patterns. The minor amount of obsidian on the site (1.6 percent) is not local and may have been obtained through trade. No tools were found of this material.

Table 74. Material Type Frequency

MATERIAL	NUMBER	PERCENT
Chert	78	40.6
Obsidian	3	1.6
Rhyolite	1	.5
Limestone	5	2.6
Silicified Shale	103	53.6
TOTAL	192	100.0

Cortex Type

The vast majority of artifact material had nonwaterworn cortex (97.5 percent). However, 38.5 percent of artifacts contained no cortex, suggesting reduction on site as evidenced by the large amount of lithic debris present. Table 75 presents the data regarding cortex type for allrecovered materials. The assemblage appears comparable to that of LA 3334 within the parameters of the sampling design.

Table 75. Cortex Type Data from LA 111747

MATERIAL	WATERWORN	NON-WATERWORN	TOTAL NUMBER
Chert	2	40	42
Rhyolite	0	1	1
Limestone	0	2	2
Silicified Shale	1	71	72
Quartzite	0	1	1
TOTAL	3	115	118

Note: for all sampled artifacts from LA 11174 that bear cortex.

Table 76 gives cortex percentages for the site. The material with the least or no amount of cortex present is chert, suggesting that it was the material most preferred to fashion workable tools or flakes. However, it is not the most prevalent material on the site. Over 84 percent of the chert had less than 20 percent cortex while only 60 percent of the silicified shale had small amounts of cortex. Likewise, only 4.3 percent of the chert contained 70 or more percent of cortex, while silicified shale flakes had 25.0percent. The common availability of silicified shale seems to be the cause for this disparity.

Table 76. Cumulative Percentages of the Flake Assemblages in the Ranked Cortical Classes by Principal Material Type

CORTEX PERCENTAGE	CHERT	SILICIFIED SHALE
0	65.2	52.1
10	13.1	8.3
20	6.5	0.0
30	2.2	4.2
40	2.1	2.1
50	0.0	2.1
60	4.4	2.0
70	2.2	4.2
80	0.0	2.1
90	2.1	6.2
100	2.2	16.7
TOTAL FLAKES	46	48

Flake Portions

Of 98 flakes obtained from the excavation, 48 are silicified shale, 46 are chert, two are obsidian, and one each isrhyolite and limestone. The flake portions of the two predominant material types are presented in Table 77. The great majority of these flakes are either whole or proximal. The preponderance of these flake types is seen to have a positive correlation with primary core reduction (Sullivan and Rozen 1985).

Table 77. Flake Portion Percentage Data for Principal Material Types

MATERIAL	WHOLE	PROXIMAL	MEDIAL	DISTAL	LATERAL	TOTAL
Chert	43.5	54.3	0.0	2.2	0.0	100.0
Silicified shale	20.8	7.0	2.1	2.1	0.0	100.0

Flake Length

The mean length of whole flakes from LA 111747 is comparable to that from LA 3334 and to other nearby sites in the region (Table 78). The mean flake length data for the other sites were obtained from the tabulated results given in Farwell et al. (1992).

For Table 78, all whole flakes of all material classes were considered in order to have data comparable with these nearby sites. Because all material types had been lumped in these sites, the proportions of different materials in the various assemblages may be contributing to the differences in the means to some degree. When comparing just the chert from LA 11747 to that from LA 3334, the proportion of chert in the assemblage is roughly seven times greater than at LA 3334 and would account for recorded differences. In actuality, mean chert flake length at LA 111747 is 20.6 mm, while at LA 3334 it is 17.1 mm. Silicified shale is 20.5 mm long at LA 111747 and 22.5 mm long at LA 3334.

Table 78. Whole Flake Lengths of Selected Regional Sites

SITE	MEAN LENGTH (cm)
3334	2.47
111747	2.22
16297	2.73
16298	2.32
16300	2.73
18436	2.64
702	2.76
2315 S	2.83
2315 N	2.69

Platform Types

Ninety-two platform-bearing flakes from LA 111747 were recovered (45 of silicified shale, 44 of chert, and 1 each of obsidian, rhyolite, and limestone). For the principal material classes of chert and silicified shale, approximately half of the platform-bearing flakes have cortical platforms (Table 79). These percentages are not in agreement with the data from LA 3334, where single-facet platforms were most prominent. The prominence of cortical platforms may reflect that this site is in closer proximity to these lithic raw materials than is LA 3334. It may also reflect on the functional differences between these sites. No unequivocal features were discerned on this site, only a very localized lens of ashy soil.

Table 79. Platform Type Percentages for All Platform Remnant-Bearing Flakes in the Principal Material Classes

MATERIAL	CORTICAL	SINGLE-FACET	MULTI-FACET
Chert	47.4	31.8	20.5
Silicified Shale	60.0	28.9	11.1

Angular Debris

The ratio of angular debris to flakes in the principal material types of silicified shale and chert are quite high from this site (Table 80). The proportions of angular debris in these material classes are about double of that encountered in the sampled assemblage of LA 3334. This high proportion of shatter from LA 111747 may indicate that an earlier reduction stage is represented here than at LA 3334.

Table 80. Angular Debris and Core Flake Frequencies and Ratios

MATERIAL	ANGULAR DEBRIS	CORE FLAKES	RATIO
Chert	30	46	0.65:1

Obsidian	1	2	0.50:1
Rhyolite	0	1	0:1
Limestone	4	1	4:1
Silicified shale	54	48	1.13:1
TOTAL	91	98	0.93:1

Length of Angular Debris

As in the analysis of mean flake length, all material types have been combined in the analysis of angular debris mean length in order to provide comparability with other sites. Again, within the parameters of the data, the angular debris assemblages appear quite similar throughout the region. Table 81 presents the mean length values for angular debris within the region.

Table 81. Angular Debris Mean Length Data of Selected Sites

SITE	MEAN LENGTH (cm)
3334	2.43
111747	2.38
16297	2.36
16298	2.50
16300	2.65
18436	2.88
702	3.00
2315 S	2.92
2315 N	2.69

Cores

Three cores comprise 1.5 percent of the lithic assemblage from LA 111747. Two are of chert and one is black silicified shale. All were multidirectionally flaked. No tools formed from these cores were found.

Conclusions

The lithic assemblage from LA 111747, as stated in the introduction, bears similarities and differences with LA 3334. Both sites apparently used quarried lithic materials to a great degree, as opposed to river cobbles, even though both are situated adjacent to streams. The lack of waterworn cortex in the assemblages may reflect upon the poor quality of most stream cobbles in the region. Currently, few siliceous materials are present in the streams and when found are diminutive in size. Flake portion, flake platform, and angular debris data all imply that an early stage of reduction is most highly represented in the LA 111747 assemblage. Cortical platforms are most prominent in this assemblage, whereas single-facet platforms are more common from the LA 3334 assemblage.

Whole and proximal flakes are the most common flake portions encountered from both site assemblages and have been seen to be indicative of an early stage of lithic reduction. Regarding the percentages of these flake portions, a proportionately greater amount are found in the LA 111747 assemblage than in the LA 3334 group. Over 97 percent of the chert flakes from LA 111747 are either whole or proximal, as opposed to 70.4 percent of the chert flakes from LA 3334. In the shale material, 95.8 percent of the flakes from LA 111747 are of these types as opposed to 67.9 percent from LA 3334. These data may indicate a greater emphasis on early-stage reduction at LA 111747 than at LA 3334.

A further indication of a greater emphasis on early-stage lithic reduction at LA 111747 is represented by the angular debris data. Within the principal material types of chert and silicified shale, the ratio of angular debris to flakes encountered at LA 111747 is almost double that of the ratio from LA 3334. LA 111747 lacked evidence of extended occupational duration whereas ample evidence of this existed at LA 3334. With an extended occupational duration one would expect a more rounded activity regimen and this may be why LA 3334 appears to show less emphasis on primary reduction. The aspects of the lithic assemblage from LA 111747 appear to indicate an almost complete emphasis on early-stage reduction.

One of the main differences between the two lithic assemblages is in the proportions of the material types present. Chert was more than seven times more common proportionally in the LA 111747 assemblage. This may reflect this site's closer relationship to a chert quarry. It could also be indicative of a greater degree of mobility engaged in by the site inhabitants of LA 111747. This inferred mobility could indicate that a more horticultural adaptation rather than an agricultural one is represented. LA 111747 appears to be temporally earlier than LA 3334 and may represent an earlier stage in the continuum towards sedentism. A greater degree of mobility would favor the acquisition of better quality materials.

LA 111747 and LA 3334 both exhibit little evidence of late-stage lithic reduction. It appears that the assemblage from LA 111747 lies at an earlier stage along the reduction continuum than does that from LA 3334. Similar material types are present in the assemblages although not in similar proportions. The greater proportion of higher grade siliceous materials encountered at LA 111747 as compared to LA 3334 may have temporal implications.

As far as can be discerned from the published information on nearby areal sites, it appears that the lithic debris patterning of LA 111747 and LA 3334 conforms to the general trends encountered within the region. No significant deviations could be noted in the length data of flakes or angular debris from the sites, nor in the material types represented. It could be surmised that the two sites were tied into regional interaction networks of their times, which facilitated the acquisition of medium-grade siliceous materials that outcropped in a few localities within the region.

PROJECTILE POINT ANALYSIS

Phil Alldritt and Yvonne Oakes

No projectile points were recovered at LA 111747. At the Angus site (LA 3334), however, 39 points were found. All were analyzed using the *Standardized Lithic Artifact Analysis: Attributes and Variable Code List* (OAS Staff 1994). Analytical variables included dimensional data, portion remaining, material type, shape, style, notching placement, and breakage pattern. Points were sorted by type and also by excavation unit in order to define any spatial or typological patterning that might be present.

Projectile Point Distributions

Projectile points were recovered from all excavation areas on the site with the exception of Areas 2000 and 4000, which also had no cultural features. The majority of projectile points were recovered from overlapping Areas 3000 and 5000 at 59.1 percent (Table 82). One deeply buried pit structure was found in this location and dates earlier than the remainder of the site, at ca. A.D. 1015. Other early features may have been present under the current NM 37 road alignment and could account for a higher number of points in this area. In general, areas to the north and northwest of the kiva contain 69.3 percent of all points (Fig. 66). At least 13 different types of projectile points were found on the site, ranging from probably Late Archaic through the A.D. 1300s in date. It is interesting that only two of the three well-defined rooms in Area 7000 yielded projectile points (in low numbers) with Room 1 having two, Room 2 having two of the four points, and Room 3 having one.

Table 82. Projectile Point Locations

AREAS	200	300	1000	3000	5000	7000	8000	TOTAL
NUMBER	2	2	5	18	5	5	2	39

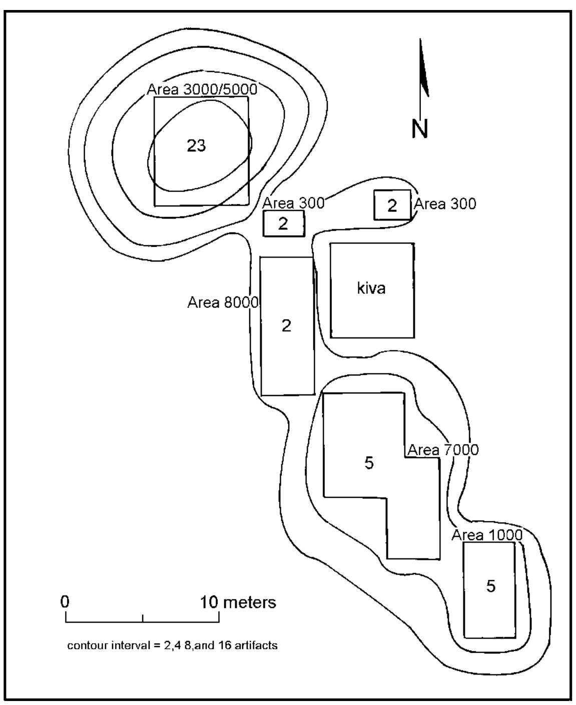


Figure 66. Projectile point concentrations at LA 3334.

Projectile Point Material Types

Of the 39 projectile points, 33 of them (84.6 percent) were produced from chert ic materials of various colors. Only six were formed in chalcedony. Material analysis for the remainder of the lithic assemblage indicates that chert and chalcedony account for only 5.4 percent of all material types present at LA 3334. These two types were clearly being selected for projectile point production. While obsidian is present in very minor amounts on the site (.3 percent), no points were made from this material.

The six chalcedony points are from Areas 200, 300, 3000, and 7000 with most (n = 3) from the fill of Area 3000. All are small, late prehistoric points including Desert Side-Notched, Fresno, and Harrell styles.

Projectile Point Breakage Patterns

Broken, discarded projectile points can often give some indication of site activities. Projectile points with breaks such as impact fractures, for example, were most likely returned to the site in meat packages. Bases of points with haft snap fractures were likely removed from the shaft for retooling of the haft after use (Keeley 1982).

Projectile point breakage patterns for the Angus site consist of manufacturing mistakes, use fractures, or other breakage. Manufacturing breaks are usually reduction errors and mostly include lateral snaps, reverse fractures, perverse fractures, outrépasses, and edge bites. Use breaks result from striking intended targets or other objects. These may include impact fractures and haft snaps. Other breakage patterns, such as snap fractures, could result from either activity or from post-depositional processes.

Sixteen (41.0 percent) of the projectile points from LA 3334 were recovered in whole condition. Most broken points had use breaks (Table 83) suggesting return of the points to the site in meat packages. Interestingly, no projectile point bases were recovered that could be indicative of proficiency in point manufacture or disposal of bases left in hafts after breakage due to use.

Table 83. Breakage Patterns of Projectile Points

BREAKAGE	NUMBER	PERCENT
Whole	16	41.0
Manufacture	7	17.9
Use	11	28.3
Other	5	12.8
TOTAL	39	100.0

Projectile Point Types

Projectile point typologies in New Mexico suffer from a lack of solid chronological placement, lack of stylistic consistency as seen in frequently overlapping styles (but with different names) with other areas in the state or on the Plains, and little research to relate point styles with cultural affiliation or to explain changing technologies. Broad distinctions are generally made between large, sometimes notched or earred, dart points and smaller, thinner, notched arrow points. Thus, we get an immediate separation into earlier Archaic and later Ceramic period points with the change occurring as prehistoric peoples switch to the use of the bow and arrow rather than the atlatl. But as this assemblage reveals, differences are often subtle and carry-overs into the Ceramic period (particularly noted for San Pedro points in west-central New Mexico) are not uncommon. Also, diminution of a point size but not style is not really understood currently in terms of cultural dynamics. And, curation of Archaic points by later people is also common and can be a cause for chronological or cultural misplacement of sites.

However, projectile point typologies can be useful, if for no other reason than to provide a basis for comparison with other sites. This section first divides points into Archaic and Ceramic period types, as best as possible, and then discusses each type. (Widths of points are used in some cases to assist in separating Archaic from Ceramic period points; however, when plotted on a graph, there is considerable overlap at 13-14 mm between the two.) Names assigned are the traditionally accepted nomenclatures; however, often these imply temporal or geographic designations that may not actually hold for the Sierra Blanca region. Ideally, however, as Moore (1999) suggests, points commonly found in New Mexico but with names from other areas need to be assigned *new* names to avoid connotations of cultural or temporal connection with points from these areas. For LA 3334, 13 basic styles

Table 84. Designated Projectile Point Styles

STYLE	NUMBER	PERCENT
Williams	2	5.1
Cienega	4	10.3
Late Archaic	3	7.7
Cliffton	1	2.6
Desert Side-Notched	5	12.8
Fresno	3	7.7
Harrell	3	7.7
Scallorn	5	12.8
Livermore	3	7.7
Padre (1A)	1	2.6
Late Prehistoric	3	7.7
Leslie 10A	1	2.6
Unknown	5	12.8
TOTAL	39	100.0

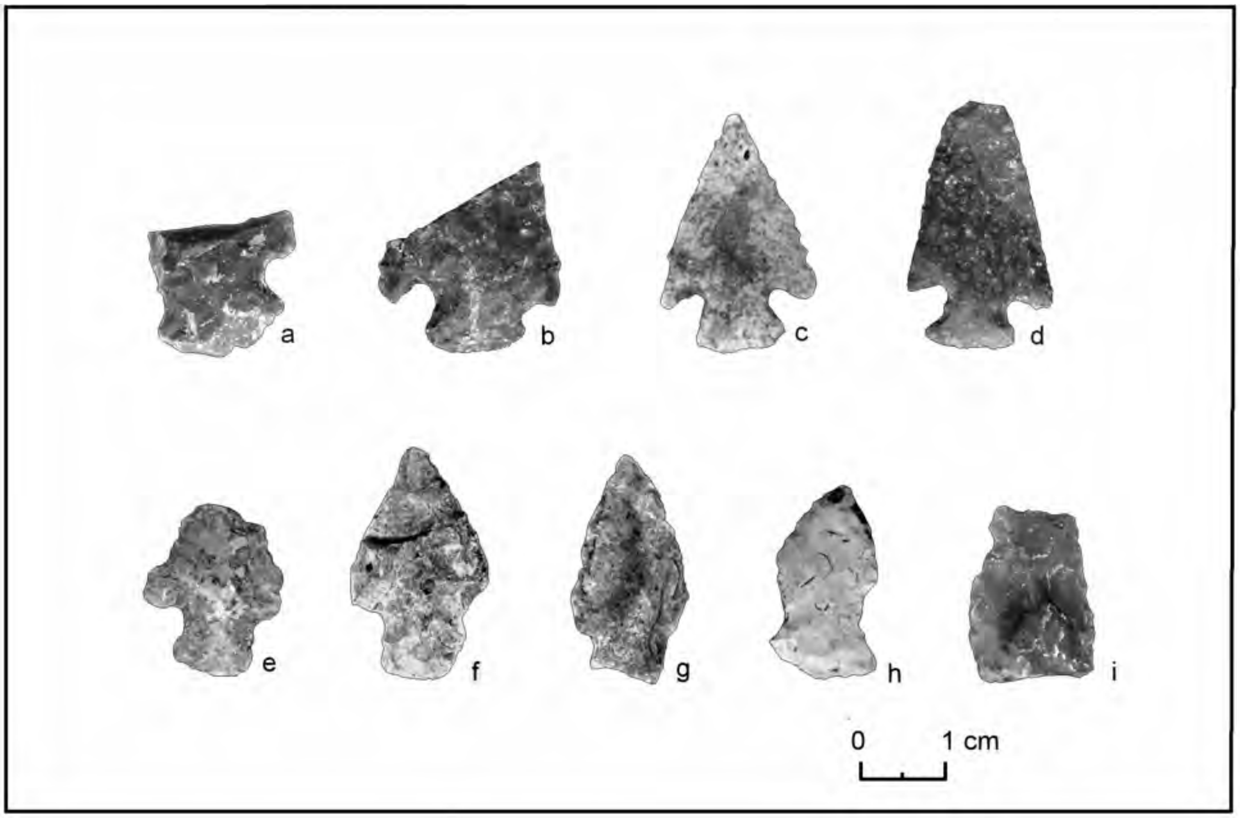


Figure 67. Probable Archaic dart points; (a) Williams-like, Area 7000, (b) Williams-like, Area 1000, (c) Cienega, Area 8000, (d) Cienega, Area 3000, (e) Cienega, Area 5000, (f) Cienega, Area 1000, (g) possible Late Archaic, Area 3000, (h) possible Late Archaic, Area 3000, (i) possible Late Archaic, Area 200.

found on the site are described below and listed in Table 84. These categories are not necessarily indicative of cultural or temporal affiliations, only stylistic consistency.

Possible Archaic Points

Williams-like (Fig. 67a-b). Two chert projectile points fit Turner and Hester's (1985) description of Williams points found predominantly in Texas and Oklahoma. Both were recovered from fill contexts in Areas 1000 and Room1 in Area 7000. They are both broad, barbed points with expanding stems and convex bases. Both exhibit corner-notching. However, they are smaller than Williams points, which range from 53 to 85 mm in width; these are 22 and 26 mm wide. The dates for Williams points supposedly extend from the Middle to Late Archaic (Turner and Hester 1985: 158); however, Bell (1960:96) suggests they last until approximately A.D. 1000. Given the smaller size of the Angus points and location in the Sierra Blanca region, they may not be Williams points nor date as early as suggested. The width of the points does infer a possible Archaic time frame and, if so, may indicate curated items.

Cienega (Fig. 67c-f). Four points are characteristic of Cienega points found in Arizona and western New Mexico (Geib and Huckell 1994). All are of chert and range in width from 20-22 mm. They are corner-notched with narrow, expanding stems, distinct barbs, and straight or slightly convex bases. Dates are thought to range from ca. 400 B.C. to A.D. 300. The Angus points were found in the fill of Areas 1000, 3000, 5000, and 8000. No points were recovered from the structures on the site. Their presence on the site may indicate curation of these points but also could suggest that Archaic peoples were once present in the site area.

Archaic-like (Fig. 67g-i). Three points may be Archaic but cannot be classified to type. The first is chert and is somewhat similar to a Cienega point but it is not large with a width of only 14 mm. The notches are shallow and could be considered to fall between side and corner-notching. One side is complete and the other unfinished suggesting the point may be an incomplete specimen. It was found in the fill of Area 3000.

Another possible Late Archaic point of chert is crudely flaked and uneven in shape. It has long, shallow side-notching and a convex base. Width of the point is 14 mm. Its placement into an Archaic-like category is subjective but the point is most similar in style to the chert point described immediately above. It was recovered from the surface of the site near the storage pit in Area 300.

The third possible Archaic point is of chert and exhibits a snap fracture across the mid-section. The point is well-flaked with a very slight concavity to the base. One side is straight-edged while the other displays a slight side-notching. Its size and lack of prominent notching suggests an Archaic point; however, this is conjecture. The artifact came from the fill of a shallow pit structure in Area 200.

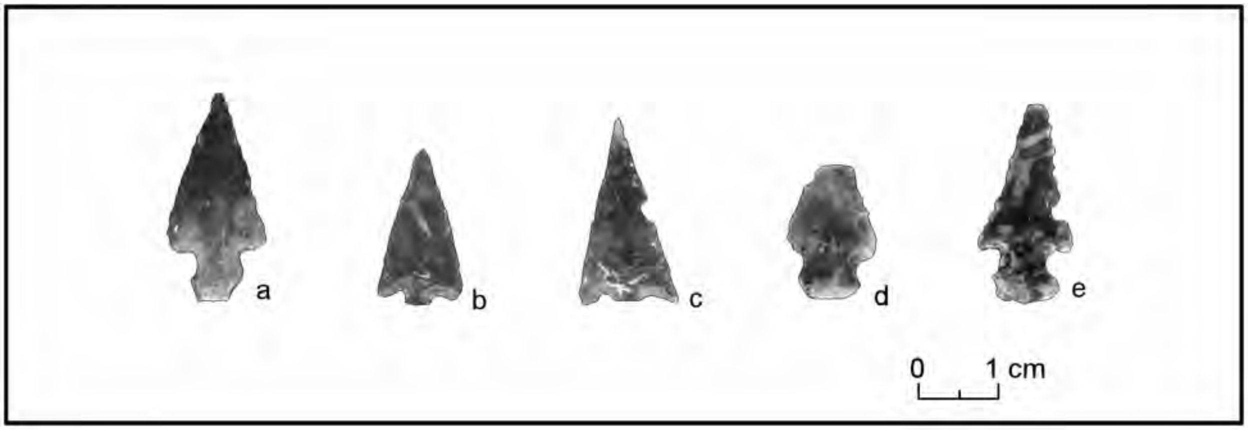


Figure 68. Scallorn points; (a) Area 3000, (b) Area 1000, (c) Area 7000, (d) Area 3000, (e) surface.

Ceramic Period

Scallorn (Fig. 68). Five small chert points are typical Scallorn types commonly found in eastern New Mexico and the Plains of Texas and Oklahoma. The temporal range is ca. A.D. 700 to the 1200s (Turner and Hester 1985: 189). The points are triangular with sharp barbs. The stems are expanding with varying base forms. One from the Angus collection has a slightly convex base; the others are broken with one seemingly unfinished (Fig. 68d). All seem to have been corner-notched except for one (Fig. 68e), which has deep side cuts. This point is also the only one that is serrated and that has an additional side notch along the blade. The points were recovered from the fill of Areas 1000, 3000, on a surface outside of the rooms in Area 7000, on the surface in the exterior work area of Area 8000, and on a use-surface in Area 3000.

Fresno (Fig. 69a-c). These small, stemless, unnotched points are frequently thought to represent unfinished Harrell or other small, triangular points (Turner and Hester 1985:174). Two of the three are chalcedony and one is chert. Two have straight bases while one is slightly concave. They are common on the Great Plains and in eastern New Mexico. A late prehistoric date of ca. A.D. 850 to 1600 (Bell 1960:44) is assigned to these points, which fits well with the site date. They were recovered from the fill of a shallow pit structure in Area 200, within a storage pit in Area 300, and in the fill of nearby Area 3000.

Harrell (Fig. 69d-f). Harrell points are also small and triangular in shape but, unlike Fresno points, they exhibit stylistic shaping in the form of notching in the concavity of their bases and small, side notches above the mid-section along the blade. They are widely distributed throughout eastern New Mexico, Texas, and Oklahoma and date to the Late Prehistoric period. One of the three Angus points is chalcedony (Fig. 69e), the others are of chert. They were all found in Area 3000, two in the fill and one on a utilized surface.

Desert Side-Notched Variant (Fig. 70). This type of point is mostly associated with the high deserts and mountains of the western United States, particularly the Great Basin (Holmer 1986: 107). Although there is quite a bit of variation in the points, most date between A.D. 1200 and 1700. Their occurrence in New Mexico is also thought to

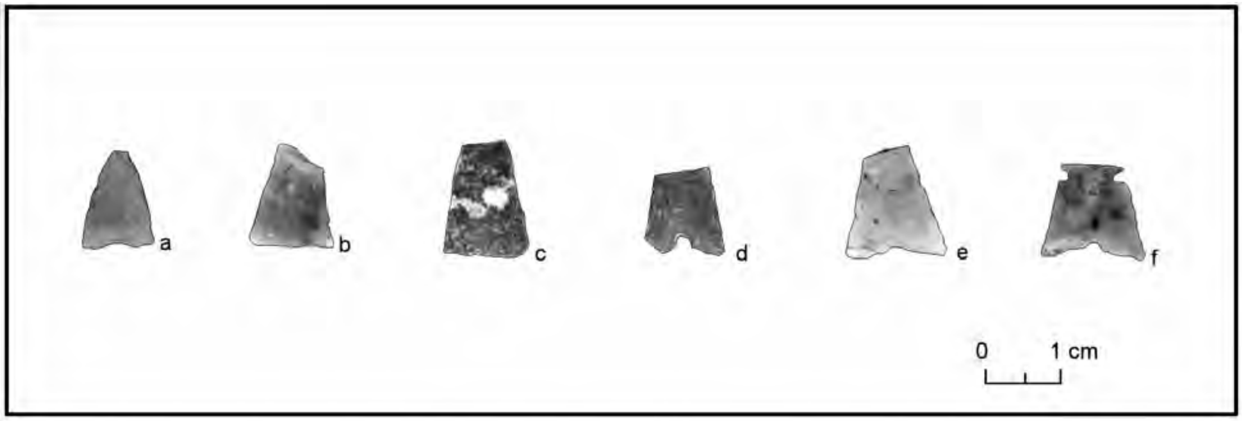


Figure 69. Fresno and Harrell points; Fresno, (a) Area 200, (b) Area 300, (c) Area 3000; Harrell, (d) Area 3000, (e) Area 3000, (f) Area 3000.

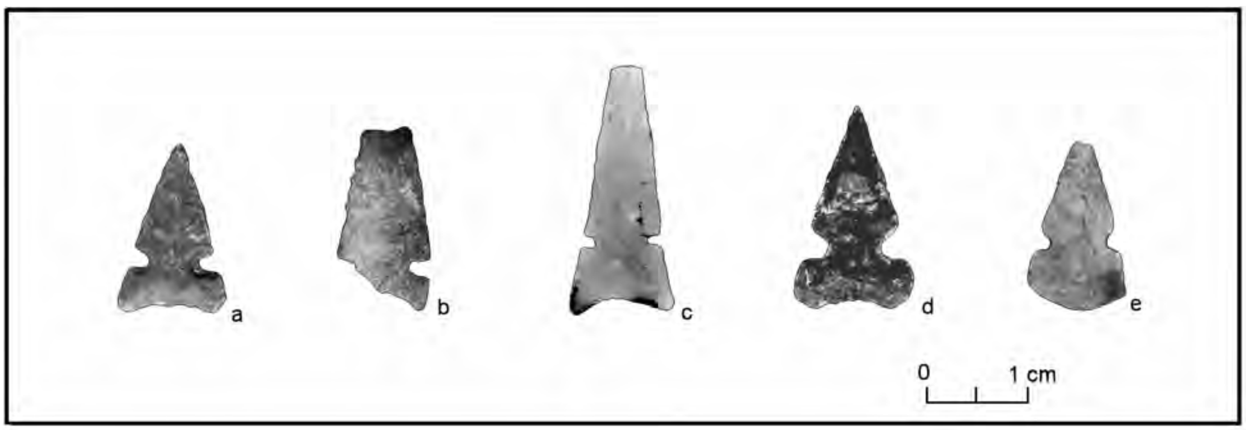


Figure 70. Desert Side-Notched points, (a) Area 3000, (b) Area 3000, (c) Area 3000, (d) Area 3000, side-notched-like, (e) Area 3000, side-notched related?

extend to this same time frame, although cultural affinity with Great Basin points has not been demonstrated (Moore 1999). The five points found on the Angus site also exhibit obvious variation in form. All are typically side-notched with concave or straight bases (although one has a convex base; Fig. 70e). Stems on Angus points have shoulders slightly wider than the blades,not a true characteristic of this type and probably indicate a subtype. Only the first two specimens in Figure 70 are considered most likely to represent true Desert Side-Notched types; the others seem to be related in style. All but one are chert; a single example (Fig. 70c) is chalcedony. They were recovered from Area 3000 in general fill.

Late Prehistoric (Fig. 71). Three points are suggestive of Late Prehistoric points as defined by Leslie (1978). He dates them to post-1400 in southeastern New Mexico; however, they may extend back to at least A.D. 1300 due to being found in various locales on the Angus site. All three are chert and are characterized by side-notching, basal concavities, and slight earring of the tangs. They were found in the fill of Areas 1000 and 3000 and also in Room 3 of the roomblock.

Livermore-like (Fig. 72a-c). These are medium-sized chert points reminiscent of Livermore points known in the Trans-Pecos area of Texas (Turner and Hester 1985: 181) dating to A.D. 900-1400. The points are also similar to Leslie's (1978) Type 3-E and have long blades with convex sides and long, flaring barbs. The stems are small and one is convex. The other has unusual stem notching. All are slightly

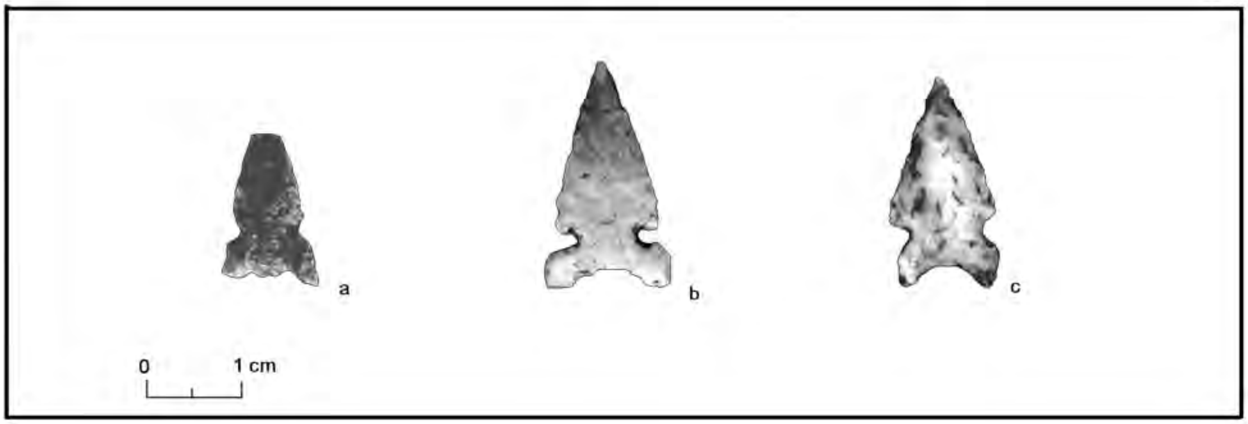


Figure 71. Post-1400s points, Leslie Type 2-F; (a) Area 7000, (b) Area 3000, (c) Area 1000.

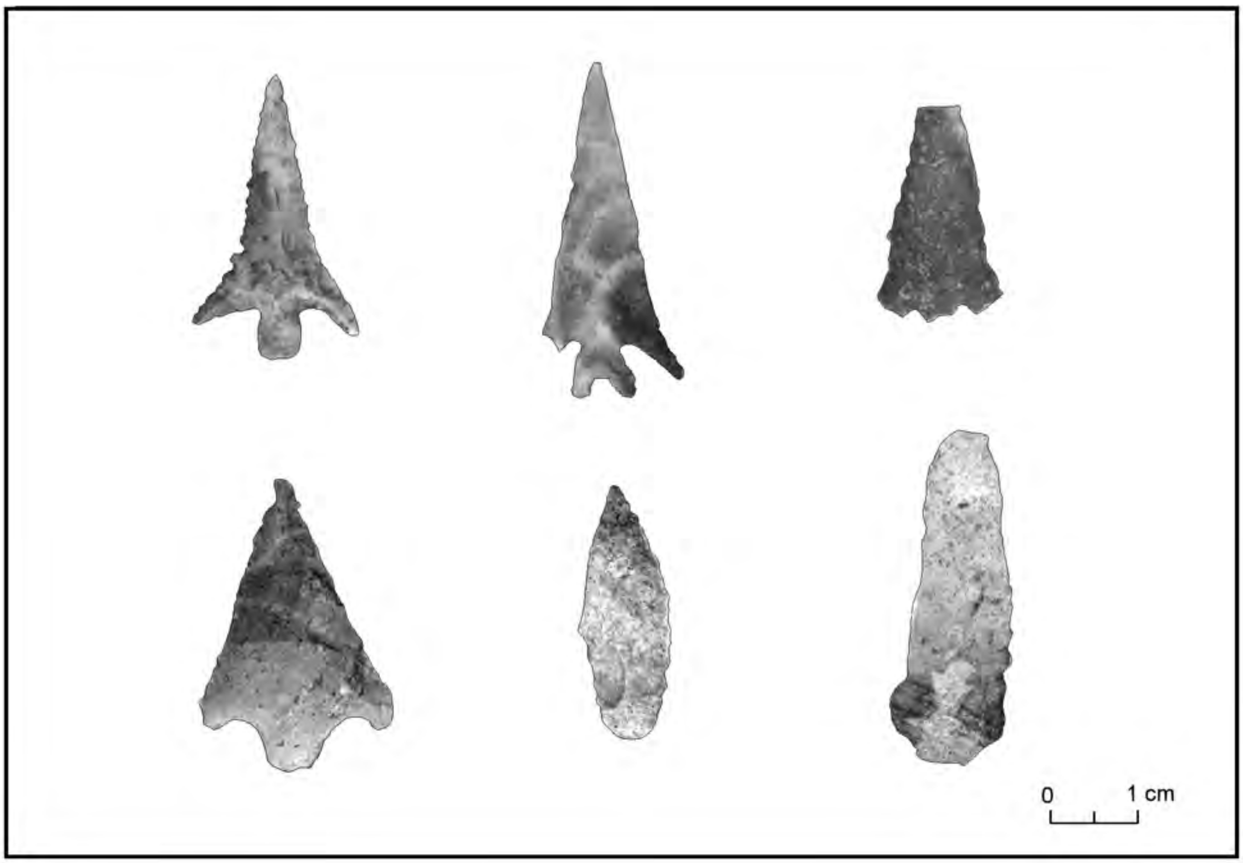


Figure 72. Unusual points; (a) Livermore-like, Area 3000, (b) Livermore-related? Area 3000, (c) Livermore-related? Area 5000, (d) Cliffton-like, Area 3000, (e) Padre-like, Leslie Type 1-A, Area 5000, (f) possible knife, Leslie Type 10-A, Area 5000.

serrated. The points were recovered from the the fill of Area 3000 and the underlying Area 5000.

Cliffton-like (Fig. 72d). This is a medium-sized chert point that resembles points from central Texas dating to the Late Prehistoric period (Turner and Hester 1985:169). It also is somewhat like Augustin points found in west-central New Mexico that date to the Late Archaic. It is not, therefore, possible to assign a valid date to this point recovered in the fill of Area 3000.

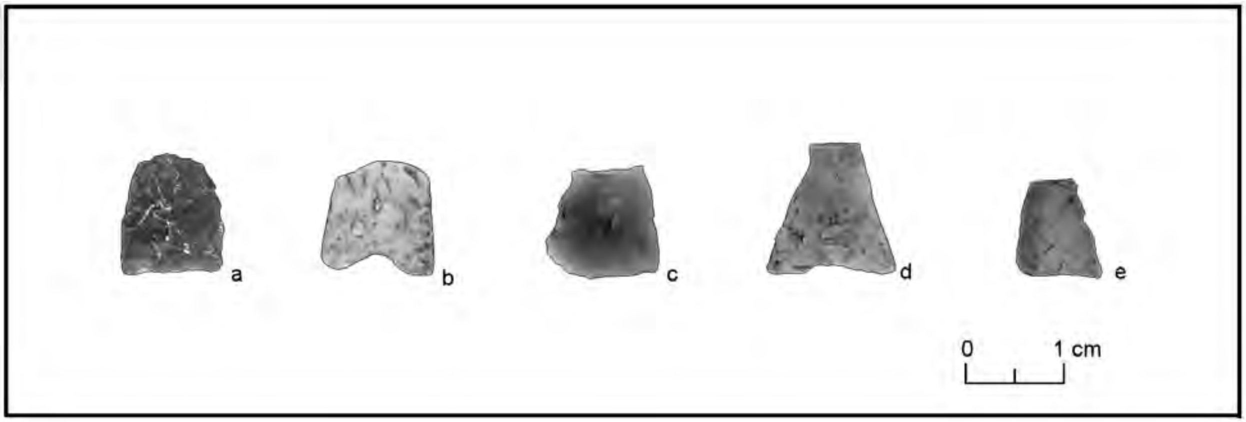


Figure 73. Unidentifiable points, (a) slight ears, Area 7000, (b) indented base, Area 5000, (c) convex base, Area 7000, (d) indented base, probably unfinished, Area 3000, (d) mid-section, Late Prehistoric, Area 1000.

Leslie Type 1-A (Fig. 72e). This is a leaf-shaped point that Leslie (1978) considers a preform for later types found in southeastern New Mexico. It is also like Padre points of coastal Texas (Turner and Hester 1985). Edges of this chert point are serrated. It was found in the fill of Area 5000.

Leslie Type 10-A (Fig. 72f). The point is long and slender but not truly straight and might actually have been used as a knife. It has no notching and a slightly bulbar base that is convex. Leslie (1978) dates this general style from Late Archaic to early Ceramic periods. The point was recovered from the fill of the pit structure in Area 5000.

Unidentifiable Points (Figure 73)

Five projectile points were not categorized to type. Four are chert and one is chalcedony. All may be considered small. One (Fig.73a) from Room 2 has a very slightly earred base not unlike some Late Archaic points. Two points in Figure 73 (b and d) have indented bases but no other distinguishing characteristics. One is from the fill of Area 3000 and one (Fig. 73b) is from the underlying pit structure fill in Area 5000. Likewise, the chalcedony point in Figure 73c from the floor in Room 2 has a convex base but with most of the point missing. Only the mid-section remains of the point in Figure 73e from the fill of Area 1000, but its size and thinness suggest a Late Prehistoric style.

Conclusions

The Angus projectile point assemblage seems to indicate a fair degree of hunting activity and game processing by site inhabitants. The large variety of points cover a potentially long temporal span. Of the 39 points, 28.2 percent are possible Archaic styles. These Archaic-like points may be curated items or they may indicate the earlier presence of Archaic peoples in the Sierra Blanca region. No area of the Angus site dates to the Archaic period. Other points have close stylistic affiliations with areas to the east in Texas and Oklahoma and also with western New Mexico and eastern Arizona. Several types are commonly found on southeastern New Mexico sites. In-depth research is needed to define accurate loci of the various projectile point styles. While trade networks most likely extended to both the east and west, it is not at all certain that the points on the Angus site occurred there through trade. Some point styles may have been much more regional in manufacture and distribution than assumed by researchers.

On the nearby Crockett Canyon site, which dates to ca. A.D. 1100, similar variability in point styles has been noted (Oakes 1992). While the Crockett Canyon site was occupied approximately 100 years earlier than the Angus site, most of the same point types were found, including small triangular eastern New Mexico types and larger, possibly Archaic forms. A Great Plains influence is noted in the small triangular points and trade or social contact (through hunting or scouting parties) is a possible reason for the similarities (Oakes 1992:206).

Almost every feature on the Angus site contains a mix of Late Prehistoric and Archaic-like points. However, the storage pit in Area 300 has only Late Prehistoric points. The ratios are almost even throughout the site except for Areas 3000 and 5000. Here, late points outnumber Archaic ones by 17 to 5. In terms of specific types of points being found in particular areas of the site, only a few types are found in association. Harrell and Desert Side-Notched projectiles were only recovered from the fill of Area 3000. The unusual Livermore-like points were also clustered in Area 3000 and the underlying Area 5000. Fresno points were found on this north half of the site only, while the two Williams-like projectile points were from the south half. These spatial divisions have no apparent significance except that perhaps certain people on the site produced or obtained only specific types of points. It is possible that projectile point variation may be more a matter of personal selection rather than a functional or cultural signature.

Projectile point raw material selection heavily favors chert material, both at the Angus site (84.6 percent) and at nearby Crockett Canyon (93.9 percent). All materials used are locally available. The six chalcedony point are all late prehistoric styles but do not cluster spatially.

In conclusion, Great Plains influence, if not actually trade, is evident in the numerous small triangular points of the Late Prehistoric period. Styles are varied but do not necessarily imply cultural diversity. Evidence for the same craftsperson producing different styles of points is strong at the nearby Crockett Canyon site (Oakes 1992). While 39 points were recovered from the Angus site, this is not a large amount. Hunting was certainly carried out, and it appears with some proficiency, due to observed breakage patterns. However, the concomitant lack of large game in the faunal assemblage suggests only a moderate to low reliance on hunting.

THE GROUND STONE FROM THE ANGUS SITE

Dorothy A. Zamora

Introduction

The ground stone assemblage from the Angus site was analyzed using the standardized ground stone manual produced by the Office of Archaeological Studies staff (1994). After each piece was recorded, the data was then entered into the computer and manipulated in SPSS to produce tables.

The data recovery plan for the ground stone focused on determining site function and degree of dependency on agriculture. In order to reach a conclusion regarding the focus of the research, the artifacts were examined for function, shape, material selection, manufacturing techniques, and specific processing activities. Pollen, pollen washes, and flotation samples from the ground stone provided information on the variety of taxa exploited, their seasonality, and dominance of either agricultural or wild foods.

Method

Several variables were monitored in the ground stone analysis. These are included in the list below (Table 85), which gives variable codes used in recording the artifacts.

Table 85. Variables for Recording Ground Stone

VARIABLE VA	RIABLE
Field Specimen Number	Metate Depth
Material Type	Plan View Outline Form
Material Texture	Flaked Surface or Margin Present
Preform Morphology	Heat
Production Input	Use Number
Shaping	Portion
Length	Function
Complete?	Ground Surface Cross section
Width	Ground Surface Sharpening
Complete?	Ground Surface Texture
Thickness	Primary Wear
Complete?	Secondary Wear
Weight	Alterations
Complete	Adhesions
Ground Surface Measurements	Striations
Mano Cross Section	

Each artifact was measured and weighed in centimeters and kilograms and was coded to its completeness. This was done to monitor the grinding surfaces of the whole metates and manos and apply the data to Hard's (1994, Hard et al. 1996) agricultural dependency models. The ground surface was taken by using a template of squares in 1-cm increments, which was placed over the ground stone artifact and squares counted.

Artifact Descriptions

The ground stone assemblage consists of a number of different items. There are 98 artifacts within the assemblage (Table 86). The materials selected for the artifacts vary widely.

Manos

There are 23 pieces of ground stone that were identified as manos. These were further grouped into one-hand and two-hand types. The one-hand manos are defined as handstones that fit comfortably in one hand. Because there were no whole one-hand manos found on the site, size criteria was not applied.

The two-hand manos are handstones used by placing two hands side-by-side. They were further categorized by type of base stone or metate they were used on (Table 87). These manos also range in size and weight with several that are very large and very heavy.

The first category "two-hand mano" in Table 87 is a generalized variable into which all unknown two-hand mano fragments were placed. Trough refers to those used on a trough metate, slab on a slab metate, and loaf-type, which are used on either a slab or a trough metate. The trough manos exhibited wear from the sides of the trough of the metate, giving the mano a convex look on its ends. The slab manos are flat on one surface and are usually triangular in profile. The loaf-shaped manos can be convex on one surface with edge wear or can be flat on one or two ground surfaces, but do not have the wear along the edges. These types of manos can range from small to very large (Table 88) and are fully shaped by pecking and grinding (Fig. 74).

Table 86. Ground Stone by Material Type

CELLS: Count Row Percent Column Percent	Igneous	Nonvesicular Basalt	Vesicular Basalt	Granite	Syenite	Rhyolite	Andesite	Limestone	Sandstone	Quartzite	Quartzitic Sandstone	Serpentine	Metamorphic Schistose	ROW TOTAL
Indeterminate		2 14.3% 33.3%		1 7.1% 4.8%	5 35.7% 19.5%	2 14.3% 50.0%	1 7.1% 50.0%	1 7.1% 25.0%	2 14.3% 10.0%					14 100.0% 14.3%
Polishing Stone			1 7.7% 50.0%	2 15.4% 9.5%	2 15.4% 7.7%		1 7.1% 50.0%		2 15.4% 10.0%	5 38.5% 83.3%				13 100.0% 13.3%
Abrading Stone			1 12.5% 50.0%	1 12.5% 4.8%	1 12.5% 3.8%	1 12.5% 25.0%		2 25.0% 50.0%	1 12.5% 5.0%		1 12.5% 50.0%			8 100.0% 8.2%
Shaft Straighteners	1 25.0% 100.0%	1 25.0% 16.7%			1 20.0% 3.8%				2 40.0% 10.0%					5 100.0% 5.1%
Anvil		1 100.0% 16.7%												1 100.0% 1.0%
Lapidary Stone										1 100.0% 16.7%				1 100.0% 1.0%
Mortar									1 100.0% 5.0%					1 100.0% 1.0%
Lapstone				2 100.0% 9.5%										2 100.0% 2.0%
Hammerstone				1 100.0% 4.8%										1 100.0% 1.0%
Portable Sipapu												1 100.0% 33.3%		1 100.0% 1.0%
Indeterminate Mano				3 30.0% 14.3%	4 40.0% 15.4%	1 10.0% 25.0%			2 20.0% 10.0%					10 100.0% 10.2%
One-hand Mano				2 50.0% 9.5%	1 25.0% 3.8%			1 25.0%. 25.0%						4 100.0% 4.1%
Two-hand Mano		1 20.0% 16.7%		1 20.0% 4.8%	1 20.0% 4.0%				2 40.0% 10.0%					5 100.0% 5.2%
Trough Two-hand Mano		1 20.0% 16.7%		3 60.0% 14.3%	1 20.0% 3.8%							1 20.0% 33.3%		5 100.0% 5.1%
Slab Two-hand Mano				2 40.0% 9.5%	1 20.0% 3.8%				2 40.0% 10.0%					5 100.0% 5.1%
Loaf-shaped Two-hand Mano		1 25.0% 16.7%		1 25.0% 4.8%	2 50.0% 7.7%									4 100.0% 4.1%
Metate				1 16.7% 4.8%	2 33.3% 7.7%				1 16.7% 5.0%		1 16.7% 50.0%		1 16.7% 100.0%	6 100.0% 6.1%
Trough Metate				1 25.0% 4.8%					3 75.0% 15.0%					4 10.0% 4.1%
Trough Metate Ends Open					2 100.0% 7.7%									2 100.0% 2.0%
Trough Metate One End Open					1 100.0% 3.8%									1 100.0% 1.0%
Slab Metate									1 100.0% 5.0%					1 100.0% 1.0%

CELLS: Count Row Percent Column Percent	Igneous	Nonvesicular Basalt	Vesicular Basalt	Granite	Syenite	Rhyolite	Andesite	Limestone	Sandstone	Quartzite	Quartzitic Sandstone	Serpentine	Metamorphic Schistose	ROW TOTAL
¾ Grooved Axe												1 100.0% 33.3%		1 100.0% 1.0%
Pestle					1 100.0% 3.8%									1 100.0% 1.0%
Paint Grinder									1 100.0% 5.0%					1 100.0% 1.0%
Shaped Stone					1 100.0% 3.8%									1 100.0% 1.0%
COLUMN TOTAL	1 1.0% 100.0%	6 6.1% 100.0%	2 2.0% 100.0%	21 21.4% 100.0%	26 26.5% 100.0%	4 4.1% 100.0%	2 2.0% 100.0%	4 4.1% 100.0%	20 20.4% 100.0%	6 6.1% 100.0%	2 2.0% 100.0%	3 3.1% 100.0%	1 1.0% 100.0%	98 100.0% 100.0%

Table 87. Two-Hand Manos from the Angus Site

TYPE	COUNT	PERCENT
Two-hand mano	4	21.0
Trough-type	5	26.4
Slab-type	6	31.6
Loaf-type	4	21.0
TOTAL	19	100.0

Table 88. Two-Hand Mano Means and Weight Ranges

FUNCTION	LENGTH (cm)	WIDTH (cm)	THICKNESS (cm)	WEIGHT (kg)
Loaf Mano	27.3	12.1	10.9	2.70 to 9.20
Trough Mano	29.3	9.9	6.3	2.25 to 4.00
Slab Mano	24.8	11.0	7.4	.95 to 4.40

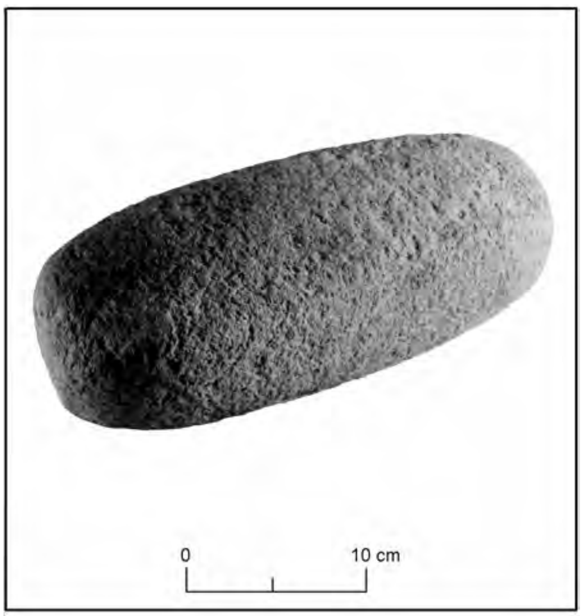


Figure 74. Large loaf mano from Area 7000.

Grinding and pecking shapes most of the manos, both one- hand and two-hand. Several were not shaped and were used in natural form (Fig. 75) with the grinding surface flat or slightly convex with the opposing side having a high ridge used for holding the stone comfortably. One mano of this type was used on a trough metate, making the ends slope upward giving the surface a slight convex look. The most common material types for the handstones are syenite and granite, which are present throughout the immediate area. However, most of the whole manos are made from granite.

Metates

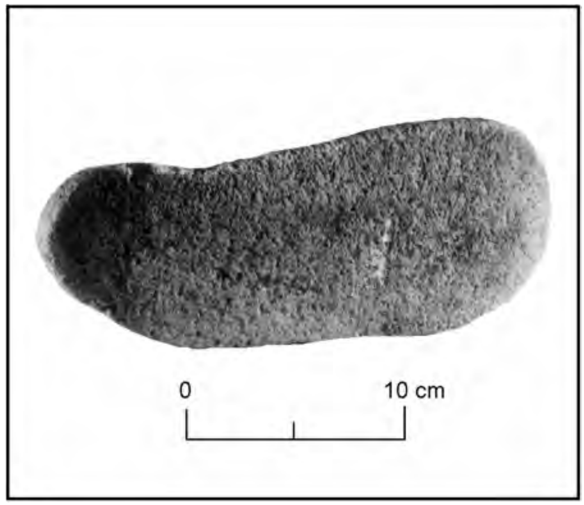


Figure 75. Unmodified two-hand mano used on trough metate.

Figure 76. Slab metate.

There were 14 metates recovered from the Angus site (Table 89); four are whole troughs and one is a whole slab (Table 90). The fragments recovered were mostly mid-section pieces that were not identifiable. No basin types were recovered. There was a wide range of material types used for the metates; however, syenite and granite were the most common. Of the five whole metates, three were syenite (Figs. 76 and 77). The other two are granite and sandstone. The sandstone slab metate was the only base stone of this material recovered from our excavations.

Table 89. Metates from the Angus Site

FUNCTION	LENGTH (cm)		WIDTH (cm)		THICKNESS (cm)		WEIGHT (kg)		NUMBER
	Mean	SD*	Mean	SD	Mean	SD	Mean	SD	
Metate	13.9	6.7	11.2	5.3	5.7	2.6	1.76	2.12	5
Trough Metate	25.3	16.3	18.3	13.0	5.2	3.7	7.98	12.8	4
Tough Metate Ends Open	43.0	7.0	30.0	11.3	11.5	4.9	23.6	15.20	2
Trough Metate One End Open	52.0	0.0	48.0	0.0	14.0	0.0	26.2	0.00	1
Slab Metate	13.9	8.0	12.5	9.2	3.8	1.1	1.35	1.27	2

*Standard Deviation

Table 90. Mean Measurements for Whole Metates

FUNCTION	LENGTH (CM)		WIDTH (CM)		THICKNESS (CM)		WEIGHT (KG)		NUMBER
	Mean	SD*	Mean	SD	Mean	SD	Mean	SD	
Trough Metate	47.0	.0.	37.2	0.0	10.0	0.0	27.00	0.00	1
Trough Metate Ends Open	43.0	7.0	30.0	11.3	11.5	4.9	23.65	15.20	2
Trough Metate One End Open	52.0	0.0	48.0	0.0	14.0	0.0	26.60	0.00	1
Slab Metate	19.6	0.0	19.1	0.0	3.0	0.0	2.25	0.00	1

*Standard Deviation

Figure 77. Trough metate from the Angus site.

Polishing Stones

Thirteen polishing stones were found (Fig.78). These were usually river cobbles; however, a few were natural surface cobbles that were highly polished. The river cobbles consisted mostly of quartzite. Some were granite or syenite cobbles and were larger in size. One item was made of vesicular basalt that had been shaped into an almost egg-like oval, with striations visible along the sheen portions. Two small sandstone concretions also exhibited polish

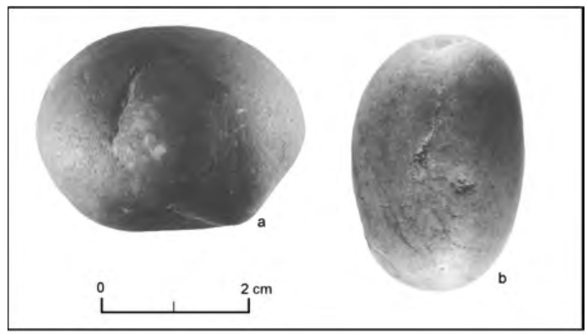


Figure 78. Polishing stones, (a) Area 5000, (b) Area 3000.

over their entire surface. The presence of this many polishing stones on the site would suggest that pottery manufacturing was taking place.

Shaft Straighteners

These are also referred to as grooved abraders. These types of artifacts have U-shaped grooves that are for shaping cylindrical objects such as wooden or reed arrow shafts, wooden spindle whorls, drills, prayer sticks, stone awls, and stone beads (Jernigan 1978). Abraders with a V-shaped groove are for shaping and sharpening awls or needles and possibly to dull edges of lithic tools (Adams 1996). DiPeso et al. (1974) found that grooved abraders were used to straighten and smooth yarn and to remove rough spines off of beargrass and other basket-weaving material.

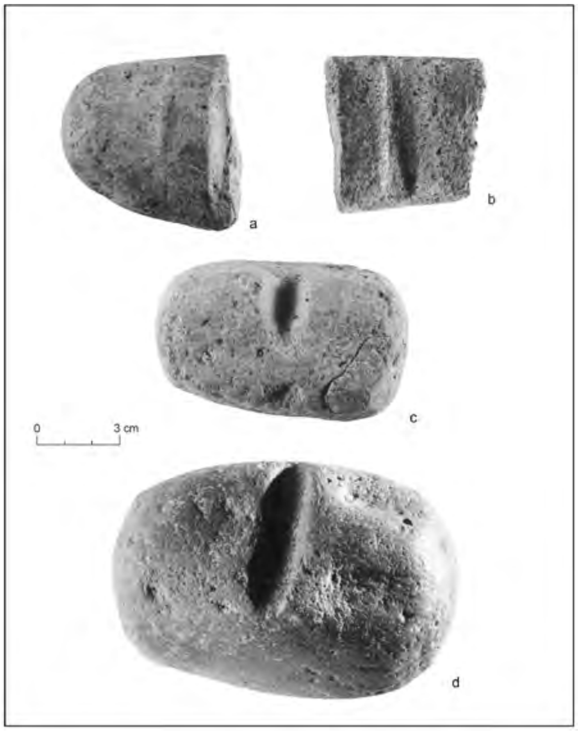


Figure 79. Shaft straighteners; (a) Area 7000, (b) Area 8000, (c) Area 7000, (d) Area 300, large storage pit.

The shaft straighteners from the Angus site all have U-shaped grooves. They all have opposing flat surfaces, and have been fully shaped. Two are complete and two are broken. One of the artifacts was broken along the edge of the groove, and another had a slight groove just beginning (Fig. 79a). Both of the broken artifacts were made from cobbles that were flattened during shaping. The whole shaft straighteners are thicker and are shaped into small rectangular blocks. The grooved areas are convex with the sides and bottoms flat. The groove on one is wider than the other (Fig. 79b). The larger artifact is a classic shaft straightener with a groove in the middle running widthwise and two indentations with a ridge in the middle going lengthwise above the groove (Figs. 79c-d). At the bottom are two pecked indentations that were possibly used as finger grips.

Abrading Stones

There are eight abrading stones present on the site. Most are coarse-grained except for one that is a fine-grained sandstone that exhibits polishing on both surfaces and along one edge (Fig. 80). With the sheen and high polish it is possible that this artifact was used for hide processing. Adams (1988:313) distinguishes hide-processing tools as having adhesive wear processing on the surface. This means that the grains of a hide-working tool are not as angular as they used to be, they are smoother as are the topographic lows and interstices between the grains. “Each grain is smoothed, accentuated, and left in high relief” (Adams 1988:313). In comparison with the ground stone implements used to grind food, such as manos, the grains lose their distinctiveness in the flat shiny areas where each grain is frosted in appearance because of scratches and cracks created by fatigue and abrasive wear. She further states that where grains are worn level and the interstices obliterated, a sheen is present.

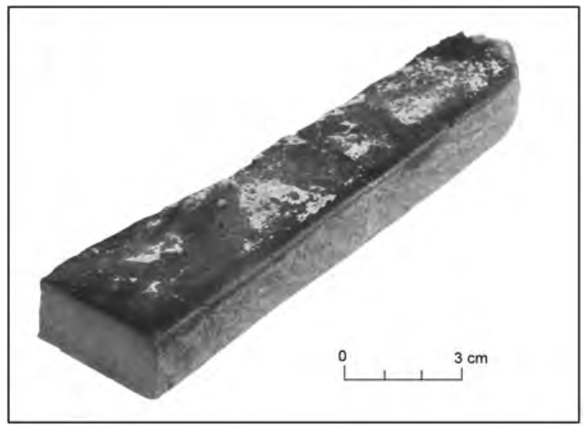


Figure 80. Abrading stone, probably used for hide-working.

Lapidary/Lapstone

These are stones that are naturally flat and exhibit minimal refinement effort and were possibly used in hide work. The two recovered lapidary/lapstones are small base stones that exhibit a sheen on the worked surface. The ones recovered from the Angus site were made of granite and quartzite.

Anvil

One small anvil was recovered from the site. Haury (1976:278) defines an anvil as a stone on which other items were placed and then shaped in a manner that left impact fractures and abrasive scratches on the surface. They are either strategically or expediently designed depending on the effort expended on shaping the stone (Adams 1996). Adams (1996) also states that clay anvils are hand-held tools that are used to shape clay into pots. The basalt anvil recovered from the Angus site had one surface that had minimal damage. The striations on the surface were more like scratches rather than deep uniform striations as found in food processing implements. It is possible that it was used in jewelry or tool manufacturing.

Hammerstones

One granite hammerstone was recovered from general fill on the site. It is a small, shaped cobble that was reused as a hammerstone. The artifact exhibited battering along the edges, with one edge having extreme crushing damage with step fractures present.

Grooved Axe

One small three-quarter grooved serpentine axe was recovered from Area 300 on a utilized surface next to several ground stone artifacts (Fig. 81). The axe, triangular in shape, is highly polished along the bit that measures 6.6 cm in length from the shoulder to the edge. The shoulder is 7.5 cm wide with a rectangular pole of 3.2 cm in length, 7.2 cm wide, and 3.2 cm thick. Pecking was used to form the wide and shallow groove. Grinding is evident on both sides of the axe.

Mortar/Portable Sipapu

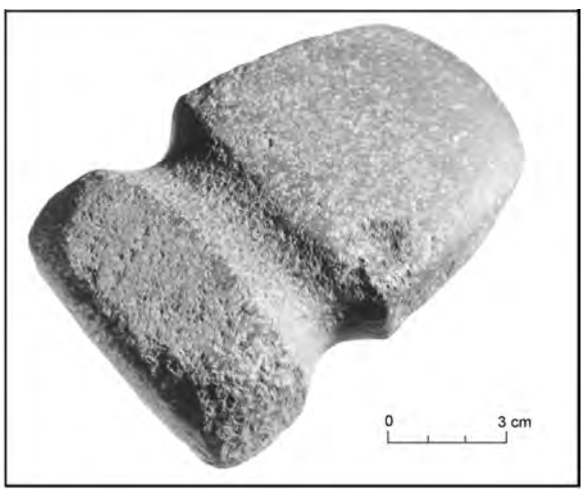


Figure 81. Three-quarter grooved axe from exterior surface in Area 300.

In Room 2, on the floor, a highly polished serpentine ground stone artifact resembling a mortar was recovered (Fig. 82). This artifact measures 18.3 cm long, 13.4 cm wide, 4.4 cm thick, and weighs 2.15 kg and may have served as a portable or substitute sipapu (Kelley 1984: 9; Wiseman, pers. comm. 1999). Kelley (1984) further states that cupped stones plastered into the floors of ceremonial chambers function as substitute sipapus and were typical in the eastern pueblos. This type of sipapu was found at Dick's Ruin at Forked Lightning in Pecos (Kidder 1958:159) and at Pindi where four were in Kiva E (Stubbs and Stallings 1953: 39). These types have also been noted in El Paso and Lincoln phase sites. There is no mention of them being present during the earlier Glencoe phase.

At the Angus site, this artifact was sitting on the floor in a slight depression of Room 2 with burned corn around it. Although corn was found in the fill of the surrounding rooms, the fill of Room 4 did not contain any. The burned corn was confined to this area.

Figure 82. Portable sipapu from Room 4, Area 7000.

Pestle

One small pestle fragment made of granite was recovered from the Angus site. It was an end piece with lengthwise striations and battering on the end.

Paint Grinder

This artifact is a hemispherical piece of sandstone that is rounded along the edges with one flat surface and the other surface convex. It has the appearance of a cobble that has been cut in half. The artifact has been ground along the edges. The flat surface is

Table 91. Ground Stone Distribution from the Angus Site

CELLS: Count Row Percent Column Percent	Backdirt	Mechanical Scraping	Kiva Hearth	Area 200	Large Storage Pit (Area 300)	Area 1000	Area 3000	Area 5000	Pit Structure (Area 5000)	Area 7000	Room 3	Room 1	Area 8000	Row Total
Indeterminate				1 7.1% 100.0%		1 7.1% 12.5%	3 21.4% 11.5%		1 7.1% 20.0%			1 7.1% 33.3%	7 50.0% 38.9%	14 100.0% 14.6%
Polishing Stone						2 15.4% 25.0%	8 61.5% 30.8%	1 7.7% 100.0%		1 7.7% 12.5%	1 7.7% 14.3%			13 100.0% 13.5%
Abrading Stone						3 37.5% 37.5%	2 25.0% 7.7%					1 12.5% 33.3%	2 25.0% 11.1%	8 100.0% 8.3%
Shaft Straightener					1 25.0% 8.3%						2 50.0% 28.6%		1 25.0% 5.6%	4 100.0% 4.2%
Anvil					1 100.0% 8.3%									1 100.0% 1.0%
Lapidary Stone		1 33.3 25.0%%			1 33.3% 8.3%								1 33.3% 5.6%	3 100.0% 3.1%
Mortar											1 100.0% 14.3%			1 100.0% 1.0%
Hammerstone					1 100.0% 8.3%									1 100.0% 1.0%
Portable Sipapu										1 100.0% 12.5%				1 100.0% 1.0%
Indeterminate Mano						1 10.% 12.5%	6 60.0% 23.1%		1 10.0% 20.0%	2 20.0% 25.0%				10 100.0% 10.4%
One-hand Mano							3 75.0% 11.5%			1 25.0% 12.5%				4 100.0% 4.2%
Two-hand Mano		1 5.6% 25.0%			5 27.8% 41.7%		1 5.6% 3.8%		3 16.7% 60.0%	3 16.7% 37.5%	1 5.6% 14.3%	1 5.6% 33.3%	3 16.7% 16.7%	18 100.0% 18.8%
Metate	1 16.7% 50.0%	1 16.7% 25.0%	1 16.7% 100.0%		1 16.7$ 8.3%		1 16.7% 3.8%						1 16.7% 5.6%	6 100.0% 6.3%
Trough Metate	1 14.3% 50.0%				1 14.3% 8.3%	1 14.3% 12.5%					1 14.3% 14.3%		3 42.9% 16.7%	7 100.0% 7.3%

CELLS: Count Row Percent Column Percent	Backdirt	Mechanical Scraping	Kiva Hearth	Area 200	Large Storage Pit (Area 300)	Area 1000	Area 3000	Area 5000	Pit Structure (Area 5000)	Area 7000	Room 3	Room 1	Area 8000	Row Total
Slab Metate		1 100.0% 25.0%												1 100.0% 1.0%
¾ Grooved Axe					1 100.0% 8.3%									1 100.0% 1.0
Pestle							1 100.0% 3.8%							1 100.0% 1.0%
Paint Grinder											1 100.0% 14.3%			1 100.0% 1.0%
Shaped Stone							1 100.0% 3.8%							1 100.0% 1.0%
COLUMN TOTAL	2 2.1% 100.0%	4 4.2% 100.0%	1 1.0% 100.0%	1 1.0% 100.0%	12 12.5% 100.0%	8 8.3% 100.0%	26 27.1% 100.0%	1 1.0% 100.0%	5 5.2% 100.0%	8 8.3% 100.0%	7 7.3% 100.0%	3 3.1% 100.0%	18 18.8% 100.0%	96 100.0% 100.0%

unmodified with the convex surface exhibiting grinding and battering. Red pigment is present on the damaged surface.

Shaped Stone

One shaped stone slab fragment with ground edges and unmodified surfaces was recovered. Its function is unknown, but it could have been used for several different purposes like a hatch cover, deflector, or comal. It measured 4.1 cm in length, 2.6 cm in width, and 2.4 cm in thickness.

Ground Stone Distribution

The Angus site was excavated by several different methods. Along with hand excavations there was much mechanical scraping and trenching. Ground stone artifacts were recovered from the backdirt piles left from Peckham's 1956 excavations and from the mechanical scraping. Table 91 contains the frequencies and percentages of ground stone recovered from each area, backdirt, and mechanical scraping (Fig. 83).

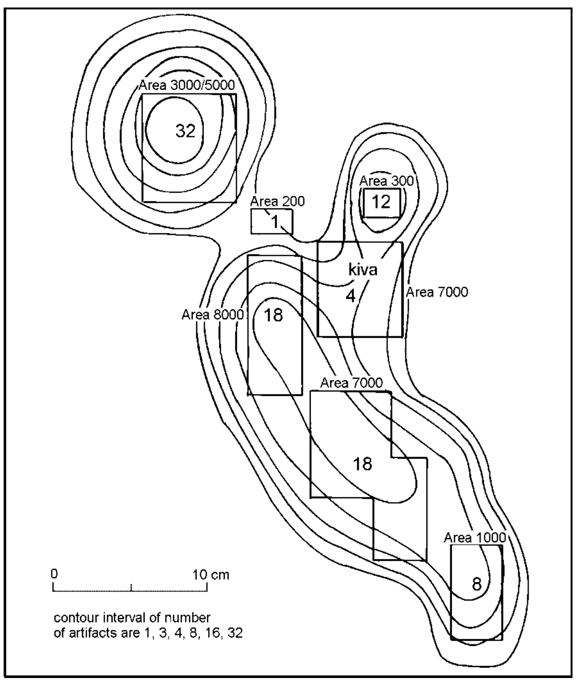


Figure 83. Ground stone distribution. Kiva includes Peckham's data.

Kiva

Peckham previously excavated the kiva in 1956. He recovered three loaf manos and a trough metate from this structure. No measurements were recorded and the ground stone from the excavations could not be relocated. Only one small ground stone fragment was recovered when the kiva was excavated again by OAS.

Area 200

One indeterminate ground stone fragment was recovered from this area. It is located between Areas 2000 and 8000. There is a possible pit structure present; however, the ground stone fragment came from general fill.

Area 300 with Large Storage Pit

This area included a large, deep storage pit containing over half of the ground stone artifacts for this area. On a possible utilized surface to the north of the storage pit, five ground stone items were recovered. This included two-hand manos (n = 2), a lapidary stone, a hammerstone, and a ¾-grooved axe. The rest of the ground stone artifacts were found within the storage pit and include a metate fragment, two-hand manos (n = 3), a trough metate, shaft straightener, and an anvil.

Area 1000

In this area, all of the assemblage recovered was from the fill. Area 1000 contained wall remnants from a possible pit structure but it was impossible to find a living surface due to the rodent and root disturbance. It was also in the middle of a drainage channel. All of the ground stone artifacts recovered from this area were fragmentary. It is possible this was an area where unusable ground stone was deposited as trash.

Area 3000

The majority of the ground stone on the site came from this area (27.1 percent). The area contained over 1 m of fill, and two use-surfaces with hearths and possible storage pits. However, all the ground stone was found in the overlying fill. Because the artifact concentration in this area was very high, the area was possibly used as a trash dump. There were no whole metates in Area 3000. Other ground stone included indeterminate fragments (n = 3), polishing stones (n = 8), abrading stones (n = 2), unknown mano fragments (n = 6), one-hand manos (n = 3), two-hand manos (n = 1), metate fragment (n = 1), pestle (n = 1), and shaped stone (n = 1). The polishing stones recovered were from the upper fill.

Area 5000

This area underlies Area 3000 and contained a pit structure. Three graduated loaf type manos (Fig. 84) were stacked next to the pit structure on the west side on an exterior surface. The manos were of three different sizes and surface textures. The largest was a loaf mano that was fully shaped and had a flat grinding surface and measured 37.0 cm in length, and was 12.5 cm wide with a thickness of 10.6 cm. It is very heavy, weighing 9.20 kg. The second one was a loaf mano with a convex grinding surface measuring 36.0 cm long, 9.0 cm wide, 8.1 cm thick, weighing 4.0 kg and had been used on a trough

Figure 84. Stacked manos next to pithouse in Area 5000.

metate. The third one was a loaf mano with two opposing ground surfaces that had a fine-grained texture. One surface is convex and the other is flat. Its measurements were 32.0 cm long, 9.3 cm wide, 4.8 cm thick, and weighed 2.45 kg. A polishing stone was recovered from the pit structure fill and another on the floor of the pit structure, suggesting possible pottery manufacturing.

Area 7000

Area 7000 covers approximately 28 sq m and

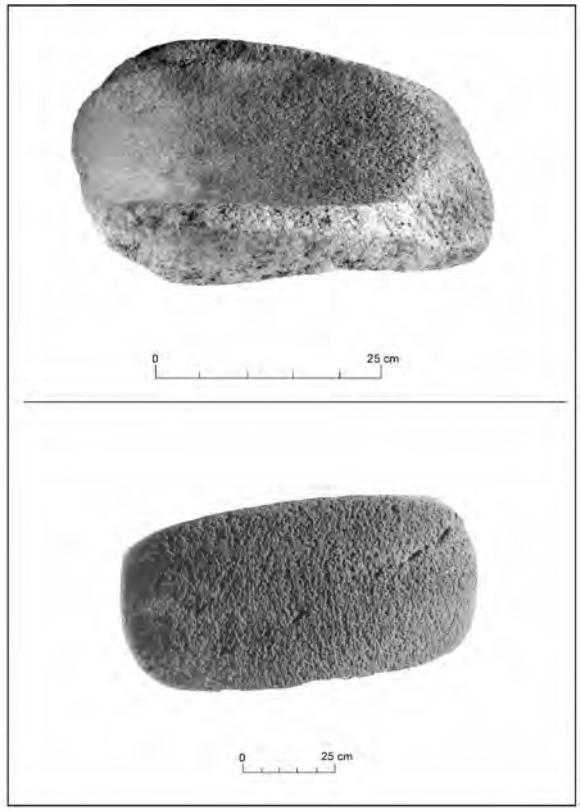


Figure 85. Mano and metate set found on floor of Room 3 in situ.

contains four to five rooms. The ground stone assemblage is 18.7 percent for Area 7000; most of it was recovered in general fill. The most common artifacts from this area were manos recovered from the fill, one trough metate and mano from Room 3, and a two-hand mano from Room 1, fill. The mano and metate from Room 3 were found on the floor in situ with the mano resting on the ground surface of the metate (Fig. 85). Next to the ground stone was a large El Paso Polychrome olla. It is possible that this room was used for storage or food processing. Other ground stone artifacts found in Room 3 below the roof fall were a polishing stone, a shaft straightener, and a paint grinder. Room 1 was probably a living area with a well-prepared floor and many floor features; however, it contained very little ground stone.

Area 8000

This area is a multicomponent area that contained a ramada type structure with three hearths superimposed over a small, earlier pit structure. All the ground stone recovered from this area was from

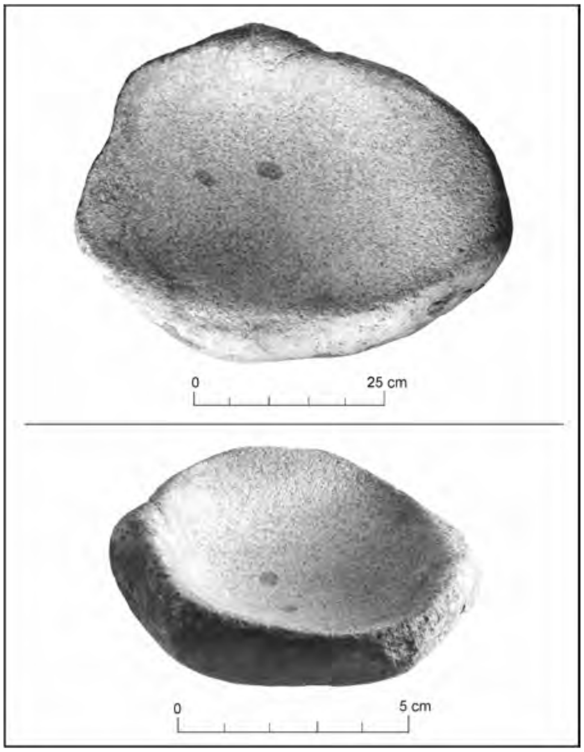


Figure 86. Trough metate from Area 8000, (a) overhead view; (b) profile view.

the upper occupation. There is a variety of ground stone artifacts from the ramada (Table 92), including four metates, of which only one is complete. This is a large trough metate that is open on one end with the trough 7.5 cm deep (Fig. 86). In profile, it has a basin shape. Three two-hand manos were also recovered. All of them, however, were broken.

Temporal Issues

The closest sites to the Angus site are the ones dug by Farwell et al. (1992), approximately 1.6 km upstream along the Rio Bonito. Four sites contained ground stone: Crockett Canyon, the Filingin site, the Nelson site, and the Sikes site. Kelley's (1984) sites, which are also in the area, included several where ground stone was recovered; however, the data needed for comparing the assemblages with the Angus site assemblage are incomplete. The data from Block Lookout, Bonnell, and Bloom Mound are sparse but were used in the comparative study where possible.

Early Glencoe Phase (A.D. 900 to A.D. 1100)

Kelley (1984) notes that the ground stone found during the Early Glencoe phase consists of one end open trough metates with mano rests. The clsoed end ranges between 10.2 cm and 15.2 cm. There are two Early Glencoe sites mentioned by Kelley (1984:497-500), Mayhill Site 1 and Mayhill Site 2, located along the Peñasco River. However, Mayhill Site 2 had only two metate fragments from the excavations.

Late Glencoe Phase (A.D. 1100 to A.D.1350)

The most complete data for ground stone in the area are from the Late Glencoe phase. All of the sites from Farwell et al.'s (1992) excavations were classified as Late Glencoe. Crockett Canyon and the Filingin site were the largest sites excavated and both were pithouse villages. Both sites had a large number of ground stone; however, only the manos and metates were used for comparison. The Nelson and Sikes sites had a few manos and metates fragments. Means, standard deviations (SD), and range are given in Table 92.

Table 92. Late Glencoe Phase Manos

SITE	ARTIFACT	NUMBER	MEAN (CM)	STANDARD DEVIATION	RANGE (CM)	WHOLE
Crockett Canyon (LA 2315)	Two-hand Loaf Mano	7	26.0	0	0	1
	Cobble Manos	6	11.1	3.5	7 to 17	6
Filingin site (LA 16297)	Two-hand Loaf Mano	6	15.5	3.5	13 to 18	2
	One-hand Manos	2	12.0	3.5	10 to 15	2
	Two-hand Slab Manos	6	24.0	6.0	17 to 34	6
Nelson site(LA 702)	Two-hand Slab Manos	2	00.0	0	0	0
Sikes (LA 16300)	Two-hand Loaf Manos	3	00.0	0	0	0
The Angus site (LA 3334)	One-hand Manos	4	23.1	78.0	18 to 48	0

SITE	ARTIFACT	NUMBER	MEAN (CM)	STANDARD DEVIATION	RANGE (CM)	WHOLE
	Two-hand Manos	1	23.4	0	23.4	1
Angus site	Two-hand Loaf Shaped Trough Manos	4	29.3	5.6	24.3 to 36	4
	Two-hand Slab Manos	5	24.8	4.3	18.9 to 29.5	5
	Two-hand Loaf Manos	2	35.0	2.8	33 to 37	2

In comparing the Late Glencoe phase at Farwell et al.'s excavations and the Angus site, it can be seen that the mano assemblages are very similar. The only differences are in the loaf manos, which are larger at the Angus site. Note that the loaf manos from the Angus site have been divided into two categories because it is evident that most of them were used on trough metates.

Farwell's sites had a large number of shaped loaf manos (n = 16) and the loaf manos from the Angus site were also fully shaped. The slab manos were well shaped and tabular from Farwell's sites; however, the Angus site slab manos were natural in form with only one flat ground surface.

The manos from Kelley's (1984) Sierra Blanca sites of the Late Glencoe phase are not categorized as one- or two-hand types. She gives a range of lengths and the number of manos recovered. The Bonnell site had 19 manos less than 15.24 cm in length. Six were triangular, 11 had one ground surface, and two had two ground surfaces with lengths ranging between 15.24 cm and 34.29 cm. Other manos included 23 trough two-hand, 9 heavy loaf, and 20 flat elongated manos. Bloom Mound, which is a Late Glencoe to early Lincoln phase site contained a mano measuring 19.5 cm in length, a quartz grinding stone that is 10.16 cm long, and three slab metates.

The metates recovered from the Angus site were mostly trough; one was slab; however, Farwell's sites contained a wider range of types. Crockett Canyon had 4 basin, 1 trough, 13 slab, and 3 flat cobble metates. At the Filingin site only slab metates were recovered. The Nelson site did not have any metates and the Sikes had two slab types.

Lincoln Phase (A.D. 1200 to A.D. 1450)

One Lincoln phase site found by Kelley (1984) within the area is Block Lookout. The ground stone consists of slab metates and trough metates with one end open. The manos are defined as:

1. Large, heavy, 30.48- cm-long, and ranging between 7.6 cm and 8.8 cm thick with a single convex grinding surface.
2. Single, slightly convex ground surface trough mano with a length ranging between 7.7 cm and 20.3 cm.
3. Loaf manos with two grinding surfaces.

Kelley (1984) observed that the most common metates for the Late Glencoe and Lincoln phases were trough type with flat mano rests at the closed end. Slab metates were few and basin types were rare within these two phases. In comparing the manos from the Late Glencoe and Lincoln phases, Kelley (1984) found that the Lincoln phase manos are rectangular in cross section and subrectangular to oval in outline. The one-hand manos from her site usually had battered ends, which are consistent with the ones from the Angus site. Kelley (1984) also mentions that during the Early Glencoe phase, the trough metates were missing the mano rests that are found on the trough metates of the later Glencoe and Lincoln phases.

The ground stone from Kelly's (1984) Sierra Blanca region sites and the Angus site are similar with the exceptions of the trough manos (Table 93). However, it seems as though the manos from the Angus site are larger than the ones recovered by Kelly. The trough metates are almost the same size;

Table 93. Trough Metate Comparisons

SIERRA BLANCA REGION SITES	ANGUS SITE

TWO-HAND TROUGH MANO	TROUGH METATE		TWO-HAND TROUGH MANO	TROUGH METATE	
SIZE	SIZE	DEPTH	SIZE	SIZE	DEPTH
15.2 cm to 34.29 cm	30.48 cm to 60.96 cm	2.5 cm to 7.62 cm	24.3 cm to 36.0 cm	38.0 cm to 52.0 cm	1.0 cm to 8.0 cm

however, only one had a mano rest. The trough depth of the metates is nearly the same but one from the Angus site is deeper.

Mano Size and Corn Dependency

There is ongoing controversial debate regarding mano size and corn dependency. Lancaster (1984), Hard (1990), Hard et al. (1996), Mauldin (1993), and Diehl (1996) believe that the size of a mano is a reliable variable that can be measured for prehistoric people's use of corn. Adams (1999) contends that mano size is more relevant to tool configuration and processing strategies.

At the Angus site, the ground surface of the manos showed considerable variation. However, several large loaf manos were recovered and the palynological studies revealed that other types of foods were being ground on these besides corn. These other types of manos, where pollen was taken, seemed to contain low amounts of corn. The mano and metate in Room 3, found on the floor, only contained a trace of corn but did have more cheno-ams, and high and low spine taxa. A mano from the same area contained small amounts of corn and cactus but had a large amount of cheno-ams, grasses, and taxa from the composite family, including low spine composites. The macrobotanical samples produced large amounts of corn from the site proving that corn was indeed a part of the subsistence practices. However, residents were not intensively grinding it as suggested by the other vegetal material on the ground stone recovered from our excavations.

Looking at the sizes of all whole manos in terms of Hard's (1990) dependency model, there is a mean mano length of 26.5 cm for the two-hand manos (n = 10) with a standard deviation of 5.0cm and a range of 18.9 cm to 36.0 cm. The larger loaf manos (n = 2) have a mean length of 40.9 cm, standard deviation of 12.9 cm, and a range of 19.6 cm to 52.0 cm. The mean ground surface for these two categories is 188.8 sq cm for the two-hand manos, a standard deviation of 37.17 sqcm and a range of 135 sq cm to 260 sq cm. The large loaf manos have a mean ground surface of 205.0 sq cm, a standard deviation of 40.1 sq cm, and a range of 176 sq cm to 234 sq cm. The mean of these artifacts falls within Hard et al.'s (1996) theory of corn dependency; however, the pollen washes dispute the theory. A good example is the mano and metate set found on the floor of Room 3 that were pollen washed and low counts of corn were present. The mano length of this artifact is 24.3 cm and the ground surface is 146 sq cm. The trough metate is 48.0 cm in length and has a ground surface of 836 sq cm. They fall well within Hard et al.'s (1996) measurement (over 15 cm and area of 152 sq cm to 175 sq cm) as being large with a ground surface of 152 cm². Clearly, large grinding surfaces do not always indicate the presence of corn.

Adams (1996) has taken a different approach to interpreting ground stone. She believes that processing strategies and differing techniques are the reasons for the variation in manos and metates through time and not the dependency on corn (Adams 1999). She, along with Wright (1993), state that tool morphology is not a good predictor of subsistence strategies (see also Stone 1994).

Conclusions

The ground stone recovered from the Angus site is a moderate-size assemblage. However, with the artifacts recovered, we propose that several activities other than food processing were being performed. There was also evidence of hide processing, pottery manufacturing, and tool processing.

Corn was found in both the flotation and pollen samples and there is no dispute that corn was important to the diet of these people. However, it was not being ground very much; Adams (1999) states that corn can be boiled instead of ground and thus not produce residue on ground stone tools. In weighing the theories that large mano size indicates dependence on corn (Hard et al. 1996) or that it is only a measure of processing strategies and techniques, the assemblage from the Angus site probably disputes that proposition based on the pollen wash data from the manos and metates.

Abundant amounts of corn were found in the fill of the rooms; however, the palynological analyses found only traces of corn on the surfaces of the whole artifacts. If mano size is a good predictor of corn dependence, then corn pollen should have been present in large amounts on the surfaces of these ground stone and the inhabitants of the Angus site should have relied heavily on corn. This was apparently not true at the Angus site. Although large amounts of corn are present on the site, it is possible that it was being prepared by boiling or roasting because intensive grinding is not suggested by the pollen analyses. Mano size does not seem to have been a good predictor for the dependency on corn at the Angus site. What type of measurement could indicate dependency on corn? The macrobotanical and palynological analyses come to mind as do vegetal materials remaining on the cooking and storage vessels. I would have to agree with Adams (1999), Wright (1993), and Stone (1994) that ground stone morphology is not a good predictor of subsistence strategies.

MISCELLANEOUS ARTIFACT ANALYSIS

Sonya O. Urban

Introduction

The Angus site yielded a variety of objects classified under the miscellaneous category, including such diverse artifacts as ornaments, crystals, and minerals. The site represents the Late Prehistoric period of the Jornada Mogollon. Although this is a diverse group of artifacts, these items are potentially important for furthering our knowledge regarding prehistoric trade routes, trade goods, personal adornment, and ceremonial items.

Methods

The analysis of the miscellaneous artifacts was structured around the basic methodology developed for the Luna-Reserve Project (Urban 1999). Artifacts were analyzed primarily by material and morphology, then by provenience due to the relatively small size of the assemblage. The variables monitored include material type, morphology, shape, manufacturing stage, surface treatment, wear polish, drill hole type and its measurements, artifact condition, source, count, weight, length (and portion), width (and portion), thickness (and portion), and additional comments for every artifact.

All miscellaneous artifacts were recorded and measured, and notable artifacts were photographed. Measurements were made in millimeters with a sliding caliper, and artifact weights were recorded in grams. Each artifact was examined with a binocular microscope to assist in the identification of material type and morphology. The magnification varied from 15x to 80x, with the higher magnifications used to closely examine drill holes, manufacturing stages, and wear patterns.

Material sources were identified by gross category unless specific sources were recognized. Identification of shell artifacts was made from a comparative sample and from locally available resources identified for the Brantley project (Murray 1985) and the region (Howells et al. 1996:48-50, 93-94). Descriptions of shell morphology come from Morris (1975), Howells et al. (1996), and from Topping (1989:8-9).

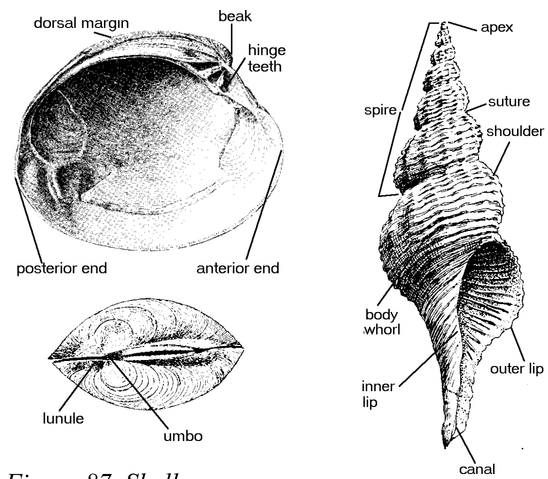


Figure 87. Shell morphology terms.

Figure 87 identifies terms used in reference to shell morphology in the manufacturing process. The term wear pertains to the identification of characteristics present based on the use of the item, as opposed to its manufacture. Condition refers to whether the whole artifact is represented, or only a portion of the original piece. All artifacts were recorded as being either whole or fragmentary. The material types, morphology, and sources were monitored to assist in the determination of possible trade routes in addition to the use of local versus imported materials. Drill hole forms and measurements, manufacturing stages, and surface treatments were recorded to determine if the ornaments were locally produced or imported as finished goods. The shape of the artifact was used as a general indicator of the forms most often used.

Artifact Summary

A total of 60 miscellaneous items were collected from the Angus site (LA 3334). The artifacts are represented by both whole and fragmentary objects, a variety of materials, and several proveniences. The following details analysis of the materials according to material, morphology, and provenience.

Minerals

Over the course of excavation, 33 mineral samples were recovered from the site (Table 94). Several different minerals are represented, all of which are local to the region. Some of the mineral samples were soft enough to be used as pigments, and several show evidence of grinding for this purpose.

Table 94. Miscellaneous Artifacts Sorted by Material and Area

Area	Mineral	Crystal	Shell	Stone	Total
surface			1		1
200			1		1
1000		1	5		6
2000	1				1
3000	5	1	3		9
4000			1		1
5000	5		5	2	12
7000	22		7		29
All	33	2	23	2	60

The mineral samples consisted of: chrysocolla (n = 2), calcium carbonate (n = 1), hematite (n = 24), and limonite (n = 6). The chrysocolla fragments measure an average of 7.5-by-6-by-4.5 mm, and weigh 0.9 g. These unmodified fragments were found in the general fill of Area 3000, and in the fill of Feature 8 (Posthole 5) in Room 2 (Fig. 88). The calcium carbonate measures 16-by-12-by-6 mm, and weighs 1.0 g. The calcium carbonate was found on the floor of Area 5000, a pit structure on the northern end of the site. This material is chalky in texture, and was ground on multiple sides, possibly because of use as a pigment.

Figure 88. Chrysocolla found in Room 2.

A total of 24 pieces of hematite were recovered from LA 3334 (Table 95). The average measurement of the hematite is 22.3-by-16.67-by-11.33 mm, with a total weight of 182.9 g. Hematite was found in two main areas of the site: the north end of the site and in Area 7000, in Rooms 1 and 4. On the north end of the site, hematite was recovered from Areas 2000, 3000, and 5000. The hematite found in the fill of Area 2000 was ground on multiple sides. Two pieces of hematite, with one end ground, were found in Area 3000; one was recovered on the floor, while the other was just above the floor. The hematite found in the general fill of Area 5000 (pit structure) was unmodified. Room 4 in Area 7000 contained the most hematite found on the site. Nineteen unmodified fragments were found in the northeast corner of the room near the floor, in a possible cache (weighing 162.7 g). One fragment of hematite, ground on one side, was also found in Room 1 (Area 7000) near the floor.

Table 95. Minerals from LA 3334 by Area

Area	Chrysocolla	Hematite	Limonite	Calcium carbonate	Total
2000		1			1
3000	1	2	2		5
5000		1	3	1	5
7000	1	20	1		22
All	2	24	6	1	33

Limonite was found in Areas 3000, 5000, and 7000 (Table 95). The six pieces of limonite measure an average of 28.67-by-23.67-by-14.83 mm, and weigh 143.5 g. Of the two fragments in Area 3000, one was ground on multiple sides and was recovered in the vicinity of a modified piece of hematite on the floor. The other piece was unmodified, and was located in the general fill. Three pieces of limonite were found in Area 5000. A large piece from the lower fill of the pit structure was flaked and ground on several sides. The other two were in the general fill, and were also ground on many sides. One piece of limonite, also ground on multiple sides, was recovered from the general fill of Area 7000.

Stone Ball

One ball-shaped sandstone concretion was recovered from this site, in Area 5000. It appears to have been partially shaped by flaking, but this may have occurred naturally. No grinding was apparent to indicate the concretion was culturally modified. This artifact measures 32-by-31-by-30 mm, and was in the general fill of the pit structure. Artifacts of this type are somewhat common on Jornada Mogollon and Mogollon sites, but it is unknown what their cultural significance is.

Stone Ring

A fragment of a stone ring was found in the general fill of the pit structure (Area 5000). Made from a piece of aphanitic gray rhyolite, less than half of the ornament remains. The ring measures 15-by-4-by-3 mm, and was fully shaped and polished, with wear polish on the interior and exterior of the ring's

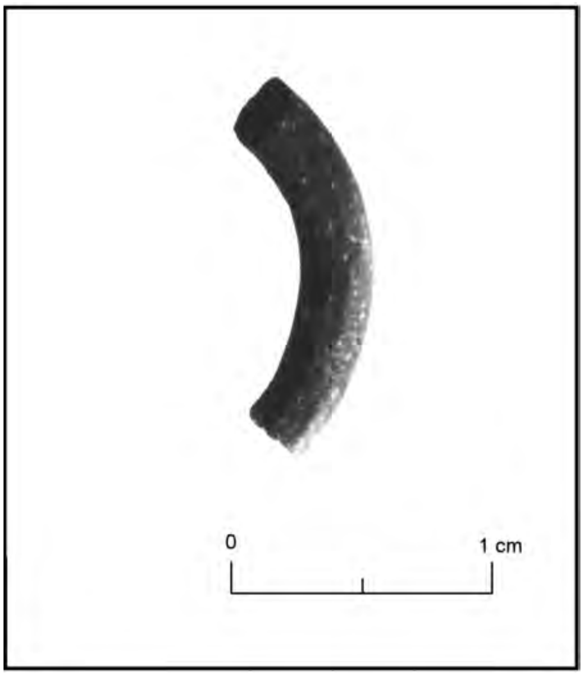


Figure 89. Stone ring found in fill of pit structure in Area 5000.

surface. It was drilled biconically, but was too fragmentary to measure the inner diameter of the drill hole (Fig. 89).

Crystals

Two quartz crystals were recovered from LA 3334. A crystal from the general fill of Area 1000 was culturally modified, showing signs of grinding and abrasion on multiple sides, slight wear polish, and traces of hematite pigment (Fig. 90). More hematite might have been present originally, but the artifact was washed during lab processing. It measures 29-by-12-by-9 mm. The crystal in Area 3000 was

Figure 90. Modified crystal from Area 1000.

unmodified, and was located in the general fill. It measures 37-by-16-by-12 mm. Total weight of the crystals is 10.9 g.

Shell

Twenty-three shell artifacts were found on the Angus site (Table 96). The recovered shell was mainly local freshwater mussel of the Family Unionidae, further identified as *Cyrtonaias tampicoensis* (Tampico pearly mussel or purple shell mussel), and *Popenaias popei* (Texas hornshell) (Table 97). All of the shells, except the snails, were ornaments or part of ornament manufacturing debris. Of the shell artifacts found, eight were local snails (not identified as to terrestrial or marine species), nine were identified as *C. tampicoensis*, one was identified as *P. popei*, four were unidentified mussel shell, and one was an unidentified species. The rough exterior of the shell has been mostly ground off (thinned) of these artifacts, leaving a little texture on one surface.

Indeterminate Artifacts

A total of eight snail shells were recovered from LA 3334. It was not determined whether they were marine or terrestrial snails, but since the Rio Bonito is located 20 m to the south of the site, they are probably a local resource. It is doubtful they were a food source, since they exhibited no signs of modification, and were in no context that would suggest otherwise. All the snail shells were recovered from the southeastern part of the site

Table 96. Shell Types from LA 3334 by Area

Area	Snail	*C. tampicoensis*	*P. popei*	Unknown mussel	Unknown shell	Total
Surface		1				1
200			1			1
1000	2	2			1	5
3000		1		2		3
4000				1		1
5000		4		1		5
7000	6	1				7
All	8	9	1	4	1	23

Table 97. Ornament Morphology by Material and Area

	Rhyolite	***C. tampicoensis***	***P. popei***	**Unknown Mussel**	**Unknown Shell**	**Total**
Unfinished Ornament		1-5000				1
Broken Ornament				1-3000	1-1000	2
Debris		1-1000 2-5000 1-7000		1-3000 1-4000		6
Ornament		1-5000				1
Pendant		1-surface 1-1000 1-3000	1-200			4
Ring	1-5000					1
Effigy pendant				1-5000		1
All	1	9	1	4	1	16

Table 98. Ornament Manufacturing Stage by Material and Area

	Unfinished Ornament	Broken Ornament	Debris	Ornament	Pendant	Ring	Effigy pendant	Total
Fully Shaped		1-1000				1-5000		2
Fully Shaped & Drilled				1-5000	1-surface 1-1000 1-3000		1-5000	5
One End Ground			1-3000*					1
Two ends ground			1-4000 1-5000**					2
Multiple sides ground	1-5000		1-5000 1-7000					3
Partially shaped			1-1000					1
Shaped, partially drilled					1-200			1
Unshaped, partially drilled		1-3000						1
All	1	2	6	1	4	1	1	16

* indicates floor contact   ** indicates just above floor contact

(Table 96), in Areas 1000 and 7000. Four were whole shells, and four were fragments. The two snail shells in Area 1000 were fragmentary, and were recovered from the lower fill. This was an area with an old drainage, so these materials were probably redeposited from another source. Three shells were recovered in the fill of Room 2, in Area 7000. Two were fragments found in the general fill, while the whole shell was found in the roof fall. The three shells found in the general fill of Room 3 were all whole. The whole shells measure an average of 14.50-by-12.75-by-8 mm, while the fragmentary shells measure an average of 13.75-by-10-by-6 mm. Total weight of the snail shells is 1.9 g.

Unfinished Ornament

An unfinished shell ornament was recovered from the general fill of Area 5000. It was ground from a piece of *C. tampicoensis* shell, and measures 23-by-18-by-3 mm. It is irregular in shape, and has multiple

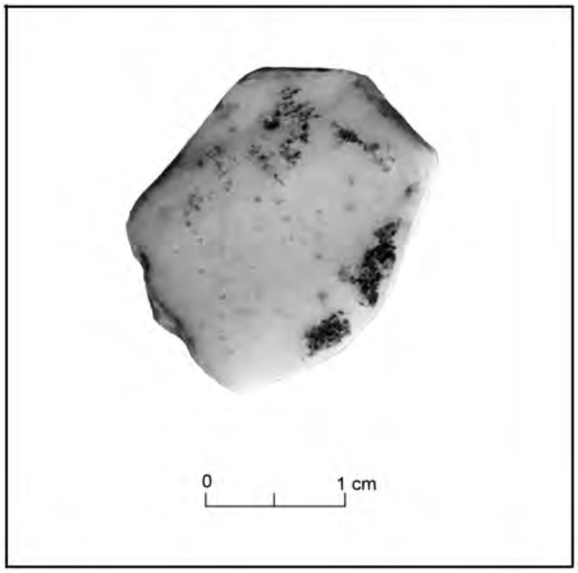


Figure 91. Unfinished shell ornament from Area 5000.

Figure 92. Shell oraments, (a) broken shell ornament from Area 3000, (b) possible ring from Area 1000.

sides ground, with a slight wear polish present (Fig. 91). It may be part of a broken ornament that was being remodified.

Broken Ornament

An ornament fragment was recovered in the lower fill of Area 1000, made from an unknown species of shell. Approximately half of the original ornament remains, which may have been a ring (Fig. 92b). It appears that the natural curve of the shell was utilized in shaping the ornament, so there is no drill hole. The ornament was fully shaped by grinding the top and bottom edges, and shows a slight wear polish. It measures 10-by-9-by-1 mm.

A second broken ornament was recovered from the lower fill of Area 3000. It was made from a piece of mussel shell that was not identified. The ornament is rectangular in shape, and has been partially shaped by grinding. There are four drill hole attempts, with a fifth biconical drill hole (1.5 mm in diameter) being successfully completed. Along one edge of the ornament is an incised line, almost a deep groove (Fig. 92a), and may represent an attempt at making a fish pendant. The ornament measures 10-by-9-by-1 mm, with no wear polish present, and probably broke during manufacture.

Ornament Manufacture Debris

There were six fragments of ornament manufacturing debris found on the site, from Areas 1000, 3000, 4000, 5000, and 7000 (Table 98). Two-thirds of these shell debris fragments were found in the northwest area of the site. One hinge fragment of *C. tampicoensis* was found in the lower fill of Area 1000 (Fig. 93b). It was partially shaped by grinding, and measures 14-by-10-by-6 mm. A second fragment of ornament debris was recovered from the floor of Area 3000. It is made from a piece of shell that was too small to identify, but is probably *P. popei*. It is ground on one end, has no wear polish present, and measures 6-by-6-by-1 mm. A third fragment found in the general fill of Area 4000, was a fragment of unidentified mussel shell measuring 4-by-3-by-1 mm. It has two ends ground, but no other treatment. Two fragments of ornament manufacturing debris were present in Area 5000. One was a piece identified as *C. tampicoensis*, and had two ends ground, with no other surface treatment. It measures 23-by-16-by-2 mm, and was recovered just above the floor of the pit structure. The other fragment was also identified as *C. tampicoensis*, and was in the upper fill of the pit structure. It had several edges ground down, was flaked (Fig. 93a), and measured 23-by-17-by-3 mm. Another *C. tampicoensis* fragment was found in the lower fill of Room 2 in Area 7000. Some possible attempts at drilling were present along with several edges being ground; it measures 12-by-11-by-3 mm.

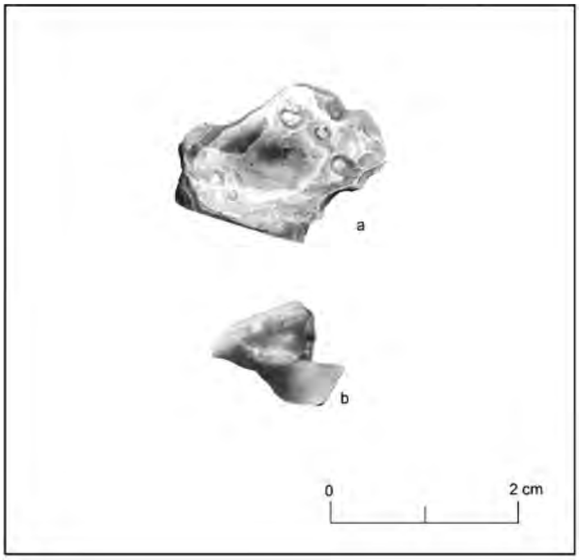


Figure 93. Ornament debris, (a) Area 5000, (b) Area 1000.

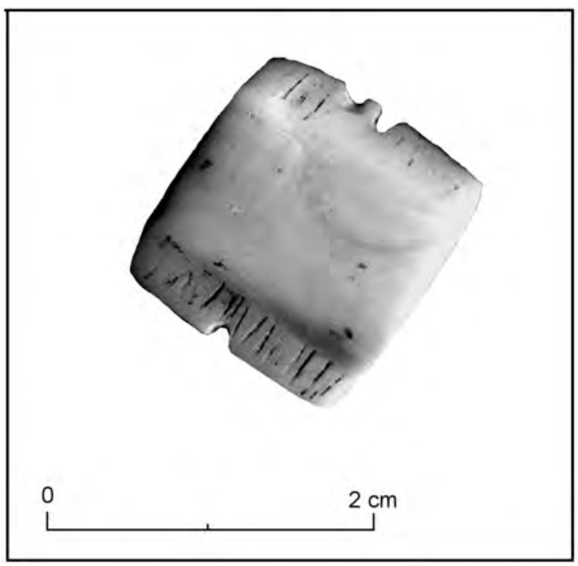


Figure 94. Shell ornament from pit structure, Area 5000.

Ornaments

One whole shell ornament was recovered from above the floor of the pit structure in Area 5000. It is fully shaped with one biconically drilled hole (diameter 1.4 and 1.6 mm), and has been ground, grooved, and incised. It is from a *C. tampicoensis* shell and is square in shape with an incised surface and edges (Fig. 94). It has slight wear polish, and measures 18-by-17-by-3 mm.

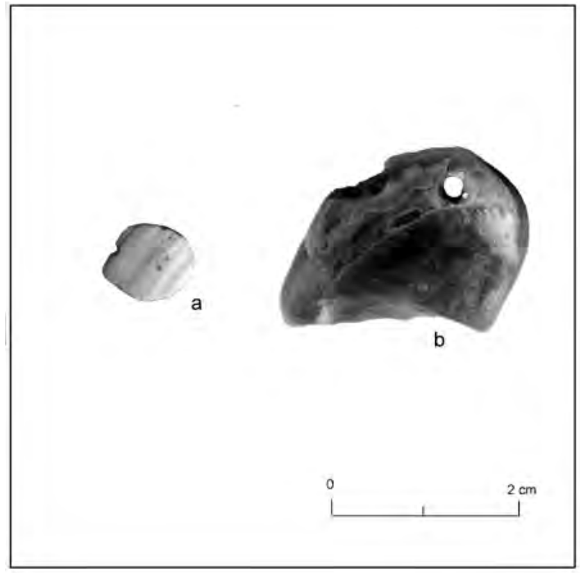


Figure 95. Shell pendants, (a) Area 200, (b) Area 1000.

Pendants

One shell pendant was recovered from the general fill of Area 200. It was tentatively identified as *P. popei*, and is teardrop-shaped. It is fully shaped (Fig. 95a), and has a partially complete conical drill hole (1.2 and 0.4 mm in diameter). It has been ground, with no wear polish evident. Its length is not complete, and measures 9-by-9-by-1 mm.

A second pendant was recovered from the lower fill of Area 1000. It is from a piece of *C. tampicoensis* shell, and is square in shape. It is fully

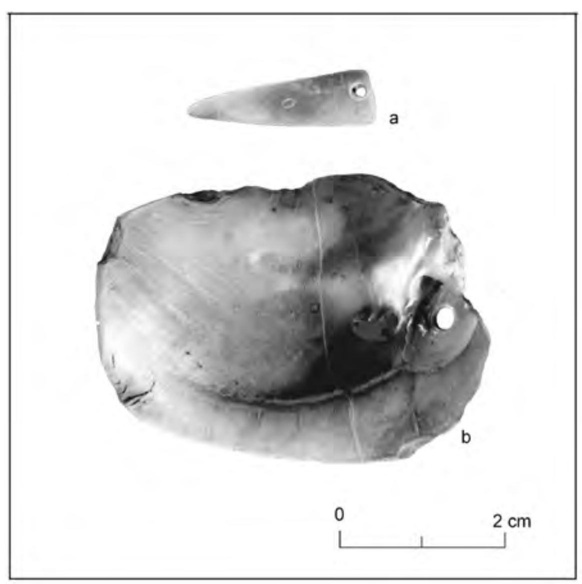


Figure 96. Shell pendants, (a) from pit structure area, (b) site surface.

shaped and drilled, with ground edges, but no other surface treatment. It has a biconically drilled hole measuring 2.7 mm and 2.6 mm in diameter. It measures 22-by-19-by-2 mm (Fig. 95b), and the length of the pendant is incomplete.

The third pendant is also from a *C. tampicoensis* shell, and was recovered from the general fill of Feature 5000 in Area 3000. It is triangular in shape, and is a whole ornament (Fig. 96a). It was fully shaped by grinding, with a biconically drilled hole (2.4 and 1.8 mm in diameter). There is slight wear polish present, and it measures 23-by-7-by-2 mm.

The fourth pendant was recovered on the surface of the northern end of the site, and was broken into four pieces during excavation. The pendant was formed from a large piece of *C. tampicoensis* shell, with part of the hinge ground down (Fig. 96b). It is rectangular in shape and measures 46-by-36-by-4 mm. The shell was flaked before the edges were ground down, and the ornament is fully shaped and drilled. It has a biconical drill hole measuring 3.3 and 3.4 mm in diameter, and there is slight wear polish present on the edges of the pendant.

Effigy Pendant

One effigy pendant was recovered from the general fill of the pit structure (Area 5000). It was formed from a piece of mussel shell (probably *C. tampicoensis*) and is in the shape of a fish (Fig. 97). It is fully shaped and drilled, and the lower part of the mouth was broken off, possibly during excavation. It has incised lines that describe the eye, mouth, head, and fins. There is wear polish evident inside the drill hole and on the outside surface of the ornament. It has a biconical drill hole (measuring 1.5

Figure 97. Fish effigy pendant from fill of pit structure, Area 5000.

and 1.6 mm in diameter), and the overall pendant measures 25-by-9-by-1 mm.

Ornaments and More of the Jornada Mogollon

Manufacture of Ornaments

Manufacturing techniques and material type and source is important in determining the area in which an ornament might have been made. The residents of the Angus site used several methods of producing ornaments from the raw materials (Table 98). The presence of debris from ornament manufacture suggests that the majority, if not all, of the ornaments were made at the site.

Ornaments were manufactured in different ways according to their material. Previous studies of shell ornament manufacturing techniques were considered (Francis 1989:25-35) in this analysis. Bivalve shells were often ground down on the highest point (the umbo), for stringing as a pendant, or cut into smaller pieces for smaller ornament manufacture. The spires of univalves were often also ground down for stringing. Stone required the most work to fashion into jewelry. First, a suitable piece of raw material had to be found, then it was ground into the appropriate shape and drilled for suspension. This could be a lengthy process if the material was very hard, like turquoise, or if it was shaped into a figure more complicated than a simple geometric form. The importance of drilling methods is interconnected with the type of material used. Some materials are more friable than others when drilled (shell, for example), and may tolerate less pressure from drilling than sturdier materials (such as turquoise and metamorphic rocks).

Materials with no natural hollow cavity to use for suspension were perforated using a different method. These ornaments were drilled using a stone drill or (possibly) a cactus spine as a drill bit, plus an abrasive, to create an opening. Three types of drill holes have been noted in prehistoric ornaments: conical, biconical, and cylindrical. Conical and biconical are the most common. Biconical drilling had a greater advantage on fragile materials since drilling on both sides instead of on a single side could minimize the pressure, as with conical drilling. To form a cylindrical hole through a material that has no inner cavity, a biconically drilled hole is formed, then either evened out with an abrasive, or smoothed through wear (which would tend to produce an uneven interior hole). Another possible way to form a cylindrical hole is to use a drill with a uniform thickness. This last method would tend to fracture fragile materials, and is a more inefficient drilling technique.

The Data: A Summary

The Angus site dates to the Late Prehistoric (ca. A.D. 1300), while the pit structure (Area 5000) dates a little earlier to ca. A.D. 1000. The 60 miscellaneous artifacts recovered from the Angus site are typical of this period and region, and included 33 minerals, 2 crystals, 1 concretion, 8 snail shells, and 16 ornaments. The assemblage is unfortunately too small to support any hypothesis regarding frequency or intensity of trading between groups, or to permit an in-depth look at various trends, especially with respect to ornament utilization. However, some general trends can be observed.

Much of the assemblage was scattered over the site, with few concentrations discernable. The assemblage data indicates the occurrence of a local ornament manufacturing strategy using locally available resources, with no ornaments of exotic materials present. Even though there were no caches of raw shell awaiting manufacture into ornaments, the presence of several modified mussel shell fragments indicate at least some, if not all, of the mussel ornaments were produced on-site. Ornament production may have been centered on the northwest end of the site, where two-thirds (n = 6) of the shell manufacturing debris, unfinished, and broken ornaments were recovered (Table 97), along with the majority of finished (n = 6) ornaments (Table 98). The unidentified shell was concentrated in the north (Table 97), and two-thirds (n = 6) of the *C. tampicoensis* shell came from the pit structure (Area 5000). The two shell fragments found above the pithouse floor in Area 5000 may be trash that washed in from an outside activity area, or from the later occupation.

The north area of the site also had the majority of the fully shaped ornaments of the site (n = 6) and the partially worked ones as well (n = 6) (Table 98). Fully shaped ornaments were concentrated at the northern end of the site, in Area 5000 (n = 3), on the surface (n = 1), and Area 3000 (n = 1). The other two fully shaped ornaments came from the redeposited fill of Area 1000. Three of the debris fragments were from Area 5000, two from Area 3000, and the rest scattered around the site, with no particular distribution evident.

Area 1000 contained the worked crystal with hematite residue, and five pieces of shell. Two were snail shells, one was a fragment of mussel shell from manufacturing debris, one was a broken ornament, and the last was a *C. tampicoensis* pendant. These artifacts were part of the redeposited fill from the drainage, so their original context is not known.

Several minerals were recovered from Area 3000, including abraded limonite and hematite fragments above the floor, a piece of ground hematite on the floor, and an unidentified mussel shell manufacturing debris fragment.

Even though there appears to be a manufacturing area on the northern end of the site, there were few artifacts found on or near the floor of the pit structure (Area 5000). There was a piece of ground calcium carbonate on the floor, and a piece of *C. tampicoensis* ornamental debris just above the floor. All the other artifacts were in the general fill and may have washed in from outside activity areas, or from the later occupation.

There were also several artifacts, mainly minerals, recovered from the rooms in Area 7000, on the south end of the site. Room 1 contained a piece of ground hematite near the floor, while Room 2 had three snail shells (one whole) in the roof fall, and a fragment of *C. tampicoensis* ornament debris just above the floor. There was also a piece of unmodified chrysocolla in Posthole 5. Room 4 had a possible cache of unmodified hematite in the northeast corner near the floor.

Discussion

The Angus site is situated in the Rio Bonito Valley in the Sierra Blanca Range, with the Rio Bonito lying 20 m to the south of the site. All of the materials represented in this assemblage are resources that could have been acquired locally. Mineral resources such as chrysocolla, limonite, and hematite are all found in the area (Northrop 1959). Copper-related minerals like chrysocolla are reported to the north (Anderson 1954:17), and both hematite and limonite are common minerals in the state (Anderson 1954:20). Hematite and limonite have been reported from other sites in the area (Lehmer 1948; Kelley 1984), where both modified and unmodified forms were recovered. As at the Angus site (see Table 94) Kelley (1984) reports more red than yellow pigments present in the assemblage.

Ball-shaped concretions are also not unusual on Mogollon sites (Martin 1939; Martin and Rinaldo 1950; Bluhm 1957) and in the Jornada Mogollon area. Lehmer (1948:53) reported "spherical stone balls" as a common artifact in the local collections of several sites, and Kelley also reports them from the Bloom Mound site (1984).

Quartz crystals have been found on many Jornada Mogollon (Lehmer 1948; Kelley 1984) and Mogollon (Martin et al. 1956; Bluhm 1957) sites from the Late Prehistoric period. These crystals are found throughout the region as a natural resource in local rock veins (Anderson 1954). Quartz occurs in plutonic, volcanic, and hypabyssal rocks, where it crystallizes directly from igneous magma, and often forms as geodes, crystal-lined pockets (veins), and as crystal crusts (Prinz et al. 1978). Quartz crystals were often modified by chipping or abrasion, and some may have been used as drills or incising tools (Sayles 1945; Jernigan 1978), or in grinding pigments. Kelley (1984) reports traces of pigments on ground stone. Crystals could have served a similar purpose, or been used additionally in the application of pigment.

A total of 23 shell artifacts were recovered from the Angus site. The eight snail shells were not identified to terrestrial or marine species, and were probably a local resource. Since there is no evidence that they were ground for stringing, as at Wind Mountain (Woosley and McIntyre 1996:266), they may have been brought to the site on items gathered from the nearby river (Murray 1985). The other shell artifacts (n = 15) found on the site were in various ornament manufacturing stages. A total of sixteen ornaments were found, with one not made from a locally available shell; it was an desite (Anderson 1954:92), and the rest were local mussel shell. Most of the shell is probably freshwater mussel originating in the Rio Bonito, which runs 20 m from the south side of the site. The Rio Bonito has no Unionidae population today, although it may have supported one in the past.

The recovered shell was primarily from local freshwater mussels of the Family Unionidae, further identified as *Cyrtonaias tampicoensis* (Tampico pearly mussel) and *Popenaias popei* (Texas hornshell). These species are common to the Rio Grande and its tributaries, and found in the Pecos River (Murray 1985:A-26; Howells et al. 1996:93-94). The larger *C. tampicoensis* is a Rio Grande native (Murray 1985:A-26: Howells et al. 1996:48-50) and may have been misidentified in past literature as *Anodonta grandis* (Howells et al.1996:38) or *Potamilus purpuratus* (Howells et al.1996:50, 100-101). While it is not known if *C. tampicoensis* and *P. popei* lived in the Rio Bonito, their presence in the Pecos and Rio Grande make them a locally available resource.

Freshwater mussel shell has been recovered from all over the Jornada Mogollon area (Jennings 1940:9; Lehmer 1948; O'Laughlin 1981: 144; Southward 1979: 100-101; Kelley 1984; Wiseman 1981:190; Wening 1992; Woosley and McIntyre 1996:261-263). Local freshwater mussel shell has been mentioned from a number of sites all over this region within the same time period. It seems that the local use of mussel shell may have started sometime just before A.D. 1000, and gained in popularity with time. Mussel shell appears to be rather common on Glencoe phase sites (Farwell et al. 1992). Many of these are unmodified whole shells or fragments of worked shell, while others are ornaments. With the wide range of items found, it suggests a trend towards local manufacturing of ornaments.

However, there is a continuing argument about whether these ornaments were of local manufacture or not. Lehmer (1948:20,48) argues that most of the shell ornaments were probably not of local manufacture, and that there was no evidence of manufacturing on-site. Kelley (1984:267) also argues against local manufacturing for the Block Lookout site, where there was a paucity of shell debris on the site. At the Wind Mountain site, Woosley and McIntyre (1996:264) also argue that although there is evidence of local mussel shell ornaments, there was no manufacturing debris, so the residents must have been involved in the trade of these ornaments. Southward (1979:102) points to the large numbers of unmodified mussel shell at the Three Rivers site, suggesting they had no trading contacts for exotic goods. At the Bonnell site (Kelley 1984:339, 428) there is evidence it was a local manufacturing center, with both worked and unmodified mussel shell present. These shells could have been obtained and made into ornaments locally. Although there is evidence for the local collection and modification of freshwater mussel shell, Southward (1979: 101) suggests three models for its procurement: direct access for use or trade, access through trade, and a combination of the two with local access and trade for marine species. Since there was no imported shell on the Angus site, the data suggests that ornaments were manufactured at the site, with the Rio Bonito as the likely source for the mussel shell.

A second argument exists about the role of the mussels as a possible food source. Some argue that most Unionids were used primarily as a foodsource, while the use of the shell for decoration was a minor by-product of food procurement (Southward 1979:101; Murray 1985: A-26). Kelley (1984: 11) argues against mussels (as well as local fish) as part of the subsistence pattern for the Jornada Mogollon. This view seems a little extreme. There is much mussel shell in the archaeological record, and the advantages of utilizing all available local resources for subsistence (including both fish and mussels) seems more likely. I would tend to agree with Wiseman (1981: 193), who considers either use possible.

On the Angus site, the use of *C. tampicoensis* was most common for the production of ornaments. The varying thickness means thinning as well as shaping to remove the outer rough layer, which exposed the nacre, or mother-of-pearl, inner layers. This highly iridescent lining may have been sought in the ornaments. Since there was much more shell than stone found on the site, the residents may have had a preference for this material. There was no evidence for stone ornament manufacturing on the site, so the andesite ring may have been obtained from another local group. Grinding and drilling were the most commonly used methods for manufacture. Since shell is a fairly soft material, ornament manufacture would not have been too difficult or time-consuming, as long as the resource was available.

One of the most interesting ornaments recovered from this site was the fish-shaped pendant. There have been other fish-form pendants found in the Jornada Mogollon: Kelley (1984:11, 108) mentions two fish pendants at the Bonnell site and at other sites of the region. Fish forms were found at Three Rivers (Bussey et al. 1976:117; Southward 1979:100), at the Bradfield site, and Alamogordo sites (Lehmer 1948:48, 62). Shell pendants in the form of fish are not uncommon in the Southwest and are fairly common for the Jornada Mogollon (Lehmer 1948:61-62), and are also found in both the Hohokam and Mimbres areas. This shape may have been borrowed originally from the Hohokam (Jernigan 1978), and adapted stylistically to local forms. These fish pendants may have represented locally available fish from both higher (mountain stream) and lower elevations (Koster 1957; Kelley 1984:11).

Regional Exchange and Trade

In general, a great deal of exchange occurred in Southwestern prehistory, and the likely trade routes have been extensively researched (Brand 1935, 1938; Colton 1941; Tower 1945; Warren and Mathien 1985). These trade routes are often reconstructed based on the locations of river valleys, mountain passes, water sources, easily traveled landscapes, and routes used by ethnohistoric populations. The conjectured routes are also based on the distribution of archaeological materials of obviously exotic origin (Venn 1984), although some exchanges may not be evident if two groups are trading similar items. When cultures interact (exchange material goods) over a lengthy period of time, similar stylistic forms and design elements will develop as one group adapts an idea from another. This can be seen among the Hohokam, Mogollon, and Anasazi, especially among their ornaments (Jernigan 1978; McNeil 1986).

There was much trade of exotic goods in the Southwest (Brand 1935, 1938; Colton 1941; Tower 1945), trade with Mexico through the Mimbres area (Whalen 1987), and with the Hohokam through the Mogollon to the west for shells from the Pacific and Gulf of California (Hayden 1972; McGuire 1992), and other items (Danson 1957; Bronitsky and Merritt 1986). This trade increased after A.D. 900 in the Mogollon area. Several theories have been suggested for long-range commerce (Doyel 1991) among the Mogollon, Hohokam, and Anasazi. Some researchers propose a limited interaction between the Mogollon and the Hohokam, but grudgingly admit to the many similarities between objects found in both areas (LeBlanc 1989). Yet some trade between the two is evident, since intrusive elements appear in both areas. Marine shells were prehistorically available from several sources. The Hohokam were the closest group to the Mogollon and were involved in the trade of shells from sources primarily along the Gulf of California (Hayden 1972; McGuire 1992), and trade between the two cultures has been previously documented (Danson 1957; Bronitsky and Merritt 1986). Trade for shells may have also originated in Mesoamerica, gone north to the Hohokam, and then along the Gila River into the Mimbres Mogollon area (Haury 1936b; Woosley and McIntyre 1996:263). This theory was espoused by DiPeso, who felt that trade routes (Woosley and McIntyre 1996:1-4) and stonework (Woosley and McIntyre 1996:254-258) originated in Mesoamerica, and were spread north along this path. In addition, the Mogollon may have been involved as middlemen in the shell trade between the Hohokam and Anasazi, and into the Mimbres area (Haury 1936b:109; Haury

1976:306-307; Jernigan 1978:211-214). Hohokam shell manufacturing was at its height during the Sedentary period (Haury 1976) at approximately A.D. 900-1100, which coincides with the earliest occupation of the Angus site. If the original idea for the fish pendants did come from the Hohokam, then there may be some validity to some of DiPeso's ideas about trade routes.

During the time of the later occupation at Angus, the cultures throughout the Southwest and Mexico were in transition. Shell from other areas such as the Hohokam, Anasazi, and Mesoamerica may have been difficult to obtain. Whatever the actual cause, there were no marine species of shell recovered from this site. While the Jornada Mogollon certainly had access to other sources of shell, there was no imported (marine) shell present on the Angus site that is commonly found on other Southwestern sites (such as *glycymeris* and *olivella*). Some researchers identify the Jornada Mogollon as a cultural backwater, claiming there was little personal ornamentation in earlier times due to their "remote and isolated position" (Kelley 1984: 49), concluding that they were culturally out of date and fashion compared to surrounding populations. Yet the Jornada Mogollon seem to have had ties to at least the Mogollon, and possibly other groups.

Conclusions

Since the assemblage from the Angus site is small, few hypotheses can be made from the evidence found. It appears there was a local manufacturing strategy for ornament production, with the Rio Bonito as the likely source for the mussel shell, and a dearth of imported shell ornaments that are often found on Jornada Mogollon sites. The only difference between the ornament manufacturing debris found in the pit structure (Area 5000), and the later occupied area of the site is the higher amount of artifacts associated with the later occupation. This seems to indicate that a larger scale of ornament production occurred during the later occupation, with a minimal amount produced during the early occupation. This shell may be part of a local trade network, since no imported items were recovered from the site to suggest that the residents had long-distance contact with other groups. Even though there is increased contact with other cultural populations at this time, the spread of ideas may have been all that these people took from that contact. The only potential evidence for outside trade or contact on the Angus site is the use of a fish form and a rise in the production of shell jewelry. Since this time period was one in which there was increasing movement and contact between cultures, the Jornada Mogollon may have had only an intermittent source for imported shell, so they produced their own ornaments instead.

While it appears that there was no trade with other cultures (i.e., the Anasazi, Hohokam, or Mesoamerican populations) at the Angus site, there may have been local trade occurring with the manufacture of local mussel shell into ornaments. Since there have been reports of other sites in the area without imported shell ornaments, and some evidence for local manufacturing centers, I think the question concerns the extent of trade going on in the area. This assemblage may just represent a local manufacturing and trade network, but it raises questions about local trade as opposed to the regional trade that seems to be fairly common at this time. To determine some of these answers, a study would have to be made as to the extent of the local mussel shell found in the Southwest, with chemical sourcing of shell to better define the sources. Unfortunately, the evidence of shell on this site also does not answer the question as to whether the shell was used as a subsistence item first, and ornament second, or even if it was eaten at all. It does seem that the river was a more important utilized resource than other researchers have concluded. A thorough investigation also needs to be made into the frequency of imported goods versus those locally manufactured, and the extent of the exchange of ideas, technology, and goods that comes with the meeting of several cultures. For improved knowledge on the subject, more ornaments from the region need to be studied, because without more research in this area, we cannot make any conclusions about the extent and nature of contact between cultures.

ANGUS FAUNA

Susan M. Moga and Nancy J. Akins

Introduction

Two sites were excavated near Angus, LA 3334 and LA 111747. The Angus site (LA 3334), a pit structure village, produced 1,030 bone specimens while only 6 bones and 1 partial bobcat skeleton were recovered from LA 111747. The Angus site yielded 33 taxa of animals, birds, and fresh water mussel shell. The majority of the faunal sample consisted of bone from small mammals, which includes an abundance of desert cottontail.

Methods

Analysis was performed on 77.3 percent of the bones recovered from LA 3334 and all from LA 111747. During excavation, ¼-inch screen was used for screening purposes. The screen size is often responsible for altering the sample size of small animals, which have a tendency to fall through the screen. In the laboratory, the bone was wet-brushed and each piece was assigned a lot number for identification.

Faunal information was recorded by coded variables following an established Office of Archaeological Studies (OAS) format. The variables include: site, field specimen (FS) and lot numbers, count, taxon, element (body part), side, portion of the element present, age of the animal, criteria for aging, environmental, animal, and thermal alteration, and evidence of human processing or bone modification.

Identification of the bone was made by utilizing the OAS comparative collection. Sources on New Mexico fauna (Bailey 1971; Findley et al. 1975) were consulted to determine which species inhabit the site area. Descriptions are provided for the fauna represented in the two assemblages.

Taxa Recovered from LA 3334

A description, common name, count, and the estimated minimum number of individuals (MNIs) is provided for each taxon. The MNI is the estimated minimum number of animals represented in a taxon from a specified provenience. Here, the entire assemblage from LA 3334 is considered a single unit for determining the absolute MNI represented. The taxa recovered from LA 111747 will be discussed later in the text as a separate unit.

Unidentifiable Taxa

Six groups of unidentifiable mammals defined by size range are present in the assemblage: small mammals (jackrabbit or smaller), small to medium mammals (dog or smaller), medium mammals (porcupine to dog), medium to large (dog to deer), large mammals (deer size), and very large mammals (bison or elk) (Table 99). The small mammals (n = 198) comprise the largest number of bones in the unidentifiable category. These fragmented pieces of bone are probably rabbit remains considering the number (n = 446) recovered from the site (LA 3334), but prairie dog and gophers cannot be exempted from possibility.

Spermophilus variegatus *(Rock Squirrel)*

Rock squirrels range mostly in the arid and mountainous regions of the southwestern United States and Mexico (Tomich 1982:192). One mature individual was represented by a mandible and two long bones.

Cynomys ludovicinus *(Black-Tailed Prairie Dog)*

Inhabiting the short grass plains of southern New Mexico, prairie dogs in this region become quite fat in fall and hibernate during the coldest months (Bailey 1971:120, 122). A considerable number of prairie dog bones (n = 90) were collected at the site. These bones represent approximately ten individuals, two juveniles, and eight mature animals. Only three bones display evidence of burning.

Thomomys Botta *(Botta's Pocket Gopher)*

Occupying the western edge of the eastern plains of New Mexico, Botta's pocket gopher prefers soils suitable for burrowing. Their pelage correlates to the soil color of their geographic region of habitation (Findley et al. 1975: 144-145). Seventeen bones represent at least one juvenile and three adult

Table 99. Taxa Recovered from LA 3334

Taxa	Common Name	Frequency	Percent
Small mammal	Jack-rabbit or smaller	198	19.2
Small-medium mammal	Dog or smaller	63	6.1
Medium mammal	Porcupine to dog-size	11	1.1
Medium-large mammal	Dog to deer-size	69	6.7
Large mammal	Deer and antelope size	33	3.2
Very large mammal	Bison and elk size	2	.2
Spermophilius variegatus	Rock Squirrel	3	.3
Cynomys ludovicinus	Black-tailed prairie dog	90	8.7
Thomomys Botta	Botta's pocket gopher	17	1.7
Dipodomys ordii	Ord's kangaroo rat	2	.2
Peromyscus sp.	Mice	2	.2
Onychomys leucogaster	Northern grasshopper mouse	1	.1
Neotoma sp.	Woodrats	11	1.1
Ondatra ziebethicus	Muskrat	1	.1
cf. Sylvilagus floridanus	Eastern cottontail	14	1.4
Sylvilagus audubonii	Desert cottontail	328	31.8
Lepus californicus	Black-tailed jack rabbit	104	10.1
Canis sp.	Dog, coyote, wolf	5	.5
Medium artiodactyl	Deer or pronghorn size	18	1.7
Large artiodactyl	Elk or bison size	3	.3
Odocoileus sp.	Deer	3	.3
Odocoileus hemionus	Mule deer	17	1.7
Antilocapra americana	Pronghorn	11	1.1
Bison bison	Bison	1	.1
Large bird	Large hawk	1	.1
Medium-large bird	Crow or larger	8	.8
Eggshell	Eggshell	3	.3
Buteo sp.	Broad-winged hawks	1	.1
Buteo jamaicensis	Red-tailed hawks	3	.3
Falco mexicanus	Prairie falcon	1	.1
Colinus virginianus	Bobwhite	1	.1
Passeriformes	Small perching birds	3	.3
Pelecypoda	Fresh water mussel	2	.2
Totals		1030	100.00

individuals. Most of the bones (n = 13) are fragmented, four are complete, and only one bone was burned, which indicates pocket gophers may have been eaten.

Dipodomys ordii *(Ord's Kangaroo Rat)*

This kangaroo rat is one of the most common and widespread rodents in New Mexico (Findley et al. 1975:174-176). With only two elements recovered, a cranium and a mandible, this mature individual may have been a post-occupational burrower at the site and not a dietary item.

Peromyscus *sp. (Mice)*

Approximately five different species of mice inhabit the site area (Findley et al. 1975:204-224). It is difficult to distinguish between these minute species, therefore, a fragmented maxillary and long bones from a mature individual could only be placed in the P*eromyscus* category. These small creatures probably were intrusive and occupied the pit structure floor space with the inhabitants. The bones were recovered from between the floors of Room 3, Area 7000. One of the specimens is blackened, which may have occurred when the structure burned.

Onychomys leucogaster *(Northern Grasshopper Mouse)*

Inhabiting sandy grasslands and mesquite stands, the northern grasshopper mouse is known for capturing and consuming small invertebrates (Findley et al. 1975:226-228). A complete mandible from a mature individual suggests a post-occupational burrower rather than a food item.

Neotoma *sp. (Woodrats)*

Three species of woodrats are found in Lincoln county: *Neotoma micropus* (Baird's southern plains woodrat), *Neotoma albigula* (white throated woodrat), and *Neotoma mexicana* (Mexican woodrat) (Findley et al. 1975:238-248). The primary difference between these species is the dentition (Hoffmeister and De La Torno 1960:477), which is often lost in the field. Approximately three mature individuals are represented by two cranial fragments and ten mandibles. None of these specimens display thermal alterations, but ten of the specimens were fragmented and only one element is complete. These creatures could have been a food item and ended up in the stew-pot, or else broken through human or other natural endeavors.

Ondatra ziberthicus *(Muskrat)*

The muskrat is widely distributed throughout most of the North American continent (Perry 1982:282). Permanent waterways, such as the Rio Bonito drainage near the Angus site, could support a muskrat population. Only one innominate from a mature individual was collected.

Lagomorphs *(Rabbits)*

Large numbers (n = 446) of rabbit bones were recovered from LA 3334 but none from LA 111747. The species of rabbits recovered from LA 3334, S*ylvilagus floridanus* (eastern cottontail), *Sylvilagus audubonii*, (desert cottontail), and *Lepus californicus* (black-tailed jackrabbit) were distributed throughout the site.

The eastern cottontail (n = 14) was identified by overall size. They are larger than a cottontail, but smaller than a jackrabbit. Driver (1985:13) notes during his comprehensive study of faunal remains from Kelley's Sierra Blanca sites, that the eastern cottontail was probably represented in those assemblages.

Aging of the lagomorphs is based on epiphiyseal fusion, size, and porosity of the compact tissue. The majority (82 percent) of rabbit bones in the assemblage belong to mature individuals, 13 percent were juvenile, and 5 percent immature. Breeding season for cottontails starts in late February or March and extends to September with approximately five litters annually. Jackrabbits breed from January through July with a mean litter size of 2.4, as reported in Arizona (New Mexico Fish and Game n.d.:17, 18; Chapman et al. 1982:94-96, 128-129). The reported litter size varies between authors.

Rabbits comprise the largest number of bones in the assemblage. Large numbers of cranial fragments, mandibles, scapulas, innominates, and long bones are present, with lower amounts of other elements (Table 100). The high frequencies and diversity of elements indicate rabbits provided a significant portion of the inhabitants' subsistence base. Only 22 of the 426 (19 percent) rabbit bones are burned. There are no obvious signs of human processing, but 85 percent (n = 378) of the rabbit bones are fragmented, and only 15 percent (n = 68) were

Table 100. Completeness of Taxa at LA 3334

Common Name	Indeterminate	Complete	>75% Complete	50-75% Complete	25-50% complete	<25% Complete
Small mammal		3	1	1	8	185
Small-medium mammal						63
Medium mammal					1	10
Medium-large mammal	2				2	65
Large mammal					2	31
Very large mammal						2
Rock squirrel		1	1		1	
Black-tailed prairie dog		27	17	4	27	15
Botta's pocket gopher		4	2	5	4	2
Ord's kangaroo rat			1			1
Mice						2
Northern grasshopper mouse		1				
Woodrats		1	1	2	2	5
Muskrat			1			
Eastern cottontail		4			9	1
Desert cottontail		50	39	22	156	61
Black-tailed jack rabbit		14	2	3	34	51
Dog, coyote, wolf		2		1	1	1
Medium artiodactyl			1		1	16
Large artiodactyl						3
Deer		1				2
Mule deer		5		2	4	6
Pronghorn		2			3	6
Bison						1
Large bird						1
Medium-large bird	1				3	4
Eggshell						3
Broad-winged hawks		1				
Red-tailed hawk		1			2	
Prairie falcon					1	
Bobwhite		1				
Small perching birds			1	1		1
Fresh water mussel						2
Total	3	118	67	41	261	540

complete specimens (Table 100).

The absence of bone alterations could imply that rabbits were cooked in a stewpot, possibly with agricultural items or wild plants. The head and entrails were removed as well as the pelage. The pelage was probably used for other utilitarian purposes. Similar subsistence patterns, with an abundance of rabbit bones and no apparent signs of human butchering, were observed at other prehistoric sites in the Sacramento foothills. These include the southern locus of the Crockett Canyon site (LA 2315, Speth and Scott 1985:140), the Bonnell site (Kelley 1984:433-434; Speth and Scott 1992:271), and the Peñasco site (Driver l985:51).

Canis *sp. (Dog, Coyote, Wolf)*

Four immature specimens and one mature caudal vertebra are similar in size and attributes to dog or coyote. None of the specimens are burned, but two bones exhibit pitting and root etching.

Medium Artiodactyl (Deer or Pronghorn)

Eighteen fragmented bones probably are from either deer or pronghorn, but none exhibit distinct attributes that allow assigning them to a species. The faunal remains include fragmented portions of a sacrum, rib, long bones, and phalanges. Interestingly, this small number of bones represents four individuals. The age range includes neonate, immature, juvenile, and an adult. The neonate suggests the site was a late spring or summer habitation because deer and antelope are born in June in New Mexico (Mackie et al. 1982:867).

Large Artiodactyl (Elk or Bison Size)

Three large bones, a flat bone fragment, and two cranial fragments from one mature animal could not be specifically identified. However, these are probably bison because of the size of the bone. One bison tooth was identified in the faunal assemblage, so it is feasible these bones are bison and not elk.

Odocoileus *sp. (Deer)*

This category includes *Odocoileus hemionus* (mule deer) and *Odocoileus virginianus* (white-tailed deer). The white-tails inhabit riparian woodlands and are smaller in stature than mule deer, which inhabit a more diverse range of environments (Findley et al. 1975:328, 332). Three fragmented bones, phalanges, and a humerus, from a mature individual could not be assigned to either species. The small size of the specimens could possibly reflect sexual dimorphism or regional variation between the two species.

Odocoileus hemionus (Mule Deer)

Mule deer range throughout most of New Mexico except for the eastern grasslands (Findley et al. 1975:328). Sexually mature at approximately one and a half years of age, yearlings can produce a single offspring and adult females typically conceive twins (Mackie et al. 1982:867). Three bones from a juvenile and a variety of other bones (n = 14) indicate at least one mature animal is present in the assemblage. A mandible fragment exhibits an impact fracture, but none were visible on the long bone fragments. Only two bones exhibit signs of burning.

Antilocapra americana *(Pronghorn)*

Pronghorns inhabit open grasslands and both males and females have horns (Findley et al. 1975:333). Females are sexually mature at 16 months of age. Like the mule deer, pronghorns commonly give birth to twins (Kitchen and O'Garcia 1982:963). Several fragmented elements (n = 11), including a scapula, long bones, and foot bones, represent at least one mature individual.

Bison bison *(Bison)*

Prehistorically, hunters living in the Sierra Blancas could have participated in long-distance hunting expeditions or traded for bison meat. The Bloom Mound site, east of Angus, has been suggested to be a trade center because of the unusual variety of artifacts that were recovered. The quantity of artifacts was thought to be too vast for the size of the estimated population at Bloom Mound (Kelley 1984:461). Situated at the convergence of the Pecos and Hondo rivers, the Bloom Mound site was an ideal location for Southwesterners and Plains people to trade.

Trading of bison meat, agricultural produce, and other commodities was probably feasible for the inhabitants of these regions (Driver 1985:60-61). Only a fragmentary (25 percent) bison tooth was recovered at the Angus site; therefore, it is difficult to determine to what extent bison was utilized at LA 3334, especially if the bison meat was deboned before transport to trade sites.

Birds

A small number (n = 18) of bird bones was collected at LA 3334. The one large and eight medium to large bird bones are so fragmented they could not be assigned to a species. Even though *Meleagris gallopavo* (turkey) was not evident in this assemblage, most of the surrounding sites contained turkey bone. Today, the main turkey population resides in the Sacramento highlands (Hubbard 1978:20). Three eggshell fragments may belong to either turkey or another large bird.

Buteo *sp. (Broad-Winged Hawks)*

This group of hawks is characterized by their broad wings, wide tails, and soaring movements (Ligon 1961:63). One complete phalanx from a mature individual is in the *Buteo* sp. size range.

Buteo jamaicensis *(Red-Tailed Hawk)*

Redtails are the most widely distributed of the *Buteo* hawks in New Mexico. They prey on rodents, squirrels, and rabbits (Ligon 1961:64). A phalanx, furculum, and carpometacarpus from at least one mature individual are represented in the assemblage.

Falco mexicanus *(Prairie Falcon)*

A swift flying bird, the prairie falcon covers open-county capturing insects, lizards, small mammals, and has a preference for ground squirrels (Ligon 1961:78; Clark and Wheeler 1987:115). A femur from a mature individual, which was 50 percent present, was identified as prairie falcon.

Colinus virginianus *(Bobwhite)*

Residing in the eastern portion of New Mexico, bobwhites are found near weed and brush covers (Ligon 1961:94). One complete tibiotarsus is attributed to a mature individual.

Passeriformes (Small Perching Birds)

This family encompasses an innumerable variety of very similar small birds making it is extremely difficult to identify any to the species level. One fragmented long bone from a juvenile individual, and a fragmented ulna and a long bone from a mature bird were placed in this category.

Pelecypoda *(Fresh Water Mussel)*

Only two small mussel shell fragments were included in this analysis at LA 3334. One shell came from the general fill of an excavated grid (Area 8000). The other piece was in a posthole in Room 1 (Area 7000). This shell fragment may have been intended as an offering. Other mussel shell fragments that may be ornaments are described elsewhere.

LA 3334 Proveniences

Fauna was recovered from 13 different proveniences at LA 3334, a few of which contained features. Table 101 gives the frequency for each taxon recovered in the 13 designated proveniences. The pit structure in Area 5000 produced the largest number (n = 485) of faunal remains, with an abundance of cottontail bones.

Taphonomy

Surface modifications of the faunal remains from the two sites (LA 3334 and LA 111747) indicate various degrees of environmental, animal, or thermal alteration. A large portion (37 percent or n = 380) of the total faunal assemblage (n = 1,037) exhibits taphonomic alterations.

Environmental alterations can modify bone through exposure to sun, moisture, and temperature change (Marshall 1989:19-20). Overexposure leads to various degrees of pitting, sunbleaching, or exfoilation. A total of 79 bones are pitted, giving the bones a sand-blasted appearance, and 26 have fine, cracked lines in the external compact tissue, which is called checking or exfoilation. Only five bones are sunbleached, appearing white in color, and usually exhibit some degree of exfoilation.

The largest category of environmental alteration is root etching, which occurs on buried bone. Roots of plants excrete humic acid and when they come in contact with bone, the roots dissolve the adjacent bone (Lyman 1994:375). Root etching was found on 127 bones (8 percent) from LA 3334.

Animal alteration on faunal remains at LA 3334 includes gnawing and puncture marks made by rodents and carnivores (Table 102). Four large mammal fragments and two pronghorn bones display

Table 101. Taxa by Provenience at LA 3334

Common Name	General Fill			
	Area 3000	Area 5000	Area 7000, Room 1	Area 8000
Small mammal	8	1		11
Small-medium mammal	2			
Medium mammal				
Medium-large mammal	5	1	1	2
Large mammal	8	1		2
Very large mammal				
Rock squirrel	1			
Black-tailed prairie dog	16	1	2	5
Botta's pocket gopher	4	1		2
Ord's kangaroo rat				
Mice				
Northern grasshopper mouse				
Woodrats	1			
Muskrat				
Eastern cottontail				3
Desert cottontail	38	6		8
Black-tailed jackrabbit	7	4		1
Dog, coyote, wolf		1		1
Medium artiodactyl	2	1		1
Large artiodactyl				
Deer				
Mule deer		1		3
Pronghorn				
Bison				
Large bird				
Medium to large bird				
Eggshell				2
Broad-winged hawks				
Red-tailed hawk	1			
Prairie falcon	1			
Bobwhite				
Small perching birds	1			1
Mussel				1
Total	95	18	3	43

Common Name	Feature Fill				
	Area 300 Large Storage Pit	Area 3000	Burial Area 5600	Area 5000	Area 7000 Room 2
Small mammal		28		1	51
Small-medium mammal		5			5

Common Name	Feature Fill				
Medium mammal		6			2
Medium-large mammal		14	1	1	9
Large mammal	2	7			4
Very large mammal					
Rock squirrel		2			
Black-tailed prairie dog	4	30	1	1	1
Botta's pocket gopher	1	4			1
Ord's kangaroo rat					1
Mice					
Northern grasshopper mouse		1			
Woodrats				1	2
Muskrat		1			
Eastern cottontail	3	2	1		1
Desert cottontail	5	132	4	6	5
Black-tailed jackrabbit	3	52		1	1
Dog, coyote, wolf					
Medium artiodactyl		9	1		2
Large artiodactyl					
Deer	3				
Mule deer	1	6	1		2
Pronghorn		5		2	
Bison		1			
Large bird		1			
Medium to large bird		1	1		
Eggshell					1
Broad-winged hawks				1	
Red-tailed hawk		1			
Prairie falcon					
Bobwhite				1	
Small perching birds					
Mussel					
Total	22	308	10	15	88

.

Common Name	Feature Fill					
	Area 7000 Room 3	Area 7500 Postholes	Surface Room 7600	Area 7000 Room 1	Area 8000	Pit structure 8400
Small mammal	1	1	7		13	
Small-medium mammal			3		2	
Medium mammal						

Common Name	Feature Fill					
Medium-large mammal	8		1			1
Large mammal	1					
Very large mammal						
Rock Squirrel						
Black-tailed prairie dog	3		2			
Botta's pocket gopher	2					
Ord's kangaroo rat						
Mice						
Northern grasshopper mouse						
Woodrats			1		1	
Muskrat						
Eastern cottontail	2					
Desert cottontail	3					1
Black-tailed jackrabbit	2					
Dog, coyote, wolf			2			
Medium artiodactyl						
Large artiodactyl				3		
Deer						
Mule deer	3					
Pronghorn	2					
Bison						
Large bird						
Medium to large bird			1			
Eggshell						
Broad-winged hawks						
Red-tailed hawk						
Prairie falcon						
Bobwhite						
Small perching birds						
Mussel						
Total	27	1	17	3	16	2

Common Name	Roof fall	Floor			
	Area 7000 Room 2	Area 3000 Pit structure	Area 7000 Room 2	Area 7000 Room 3	Area 3000 Upper Surface
Small mammal	1	19		6	10
Small-medium mammal					1
Medium -large mammal	1	7		2	
Large mammal	2	1	2		2

Very large mammal	2				
Black-tailed prairie dog	1	4			4
Mice		1		2	
Eastern cottontail		1			
Desert cottontail		11			7
Black-tailed jackrabbit		5		1	3
Dog, coyote, wolf		1			
Medium artiodactyl		2			
Mule deer			1		
Pronghorn					1
Medium-large bird		1			
Red-tailed hawk					1
Passeriformes				1	
Total	7	53	3	12	29

Common Name	**Subfloor**				
	Area 7000 Room 2 Posthole 5	**Area 7000 Room 1 Posthole 2**	**Area 7000 Room 3 Adult Burial Pit**	**Area 7000 Room 3 Infant Burial Pit**	**Area 7000 Room 3 Storage Pit 2**
Small mammal	3	7	6	3	3
Small-medium mammal	3	2	36	1	3
Medium mammal			2	1	
Medium-large mammal		3	9		2
Very large mammal					
Black-tailed prairie dog			1		1
Botta’s pocket gopher			1		1
Woodrats	1		1		
Desert cottontail	2		4		
Medium-large bird					1
Mussel		1			
Total	9	13	60	5	11

Common Name	**Fill Between Surfaces 1 and 2**	**Surface 2**
	Pit structure 3000	**Pit structure 3000**
Small mammal	17	1
Medium-large mammal		1
Large mammal	1	
Black-tailed prairie dog	11	2
Woodrats	3	
Eastern cottontail	1	
Desert cottontail	88	8

Common Name	Fill Between Surfaces 1 and 2	Surface 2
Black-tailed jackrabbit	24	
Medium-large bird	3	
Total	148	12

carnivore gnawing. Carnivores generally start gnawing on the soft cancellous ends of large mammal long bones and then proceed to gnaw the harder shaft (Binford 1981: 46). For this reason, puncture marks produced by carnivores are usually located near the proximal or distal ends of a bone. Four rabbit bones and one deer bone have puncture marks. These specimens were recovered from the fill of a storage pit, a pit structure, and an excavated grid area. Rodents create parallel grooves with their chisel-like incisors on bone shafts and edges (Fisher 1995:40). One rabbit bone and a pronghorn fragment from the feature fill of Rooms 2 and 3 display rodent gnawing.

Thermal alterations are visible on 133 bones (13 percent) from LA 3334 (Table 103). On the southern site, LA 111747, bones are completely devoid of burning. The burned bones display a range of thermal intensity. A good number (n = 35) of bones are lightly scorched or tan in color from superficial burning and 30 bones range from light to heavily charred. Heavily charred bone is produced by excessive heat. The collagen in the bone becomes carbonized and bone turns black. The majority of blackened bone (n = 44) is from small mammals, probably rabbits, and medium to large mammals, which are probably deer or pronghorn. These remains can become blackened through a variety of events, being tossed directly in to the fire after a meal, during processing, clean-up, or they could have been burned at the time the pit structure was burned. Four small- to large-sized mammal bones were classified as heavily burned to calcined. Carbonized (black) bone will become calcified (white) through excessive and continuous direct or indirect heat (Lyman l994:384-385). Twenty bones are calcined, including 1 rabbit bone and 19 small mammal bones, which once again is probably rabbit and cooking refuse.

Processing

Evidence of human processing of bones is minimal in this assemblage. At LA 3334, impact fractures are present on several fragments, indicating disarticulation of a carcass or extracting marrow from the bones. Evidence of impact fractures are visible on a medium to large mammal rib, an anterior mandible, and metatarsal from a mule deer, a metatarsal from a medium artiodactyl, and a scapula, femur, and two metacarpals from pronghorn.

Cutmarks are trademarks of defleshing the bone or dismembering a carcass. Two vertebrae from a mule deer, one thoracic and one lumbar, display random cutmarks. The distal humerus of an antelope has both transverse cut marks and percussion striations. The striations resulted from a portion of the bone being impacted by an instrument that slid across a surface, creating striations on the bone.

With the high frequencies of rabbit bones utilized at LA 3334 some degree of bone breakage must have taken place during the cooking process. But, it is impossible to differentiate whether most breakage occurred intentionally, or the bones were thrown on the ground and fractured by human trampling. Trampling on bone by humans produces spiral fractures, flaking, splintering, striations, and polishing (Marshall 1989:19).

Table 102. Animal Alteration by Provenience at LA 3334

FEATURE	LEVEL	ABSENT	CARNIVORE GNAWING	CARNIVORE TOOTH PUNCTURE	RODENT GNAWING	TOTAL
AREA 300						
Large Storage Pit	Feature fill	20		2		22
AREA 3000						
Area 3000	General fill	396	5	2		404
	Utilized Surface 1	53				53

FEATURE	LEVEL	ABSENT	CARNIVORE GNAWING	CARNIVORE TOOTH PUNCTURE	RODENT GNAWING	TOTAL
	Surface features	29				29
	Fill between Surfaces 1 and 2	148				148
	Utilized Surface 2	12				12
AREA 5000						
Area 5000	General fill	18		1		19
Burial Pit	Feature fill	2				2
	Feature fill	8				8
AREA 7000						
Room 1	General fill	3				3
	Feature fill	3				3
Room 1 Posthole 2	Feature fill	13				13
Room 2	Feature fill	87			1	88
	Roof fall	7				7
	Floor	3				3
Room 2 Posthole 5	Subfloor	9				9
Room 3	Feature fill	25	1		1	27
	Floor	6				6
	Subfloor	6				6
Room 5	Feature fill	17				17
Possible Ramada Area	Subfloor	1				1
AREA 8000						
Area 8000	General fill	42				42
	Feature fill	16				16
Pit Structure	Feature fill	2				2

Table103. Taxa with Thermal Alterations at LA 3334

Common Name	Light/ Scorch	Light to Heavy	Heavy (Black)	Heavy to Calcined	Calcined (white)
Small mammal	13	10	11	1	17
Small to medium mammal	6		3		1
Medium mammal	2	1	1	1	
Medium to large mammal	4	4	15	1	1
Large mammal		1	4		
Very large mammal				1	
Black-tailed prairie dog	2	1			
Botta's pocket gopher		1			
Mice			1		
Desert cottontail	3	4	6		1
Black-tailed jackrabbit	5	2	1		
Medium artiodactyl		1	1		
Deer		2			
Mule deer		1	1		
Bison		1			
Medium to large bird		1			
Totals	35	30	44	4	20

Bone Tools

Fifteen bone tools were recovered from six different proveniences at LA 3334. The small site, LA 111747, lacked bone tools. None of the tools from LA 3334 are complete, although one tool is nearly complete, five are fragmented, five are incomplete, and four are distal fragments.

The fill in the pit structure in Area 5000 contained the greatest quantity (n = 5) of tools. A bead fragment, an indeterminate tool fragment, which is heavily burned, and three fine-tipped awl fragments, two of which appear to be expediently-made splinter awls, were recovered. This featurealso contained the largest sample of faunal remains. Ninety-five bones were recovered from the general fill, 308 from the feature fill, and 82 from the lower levels.

Room 2 (Area 7000), produced the next largest number of tools (n = 4), all of which are lightly (tan) to heavily (black) burned. Three tool fragments from feature fill may be portions of awl handles along with a single bone bead or tube fragment recovered from roof fall.

A small section of antler tine was recovered from the burial pit fill (Area 5000). The tip is blunt, with several cut marks just below the blunted area. Unsure of its function, it was recorded as a tool fragment. Kelley (1984:428) collected two antler tines with the same attributes from the Bonnell site and labeled them antler punches. Kidder (1932:278-280) recovered the same type of tool implements at Pecos and suggested the tips were modified by use rather than shaping. He further indicated the tines were used for polishing or rubbing soft materials, possibly leather, which created polished tips through repetitious utilization. The Crockett site (LA 2315) also produced two antler tine tools from a pithouse. One tine has a blunt and polished tip and the other tine exhibits gouging and striations, which flattened the tip. This tine was probably utilized as a pressure flaking tool (Farwell et al. 1992:113).

A portion of a pronghorn metacarpal was classified as manufacturing debris with grooves, indicating the element was split, probably for manufacture of a tool. The remaining three features, a large storage pit (Area 300), and the surface room (7600) produced only one tool fragment each with

Table 104. Bone Tools Recovered from Features at LA3334

Feature	Level	Tool type	N=	Thermal Alteration
Area 300-Large storage pit	Feature fill	Fragmented awl	1	
Pitstructure (3000)	General fill	Fine pointed awls	3	
		Tool fragments	1	Heavy (black)
	Fill between surfaces 1 and 2	Bead	1	
Area 5000-Excavated grids	General fill	Tool fragment (antler tine)	1	
		Manufactured debris with grooves	1	
Room 2 (Area 7000)	Feature fill	Tool fragments (handle fragments)	2	Light to heavy (tan to black)
		Tool fragments	1	Heavy (black)
	Roof fall	Bead or bone tube	1	Heavy (black)
Room 3 (7002)	Feature fill	Tool fragment	1	Heavy (black)
		Tool fragment	1	Heavy to calcined (black to white)
Surface Room (7600)	Feature fill	Tool fragment	1	Heavy (black)
Total			15	

two tool fragments in Room 3 (7200) that display heavy burning. These tools were recovered from feature fill (Table 104).

LA 111747

This small site, a ceramic and lithic scatter, dates to the Early Glencoe phase (A.D. 1100- 1300). It produced only five fragmented bones and a near complete, juvenile *Felis rufus* (bobcat) skeleton (Table 105). The five fragments, all from mature individuals, were identified as medium to large mammal, large mammal, *Thomomys Botta* (Botta's pocket gopher), and *Odocoileus hemionus* (mule deer). None of these specimens display evidence of animal or thermal alterations. All the species, except the pocket gopher, are environmentally altered, either by pitting or exfoliation.

The bobcat skeleton recovered from Level 1 was probably from a recent trapping episode or road kill. Several of the metacarpals were snapped in half, suggesting trapping. Bobcats have been exploited for their pelage since the settlement of North America. Their pelage is short, dense, and very soft. Coloration range is either a yellowish or reddish brown with streaks or spots of black or brown. Bobcats prey basically on mice, rabbits, and deer (McCord and Cardoza 1982:730, 747, 757), all of which inhabit the site area and are also frequent road kills that attract predators like bobcats. The frequency of bobcats in this location, in pursuit of their prey, may have promoted their commercial exploitation for pelage purposes.

Table 105. Taxa Recovered from LA 111747

Taxa	Common Name	Number
Medium to large mammal	Dog to deer size	1
Large mammal	Deer and antelope size	1
Thomomys botta	Botta's pocket gopher	1
Felis rufus	Bobcat	1 skeleton
Odocoileus hemionus	Mule deer	2
Totals		6

Discussion

Faunal evidence in the form of medium-sized artiodactyl (deer and pronghorn) fragments suggests that the Lincoln phase inhabitants to the north consumed more meat than the southern Glencoe phase communities. The northern grasslands were occupied by herds of pronghorn that the inhabitants exploited, whereas the southern communities hunted more deer (Driver 1985: 58). Large artiodactyl (bison-size) proportions in the assemblage are small and bison smaller still. These could have been obtained through long-distance hunting expeditions or through trade (Driver 1990:253). The relative contribution of the medium and large-sized artiodactyls is difficult to measure. Since bison probably did not occur in the Sierra Blanca region prehistorically, it would have had to have been transported to the site. Quantities of preserved bison meat could have entered a site leaving little archaeological evidence (Driver 1985:60).

Carbon-isotope analyses of human collagen from a number of Sierra Blanca region sites indicate the inhabitants were horticulturalists who relied heavily on corn (Driver 1990: 246). The animal component of the diet was obtained from a number of sources. Small mammals were hunted nearby, medium artiodactyls at a greater distance, and large artiodactyls were acquired through trade or long-range hunting expeditions. The relationship between agricultural cycles and hunting schedules was undoubtedly complex (Driver 1985: 60-6l). In the spring, when the corn surplus was depleted and crops were being planted, animal protein probably supplemented their diet. This could have been in the form of exploiting the local small mammals, through scheduled hunts when labor was available, or through trade, if there was a commodity to trade during the lean period. This could have been in the form of more intensive exploitation of the local small mammals, using alternative resources such as fish, or a more specialized strategy of taking greater proportions of larger, higher-yield animals, such as deer or pronghorn (Speth and Scott 1989:78).

The faunal assemblage from LA 3334 differs somewhat from other Sierra Blanca region sites. As Table 106 shows, the lagomorph index, a gauge of the relative proportion of cottontails and jackrabbits, falls within the range observed at other sites in the area. However, the artiodactyl index, which compares the amount of artiodactyls with lagomorphs, is well below those reported elsewhere. Relative proportions of deer and pronghorn are consistent with other southern sites.

Table 106. Comparative Lagomorph and Artiodactyl Indexes

Locale	Sites	Lagomorph Index	Artiodactyl Index
Northern sites:	Phillips	.75	.89
	Block	.73	.93
	Hiner	.60	.93
	Bloom	.70	.67
Southern sites:	Bonnell	.86	.54
	Peñasco	.46	.77
	LA 2315S	.70	.72
	LA 3334	.77	.26

Sources: Driver 1985:46; Speth and Scott 1992:297
Lagomorph index = cottontail + jackrabbit + lagomorph divided by cottontail
Artiodactyl index = total lagomorphs + total artiodactyls (and large mammals) divided by artiodactyls (and large mammals)

Most sites were sampled similarly, screened through ¼-inch mesh, so that collection procedures should not account for the low artiodactyl indexes. The high proportion of lagomorphs implied by this index has several implications. Abundant lagomorphs suggest that the primary strategy represented in this assemblage is garden hunting. Agricultural plots not only attract and increase the biomass of some animals, but hunting nearby also eliminates seasonality and scheduling problems (Speth and Scott 1989:74). A strategy based largely on garden hunting could suggest the occupation was of limited duration or even seasonal. The few artiodactyl bones found indicate some hunting of larger mammals, and the single bison tooth indicates the possibility of trade, but certainly not on the same scale as other Sierra Blanca region sites.

ANGUS HUMAN REMAINS

Nancy J. Akins

Recent excavations at LA 3334 recovered three primary burials and several disarticulated and scattered individuals. These were analyzed following procedures set out in *Standards for Data Collection from Human Skeletal Remains*, designed for the systematic and uniform collection of the data needed to learn about the demography, health, interment procedures, diet, and genetic relationships of prehistoric peoples (Buikstra and Ubelaker 1994:4). Appendix 2 contains summaries of the demographic, paleopathological, and other information for each individual. This chapter discusses the results of the analysis at the population level.

Demographic Characteristics

At least eleven individuals are represented by the human bone from LA 3334. Those recovered as burials include an older male (50+) from Feature 5002, a young female (18-22) from Room 3, an older female (50+) from Room 2, and a newborn or infant (newborn to 6 months) from Room 3. In addition, two elements of a fetus or newborn were recovered with the young female, another older male (45+) was scattered throughout Feature 3000, at least two children (1.5 to 2.5 years of age) were scattered throughout Room 3 and the general area, and at least one adult female was scattered in Rooms 1, 2, and 3. An occipital base fragment from another 1.5- to 2.5-year-old child was recovered from Feature 5000, as were two adult parts. Finally, pieces of a cranium from a child about one to two years of age were found in the previously excavated kiva.

The age and sex distribution is consistent with that expected in archaeological contexts, that is, those individuals most at risk–older individuals (n = 3), infants and children (n = 6), and occasional females dying during childbearing years (n = 1). Before the advent of antibiotics, infant deaths were most often caused by respiratory infection and gastroenteritis while mortality in young females was often related to complications associated with childbirth (Roberts and Manchester 1995: 24-25). Large proportions of infants and children are common in archaeological populations where, in general, between 30 and 70 percent die before the age of 15 (Buikstra and Mielke 1985:399).

In this population, more than half are infants. While this seems high, it could also reflect burial practices where adults were formally buried and infants and children were not. With the possible exception of one infant, those recovered are represented by a few elements found scattered as though they had not been formally buried and were more vulnerable to dispersal from human and animal activity. This wide distribution makes it more likely that parts of young individuals are found in any particular excavation unit.

General Indications of Health

Human bones and teeth reflect conditions during life as well as at death (Goodman 1993:282). Several indicators of physiological stress are routinely monitored to assess general health. These include adult stature, which may be a response to undernutrition, and subadult size, which can indicate the timing of stress events. Sexual dimorphism tends to decrease with increased stress, or over time, with greater divisions of labor. Enamel defects, hypoplasias or pitting, are associated with specific physiological disruptions and can be relatively accurately assigned an age of onset. Dental asymmetry begins in utero and reflects developmental stress while dental crowding can be nutritional or genetic. Dental caries reflect refined carbohydrates in the diet and can lead to infection and tooth loss. Dental abscesses can become systemic and life-threatening. Osteoarthritis and osteophytosis can indicate biomechanical stress. Osteoporosis, related to calcium loss and malnutrition, can be acute to severe during pregnancy and lactation and can affect the elderly. Porotic hyperostosis is related to iron deficiency anemia and leaves permanent markers. Periosteal reactions result from chronic systemic infections (Martin 1994:94-95).

Although the LA 3334 population is much too small to infer specific patterns of health for this site or time period, some suggestions can be made. In addition, the resulting data contributes to building a regional database.

Size and Dimorphism

Chronic nutritional stress during early childhood can retard growth rates, prolong skeletal maturation, and result in reduced body size. Improved nutrition later in childhood or adolescence can allow some catch-up growth, depending on the age when nutrition improves. Chronic nutritional stress reduces body size at all ages (Powell 1988: 39). Diets high in vegetable foods can produce serious deficiencies in important nutrients. Combining maize and beans results in more usable protein than either would alone. Even small amounts of meat further promotes the value of the vegetable proteins by supplementing amino acid levels and composition (Powell 1988:36).

Unfortunately, none of the infants in this collection are complete enough to compare ages estimated from genetically more stable dental calcification and eruption with those based on long bone length. The latter are not as exact because of differences in growth rates among populations (Ubelaker 1978:46-47) and their susceptibility to nutritional stress. There is a hint that dental ages are greater than those based on size for at least some in this population. Although we cannot be certain that the same individual is represented, the mandible from a child found in the Room 3 area is aged 3 ± 1 year while the long bones are comparable with a 1.5 to 2.5-year-old Anasazi child aged by dentition.

Adult size and dimorphism can be evaluated, although such a small sample may not be representative of the area or even the site as a whole. During the analysis, my impression was that the two fairly complete females (Burials 1 and 2) are quite small and the male (Burial 4) fairly large. Table 107 compares size measurements for selected elements with those from several very different Southwestern populations. The Henderson site, near Roswell, is a late prehistoric village of about 60 contiguous adobe rooms dating A.D. 1275 to 1350. Its occupants were semisedentary farmers and hunters (Rocek and Speth 1986; Speth 1997:3). Gran Quivira, one of the Salinas Pueblos, was a large protohistoric and early historic site located in an area that was relatively unfavorable for agriculture. The population may have relied more on hunting than many groups, while trading wild resources for corn and cotton with the Rio Grande pueblos (Hayes et al. 1981a:10-11). LA 3333, in the Galisteo Basin, represents a fairly mobile group who may have occupied the area on a seasonal basis and dates to the early A.D. 1200s (Akins 1996). The La Plata burials are from 11 sites along the La Plata River in the San Juan Basin of northwestern New Mexico. Most date between A.D. 1075 and 1300. La Plata is the most sedentary and corn-dependant population in this small sample. Henderson, Gran Quivira, and Galisteo represent varying degrees of mobility.

The Angus females are on the small end of the spectrum for length and some diameter measurements. The Angus male falls more towards the middle of the male range except that the humerus is short and the anterior-posterior tibia diameter is large (Table 107). In the Angus sample, sexual dimorphism is greatest in measurements of the tibia shaft with no other group having indices that high for any measurement (37.0 and 30.0). In the other groups, the highs tend to be in the joint surface measurements or the femur diameter. Some of this is undoubtedly due to the very small sample of individuals contributing to the Angus means (n = 1 to 2). However, the numbers and indices do suggest that these two females are relatively small, especially when compared to the single male from the site.

All groups have relatively high dimorphism indices for femur and tibia diameters indicating leg strength was greater for males than females in all groups. Only the La Plata females show a major commitment to corn grinding as seen in the strength of the upper arm where the females average 4 mm larger than males in maximum humerus diameter. The other groups have fairly low and comparable indices.

Femoral diaphysis shape indices, the ratio between anterioposterior and mediolateral dimensions, are high in hunter-gatherer males. With decreased mobility, femoral diaphyses shapes become more circular as reflected in low shape indices (Bridges 1996:118). Changes in shape occur when high levels of mechanical loading cause new bone to be added or redistributed to counteract resulting strain (Bridges 1989:387). Flatness (high indices) reflects the general level of mechanical stress on the leg (Larsen and Ruff 1991:103).

When compared to other Southwestern populations (Table 107), the femoral shape index for the Angus burials most resembles that for La Plata, the most sedentary. This suggests that the Angus individuals were not as mobile as those from Henderson or Galisteo, comparable measures are not available for Gran Quivira. Tibia shape indices are fairly flat for all of the populations and vary considerably from the femoral indices.

Table 107. Comparative Measurements (mean in mm) and Dimorphism and Shape Indices

MEASUREMENT	ANGUS (LA 3334)			HENDERSON			GRAN QUIVIRA			GALISTEO (LA 3333)			LA PLATA		
	female	male	INDEX	female	male	INDEX	female	male	INDEX	female	male	INDEX	female	male	INDEX
Femur: bi length	386			394	463	17.5	396	423	6.8	401	433	8.0	395	419	6.2
Head diameter	40	16	15.0	40	49	22.5	39	45	15.4	40	44	11.8	38	44	14.1
AP diameter	23	28	21.7	26	32	23.1				25	30	17.9	23	25	10.1
Tiba; length	318			241	388	13.8	332	365	9.9	340	366	7.6	326	352	8.0
AP dia at nut for	29	40	37.9	35	39	11.4				30	36	17.8	28	34	20.7
ML dia at nut for	20	26	30.0	20	24	20.0				19	21	11.5	18	20	15.1
Humerus: length	280	296	5.7	283	328	15.9	282	306	8.5	283	315	11.3	286	315	10.1
Head diameter	39	45	15.4	38	47	23.7	38	45	18.4	39	44	14.2	37	44	19.2
Maximum diameter	21	23	9.5	22	24	9.1				21	23	10.1	27	21	-21.8
Minimum diameter	15	17	13.3	14	16	14.3				13	16	17.0	14	15	12.3
Femur shape	1.4	1.00		1.12	1.27					1.14	1.16		1.03	1.00	
Tibia shape	1.51	1.54		1.79	1.65					1.64	1.70		1.64	1.67	

Indices= (male mean -female mean) X 100 ÷ female mean (Powell 1988:185)
Shape indices = anterioposterior diameter ÷ mediolateal diameter (Bridges 1996:118)

Source: Angus, Appendix 2-3
Henderson: Rocek and Speth 1986:184-185
Gran Quivira : Reed 1981:191, 195
La Plata and LA 3333: Akins 1995

Table 108. Estimated Age for Development of Enamel Hypoplastic Defects

BURIAL	TOOTH	DEFECT	AGE (Years)
1	Left maxillary central incisor	linear pits	3.0
	Left maxillary canine	nonlinear pits	3.7
2	Right maxillary molar 2	single pit	6.2
	Right maxillary molar 1	single pit	2.6
	Right maxillary premolar	single pit	3.9
	Right maxillary lateral incisor	single pit	4.1
	Right maxillary centra incisor	single pit	2.3 and 1.8
	Left maxillary central incisor	single pit	2.6
	Left maxillary lateral incisor	single pit	1.8
	Left maxillary canine	linear horizontal groove	3.5 and 4.0
	Left maxillary molar 2	single pit	3.6
	Left mandibular canine	single pit	4.9
	Right mandibular canine	singe pit	4.5
4	Left mandibular canine	linear pits	4.1
	Right mandibular canine	linear pits	4.4
		single pit	5.3

Dentition

Teeth provide information on health, diet, disease, and genetic affiliation. Systemic stressors such as malnutrition and infectious disease can produce abnormal enamel growth. Dental hypoplasia frequency is influenced by the quality and quantity of diet. Once formed, these defects provide a permanent record of disturbances experienced during infancy and childhood, from ages of about six months to seven years. Patterns of wear and disease are also influenced by nutritional quality and the physical characteristics of the food and preparation methods. Frequency of decay is a relative indicator of sugar or carbonates in the diet and the amount of cooking (Buikstra and Ubelaker 1994:47; Goodman et al. 1987:8; Rose et al. 1985:282).

Only Burial 2 has anything close to a full set of teeth. The two older individuals (Burials 1 and 4) lost most of their teeth long before death. Burial 1 has only two remaining teeth and three empty sockets from post mortem loss. The others have remodeled tooth sockets indicating loss well before death. Burial 4 had lost all maxillary teeth but retained five of the anterior mandibular teeth.

Regression equations were used to estimate the age of development of dental hypoplasias (Martin et al. 1995, table 2.3) for each burial (Table 108). The two remaining teeth of Burial 1 were both well worn so that any defects formed early in life were lost. While none of the hypoplastic defects are pronounced, the frequency of defects, especially for Burial 2, indicates repeated stress episodes throughout childhood for at least these three individuals.

Burial 1 is the only individual with caries, two small interproximal caries at the cemento-enamel junction. She also has evidence of several abscesses and probable abscesses in areas that are extensively remodeled. These are at the base of the right central incisor and second premolar in the maxilla and the left lateral and right central incisor of the mandible. Burial 4 has two abscesses, both on the left mandible beneath the premolars. This contrasts with Burial 2, who is remarkably free of evidence of caries.

Tooth wear, scored from stage 1 for virtually no wear to stage 8 for anterior teeth and stage 10 for molars when only the pulp cavity remains (Buikstra and Ubelaker 1994:52-53), is advanced in both older individuals. The remaining maxillary central incisor of Burial 1 is broken and irregular with over half the crown worn away (stage 7). The mandibular lateral incisor is worn at a steep bevel with the low aspect mesial (stage 6). Again, over half the crown is worn away. Burial 4, who has no remaining maxillary teeth, has extensive wear on only one of the remaining mandibular teeth. The right lateral incisor is worn at a steep angle with the lowest point on the distal edge (stage 7). The other teeth have much less wear (stage 4 [n = 2] or 6 [n = 2]), suggesting the corresponding maxillary teeth were lost much earlier. Burial 2 has little wear. For the maxilla, anterior teeth range from stage 2 to 4, and molar total scores (each quadrant of molars are scored then added so the a maximum of 40 is possible), are 7 for the third molars, 11 and 14 for the second molars, and 14 and 17 for the first molars. For the mandible, the anterior teeth are stage 2 (n = 3), stage 4 (n = 1), and stage 5 (n = 4). Molar wear is heavier on the left side with scores of 14, 12, and 14 compared to 13, 10, and 5. Again, the contrast between the older and younger individuals is fairly extreme, but not that unusual. Younger individuals from the Henderson site (F 8, F 36, and F 40) also have only slight attrition, while the older individual (F 21) has tooth loss and considerable wear (Rocek and Speth 1986:75, 87-88, 125-126, 132-134, 172). Tooth wear for Gran Quivira is described as moderate for young adults, fairly to moderately severe for most adults, and extreme for a few older individuals (Reed 1981:80).

Dental crowding is evident in both female burials. Burial 1 has an impacted maxillary right canine that is positioned in front of the root of the lateral incisor. In general, the third molar is the most commonly impacted tooth, followed by the maxillary canine (Hillson 1996:113). Burial 2 is more unusual. She lacks the left lateral incisor in the mandible. As a result, the right central incisor is centered on midline of the mandible allowing room for all teeth without crowding. Agenesis, where a tooth is not formed at all, is most common for third molars followed by maxillary lateral incisors, second premolars, mandibular central incisors, then first premolars (Hillson 1996:113).

Joint Disease

Osteoarthritis is the most common joint disease. It is characterized by loss of articular cartilage and bony reactions of the subchondral and marginal bone. While often referred to as degenerative disease, it is more a product of normal remodeling or repair in reaction to a joint failure. Age and systemic and genetic predisposition of the individual are also important factors in the development of osteoarthritis (Rodgers and Waldron 1995: 33-34). Processes characteristic of osteoarthritis take two general forms, proliferation and erosion. The presence of new bone around a joint margin or on the surface of a joint (osteophytes) is proliferation while erosion applies to lesions in or around joints. The formation of osteophytes is a normal part of aging. The prevalence increases with age in some joints, while other joints, such as the spine and hip, progress independently of other signs of osteoarthritis (Rodgers and Waldron 1995:11-12, 24-25). Osteochondritis dissecans (OD) is a lesion that forms when trauma causes fragmentation of cartilage leaving a defect in the subchondral bone. Incidences of OD peak between 15 and 20 years of age and are more common in males than females. The most common site is the distal medial femoral condyle, but they are fairly frequent on the distal humerus and talus. Eburnation occurs when cartilage completely degrades and bony surfaces rub together forming a dense shiny surface (Rodgers and Waldron1995:28-29, 35).

For LA 3334, the young female (Burial 2) has minimal signs of osteoarthritis involving minor lipping on the proximal margins of the metacarpals. The two older individuals have numerous proliferative and erosional changes. Burial 1 has surface erosion or osteophyte formation affecting the knees, elbows, shoulders, hips, sacroiliac, proximal phalanges, rib facets, occipital, and intervertebral facets. Osteophytes range from elevated rings to curved spicules on the lumbar vertebral bodies. Most of the thoracic vertebral bodies are missing. She also has ODs on both distal femurs, and areas of coalesced surface porosity on the proximal right tibia, the distal left humerus, the left glenoid, and right acetabulum, and eburnation on the left distal femur. Burial 4 has vertebral body osteophytes ranging from barely discernable on most thoracic vertebrae to curved spicules on the lumbar vertebrae and sacrum. Porosity, lipping, and some resorptive foci were noted on the intervertebral surfaces, rib facets, the hips, knees, ankles, shoulder, elbow, wrist, and hands. Eburnation affects the right elbow, that is, the distal humerus and proximal radius.

Like most older individuals, Burials 1 and 4 show age-related changes in numerous joints. Both have eburnation, Burial 1 on the knees and Burial 4, the elbows. ODs, suggestive of damage to joints occur on Burial 1 in the knee. Burial 4 lacks many of the joint surfaces where eburnation or ODs are likely to occur. In addition to preservation, differences in the two individuals could reflect age, the division of labor, or the propensity to develop osteoarthritis. Severity of the proliferation or erosion is a poor indication of the progression of the disease or of pain and suffering (Rodgers and Waldron 1995:101-102).

Porotic Hyperostosis

Porotic hyperostosis lesions are an anemic response to nutritional deficiency, infectious disease, or parasitism (Buikstra and Ubelaker 1994:120). In the Southwest, higher frequencies are associated with agricultural intensification, due not only to diet but to increased community size, population density, and sedentism (Stodder 1989:178).

No porosities were found on the orbits or cranial vaults of the small LA 3334 population. No orbits and only small parts of the cranial vault were recovered for the children. All three adults have orbits and some vault portions and lacked porotic hyperostosis. This contrasts markedly with findings at other sites in the area. Human remains recovered from 1979 excavations at sites along NM 37, near Angus, frequently (16 of 23 individuals) had mild to moderate cranial and orbital lesions. Six were infants or children, who usually had lesions on the parietals (n = 5). In the adults, some of the porosity was a result of infection or age. Four had porosity in the orbits (Noble 1992:323). In a sample of Southwestern populations, Stodder finds that rates for porosities on the vault are generally higher in infants and young children and on a population basis range from none in a population of 86 from Pindi, to 72 percent on a population of 32 from Chaco Canyon. Rates for lesions in the orbits are much lower, ranging from 3 percent at Pecos Pueblo (n = 581) to 19 percent at Salmon Ruin (n = 105) (Stodder 1989:179-180).

Periosteal Reactions

Indications of infection on bone generally result from chronic, often nonlethal, conditions rather than acute or epidemic diseases but are also caused by trauma and associated infection. Nonspecific infections can be caused by a number of conditions but most are caused by microorganisms such as staphylococcus and streptococcus. When the infection is restricted to the outer shaft or periosteum, the response is called periostitis (Martin et al. 1995:2.14-2.15).

Evidence of specific infection was found on one adult and generalized infection found on at least one and possibly two other individuals, all infants or children. Fragmentary Burial 5 has a rib shaft fragment with periositis near the end of the piece. Part of the broken edge is rounded and highly polished, probably from a postmortem taphonomic process. The periostitis is mostly on the interior of the shaft where it is reactive new bone that is probably from localized infection caused by a fracture.

A piece of cranium from one of the 1.5- to 2.5-year-old children (Burial 6), probably a frontal or parietal fragment, has endocranial lesions comprised of reactive woven immature bone. The bone from one of the infants (Burial 3) is very thin and fragile with woven immature bone on most elements. Either or both of these could result from rapid growth or could indicate generalized infection. A third child, FS 13, represented only by a fragment of a parietal, has active periostitis showing some healing. It mainly affects the exterior table but extends partly into the cancellous bone.

Generalized infections are usually fairly rare in prehistoric Southwestern populations. Rates generally correspond to site size and population density, increasing dramatically in protohistoric and historic populations (Stodder 1989:184).

Trauma

Three of the adults have evidence of past trauma. Trauma is most severe in Burial 1, which has multiple incidences. A small round depression fracture (4.9- by-4.4 mm and 0.5 mm deep) just above the edge of the right orbit, is well healed indicating an event earlier in her lifetime. The second injury is more unusual. While an actual fracture line is not visible, the left occipital condyle has collapsed slightly into the cranial case so that the postcondylar foramen is compressed and filled with bone. This type of fracture is often caused by indirect trauma. Ring fractures around the foramen magnum reflect impact forces transmitted up through the spine to the occipital condyles (Lovell 1997:150). It is also possible that this is congenital, but it is more likely traumatically induced. In reaction to the shifting of the condyle surface, the atlas and axis vertebral facets on the left side are hypertrophic with extensive porosity on the surfaces and on much of the odontoid process. She also has bilateral separation of the arch of the forth lumbar vertebra or spondylolisthesis at pars interarticularis. The arch portion was not recovered. There is some disagreement as to whether spondlolysis is a congenital defect resulting from the lack of fusion or a fracture. Buikstra and Ubelaker (1994:122) record it as a vertebral pathology with various degrees of fracture and healing. High incidences in Eskimo skeletal populations and frequencies that increase with age suggests that it is traumatic but could have a genetic predisposition (Binford 1981:358). Lovell considers separation of the arch at pars inter-articularis as a traumatic separation that appears to be a common consequence of habitual physical stress. These can begin in childhood as stress fractures that either heal or progress to complete separation. The determining factor is chronic trauma with repeated stressing and eventual fatigue fracture (Lovell 1997:158). A few consider it a congenital defect (Coyne 1981:152).

Spondylolysis is most common in the fifth lumbar vertebra and to a lesser degree in the fourth (Buikstra and Ubelaker 1994:122; Lovell 1997:158). All five of the instances from Gran Quivira (three males and two females) were of the fifth lumbar. One was unilateral and the others bilateral (Coyne 1981:153).

The older male (Burial 4) also has a small round depression fracture on the right frontal bone. It consists of a larger ring (14.5- by-13.5 mm), indicating the depression fracture and a more active area (6.9-by-5.8 mm) at the core, suggesting that there may have been some additional damage and infection at the center of the fracture. Again, the injury is well healed, indicating a past event led to the injury.

The third incidence is the probable rib fracture previously described (Burial 5). With periostitis, it is the only one of the three that occurred not too long before the individual died. This in itself was not enough to have caused his death.

Cranial trauma rates for Southwestern populations are generally low, ranging from 2 to 8 percent in the populations summarized by Stodder. The Gallina area is an exception where cranial trauma was present on 20 percent of the population (n = 41). Postcranial trauma is more variable, ranging from 1 to 22 percent. Combined cranial and postcranial totals range from 5 to 41 percent (Stodder 1989:187).

Developmental Anomalies

In addition to the conditions that could be traumatic or developmental and the dental anomalies already described, Burial 2 has a large sternal aperture (8.25-by-8.10 mm) that is open at the base, leaving a small gap (1.3 mm). These apertures generally result when the sternal bands fail to fuse together. The size and shape depend on the timing of the delay in fusion. These are fairly common with eight burials found in the collection from Mound 7 at Gran Quivira (Barnes 1994:221-223).

Some degree of mandibular torus was recorded for the three burials. For the two females it was rated as moderate (elevation between 2 and 5 mm), and the male marked (elevation greater than 5 mm) (Buikstra and Ubelaker 1994, attachment 22). These consist of a series of bony exostoses on the lingual surface of the mandible composed of compact but otherwise normal bone. It is probably a hereditary trait. In a population of 121 from Gran Quivira, frequencies of tori were high (77.7 percent) and appear more often and are larger in males than females. Other Southwestern groups have fewer instances: Pecos Pueblo, 64 percent; a series from Hopi, 35.1 percent; and a site at Cochiti, 10.8 percent (Morris 1981:123-127).

Postmortem Modification

All three adult burials, disarticulated adult bones, and at least one of the children exhibit a variety of marks. Most appear to result from carnivore and rodent damage, but others are probably result from human actions. Considerable time was spent examining these marks to determine their probable origin, however, several remain problematical.

Surface modification of bone can result from either human or nonhuman processes that can be difficult to distinguish. It is particularly difficult here where the human bone is in poor condition with surface erosion, root etching, and overall deterioration obscuring or altering the appearance. This is further complicated by taphonomic processes that mimic cut marks, hammerstone scars, and other marks created by human activities (Fisher 1995:10). Terms and definitions relevant to the following discussion are as follows. Cut marks are narrow elongated linear striations that are usually V-shaped in cross section with flat sides. Morphology depends on the shape of the cutting edge, the angle at which it is held, the force applied, and the protective effect of membranes covering the bone. These are often manifest as a series of short parallel marks that rarely follow the contours of the bone. Yet small sedimentary particles with sharp edges and sufficient force and movement can produce a striation quite similar to stone tool cut marks, as can carnivore teeth. Two features that are more reliable indicators of human cut marks are shoulder effects or barbs and splitting. These should always be used in conjunction with considerations of anatomical placement and purpose for cutting at that location (Fisher 1995: 12-16). Scrape marks consist of multiple, closely space, parallel striations produced by moving a sharp edge across the bone, often with chatter marks. Sedimentary abrasion can produce similar marks but without chatter marks (Fisher 1995:18-19). Chop marks are short, broad linear depressions, usually with a V-shaped cross section. Chopping is useful when the flesh has dried out and is resistant to cutting tools, when it is frozen, or for separating articulated bones. Similar marks in the form of broad furrows can be made by carnivore teeth. Percussion pits are small roughly circular depressions that often have microstriations in or around the pit. Similar pits could be created by falling rocks and by carnivore teeth (Fisher 1995:19, 25-27).

Carnivore gnawing is known to produce striations, furrows, pits, punctures, ragged, sinuous, or chipped edges, and polish. Species and tooth type determine the shape of the mark as does the amount of wear on the teeth. Numbers of actual marks range from none to many. The morphology of tooth marks overlaps that of cut marks in many cases (Fisher 1995:36-38). Canids generally begin by gnawing the soft articular ends of long bones before attempting to crush the shaft. Chipped edges are produced by chewing with the posterior teeth. Repeated licking can result in rounding and polish (Binford 1981:51, 55).

Rodents generally produce relatively broad and flat-bottomed or slightly rounded marks that consist of multiple parallel or near-parallel grooves. These can occur in relatively long, regular rows, or as sets of irregularly oriented grooves. Persistent localized gnawing can create sizable troughs or cavities (Fisher 1995:41).

In addition, excavation tools leave marks similar to cuts and tooth marks. While modern damage can sometimes be recognized by the lighter color of freshly exposed subsurface bone, this is not always the case. Shallow crushing, especially with wooden or bamboo tools, and cleaning or excavation of moist bone also results in marks that can be mistaken for those produced by teeth or tools (Fisher 1995:46).

For the most part, the marks found on the LA 3334 human burials can be attributed to a combination of carnivore and rodent activity and excavation damage. Those on at least one of the disarticulated children's bones cannot.

Burial 1 is a good example of the damage that can be done by carnivores. Although the burial pit for this individual was sealed by a floor surface, this was reportedly disturbed by roots and rodents in some areas. While the pit could have been sealed after the carnivore intrusion, it is also possible that the disturbance noted was caused by carnivores. Positioned on her back with arms to the side and knees flexed upward, both scapulae, some ribs, and the right arm were moved from anatomical position when found. Both hands were missing as were most of the feet. Portions of the anterior thoracic vertebral bodies, sternum, ribs, scapulae, proximal right humerus, pelvis, left distal tibia, distal fibulae, and calcanei display breakage patterns consistent with carnivore chewing. In addition, abrasions and shallow U cross-sectioned gouges, probably tooth marks, occur on the right parietal, both scapulae, bones of both arms, left and right ribs, and the left tibia. Puncture-like marks and pits are rare but present. Marks that do not resemble classic carnivore or rodent damage were also found. The most unusual are those found on the superior border of the left scapula (Fig. 98), which resemble a series of deep cuts with a broad bladed object or a cut-and-snap motion. Isolated marks resembling beveled cuts are present on the right scapula and possibly the right humerus, which also has a pit that resembles a percussion pit. Both these elements also have damage characteristic of carnivore gnawing and could be unusual manifestations of marks made by carnivores.

Burial 2 was also placed on her back with lower arms on the chest or pelvis and legs flexed to the chest. Her hands and feet were also missing. The pit was not sealed. Much of the damage to this individual was from deterioration, although several parts were missing and could have been removed by carnivores. Possible chewing was observed on the pelvis and distal right tibia. Marks on this individual include a few shallow gouges or pits, probably tooth marks, on the right humerus shaft, both femur shafts, and the right tibia shaft. Fine stria occur on the left radius shaft, right femur shaft, and right tibia shaft. Excavation marks are also present on all these elements. All of the modification on this individual are characteristic of animal and excavation damage.

Burial 4 was also placed in a shallow pit on his back with the knees against his chest. Arms were along his side tightly flexed upward at the elbow. Hands and feet were missing. The poor condition of this individual made it difficult to assess why parts are missing. Carnivore-like chewing is evident on the right femur and left patella, dents or tooth punctures in the left clavicle, right proximal femur and shaft, and both tibia shafts, and shallow gouges on the right femur shaft, left tibia shaft, left fibula shaft, left humerus shaft, and right ulna shaft. Beveled slice-like marks, resembling those found on Burial 1, were noted on the left humerus shaft.

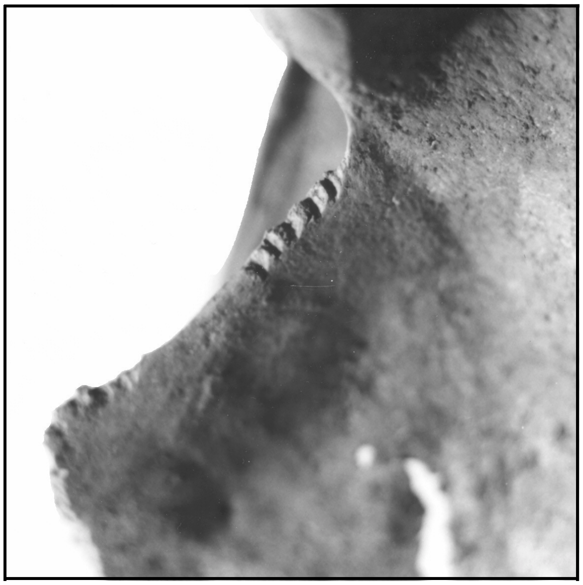


Figure 98. Burial 1, scapula.

In addition, some of the disarticulated adult bones have modification. An adult metacarpal recovered from Feature 5000 has fine V cross-sectioned marks perpendicular to the shaft that could be cut marks. Other damage to the shaft appears fresh but has left an unusual cluster of flake-like scars. A metatarsal from Room 2 has damage resembling carnivore chewing and polish on both ends and a shallow gouge on the shaft. A rib from the same room has damage that resembles carnivore damage but also two small slice-like marks resembling those described below. Another rib from Room 3 has shalow gouges and marks that resemble beveled cuts.

Several elements from one or more of the disarticulated 1.5- to 2.5-year-old child(ren) have unusual modification. All are from Room 3. The part with the most varied modification is a right femur with a possible cut removing the lesser trochanter, a possible shallow scrape perpendicular to the shaft slightly below the lesser trochanter, a possible cut perpendicular to the posterior shaft at about midshaft, a series of marks resembling those on the Burial 1 scapula but shallower, also posterior and perpendicular to the shaft just above the distal end, and what looks like a beveled cut that removed the distal end of the femur from the posterior (Fig. 99). A left tibia shaft has what could be a portion of a beveled cut removing the proximal end from the posterior, and a shallow scooped out area and small abrasions on the anterior shaft. Possible cuts are found on the radius shaft, diagonal to the shaft about two-thirds down the shaft. A portion of the cortex on the opposite side could have been removed by cutting. In addition, the radius, a rib, and one fibula have tiny acute slices that lift the outer cortex of the bone, usually without detaching it. An implement with razorblade sharpness would be needed to make this kind of mark. The radius has three of these marks at various orientations to the shaft. The fibula has one slice diagonal to the shaft near the distal end. The rib has one perpendicular to the shaft with the cortex piece missing. The other fibula hasthree very fine perpendicular cuts on the interior of the shaft and an acute angled cut or break on the opposite side. The latter and the broken edges are undulating and polished.

Marks similar to many of the probable human modifications from LA 3334 are fairly unique or go unreported. With the possible exception of the

Figure 99. Burial 6, distal femur.

child's distal femur cut, none resemble marks that would be caused by disarticulation, generally characterized by fine cut marks on or adjacent to articular surfaces. Defleshing can leave marks anywhere on the bone while those detaching muscles are concentrated at points of muscle and tendon origin and insertion (Olsen and Shipman 1994:381). The complete absence of burning, evidence for intentional breakage, and the presence of marks on articulated burials suggests anyexplanation for these marks should not follow the current trend to attribute any and all modification to cannibalism. For the moment, at least, the pattern here best resembles one of defleshing, possibly as part of the burial process. The marks observed are not concentrated around joints or muscle and tendon insertions, rather, they appear fairly random on shafts. Some were probably produced by carnivores but resulted in uncharacteristic marks.

<u>Comparisons with Other Populations</u>

Comparing the range of measurements recorded for populations from the Henderson Site and Gran Quivira (Appendixes 2,3), the cranial measurements from the two females from LA 3334 fall outside the range recorded for Henderson in 59 percent (17 of 29) of the measurements, but only 23 percent (3 of 13) of those for Gran Quivira. For the postcranial measurements, the LA 3334 females are outside the Henderson range for 48 percent (12 of 25) of the measurement, but none are outside the range for Gran Quivira (0 of 6). The male measurements are similar. For cranial measurements, 73 percent (8 of 11) are outside the Henderson range and 33 percent are outside the Gran Quivira range (3 of 9). For the postcranial measurements, 50 percent (7 of 14) are outside the Henderson range and none (0 of 4) are outside the Gran Quivira range. While this could suggest the Angus population was more closely related to that from Gran Quivira, much of this results from sample size. Females used for comparisons at Henderson are far fewer (n = 2 to 4) compared to Gran Quivira (n = 19 to 45). For males, the Henderson sample is again small (n = 2 to 4), while that from Gran Quivira is much larger (n = 14 to 38). The larger sample from Gran Quivira should reflect a greater range of variability.

This small group from LA 3334 has other similarities with the Gran Quivira population, such as the prevalence of mandibular tori and overall facial appearance. Yet, the population is far too small and other data from other likely groups too sparse to conclude there was any biological affinity.

FOOD AND FUEL AT THE ANGUS SITE

Mollie S. Toll and Pamela J. McBride

Introduction

The Angus site (LA 3334) includes several areas with distinct importance for structuring subsistence activities and occupational eras. The pit structure in Area 5000 was built and occupied earliest (A.D. 1005-1035), and consists of an eroded pit structure, 1.3 m in depth, and an outside activity area. A roomblock area, about 13 m to the south and east, was in use from about A.D. 1290 to 1455. Three rooms were constructed entirely from the natural red clay soil that forms the substrata of the site and the other two had cobble and mud walls. Postholes, hearths, ash pits, and storage pits from the roomblock were sampled for flotation. Ramadas, built in the last segment of roomblock use (A.D. 1400-1440), provided shade for several hearths. Metates and manos along with ceramic and lithic artifacts were found, indicating a wide variety of activities took place in this part of the site. Other site features include a kiva built in the 1300s and excavated by Peckham in 1956, and a large storage pit, whose use (A.D. 1345) overlapped with occupation of the kiva and roomblock.

LA 3334 is on an alluvial fan that overlooks the Rio Bonito in the foothills of the Sacramento Mountains, alongside NM 48 between the modern towns of Alto and Angus. Junipers (*Juniperus monosperma, J. deppeana*) and piñons (*Pinus edulis, P. cembroides*) are the primary arboreal species found where the Great Basin conifer woodland and Madrean evergreen woodland interface in the eastern slopes of the Sacramento Mountains (Brown 1994). Juniper, piñon, and an occasional ponderosa pine are the trees found on the slope above the site, while cottonwood (*Populus* sp.) is found in the river corridor below. Common reed was also observed along the edges of the Rio Bonito during excavation at the nearby Angus North project (Farwell et al. 1992:10). The site is located in an old orchard, now invaded by oaks (*Quercus* sp.). Yuccas, fourwing saltbush (*Atriplex canescens*), sagebrush (*Artemisia* sp.), Mormon tea (*Ephedra* sp.), and mountain mahogany (*Cercocarpus montanus*), as well as other shrubs in the rose family also occur. Gilias (*Gilia* sp.), buckwheats (*Eriogonum* sp.), globemallows (*Sphaeralcea* sp.), dropseeds (*Sporobolus* sp.), and muhleys (*Muhlenbergia* sp.) are some of the herbs and grasses that provide understory in this biotic community.

The prevalence of corn remains at LA 3334 reminds us that site inhabitants were farmers, in all phases of occupation, from the eleventh to the fifteenth centuries. With an elevation of 2,088 m and frost-free growing season of about 120 days, farming in the site area has some insecurities. We are interested, then, in the interrelation of agriculture, gathering, and hunting in different eras of occupation, and whether sites were occupied year-round or seasonally.

Methods

The 23 soil samples collected during excavation were processed at the Museum of New Mexico's Office of Archaeological Studies by the simplified "bucket" version of flotation (see Bohrer and Adams 1977). All available soil was processed from each sample (from 200 to 3,750 ml, with an average volume of 2,054 ml). Each sample was immersed in a bucket of water, and a 30-40 second interval allowed for settling out of heavy particles. 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 lifted out and laid flat on coarse mesh screen trays, until the recovered material had dried. Each sample was sorted using a series of nested geological screens (4.0, 2.0, 1.0, 0.5 mm mesh), and then reviewed under a binocular microscope at 7-45x. Most samples were sorted in their entirety, but a few "floated" samples were very large, and required subsampling the smallest screen sizes and calculating an estimated number of seeds for the total sample. The small screen sizes (.05 mm, and materials passing through all the screens) are good targets for sampling, as they take the longest to sort and provide the least new information (they tend to contain a few fragments of seed taxa encountered in larger screens).

From each of the 21 flotation samples with enough charcoal, a sample of 20 pieces was identified (10 from the 4 mm screen, and 10 from the 2 mm screen). Each piece was snapped to expose a fresh transverse section, and identified at 45x. Low-power, incident light identification of wood specimens does not often allow species, or even genus-level precision, but can provide reliable information useful in distinguishing broad patterns of utilization of a major resource class.

Results

Pit Structure, Area 5000

Floral remains from the pit structure area were dominated by maize cupules, followed by piñon nutshell (Table 109). Mustard, stickleaf, and juniper seeds comprised the remainder of the archaeobotanical assemblage. Uncharred plant parts were limited to goosefoot seeds from Pit 1 in the pit structure, indicating contamination by noncultural intrusives was minimal.

Durable maize cob parts like cupules are often recovered from sites because maize is not only a nutritious food resource, but also cobs, minus the edible kernels, are a good source of fuel. Throughout the Southwest, seeds or nuts of the piñon were a valued food resource, and often the focus of long-distance foraging missions (Harrington 1967:326). A pound of piñon nuts contains over 3,000 calories and all twenty amino acids that comprise complete protein (Dunmire and Tierney 1995:97). Mustard seeds are quite spicy and could have been used to flavor an otherwise bland diet. The seeds can be parched and ground and made into a meal or mush. Stickleaf seeds can also be parched and ground into a meal. Charred juniper seeds could be residues from juniper fuelwood use, or from processing the mealy cones for emergency food or seasoning.

Identifiable wood was present only in the three extramural contexts (Table 110). Piñon was the dominant wood by weight, but juniper and oak were the only woods recovered from all three samples. The extramural ash area yielded the richest number of wood taxa, including cottonwood-willow and mountain mahogany, which were restricted to this context alone. This area is next to the hearth and probably represents repeated dumping episodes and a broader spectrum of wood use at the site.

Archaeobotanical remains indicate inhabitants of the pit structure area had a diet that consisted largely of maize and annual and perennial resources readily available from the surrounding piñon-juniper woodland. The full growing season is represented, from spring (mustard and stickleaf) to fall (piñon).

Table 109. LA 3334, Flotation Plant Remains, Pit Structure Area (A.D. 1005-1035)

Feature	Pit 1 in pit structure	Extramural hearth, SW of pit structure	Area 3000: Burned Area	Extramural ash area next to hearth	Ubiquity: # samples found in (n=4)	Total of items/liter
FS No.	3060	3104	3148	3131		
CULTURAL Annuals: Cheno-am	1.3*				25%	
Descurainia mustard	.67*				25%	
Mentzelia stickleaf		.56*			25%	
Domesticates: *Zea mays* maize	cupule+*	cupule+*, glume+*	cupule+*, glume+*	cupule+*, glume+*	100%	
Perennials: *Juniperus* juniper		1.1*			25%	
Pinus edulis piñon	nutshell+*	nutshell+*	nutshell+*		75%	
Undetermined	1 plant part*		0.5*	1 plant part*		
NONCULTURAL *Chenopodium* goosefoot	.67					

Table 110. LA 3334, Species Composition of Flotation Wood, Pit Structure Area

Feature	Extramural hearth, SW of pit structure	Extramural ash area next to hearth	Extramural burned area
FS No.	3104	3131	3148
Conifers: *Juniperus* juniper	2/0.1g	6/0.2g	4/0.1g
Pinus pine			2/<0.1g
Pinus edulis piñon	5/2.1g	5/0.2g	
Undetermined conifer	5/0.1g	12/0.2g	6/0.1g
Nonconifers: *Cercocarpus* mountain mahogany		2/0.1g	
Quercus oak	4/0.2g	6/0.1g	4/0.1g
Rosaceae rose family		2/<0.1g	1/<0.1g
Salicaceae cottonwood/willow		2/<0.1g	
Undetermined non-conifer		1/<0.1g	2/<0.1g
Totals	16/2.5g	35/0.8g	19/0.3g

Roomblock Area

Maize, weedy annuals, conifer duff, and piñon nutshell were the dominant charred plant remains recovered from the roomblock area (Tables 111a and 111b). Uncharred plant material was primarily conifer duff, representing low levels of ubiquitous intrusive fallout from the local conifer woodland. Weedy annuals proliferate in the disturbed ground around habitation sites, agricultural fields, and middens, making them a readily available resource; their seeds have been recovered from a wide array of prehistoric assemblages. Documented economic uses of weedy annuals like goosefoot and pigweed seeds abound in the ethnographic literature. Castetter (1935) describes the use of these as greens, early in the growing season, and later as a ground meal, either eaten as gruel or combined with other food such as corn meal and made into cakes.

Common reedgrass (*Phragmites communis*; recovered from a Burial in Room 3, and from an area just west of Room 1) was used widely for a variety of manufacturing and construction purposes. This plant provides strong but lightweight, straight spans of as much as 2 or more meters, and requires wet soils (Hitchcock 1971:190) such as those along Rio Bonito. Common reedgrass was frequently used as roof closing material (as at Pueblo Bonito in Chaco Canyon, Judd 1954; see also Whiting 1939:66), and for screens and partitions (as for a corn crib at Arroyo Hondo Pueblo; Wetterstrom 1986). Manufacturing uses include arrowshafts, cigarettes, flutes, prayer sticks, and other household items (Reagan 1928:159; Robbins et al. 1916:66; Curtin 1949:75).

The most diverse floral assemblages were recovered from the hearth in Room 5 and the hearth and ash pit in Room 2. The diversity of remains from Room 5 is somewhat surprising considering the shallow depth of the room. Room 2 also contained the largest quantities of maize kernels (see Table 114), suggesting storage (a number of large sherds were present) took place in Room 2. Concentrated use of Room 2 for food preparation is not likely because this was the only room where ground stone artifacts were *not* recovered.

Seven wood taxa were identified from the roomblock area: piñon, ponderosa pine, mountain mahogany, oak, rose family, and cottonwood-willow (Tables 112a and 112b). Context (charcoal from floor fill, thermal features, and pit fill) and condition (charcoal fragments found in posthole fill) point to functional derivation of flotation wood as primary or redeposited hearth sweepings. Cottonwood-willow was recovered in the greatest number of samples (93 percent), followed by ponderosa pine (71 percent). Often cottonwood-willow and ponderosa pine have been preferentially used as construction material, but neither of these two taxa was associated clearly and consistently with construction contexts. Juniper, on the other hand, was identified from two macrobotanical samples collected from postholes in Room 2 and a large log fragment from Room 3 roof fall (Table 113), suggesting juniper was the preferred taxon for roof supports and beams.

The large amounts of maize kernels recovered from the roomblock area (Table 114) suggest that maize was the staple food, but piñon nuts and weedy annuals were an important part of the diet as well. As in the pithouse area, all segments of the growing season are represented, but here there is a decided emphasis on late summer-early fall crops of corn and piñon.

Ramada, Area 8000

Maize was recovered from all ramada samples and annual seeds were identified in two of the three samples (Table 115). Hearth 3 had the most diverse

Table 111a. LA 3334, Flotation Plant Remains, Roomblock Area

Feature	Room 1, floor fill	Hearth in Room 2	Ash pit associated with hearth, Room 2	Floor, Room 3	Metate on floor, Room 3	Storage Pit 22, Room 3	Loaf mano, west of Room 1
FS No.	7040	7212	7215	7236	7268	7290	7296
CULTURAL Annuals: *Chenopodium* goosefoot	0.8*	1*	0.3*				
Cheno-am		0.5*	0.6pc				
Portulaca purslane		0.8*	0.6*				
Domesticates: *Zea mays* maize	2.4 kernels*, 1 embryo*, cupule+*, glume+*	cupule+*, 1.5 embryos*, 1.8 kernel*	cupules+*, 1.1 embryos*, 2 kernels*	cupules+ *, glume+*	cupules+*	cupules+*, 1.9 kernels*	cupules+*
Grasses: *Phragmites* common reed							stem+*
Other: Monocotyledonae monocot				stem+++*	stem+++*	stem+*	stem+*
Perennials: *Pinus* pine	needle+*		needle+*	needle+*			
Pinus edulis piñon		nutshell+*	nutshell+*	nutshell+ *			nutshell+*
Pinus ponderosa ponderosa pine	needle+*			needle+*	needle+*		
Undetermined	2.7 plant parts*				bark+*		stem+*
Unknown conifer			twig+*				
NONCULTURAL *Chenopodium* goosefoot						0.5	
Grasses: Gramineae grass family	stem+						
Perennials: *Juniperus* juniper	twig+	twig+		twig+			
Dicotyledonae dicot	leaf+						
Monocotyledonae monocot	stem+						
Undetermined	bark+, cf. berry+	nutlet*		bark+			
Unknown #9186			0.3				

Table 111b. LA 3334, Flotation Plant Remains, Roomblock Area, cont.

Feature	Burial 25, Room 3	Infant Burial, Room 3	Storage Pit 28, Room 3	Posthole 8, Room 2	Posthole east of Room 1	Hearth 1, Room 5	Posthole 1, Room 1	Posthole 2, Room 1	Ubiquity: # of samples found in (n=13)	Total seeds/liter
FS No.	7303	7304	7308	7325	7513	7627	7903	7906		
CULTURAL Annuals: *Amaranthus* pigweed							0.4*		8%	
Chenopodium goosefoot	6.7*		0.4*	0.6*	1.7*	1*	0.7*	1.6*	77%	
Cheno-am	1.4*		0.8*						31%	
Descurainia mustard					0.6*	0.3*			15%	
Portulaca purslane	1.4*	0.4*	0.4*			0.3*	0.4*		54%	
Domesticates: *Zea mays* maize	cupules+*, glumes+*, 0.4 kernels*	cupules+*, glumes+*, 3.7 kernels*	cupules+*, 0.8 embryos*, glumes+*, 1.6 kernels*	cupules+*, 0.6 embryos*, 2.1 kernels*	cupules+*.	2.0 embryos*, glumes+*, 0.8 kernels*	cupules+*, 0.4 kernels*	cupules+*	100%	
Grasses: *Phragmites* common reed	stem+*								15%	
Other: Monocotyledonae monocot	stem+*		stem+*					stem+*	54%	
Perennials: *Juniperus* juniper	0.4*				♀ cone				seed 8% ♀ cone 8%	
Pinus pine			needle+*				needle+*	needle+*	46%	
Pinus edulis piñon				nutshell+*					38%	
Pinus ponderosa ponderosa pine	needle+*		needle+*						38%	
Sphaeralcea globemallow						0.3*			8%	
Undetermined	0.4 plant part*, 1.4*	0.4 plant part*	0.4 plant part*, 0.4*			0.3 plant part*				
NONCULTURAL *Chenopodium* goosefoot	0.7		1.2						23%	
Euphorbia spurge			0.4							
Perennials: *Juniperus* juniper	0.5						twig+			
Monoctyledonae monocot						stem+*				

Table 112a. LA 3334, Species Composition of Flotation Wood, Roomblock Area

Feature	Room 1, floor fill	Hearth in Room 2	Ash pit associated with hearth, Room 2	Metate on floor, Room 3	Storage Pit 22, Room 3	Loaf mano, west of Room 1	Burial 25, Room 3
FS No.	7040	7212	7215	7268	7290	7296	7303
Conifers: *Juniperus* juniper		1/<0.1g	1/<0.1g		1/<0.1g		
Pinus pine	2/0.1g		4/0.1g	1/<0.1g	2/<0.1g	1/<0.1g	4/<0.1g
Pinus edulis piñon	1/<0.1g		3/0.3g		2/<0.1g		1/<0.1g
Pinus ponderosa ponderosa pine	6/0.3g	3/0.5g	5/0.3g	12/1.4g	5/0.1g	9/0.2g	10/0.2g
Undetermined conifer	3/<0.1g						3/<0.1g
Nonconifers: *Cercocarpus* mountain mahogany	3/0.1g			1/<0.1g		4/<0.1g	
Quercus oak	1/<0.1g	5/0.8g				2/<0.1g	2/<0.1g
Rosaceae rose family		1/<0.1g					3/<0.1g
Salicaceae cottonwood/willow	3/0.1g	3/0.6g	7/0.3g	6/0.2g	1/<0.1g	4/<0.1g	5/0.1g
Undetermined non-conifer	1/<0.1g						1/<0.1g
Totals	20/0.6g	13/1.9g	20/1.0g	20/1.6g	11/0.1g	20/0.2g	29/0.3g

Table 112b. LA 3334, Species Composition of Flotation Wood, Roomblock Area

Feature	Infant Burial, Room 3	Storage Pit 28, Room 3	Posthole 8, Room 2	Posthole east of Room 1	Hearth 1, Room 5	Posthole 1, Room 1	Posthole 2, Room 1
FS No.	7304	7308	7325	7513	7627	7903	7906
Conifers: *Abies/Juniperus* fir/juniper	1/0.1g	2/0.1g	7/0.5g	20/0.6g			
Juniperus juniper	8/<0.1g	4/<0.1g			4/0.1g	3/<0.1g	3/0.1g
Pinus pine		2/0.1g	2/0.1g			3/<0.1g	
Pinus edulis piñon	3/0.1g	8/0.4g	1/0.1g		3/0.1g		
Pinus ponderosa ponderosa pine	4/<0.1g					6/0.1g	8/0.2g
Undetermined conifer		1/<0.1g			5/<0.1g		
Nonconifers: *Cercocarpus* mountain mahogany	2/<0.1g						
Quercus oak						6/0.2g	
cf. *Robinia* New Mexico locust	2/<0.1g	2/<0.1g	1/0.1g				
Rosaceae rose family					1/<0.1g		
Salicaceae cottonwood/willow	20/0.2g	19/0.6g	11/0.8g		7/0.2g	2/<0.1g	6/0.2g
Undetermined non-conifer							3/0.1g
Totals				20/0.6g	20/0.4g	20/0.3g	20/0.6g

Table 113. LA 3334, Species Composition of Macrobotanical Wood, Roomblock Area

Feature	Room 1 fill	Room 3 fill	Posthole 8, Room 2	Posthole 7, Room 2	Room 3 rooffall
FS No.	7149	7285	7326	7337	7354
Conifers: *Juniperus* juniper	7pc/292.1g	1pc/293.0g	1pc/42.0g	3pc/32.9g; 10u/29.7g	1pc/294.5g

Note: pc = partially charred; u = uncharred.

Table 114. LA 3334, Corn Inventory and Kernel Morphometrics, Roomblock Area

Feature	FS No.	Measurable Kernels					Unmeasurable Kernels		Cob Fragments	
		#	g	Mean	Range	CV	#	g	#	g
Room 1	7044, 7117, 7132	5	0.7	L 10.0 W 8.6 TH 5.9	L 10.0 W 7.5-10.0 TH 4.7- 6.7	L-- W-- TH--	25	0.7	-	-
Room 2	7125, 7139, 7146, 7158, 7160	373	59.6	L 8.0 W 8.2 TH 5.6	L 5.3-10.7 W 5.8-11.1 TH 3.7 -8.4	L .0988 W .1011 TH .1485	672	25.0	-	-
Room 3	7303, 7352, 7261	94	14.2	L 8.0 W 8.0 TH 5.8	L 6.1- 9.9 W 5.6-11.5 TH 4.1- 8.6	L .0902 W .1242 TH .1526	53	3.7	-	-
Room 4	7107	1	0.1	-	-	-	-	-	-	
Midden	1169	-	-	-	-	-	-	-	1	0.05
Extramural	7266, 7317	67	8.8	L 8.1 W 8.1 TH 5.6	L 6.8- 9.0 W 6.3-10.0 TH 3.8- 9.1	L .0782 W .1061 TH .1874	71	5.0	2	7.6 (with dirt)
Large XM Storage pit	307	-	-	-	-	-	-	-	1	0.4
Totals	16 samples	540	83.3	L 8.0 W 8.1 TH 5.6	L 5.3-10.7 W 5.6-11.5 TH 3.7- 9.1	L .0970 W .1059 TH .1521	821	34.3	4	8.0

Note: CV = coefficient of variation, L = length, TH = thickness, W = width.

Table 115. Flotation Results, Ramada Area, LA 3334

Feature	Extramural hearth 1	Extramural hearth 3	From metate on living surface	Ubiquity: # of samples found in (n=3)	Total seeds/liter
FS No.	8004	8105	8214		
CULTURAL Annuals: *Chenopodium* goosefoot	9.2*			33%	
Cheno-am		0.8*		33%	
Portulaca purslane	0.8*			33%	
Domesticates: *Zea mays* maize	cupules+*	cupules+*	cupules+*	100%	
Grasses: Gramineae grass family		1.6*		33%	
Phragmites common reed			stem+*	33%	

Feature	Extramural hearth 1	Extramural hearth 3	From metate on living surface	Ubiquity: # of samples found in (n=3)	Total seeds/liter
FS No.	8004	8105	8214		
Other: Monocotyledonae monocot		stem+*	stem+*	66%	
Perennials: *Juniperus* juniper		9.6*, 1.6 ♀ cones*		seed 33% ♀ cone 33%	
Pinus edulis piñon			needle+*, nutshell+*	needle 33% nutshell 33%	
Undetermined		4.8*	0.4 plant part*, 0.4*		
Noncultural *Chenopodium* goosefoot	0.8		0.7		

plant assemblage, suggesting plant preparation activities centered here. Maize cupules, grass family, juniper, and cheno-am seeds and monocot stems were identified from the feature. Piñon nutshell, maize cupules, and common reed stems were identified in the sample from the metate. The diversity of taxa recovered from the metate indicates general fill rather than plant materials actually processed with the ground stone. Evidence of spring-ripening plants is lacking from the ramada area, perhaps demonstrating summer and fall use of the area.

Wood taxa diversity was distributed fairly evenly across features, but mountain mahogany was restricted to Hearth 1 and juniper was only identified in Hearth 3. Ponderosa pine and cottonwood-willow were identified in all samples, but ponderosa in particular, and conifers in general, were the dominant wood taxa by weight and frequency (Table 116). The floral assemblage from the ramada area indicates a variety of plants were processed for food or used as construction material during its use.

Table 116. LA 3334, Species Composition of Flotation Wood, Ramada Area

Feature	Extra-mural Hearth 1	Extra-mural Hearth 3	From Metate on Living Surface
FS No.	8004	8105	8214
Conifers: Juniperus, juniper		1/< 0.1 g	
Pinus, pine	2/0.3 g	6/0.1 g	3/0.1 g
Pinus edulis pinon		2/0.2 g	2/0.7 g
Pinus ponderosa, pnderosa pine	3/0.4 g	8/0.5 g	7/1.2g
Undetermined conifer	10/0.3 g		
Nonconifers: Cercocarpus, Mountain mahogany	4/0.6 g		
cf. Robinia, New Mexico locust			1/<0.1 g
Salicaceae, cottonwood-willow	1/0.1 g	3/<0.1 g	6/0.3 g
Undetermined nonconifer			1/<0.1 g
Totals	20/1.6 g	20/0.8 g	20/2.3 g

Discussion

Wild Food Plants

The prehistoric inhabitants of the area did not wander far from the surrounding conifer woodland to collect wild plants. The archaeobotanical record from LA 3334 points to a continuum of weedy annual, juniper, and piñon use. A greater diversity of wild plants was recovered from the roomblock and ramada areas than the pit structure area. The differences in diversity could indicate a pattern of increased use of wild plant resources through time or they could be a factor of differential preservation. With the exception of the ramada area, there is evidence of wild plant collecting that extended from the late spring when stickleaf and tansymustard

Table 117. Summary of Carbonized Botanical Remains by Site Area, LA 3334

Site Area	Flotation	Corn	Wood
Pithouse Area A.D. 1005-1035	(n=4 samples) Weedy annuals: cheno-ams, tansymustard, and stickleaf (1 sample each) Conifers: Juniper (1 sample), piñon nutshell (3) Corn in all samples	-	**Flotation** (n=70, 3.6g) 86% coniferous (11%juniper, 64% piñon, 11% undetermined) 14% non-coniferous (3% mt. mahogany, 11% oak)
Roomblock Area A.D. 1290-1455	(n=15 samples) Weedy annuals: pigweed (1 sample), goosefoot (10), tansymustard (2), purslane (7) Globemallow (1) Reedgrass (2 samples), and undetermined monocot stem (7) Conifers: juniper (2), piñon nutshell (5); 8 samples have pine +/or ponderosa needle fragments Corn in all samples	540 measurable kernels (83.33g) 821 kernel fragments (34.30g) 3 cob fragments (7.61g*)	**Flotation** (n=263, 9.2g) 67% coniferous (16% juniper, 4% pine, 11% piñon, 35% ponderosa) 33% non-coniferous (1% mt. mahogany, 11% oak, 18% cottonwood/willow, 3% other) **All macrobotanical wood** (n=23, 984.2g) was juniper
Ramada Area A.D. 1400-1440	(n=3 samples) Weedy annuals: goosefoot, purslane (each in 1 sample) Reedgrass stem, grass seed (each in 1) Conifers: juniper, piñon needle/nutshell (each in 1 sample) Corn in all samples	-	**Flotation** (n=60, 4.7g) 81% coniferous (11% pine, 19% piñon, 45% ponderosa, 6% undetermined) 19% nonconiferous (13% mt. mahogany, 6% cottonwood/willow)
Extramural Storage Pit A.D. 1345	-	1 cob with kernels (.37g)	
TOTAL	(n=22 samples)	1365 corn parts (125.61g)	Flotation (393 pieces, 17.5g) Macrobotanical (23 pieces, 984.2g)

*including dirt matrix

Table 118. Comparative Carbonized Flotation Remains from Agricultural Sites of the Eastern Slopes, Sacramento Mountains

Sites	n	Annuals	Grasses	Perennials	Cultigens
HIGHLAND SITES: Angus North (LA 3334), elev. 2088 m A.D. 1005-1455 (this study)	23	Ch-am, **Ch, Port,** Ment, Desc	Phragmites, **Monocot stem**	Jun, P ed, P pond, Sphaer	**Zea**
Bent (LA 10835), elev. 1753 m A.D. 800-1000/, A.D. 1100-1200 Minnis et al. 1982	8			Prosopis	**Zea**
Abajo de la Cruz (LA 10832), elev. 1753 m A.D. 1150-1350 Minnis et al. 1982; Ford 1975	17	Ch, Port		P ed, Prosopis, Opun, Echino, Atriplex, Vitis	**Zea**, Cucurbita
Block Lookout (LA 2112), elev. 1865 m A.D. 1300-1350 Ford 1976	(macro bot. only)	Hel	Phragmites Muhlenbergia	P pond, Jun, Quercus	Zea, Cucurbita
Angus (LA 2315, 16297), elev. 2135 m A.D. 1150-1350 Toll and Donaldson 1992	30	**Ch**, Am, Port, Hel, Desc, Phys	Sporobolus Phragmites	P ed, Jun, Echino	Zea Cucurbita
Robinson Pueblo (LA 46326), elev. 2135 m A.D. 1150-1400 Adams 1991	38	Ch, Am, Port, Cleome, Hel, Phys, Compositae		Jun, P ed, Opun, Yucca, Atriplex, Juglans	**Zea,** Cucurbita, Phaseolus
Tortolita Canyon (LA 89652), elev. 2150 m A.D. 600-1000 Dean 1993; Holloway 1994	30 30	**Ch,** Am, Compositae	Paspalum	P ed, Jun, Opun, Quercus	**Zea** poss. Phaseolus
FLATLAND SITES: Los Molinos (LA 68182), elev. 1067 m AD 1000-1350 McBride 1999	37	Ch-am, Ch, Port, Desc, Hel, Compositae, Phacelia, Plantago	Sporobolus	Scirpus, Astragalus	Zea
Fox Place (LA 68188), elev. 1067 m A.D. 1225-1425 Toll 1993	25	Ch, Am, Port, Phys, Compositae, Polygonum	Sporobolus		Zea
Tintop Cave (LA 71167), elev. 1487 m A.D. 1100?-1250 Toll 1996	26	Ch, Port, Sphaer, Nicot		Echino, Opun, Juglans, Rhus, Vitis, Yucca	**Zea,** Phaseolus
Henderson Pueblo (LA 1549), elev. 1186 m A.D. 1200/1250-1400/1450 Huckell and Toll in prep.	83	Ch, Port, Argemone, Astragalus, Comp, Desc, Guara, Nicot, Polygonum/Rumex, Salvia, Trianthema	Phragmites, Sporobolus	Cyperaceae, Jun, Opun, Prosopis, Rhus, Vitis, Yucca	**Zea**, Cucurbita, Phaseolus, Gossypium

Taxa in **BOLD** are present in 50+% of samples
Ch (*Chenopodium*), Am (*Amaranthus*), Port (*Portulaca*), Hel (*Helianthus*), Phy (*Physalis*), Desc (*Descurainia*), Sphaer (*Sphaeralcea*), Nicot (*Nicotiana*), Echino (*Echinocereus*), Op (*Opuntia*), Jun (*Juniperus*), P ed (*Pinus edulis*)

mature, into late fall when piñon can still be gathered. The ramada area may have been more heavily used during the hot summer months and when processing corn and piñon was in full swing.

Corn and Other Domesticates

Corn recovered by flotation forms an interesting counterpoint to those recovered as macroremains. If we were looking only at materials collected in the field, we might think that corn processing, storage, and consumption took place largely indoors, and only after construction of the roomblock ca. A.D. 1290 (see Table 117). Macroremains were almost exclusively kernels—an unusual pattern suggesting a role as an imported commodity. As it often does, our data from flotation samples provide another perspective. *Every* Angus flotation sample contains corn *cob* fragments (cupules, glumes), while kernel fragments turn up only in the roomblock area (67 percent of samples). This pattern suggests we are looking at a case of differential corn use. With its concentration of kernel remains, Room 2 may have been a storage location.

Angus North's corn assemblage, dominated by kernels, is echoed at Robinson Pueblo, where over 20 kg of whole carbonized kernels were estimated to be present (Adams 1991:32). Unfortunately, only cobs were measured at Robinson (and only one cob at Angus North was measurable) so we have little morphometric basis for comparison. Angus North kernels are generally globular, with similar length and width (Table 114). The majority of Angus kernels are swollen, and the scutellum (or germ) has popped off, indicating they were not on the cob when they burned.

Looking at the regional cob database, we see a consistent pattern of small, slender, cigar-shaped cobs, with a high proportion of 10-rowed cobs but significant numbers of 8- and 12-rowed specimens (Adams 1991; Harvey and Galinat in Kelley 1984; Toll 1993). Interestingly, this pattern holds true over a considerable time span and elevational variability. We see no evidence of regional variation in farming effort or success. Larger aggregated settlements such as Henderson Pueblo would be appropriate candidates for an intensive investment in agriculture, but recent, careful investigations of a Henderson cob population (Dunavan 1994) shows these cobs to be very similar in size, conformation, and variability.

Wood

Wood use points to general dependence on coniferous woods (juniper, piñon, and ponderosa) with additional dicot components from valley terraces and slopes (oak, mountain mahogany) and the river corridor (cottonwood-willow). A small sample of roomblock construction elements are all juniper, while juniper's share of the fuel wood sample is 11 percent sitewide. In the pithouse occupation, piñon predominates in the fuel assemblage. In the thirteenth- to fifteenth-century roomblock occupation, ponderosa appears and becomes the largest conifer component, piñon decreases, and a significant element of riparian woods emerges. Cottonwood-willow provides soft, light wood in relatively long, straight limbs (Lamb 1975:86); lower heat value, and susceptibility to damage by rot and insects are counterbalanced by rapid replacement rates (Vines 1960:676, 677). Shifts in wood use in the later occupation at LA 3334 suggest greater construction or fuel needs (ponderosa requires more concentrated effort to harvest and transport, and provides larger masses of good fuel and substantial construction timbers) as well as pressure on wood sources (use of poorer quality riparian woods with faster replacement rates).

All macrobotanical wood was juniper. Context suggests that these larger pieces recovered during excavation from the roomblock area are posts. In fact, they are the only Angus wood specimens thought to represent architectural elements rather than fuel remnants. Numerous reedgrass fragments found in roomblock and ramada flotation samples indicate likely use of this local species as roof closing material (Table 118). *Phragmites* culms have also been recovered at Fox Place, Sunset (Picacho), Angus, Bent, Robinson Pueblo, and Block Lookout (Table 119). Flotation charcoal from Room 1 and 2 postholes (Table 112b) most likely represents redeposited hearth sweepings, which often find their way to floor depressions.

Summary

The limited repertoire of wild gathered plant products (goosefoot, pigweed, purslane, stickleaf, tansymustard, globemallow, piñon, and juniper) echoes that seen at other pueblos in the piñon-juniper woodlands of the eastern slopes of the Sacramento Mountains. Abundant reedgrass rem-

Table 119. Regional Wood Use (Fuel and Trash Contexts): Percent Weight or Pieces, by Taxon

Sites	Percent Weight		Percent Pieces	Ubiquity (Percent samples found in)
	Conifers	Nonconifers		
HIGHLAND SITES: Angus North elev. 2088 m A.D. 1005-1455 (n=17.5g)	juniper/fir 11% pine 5% piñon 24% ponderosa 31% undet. conifer 4% ALL CONIFER 75%	cottonwood/willow 11% mt. mahogany 5% oak 8% others & undet. 1% ALL NONCONIFER 25%		
Tortolita Canyon elev. 2150 m A.D. 600-1000 Holloway 1994 (n=30 samples)				juniper 37% pine 30% undet. conifer 20% cottonwood/willow 13% oak family 20% undet. nonconifer 3%
Abajo de la Cruz elev. 1753 m A.D. 1150-1350 Minnis et al. 1982 Ford 1975	juniper 19% piñon 35% undet. conifer 3% ALL CONIFER 57%	ash 28% saltbush 14% undet. non-conifer 1% ALL NONCONIFER 43%		
FLATLAND SITES: Tintop Cave LA 71167 elev. 1487 m A.D. 1100?-1250 Toll 1996			juniper 15% box elder 4% composite 2% cottonwood/willow 4% creosotebush 19% mesquite 21% oak 1% saltbush/greasewood 13% walnut 7%	
Fox Place elev. 1067 m A.D. 1225-1425 Toll 1993	none	ash 15% box elder 1% cottonwood/willow 7% creosotebush 2% hackberry 2% mesquite 5% saltbush/greasewood 50% undet. nonconifer 5% walnut 13%		
Henderson Pueblo elev. 1186 A.D. 1200/1250-1400/1450 Archer 1995			ash 15% common reed 1% diffuse porous (cf. cottonwood/willow) 17% juniper 2% mesquite 6% saltbush/greasewood 23% type x (cf. oak 0 3% unid. nonconifer 7% unknown 28%	

nants at several local sites attest to use of this riparian grass, largely for roof closing material. Local perennial crops of hedgehog and pricklypear cacti, yucca, canyon grape, oak, and walnut, are curiously absent from the Angus repertoire. Mesquite has been recovered chiefly from lower elevation sites such as Henderson Pueblo and Tintop Cave, but has also been found at Bent and Abajo de la Cruz.

Corn has been recovered at contemporary sites throughout the area. The general regional population of corn consists of small cigar-shaped cobs with probable Chapalote antecedents. Angus corn consists almost wholely of kernels, apparently carbonized after removal from mature ears. Rare recovery of squash and beans may be largely an issue of differential deposition and preservation. Cotton (which requires considerable soil warmth for germination) has been recovered only at Henderson, where average annual temperatures are considerable higher. Wood use as determined by fragmentary charcoal remains in flotation samples appears to be generally similar throughout areas of the site, and the full occupation span. Conifers make up the bulk of wood consumed (67-86 percent, including juniper, piñon, and ponderosa pine), and a short list of local shrubs (mountain mahogany, oak, cottonwood-willow) make up the remainder. Over time, there are some finer-grained changes. Going from the earliest-occupied pithouse area to the roomblock area, and thence to the ramada that was occupied only in the latter segment of roomblock use, use of piñon decreases, while ponderosa and mountain mahogany increase slightly.

POLLEN ANALYSIS OF SOIL SAMPLES AND POLLEN WASHES FROM LA 3334

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Introduction

Five soil samples and five pollen wash samples from selected ground stone artifacts were submitted to Quaternary Service for analysis. These samples were all from LA 3334. The site is a late prehistoric occupation that dates to ca. A.D. 1300. Four of the five soil samples were taken from rectangular rooms while one sample was from an exterior use-surface that may have been covered by a ramada-type structure. Four of the pollen wash samples were from artifacts within the rooms while one was from a trough metate from the possible ramada structure.

Methods and Materials

Chemical extraction of pollen samples was conducted at the Palynology Laboratory at Texas A&M University, using a procedure designed for semi-arid Southwestern sediments. The method, detailed below, specifically avoids use of such reagents as nitric acid and bleach, which have been demonstrated experimentally to be destructive to pollen grains (Holloway 1981).

From each pollen sample submitted, 25 grams (g) of soil were subsampled. Prior to chemical extraction, three tablets of concentrated *Lycopodium* spores (batch #307862, Department of Quaternary Geology, Lund, Sweden; 13,500 ± 500 marker grains per tablet) were added to each subsample. The addition of marker grains permits calculation of pollen concentration values and provides an indicator for accidental destruction of pollen during the laboratory procedure. The pollen wash samples were prepared by personnel at the Office of Archaeological Studies. The area to be washed was measured and all loose soil was removed from the artifact surface by a very light brushing. The surface was initially washed with distilled water, followed by washing with dilute (<10 percent) HCl followed by washes with distilled water. The liquid fraction from all three washes was collected into a plastic bottle, labeled, and sent to Texas A&M University along with the soil samples. At the Palynology Laboratory at Texas A&M University the liquid portion was centrifuged and the supernatant liquid discarded. At this point, three tablets of concentrated *Lycopodium* spores were added to each sample and the extraction proceeded as described below.

The samples were treated with 35 percent hydrochloric acid (HCl) overnight to remove carbonates and to release the *Lycopodium* spores from their matrix. After neutralizing the acid with distilled water, the samples were allowed to settle for a period of at least 3 hours before the supernatant liquid was removed. Additional distilled water was added to the supernatant, and the mixture was swirled and then allowed to settle for 5 seconds. The suspended fine fraction was decanted through 150μ mesh screen into a second beaker. This procedure, repeated at least three times, removed lighter materials, including pollen grains, from the heavier fractions. The fine material was concentrated by centrifugation at 2,000 revolutions per minute (RPM).

The fine fraction was treated with concentrated hydrofluoric acid (HF) overnight to remove silicates. After completely neutralizing the acid with distilled water, the samples were treated with a solution of darvan, and sonicated in a Delta D-9 Sonicator for 30 seconds. The Darvan solution was removed by repeated washing with distilled water and centrifuged (2,000 RPM) until the supernatant liquid was clear and neutral. This procedure removed fine charcoal and other associated organic matter and effectively deflocculated the sample.

The samples were dehydrated in glacial acetic acid in preparation for acetolyis. Acetolysis solution (acetic anhydride: concentrated sulfuric acid in 9:1 ratio) following Erdtman (1960), was added to each sample. Centrifuge tubes containing the solution were heated in a boiling water bath for approximately 8 minutes and then cooled for an additional 8 minutes before centrifugation and removal of the acetolysis solution with glacial acetic acid followed by distilled water. Centrifugation at 2,000 RPM for 90 seconds dramatically reduced the size of the sample, yet from periodic examination of the residue, did not remove fossil palynomorphs.

Heavy density separation ensued using zinc bromide ($ZnBr_2$), with a specific gravity of 2.00, to remove much of the remaining detritus from the pollen. The light fraction was diluted with distilled water (10:1) and concentrated by centrifugation. The samples were washed repeatedly in distilled water until neutral. The residues were rinsed in a 1 percent solution of potassium hydroxide (KOH) for less than 1minute, which was effective in removing the majority of the unwanted alkaline soluble humates.

The material was rinsed in ethanol (ETOH) stained with safranin-O, rinsed twice with ETOH, and transferred to 1-dram vials with tertiary butyl alcohol (TBA). The samples were mixed with a small quantity of glycerine and allowed to stand overnight for evaporation of the TBA. The storage vials were capped and were returned to Museum of New Mexico at the completion of the project.

A drop of the polliniferous residue was mounted on a microscope slide for examination under an 18 x 18 mm cover slip sealed with fingernail polish. The slide was examined using 200x or 100x magnification under an aus-Jena Laboval 4 compound microscope. Occasionally, pollen grains were examined using either 400x or 1,000x oil immersion to obtain a positive identification to either the family or genus level.

Abbreviated microscopy was performed on each sample in which either 20 percent of the slide (approximately four transects at 200x magnification) or a minimum of 50 marker grains were counted. If warranted, full counts were conducted by counting to a minimum of 200 fossil grains. Regardless of which method was used, the uncounted portion of each slide was completely scanned at a magnification of 100x for larger grains of cultivated plants such as *Zea mays* and *Cucurbita,* two types of cactus (platyopuntia and cylindropuntia), and other large pollen types such as members of the Malvaceae or Nyctaginaceae families. Because corn pollen was very common in many of these samples, corn grains were tabulated during the scans only if an unequal distribution of this taxon on the microscope slide was observed.

For those samples warranting full microscopy, a minimum of 200 pollen grains per sample were counted as suggested by Barkley (1934), which allows the analyst to inventory the most common taxa present in the sample. All transects were counted completely, resulting in various numbers of grains counted beyond 200. Pollen taxa encountered on the uncounted portion of the slide during the low magnification scan are tabulated separately.

Total pollen concentration values were computed for all taxa. In addition, the percentage of indeterminate pollen was also computed. Statistically, pollen concentration values provide a more reliable estimate of species composition within the assemblage. Traditionally, results have been presented by relative frequencies (percentages) where the abundance of each taxon is expressed in relation to the total pollen sum (200+ grains) per sample. With this method, rare pollen types tend to constitute less than 1 percent of the total assemblage. Pollen concentration values, provide a more precise measurement of the abundance of even these rare types. The pollen data are reported here as pollen concentration values using the following formula:

$$PC = \frac{K*_P}{_L*S}$$

Where: PC = Pollen Concentration
K = *Lycopodium* spores added
$_P$ = Fossil pollen counted
$_L$ = *Lycopodium* spores counted
S = Sediment weight

The following example should clarify this approach. Taxon X may be represented by a total of 10 grains (1 percent) in a sample consisting of 1,000 grains, and by 100 grains (1 percent) in a second sample consisting of 10,000 grains. Taxon X is 1 percent of each sample, but the difference in actual occurrence of the taxon is obscured when pollen frequencies are used. The use of "pollen concentration values" are preferred because it accentuates the variability between samples in the occurrence of the taxon. The variability, therefore, is more readily interpretable when comparing cultural activity to noncultural distribution of the pollen rain.

The pollen concentration values for pollen wash samples were calculated using a modification of the above formula. This modification involved the substitution of the area washed (in cm^2) for the sediment weight (S) variable in the denominator from the above equation because the sample was in liquid form. The resulting concentration value is thus expressed as estimated grains per cm^2. The resulting pollen concentration values from pollen wash samples are treated independently of those from soil samples in the results and discussion sections, although the data are presented with the other samples in the tables. The use of pollen concentration values from these particular samples are preferred, as explained above, in order to accentuate the variability between pollen wash samples. The use of the area washed also provides a mechanism for the comparison of calculated pollen concentration values between artifacts.

Variability in pollen concentration values can also be attributed to deterioration of the grains through natural processes. In his study of sediment samples collected from a rockshelter, Hall (1981) developed the "1,000 grains/g" rule to assess the degree of pollen destruction. This approach has been used by many palynologists working in other contexts as a guide to determine the degree of preservation of a pollen assemblage and, ultimately, to aid in the selection of samples to be examined in greater detail. According to Hall (1981), a pollen concentration value below 1,000 grains/g indicates that forces of degradation may have severely altered the original assemblage. However, a pollen concentration value of fewer than 1,000 grains/g can indicate the restriction of the natural pollen rain. Samples from pit structures or floors within enclosed rooms, for example, often yield pollen concentration values below 1,000 grains/g.

Pollen degradation also modifies the pollen assemblage because pollen grains of different taxa degrade at variable rates (Holloway 1981, 1989). Some taxa are more resistant to deterioration than others and remain in assemblages after other types have deteriorated completely. Many commonly occurring taxa degrade beyond recognition in only a short time. For example, most (about 70 percent) angiosperm pollen has either tricolpate (three furrows) or tricolporate (three furrows each with pores) morphology. Because surfaces erode rather easily, once deteriorated, these grains tend to resemble each other and are not readily distinguishable. Other pollen types (e.g., Cheno-am) are so distinctive that they remain identifiable even when almost completely degraded.

Pollen grains were identified to the lowest taxonomic level whenever possible. The majority of these identifications conformed to existing levels of taxonomy with a few exceptions. For example, Cheno-am is an artificial, pollen morphological category that includes pollen of the family Chenopodiaceae (goosefoot) and the genus *Amaranthus* (pigweed), which are indistinguishable from each other (Martin 1963). All members are wind pollinated (anemophilous) and produce very large quantities of pollen. In many sediment samples from the American Southwest, this taxon often dominates the assemblage.

Pollen of the Asteraceae (sunflower) family was divided into four groups. The high spine and low spine groups were identified on the basis of spine length. High spine Asteraceae contains those grains with spine length greater than or equal to 2.5μ while the low spine group have spines less than 2.5μ in length (Bryant 1969; Martin 1963). *Artemisia* pollen is identifiable to the genus level because of its unique morphology of a double tectum in the mesocopial (between furrows) region of the pollen grain. Pollen grains of the Liguliflorae family are also distinguished by their fenestrate morphology. Grains of this type are restricted to the tribe Cichoreae, which includes such genera as *Taraxacum* (dandelion) and *Lactuca* (lettuce).

Pollen of the Poaceae (grass) family are generally indistinguishable below the family level, with the single exception of *Zea mays*, identifiable by its large size (about 80μ), relatively large pore annulus, and the internal morphology of the exine. All members of the family contain a single pore, are spherical, and have simple wall architecture. Identification of noncorn pollen is dependent on the presence of the single pore. Only complete or fragmented grains containing this pore were tabulated as members of the Poaceae family.

Clumps of four or more pollen grains (anther fragments) were tabulated as single grains to avoid skewing the counts. Clumps of pollen grains (anther fragments) from archaeological contexts are interpreted as evidence for the presence of flowers at the sampling locale (Bohrer 1981). This enables the analyst to infer possible human behavior.

Finally, pollen grains in the final stages of disintegration but retaining identifiable features, such as furrows, pores, complex wall architecture, or a combination of these attributes, were assigned to the Indeterminate category. The potential exists to miss counting pollen grains without identifiable characteristics. For example, a grain that is so severely deteriorated that no distinguishing features exist, closely resembles many spores. Pollen grains and spores are similar both in size and are composed of the same material (sporopollenin). So that spores are not counted as deteriorated pollen, only those grains containing identifiable pollen characteristics are assigned to the indeterminate category. Thus, the indeterminate category contains a minimum estimate of degradation for any assemblage. If the percentage of indeterminate pollen is between 10 and 20 percent, relatively poor preservation of the assemblage is indicated, whereas indeterminate pollen in excess of 20 percent indicates severe deterioration to the assemblage.

In those samples where the total pollen concentration values are approximately at or below 1000 grains/g, and the percentage of indeterminate pollen is 20 percent or greater, counting was terminated at the completion of the abbreviated microscopy phase. In some cases, the assemblage was so deteriorated that only a small number of taxa remained. Statistically, the concentration values may have exceeded 1,000 grains/g. If the species diversity was low (generally these samples contained only pine, Cheno-am, members of the Asteraceae (sunflower) family and indeterminate category, counting was also terminated after abbreviated microscopy even if the pollen concentration values slightly exceeded 1,000 grains/g.

Results

For ease of convenience, Table 120 contains a list of the scientific and common names of plant taxa used in this report. Table 121 contains the raw pollen counts and the calculated pollen concentration values from LA 3334. The results of the pollen analysis are presented below by room and by sample type.

Room 7000

Burial 4. FS 7234 was a pollen sample taken from the pelvis region of this burial. This sample contained 4,795 grains/g total pollen concentration value, which was based on a pollen sum of 148 grains. *Pinus* (1,199 grains/g) was moderate to low in concentration values. Cheno-am (2,398 grains/g) dominated the assemblage along with a high amount of both high (648 grains/g) and low spine (259 grains/g) Asteraceae. Poaceae, *Artemisia,* and *Ephedra* (32 grains/g each) were moderate. *Zea mays, Agave*, Cylindropuntia, and *Polygonum* were present (32 grains/g each), but this was based on a single grain of each type.

Pollen Washes. FS 7294a was taken from mano #1, from Level 2 of this room. This assemblage contained 102 grains/cm^2 total pollen concentration values. *Pinus* (38 grains/cm^2) was low with a trace of *Juniperus* pollen (1 grains/cm^2). Cheno-am (33 grains/cm^2) was low with low amounts of high (8 grains/cm^2) and low spine (14 grains/cm^2) Asteraceae. Cylindropuntia, *Ephedra*, and *Typha* (1 grain/cm^2 each) were present in trace amounts.

FS 7294b was taken from mano #2, also from Level 2. The assemblage contained 438 grains/cm^2 total pollen concentration values. *Pinus* (238 grains/cm^2) was low but dominated the assemblage. *Prosopis* (5 grains/cm^2) was also present in low amounts. Cheno-am (92 grains/cm^2) was low along with low amounts of high (19 grains/cm^2) and low spine (15 grains/cm^2) Asteraceae.

FS 7013 was taken from a mortar from Level 2 within this room. The assemblage contained 124 grains/cm^2 total pollen concentration values. *Pinus* (8 grains/cm^2) was low with very low amounts of Cheno-am (35 grains/cm^2), and high (2 grains/cm^2) and low spine (3 grains/cm^2) Asteraceae. Cylindropuntia and *Zea mays* (1 grains/cm^2 each) were also present but in low amounts.

Room 7002

Pollen Wash. FS 7272 was a pollen wash of a trough metate from this room. The assemblage contained only 24 grains/cm^2 total pollen concentration values. *Pinus* (5 grains/cm^2) was very low. Cheno-am (12 grains/cm^2), and both high and low spine Asteraceae (3 grains/cm^2) were the only other taxa present in addition to indeterminate pollen.

Burial. FS 7303 was a pollen sample from the pelvis region of this burial. The assemblage contained 3,385 grains/g total pollen concentration values. *Pinus* (991 grains/g) was very low with moderate to high amounts of *Juniperus* and *Acacia* (24 grains/g each). Cheno-am (1620 grains/g) was moderate with moderate Poaceae (24 grains/g) and high amounts of high (484 grains/g) and low spine (193 grains/g) Asteraceae. *Zea mays* (24 grains/g) pollen was also present.

Posthole. FS 7306 was taken from this posthole feature. The assemblage contained 6,022 grains/g total pollen concentration values. *Pinus* (1,406 grains/g) was moderate to high with a small amount of *Juniperus* pollen. Cheno-am (3,393 grains/g) was high with high amounts of both high (795 grains/g) and low spine (306 grains/g) Asteraceae.

Storage Pit. FS 7309 was taken from this storage pit feature. The assemblage contained 3,645 grains/g total pollen concentration values. *Pinus* (1,144 grains/g) was low to moderate and Cheno-am (1,787 grains/g) pollen was high. A large number of

Table 120. Scientific and Common Names of Plant Taxa Used in This Report

Family	Scientific Name	Common Name
Agavaceae		
	Agave	century plant
Amaranthaceae	*Amaranthus*	Pigweed
Asteraceae		Composite Family
	Ambrosia	bursage
	Artemisia	sagebrush
	Helianthus	sunflower
	Lactuca	Lettuce
	Taraxacum	dandelion
	Chichoreae	Tribe of Asteraceae, heads comprised entirely of ligulate flowers
	Liguliflorae	Pollen morphological group, Fenestrate type pollen
	Low Spine	Pollen morphological group, spines <2.5 (height
	High Spine	Pollen morphological group, spines >2.5 (height
Cactaceae		Cactus Family
	Opuntia	Prickly Pear or Cholla Cactus
	Cylindropuntia	Sub-genus of *Opuntia*, Cholla Cactus
	Platyopuntia	Sub-genus of *Opuntia*, Prickly Pear Cactus
Chenopodiaceae		Goosefoot Family
	Atriplex canescens	Saltbush
	Chenopodium	Goosefoot, Lambs quarters
	Sarcobatus	greasewood
	Cheno-am	Pollen morphological group, members of the family Chenopodiaceae and the genus *Amaranthus*
Cupressaceae	*Juniperus*	Juniper
Cucurbitaceae		
	Cucurbita	Squash, gourd
Ephedraceae		Joint Fir Family
	Ephedra	Mormon tea
Fabaceae		Bean Family
	Acacia	Acacia
	Prosopis	Mesquite
Lycopodiaceae		Clubmoss Family
	Lycopodium	clubmoss
Malvaceae		Cotton Family
Nyctaginaceae		Desert Four O'Clock Family
Onagraceae		Evening Primrose Family
Pinaceae		Pine Family
	Abies	Fir
	Picea	Spruce
	Pinus	
Poaceae		Grass Family
	Zea mays	Corn
Polygonaceae		Buckwheat Family
	Eriogonum	Wild Buckwheat
	Polygonum	Knotweed, Smartweed
Ulmaceae		
	Ulmus	Elm
Typhaceae		
	Typha	cattail

Bag #	cf. *Agave*	Poaceae	Cheno-am	Cheno-am af.	Asteraceae hs.	Asteraceae ls	*Artemisia*	Cactaceae	Cylindropuntia	*Ephedra*
fs 8206			26		4	2				
fs 7234	32	32	2398		648	259	32		32	32
fs 7303		24	1620		484	193				
fs 7306			3393		795	306				
fs 7309			1787	48	357	119	48			
fs 8233		60	1980		540	360		30		

Bag #	Indeterminate	*Typha*	*Zea mays*	Sum	Total	marker	% Indeterminate	trans	tot trans	mark/slide	*Lycopodium* added	Wt/area
Raw Counts												
fs 7272	2			53	24	53	3.77	3	23	406	40500	1665
fs 7294	6	1		105	102	59	5.71	8	26	192	40500	704
fs 7294	5			90	438	52	5.56	4	24	312	40500	160
fs 7013			1	46	50	124	0.00	4	26	806	40500	298
fs 8206			1	117	36	61	0.00	10	26	159	40500	2184
fs 7234	3			148	4795	50	2.03	8	25	156	40500	25
fs 7303			1	140	3385	67	0.00	6	26	290	40500	25
fs 7306	3			197	6022	53	1.52	12	24	106	40500	25
fs 7309	6			153	3645	68	3.92	7	27	262	40500	25
fs 8233	3		1	134	4020	54	2.24	6	25	225	40500	25
Concentration Values												
fs 7272	1											
fs 7294	6	1										
fs 7294	24											
fs 7013			1									
fs 8206												
fs 7234	97											
fs 7303	0		24									
fs 7306	92											
fs 7309	143											
fs 8233	90		30									

	Based on Count and low magnification scan of slide							
Bag #	*Picea*	*Abies*	*Zea mays*	Cylindropuntia	Onagraceae	*Agave*	*Polygonum*	Max. Potential Concentration
Raw Counts								
fs 7272			2					
fs 7294	1		1	2				
fs 7294								
fs 7013			1	1				
fs 8206			1				1	
fs 7234			3	1		1	1	

Table 121. Raw Counts and Concentration Values, LA 3334, Lincoln County, New Mexico

Bag #	Prov	Locus/unit	Structure	Level	Feature	Type	Age	*Pinus*	*Juniperus*	*Ulmus*	*Prosopis*	*Acacia*	*Polygonum*
Raw Counts													
fs 7272	N70/E107		rm 7002	4:floor		trough metate	AD 1300	11					
fs 7294	N76/E101		rm 7000	2:room fill		mano 1	AD 1300	39	1				
fs 7294	N76/E101		rm 7000	2:room fill		mano 2	AD 1300	58			1		
fs 7013	N76/E104		rm 7000	2:room fill		mortar	AD 1300	7					
fs 8206	N86/E97	8000	?ramada	7:external		trough metate	AD 1300	11		2			1
fs 7234	N76/E107		rm 7000	213 cm	burial 4	pelvis area	AD 1300	37					1
fs 7303	N70/E106		rm 7002	312-351 cm	burial 25	pelvis area	AD 1300	41	1			1	
fs 7306	N72/E108		rm 7002	336 cm	27	posthole	AD 1300	46	1				
fs 7309	N72/E108		rm 7002	326 cm	28	Pit:storage	AD 1300	48					
fs 8233	N84/E98	8000		160-173 cm		Mano	AD 1300	31					
Concentration Values													
fs 7272	N70/E107		rm 7002	4:floor		trough metate	AD 1300	5					
fs 7294	N76/E101		rm 7000	2:room fill		mano 1	AD 1300	38	1				
fs 7294	N76/E101		rm 7000	2:room fill		mano 2	AD 1300	282			5		
fs 7013	N76/E104		rm 7000	2:room fill		mortar	AD 1300	8					
fs 8206	N86/E97	8000	?ramada	7:external		trough metate	AD 1300	3		1			
fs 7234	N76/E107		rm 7000	213 cm	burial 4	pelvis area	AD 1300	1199					32
fs 7303	N70/E106		rm 7002	312-351 cm	burial 25	pelvis area	AD 1300	991	24			24	
fs 7306	N72/E108		rm 7002	336 cm	27	posthole	AD 1300	1406	31				
fs 7309	N72/E108		rm 7002	326 cm	28	Pit:storage	AD 1300	1144					
fs 8233	N84/E98	8000		160-173 cm		Mano	AD 1300	930					

Bag #	cf. *Agave*	Poaceae	Cheno-am	Cheno-am af.	Asteraceae hs.	Asteraceae ls	*Artemisia*	Cactaceae	Cylindropuntia	*Ephedra*
Raw Counts										
fs 7272			27		6	6				1
fs 7294			34		8	14			1	1
fs 7294			19		4	3				
fs 7013			32		2	3			1	
fs 8206			84	1	12	5				
fs 7234	1	1	74		20	8	1		1	1
fs 7303		1	67		20	8				
fs 7306			111		26	10				
fs 7309			75	2	15	5	2			
fs 8233		2	66		18	12		1		
Concentration Values										
fs 7272			12		3	3				
fs 7294			33		8	14			1	1
fs 7294			92		19	15				
fs 7013			35		2	3			1	

	Based on Count and low magnification scan of slide							
Bag #	*Picea*	*Abies*	*Zea mays*	Cylindropuntia	Onagraceae	*Agave*	*Polygonum*	Max. Potential Concentration
s 7303			3					
s 7306								
s 7309		1	2					
s 8233			1		1			
Concentration Values								
s 7272			0.12					0.06
s 7294			0.30	0.60				0.30
s 7294			0.00					0.81
s 7013			0.17	0.17				0.17
s 8206			0.12				0.12	0.12
s 7234			31.10	10.37		10.37	10.37	10.37
s 7303			16.74					5.58
s 7306			0.00					15.28
s 7309		6.18	12.35					6.18
s 8233			7.20		7.20			7.20

Cheno-am pollen clumps (48 grains/g) were also present. High (357 grains/g) and low spine (119 grains/g) were high with moderate amounts of *Artemisia* (48 grains/g).

Area 8000, Ramada

FS 8233 was taken in association with a mano from this area. The assemblage contained 4,020 grains/g total pollen concentration values. *Pinus* (930 grains/g) was low. Cheno-am (1,980 grains/g) was high with high amounts of Poaceae (60 grains/g), high (560 grains/g) and low spine (360 grains/g) Asteraceae. *Zea mays* and Cactaceae (30 grains/g each) were also present in this assemblage.

FS 8206 was a pollen wash sample from a trough metate from Level 2. The assemblage contained only 36 grains/cm^2 total pollen concentration values. *Pinus* (3 grains/cm^2) and *Ulmus* (1 grain/cm^2) were the only arboreal components present. Cheno-am (26 grains/cm^2), high (4 grains/cm^2) and low spine (2 grains/cm^2) were the only other taxa present.

Discussion

The pollen concentration values obtained for *Pinus* from the soil samples were primarily moderate in value (1,000-1,500 grains/g). This is not unexpected given the forested environment in the surrounding area. *Pinus* pollen is produced in structures called strobili, which are located in clusters of 7-10+ on the terminal branch ends. Each strobilus produces in excess of 1 million pollen grains so it is not unusual to obtain low to moderate *Pinus* pollen concentration values in areas that contain no pine trees. In forested areas, the *Pinus* pollen concentration values are normally expected to be higher. Much of the *Pinus* pollen deposition from this site was likely blocked by the presence of the structures. This probably explains the lower than expected concentration values for this taxon.

Juniperus pollen is thin walled and is generally only poorly preserved within these types of sediments. Holloway (1981, 1989), in a series of controlled experiments, demonstrated that more than 80 percent of fresh *Juniperus* pollen was deteriorated after only 25 alternating cycles of freezing/thawing temperatures or wet/dry conditions. The preservation of *Juniperus* pollen is also correlated with the percentage of the compound sporopollenin in the pollen wall (Brookes 1971). Brookes demonstrated that *Juniperus* pollen contains only very little of this compound and therefore is more susceptible to deterioration. While *Juniperus* was undoubtedly a constituent of the vegetation, the small pollen concentration values recovered are not totally unexpected.

Burial Samples

Two pollen samples were taken from the pelvis region of two separate burials, Burial 4 (Room 7000) and Burial 25 (Room 7002). The total pollen concentration values from both samples were high (4,795 and 3,385 grains/g respectively). However, the sample from Burial 4 contained a higher number of taxa than did burial 25. Both samples contained several economic or potentially economic pollen taxa. Burial 4 contained *Polygonum*, *Agave*, Cylindropuntia and *Zea mays*, whereas Burial 25 contained *Acacia* and *Zea mays*. The concentration values for *Zea mays* from both burials were higher than from the other samples. Additionally, Poaceae pollen was present from both burials and absent from all other samples except the soil sample from the suspected ramada.

While it is certainly possible that these pollen types were deposited naturally as part of the pollen rain, I find this highly improbable. The samples were taken from within a constructed room and from a location intentionally dug into the sediments and were in association with the pelvis area of both burials. These economic pollen types also produce very little pollen and many of the taxa are insect pollinated. Thus I believe that it is highly unlikely that these taxa were deposited as part of the natural pollen rain. The assemblages are therefore likely representative of materials taken from within the body. Both *Acacia* and *Agave* are only rarely preserved in the fossil record and both produce only limited amounts of pollen. These pollen types were likely ingested by the deceased individual prior to death. Whether they were taken as food or inhaled cannot be determined. The pollen of these types may have been adhering to leaves or fruits of the respective taxa that could have been stored. If these types were inhaled, it likely represents a late spring to summer period but this is only speculative.

The pollen assemblages generally reflect a diet of corn materials. These were probably supplemented by the other taxa recovered. Thus, there is indirect evidence for the utilization of both cultivated and gathered wild plant materials.

The posthole (Feature 27) contained only background pollen types, which was expected. No economic type pollens were recovered and this was the only soil sample that did not contain *Zea mays* pollen. Often, corn pollen is used as an offering during construction and is placed in the pit prepared for the post so it is not uncommon to recover small amounts of corn pollen from these postholes. This was apparently not done in this case.

The storage pit (Feature 28) contained the next highest concentration for *Zea mays* pollen other than the burials. This also contained a large number (48 grains/g) of Cheno-am pollen clumps. This suggests that Cheno-am plants may have been used to cover the storage pit. The pit was probably used to store corn materials. It may have also been used to store other plant materials but if so, no evidence was left.

The pollen washes of artifacts contained generally very low amounts of pollen. The highest pollen concentration values were obtained from the two manos in Room 7000 but these were not all that high. Mano 1 contained traces of *Zea mays, Typha,* and Cylindropuntia, while Mano 2 contained no economic pollen. The corn and cholla pollen was observed only in the low magnification scan of the slide. This suggests that Mano 1 was likely used in the preparation of both cultivated and wild plant materials. The extremely low pollen concentration values for corn also suggest that it was either used infrequently, or used on corn fruit materials where the amount of pollen would normally be reduced. There is no indication of potential use for Mano 2.

The mortar sample (Room 7000) contained *Zea mays* and Cylindropuntia pollen but in trace amounts. Potentially, this artifact could have been used in the processing of these plant materials.

The trough metate from Room 7002 contained only a trace amount of *Zea mays* pollen. Thus the only evidence for use is in processing cultivated materials.

The soil sample taken in association with the mano from the external ramada contained mostly background pollen types. *Ulmus* pollen was recovered from this artifact. *Ulmus* is not native to New Mexico but has been introduced historically as a shade tree. The presence of *Ulmus* from this locale is likely indicative of modern contamination.

Poaceae and Cheno-am pollen were somewhat higher from this sample but this would be expected from an outdoor locale. This sample contained *Zea mays*, Onagraceae pollen, and pollen of non-*Opuntia* Cactaceae. While the Onagraceae and non-*Opuntia* Cactaceae pollen may have been naturally deposited given the external location, there is a good indication that the assemblage reflects the use of the mano. This was certainly used in preparation of corn materials and potentially may have been used on these other gathered materials as well. The trough metate contained *Zea mays* and a small number of Cheno-am pollen clumps (1grain/g). Corn material was probably prepared on this artifact. However, the trace amount of Cheno-am pollen clumps could have been deposited naturally since this was an external location. Possibly, this metate was used in the processing of *Chenopodium* seeds but this cannot be conclusively demonstrated based on the pollen evidence alone. It would be interesting to compare the results of the flotation analysis to see if broken *Chenopodium* seeds were recovered.

Based on the pollen taxa recovered, the question always arises, Are economic taxa absent from these assemblages because they are truly not present, or, are they present in such small amounts to have been missed during sampling? In order to assess the likelihood of their being missed, the estimated maximum potential concentration values of target taxa was computed (Dean 1998). Since the entire slide was examined (either by count or low magnification scan of the slide) the estimated number of marker grains per slide was computed by averaging the number of marker grains per transect and multiplying this by the total number of transects examined. Assuming, that the first grain observed on an hypothetical second slide was one of the target taxa, the maximum potential concentration value can be computed. Thus, the number of the fossil grains is one, and the number of marker grains per slide is substituted for the number of marker grains counted in the pollen concentration formula. These data are presented in Table 121 and indicate that the estimated potential pollen concentration values fall between 0.06 and 0.81 grains/cm^2 from the pollen wash samples and between 5.58 and 15.28 grains/g for the soil samples. Without examining the total of the pollen residues we can never be absolutely sure that target taxa are indeed absent from the assemblage. Given the low estimated potential pollen concentration values however, I conclude that it is more likely that the missing taxa were indeed absent from these assemblages.

Conclusions

The pollen wash samples from LA 3334 contained only very small quantities of pollen. However, there were indications that these artifacts were being used in the preparation of cultivated corn and perhaps other gathered plant materials. The evidence is much stronger for those artifacts recovered from inside the rooms than for those recovered from the suspected ramada. The storage pit was likely used to store corn materials and may have been covered with

Chenopodium. The pit may have been used to store other plant materials but no direct evidence of this was recovered. The burials suggested that plant materials such as corn, cholla, *Agave*, and perhaps *Polygonum* and Poaceae were consumed prior to death. This suggests a mixed diet of cultivated and gathered materials.

CONCLUSIONS

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Introduction

The two sites excavated on the Angus project produced widely varying results. The Little Creek site (LA 111747) proved to be peripheral deposits from a larger pithouse village located across the highway from the site, which is now covered by condominium units. No conclusions about the small amount of material from the site can be reached.

The Angus site (LA 3334), however, was found to be a late, multicomponent prehistoric community consisting principally of a four- to five-unit roomblock, kiva, ramada area with outside hearths, and a large storage facility all dated by radiocarbon analysis to ca. A.D. 1310. An earlier pit structure on the site is dated to ca. A.D. 1015, while another lies under the ramada hearths and may date to A.D. 1265. A later Athabaskan occupation at ca. A.D. 1425 may have caused reuse of several rooms on the site in addition to the ramada and outside hearth.

The data recovery plan basically calls for the investigation of three research domains that include determining the accurate chronological placement of the site, assessing site function and type, and examining the subsistence adaptations as they vary between the site and others in the region (Oakes 1998).

Chronometric Placement of Sites

Nowhere is the placement of sites within a temporal or cultural scheme more confusing than in the Sierra Blanca region. And yet, through chronological ordering of sites, researchers attempt to define temporal distinctions in the ceramics of a region and observe change in subsistence adaptations, architectural variability, and economic relationships. We submit that these are difficult tasks for the area under discussion, given the current state of regional chronometrics.

An intensive literature search produced few sites dated by absolute means. Only 12 of 83 sites had available ceramic data. Sites have usually been dated by placement into phase categories, originally devised by Kelley (1984), and based mostly on geographic area within the Sierra Blanca region and the range of ceramics recovered from the sites. This system provides needed organization to the variety of sites and their assemblages, but current increases in recorded sites and new radiocarbon dates have made some aspects of the phase system outmoded.

In this report we attempted to place the Angus site into a phase as described for the region by Kelley (1984). This proved impossible to do without a large measure of ambiguity and overlapping of several phases, particularly in terms of architectural styles and ceramic associations. We then devised our own system of organizing sites chronometrically by arranging sites sequentially by ceramic types (I-V). The Angus site fits within the middle (after A.D. 1310) of the sequence of late prehistoric sites (Type V) in the Sierra Blanca region. We did not assign a phase designation to the site. (Prior to the determination that the site *did not* fit well into any phase, ceramics were analyzed with the assumption that the site dated to the Late Glencoe phase. We left that chapter as stated because several cogent points were made about Glencoe phase ceramics.)

As a result of our chronological ordering of sites in the Sierra Blancas, we found that the few recorded Archaic and aceramic pithouse sites in the region had not been dated. Also, only a very few dates exist for pithouses containing early ceramics. This lack of chronometric control should be of great concern to archaeologists working in the area. As it stands now, there are no clues as to how early in time Archaic people made use of this mountainous zone or how long this adaptation continued. Recent estimates for initial population of the region by ceramic-using peoples are at A.D. 900, but we find this date almost impossible to believe, given the considerable development of cultures in other areas of New Mexico by this time. The lack of chronometric data from small pithouse units may be partially to blame for this seeming temporal vacuum. (Frequently, small pithouses may be buried under later, larger sites and thus be archaeologically obscured.)

In conclusion, we know that our dating system may not be appropriate for everyone, but we found it to be a useful tool for sorting sites into a sequentially temporal sequence. We ask others to examine this serious lack of chronometric control in the Sierra Blanca area and to continue to work towards refining the given phase designations.

Site Function and Type

The Angus site is a small settlement of four to five contiguous rooms of masonry, earth, and upright slabs associated with a kiva, an outside ramada area with several hearths, and a large storage pit. Two small pithouses on the site predate the roomblock occupation. We assume that the primary occupation at ca. A.D. 1310 was fairly sedentary based on several indicators. The architectural complexity of the site, including the construction of a kiva, the masonry-walled rooms, and the large storage pit all point to some degree of permanence. The obvious labor investment involved in the site and the presence of a large storage facility also are good indicators of planned sedentism. Winter use is suggested by the construction of subterranean rooms, formalized interior hearths and pits, while summer utilization is seen through the building of possibly two ramadas with associated outdoor cooking hearths. Faunal, macrobotanical, and palynological data suggest that a full growing season from late spring through fall was enjoyed. Plentiful manos and metates indicate processing of harvested foods, possibly for winter use. Also, a fair number of burials infers some length to site occupation.

However, in the A.D. 1300s in the Sierra Blanca region, there is considerable variation in site layout, size, and placement of internal features. Standardization, particularly of interior features is not apparent. This lack of structural patterning possibly suggests a loose social organization on an areal scale for the entire region.

Although a strong degree of sedentism is implied for the Angus site, occupation of the site could well have varied seasonally or even yearly as resource availability changed, as greater distances to resources required more movement, or as territory broadened or shrank due to competition among settlements for resources. Thus, sedentism becomes a relative term, best measured against other contemporary groups rather than some static yardstick. As Rocek (1996:49) states, sedentism is a relative process not tied to a progressive continuum.

Some degree of mobility of site occupants can be assumed by the presence of large game that is not found naturally near the site, such as bison and antelope. Several possible procurement strategies for acquisition of these resources are given below. Trade items, such as freshwater mussel shell, Glaze I pottery, obsidian, and turquoise on the site, could also suggest travel to the sources of such goods. Of course, an established trade network might obviate the need for extensive travel. Other probable trade items found on Sierra Blanca sites include copper bells, parrot and macaw feathers, and *olivella, strombus,* and *glycymeris* shell jewelry. Driver (1990:254) comments that few items seem to derive from the Plains area. However, mussel shell ornaments, found on virtually every late Sierra Blanca site, are believed to come from the Pecos River (as well as possibly the Rio Bonito) with the Bloom Mound site possibly serving as a local trade or manufacturing center. And bison are certainly Plains-based and may likewise have been traded to the mountains of the Sierra Blancas, rather than obtained by hunting parties (Speth and Scott 1985:147). (This possibility will be examined further in the next section.)

Subsistence Adaptations

There are three basic types of subsistence resources potentially available to prehistoric peoples: harvested domestic crops such as corn, gathered wild plant food such as acorns, berries, nuts, and grasses, and hunted wild game. The appearance of any of these resources in a site assemblage is dependent, to varying degrees, on many factors including the vagaries of climate (such as drought), seasonal availability, food preferences, and competition for resources. Thus, reliable dependence on any one particular resource can never be a given assumption (Oakes 1999, vol. 6, 50).

Pursuit of Agriculture

While some bean and squash remains have been recovered on sites in the Sierra Blancas, almost all sites in the region contain evidence of the domestication of corn. However, it is the degree of dependency on corn agriculture that is of interest in this report. Agriculture may be defined simply as the cultivation of domesticates (Wills 1988:1). But we believe an integrated definition of subsistence adaptations, such as Welch's (1991:77), best fits the Sierra Blanca area, whereby he states that it is a mixture of hunting and gathering combined with gardening, while wild foods remain an integral part of the subsistence strategy.

There are numerable reasons given why populations employ domestication, but (all else being equal) *not* to practice agriculture is a less costly means of obtaining food. The presence of high vegetal productivity, low areal populations, no storage facilities, dispersed resources requiring a high rate of mobility, and possible socioeconomic restrictions are all valid reasons for maintaining a hunting-and-gathering lifestyle without incorporating agriculture into the subsistence system (Pryor 1996:889-890).

Some causal factors that might eventually lead to the decision to practice agriculture include the opportunity to acquire a supplemental food source, an imbalance in local populations whereby there are constraints on obtaining regional resources (Wills 1990:325), the chance to occupy an area more intensely than could be done under normal conditions (Huckell 1990), or a degrading environment (refuted by Cordell 1984:178). We agree that environmental stress does not seem to be a valid causal mechanism in the Sierra Blancas, based on the few climatic reconstructions available. The presence of corn on early sites dating on or before A.D. 1000 is not likely the result of a population imbalance at this time. And so the initial use of corn crops may have started simply as a supplemental activity to bolster food choices. However, the implied heavy use of agriculture as indicated by numerous corn remains found on later sites may suggest changing resource acquisition patterns or, more likely, populations expanding into the limited number of agriculturally suited river valleys causing resource stress within neighboring communities.

Katzenberg and Kelley (1991:213) indicate, however, that intensification of agriculture on later sites, specifically Bloom Mound and the Robinson site, is not supported by an examination of the ratios of stable carbon isotopes from these sites. They believe, however, that their data are contradictory to the archaeological record. They suggest that corn may have been traded into the region at some point. We do know that cobs from different sites exhibit large differences in size. At Block Lookout, the cobs are considered unusually small and primitive (Kelley 1984:269). The same holds true for the Bonnell site; however, Bloom Mound, at the same general time period, has much larger cobs. This discrepancy has not been satisfactorily explained.

One method of examining intensity of dependency on agriculture is through comparing ubiquity of corn on sites through time. Unfortunately, only five site reports provide this kind of data (Table 122). These are presented in order of earliest to latest. There are too few sites represented to show a reliable pattern of increasing presence of corn on sites and the data are inclusive.

Table 122. Corn Ubiquity Scores

SITE	SCORE	SAMPLE SIZE
Rio Bonito Pithouse	1.00	3
Filingin	.50	10
Crockett Canyon	.45	20
Angus	1.00	22
Robinson	.89	?

Another potential indicator of dependency on agriculture is the comparison of lengths and areas of manos as proposed by Hard (1990) and Mauldin (1993). In effect, the longer the length of the mano or the greater the area, the more intense grinding use is implied. This model was found to not hold true on a study of 25 sites in the Mogollon Highlands (Zamora 1999) and it was tested for this study as well. Only three complete manos were recovered and these had a mean length of 27.1 cm, considered very large by Hard (1990) and thus, by inference, used for the two-hand grinding of corn. The sample is too small for such deductions, however; but certainly indicates some dependency on corn agriculture.

While data from the Angus site and other late sites in the Sierra Blanca region seem to indicate a progressive reliance on the domestication of corn, any change over time in the dependency on wild plants and animals must also be considered. These are examined next.

Gathering Wild Plant Foods

Wild plant foods have always been important dietary items in the subsistence regimen of prehistoric populations. Wild foods can range from grasses, berries, root vegetables, and nuts to shrub fruit, flowers, pods, and seeds. Availability of these items is usually restricted, however, to seasonal maturities. Thus, movement over the landscape (whether residential or logistical) is almost a necessity. The important question for this report is whether the intake of wild plants drops after the introduction of agriculture. We wanted to look for fluctuations in the diversity of types of plants utilized through time, following the proposition that an increase in diversity of wild plants used is an indicator of resource depletion (Shaffer and Schick 1995).

Table 123 provides a list of plant foods identified by site in the Sierra Blanca region. Sites are arranged from earliest to latest.

The table shows that no plant species is dominant throughout all time periods except for domesticated corn. Cactus flowers and parts are the most common of the wild plant foods, appearing in 54 percent of the sites. It does not appear in Archaic and early pithouse sites, however. Piñon and walnuts are the only other two plant species that occur with any frequency on sites, with walnuts appearing after ca. A.D. 1200 in plant assemblages. Data are actually sufficient for only five sites, four of which have been excavated by the Museum of New Mexico. Other sites may well have a greater diversity of plants, but complete tabulations do not exist. The Angus site displays the most diversity with 26 of 42 species represented, or 61 percent. The Rio Bonito pithouse, Filingin, and Robinson sites all display an equal amount of diversity at about 40 percent. The only other well-recorded site, Crockett Canyon, reports only a 21 percent diversity.

Table 123. Plant Material (including corn) from Regional Sites

	REGIONAL SITES										
	Feather Cave	Fresnal Shelter	Rio Bonito Pithouse	Filingin	Crockett Canyon	Angus	Robinson	Phillips	Block Lookout	Bloom Mound	Bonnell
Corn	x	x	x	x	x	x*	x	x	x	x	x
Yucca	x	x					x				
Piñon		x	x	x		x	x				
Agave		x				x*					
Juniper			x	x		x*	x				
Pine			x			x*	x				
Cheno-Ams			x	x	x	x*	x				
Lilies			x	x							
Amaranth			x								
Oak			x			x					
Beeweed			x	x	x*						
Sunflower			x				x		x		
Sagebrush			x	x		x*					
Low Spine			x	x		x*					
High Spine			x	x		x*					
Mormon Tea			x	x		x*					
Grasses			x	x	x	x*					
Mountain Mahogany			x			x					
Mustard				x		x	x				
Umbrella Plant				x							
Indian Hemp				x							
Cactus				x	x	x	x		x		x
Primrose				x	x						
Squash				x	x		x				

	REGIONAL SITES										
	Feather Cave	Fresnal Shelter	Rio Bonito Pithouse	Filingin	Crockett Canyon	Angus	Robinson	Phillips	Block Lookout	Bloom Mound	Bonnell
Globe Mallow					x*	x					
Walnut					x*		x	x	x		x
Purslane						x*	x				
Locust						x					
Rose Family						x					
Common Reed						x*	x				
Spruge						x					
Stickleaf						x					
Cattail						x					
Mesquite						x					
Acacia						x*					
Buckwheat						x*					
Beans							x			x	
Saltbush							x				
Husk Tomato							x				
Thorn Apple									x		
Hackberry										x	

* Within burial pit

With only five sites presenting adequate data, it is almost impossible to suggest that the high diversity at the Angus site implies resource stress because such a wide variety of plants were utilized. This is, however, suggested by the available data. The site is a late pueblo occupation and the frequency of fauna on the site is very low. The data do suggest that although corn was utilized somewhat consistently at the Angus site, the diet of the site population was certainly not limited to corn and corn products.

Hunting Game

The dependency on wild game by prehistoric populations in the Sierra Blanca region could be assumed to be very high, given the great amount of forested terrain and high frequency of game found there today. The dependency of site populations on large versus small game as well as overall abundance of fauna found on sites can be measured and thus used as an index of both degreee of utilization and amount of faunal resource stress.

Bayham (1982) and Szuter and Bayham (1989) have devised an Artiodactyl Index that compares the amount of deer and antelope on a site to the number of Leporids (rabbits) to determine degree of dependency on fauna. It is calculated as the ratio of the number of artiodactyls relative to the number of artiodactyls plus leporids ($\sum$ Artiodactyls ÷ $\sum$ Artiodactyls + Leporids). A resulting value of .80 is considered high, for example, while .30 is low. The index is based on the premise that large game (such as deer and antelope) are the preferred species in any given prehistoric subsistence strategy. Small game, such as rabbits or rodents, are a relatively inefficient source of food and not likely pursued by choice (Cohen 1985:102). Thus, a declining value in the Artiodactyl Index over time in an area is considered by Szuter and Bayham (1989) to be evidence of faunal resource depletion, specifically large game. However, Cannon (1998) warns against comparing indices for areas that vary in location or elevation as results may not be measuring the same degree of depletion, but rather only a difference in environmental availability.

An increase in diversity in faunal resources on a site is also considered an indication of resource stress (Minnis 1985:35). Reasons for a lessening availability or increasing diversity could be human overpopulation within a given area, overexploitation, competition for resources, or environmental perturbations. One of the most frequent responses to a failing resource base is to diversify and rely more heavily on less frequently used subsistence items (Oakes 1999, vol. 6, 54). Rather than a weakening dependency on large game over time in the Sierra Blancas, Speth and Scott (1985:141) believe there was an actual increase in large game through the centuries. This, of course, would indicate that there was no faunal depletion in the Sierra Blancas and that, also, environmental conditions would have been favorable for large game and that populations did not eventually overexploit them.

We tested this statement by Speth and Scott (1985) using the Artiodactyl Index to determine if large game use increases and small game exploitation decreases. We added new sites to the database established by Speth and Scott (1985) and Driver (1990), slightly changing the index to include bison as large game and edible rodents as small game. Results are shown in Table 124, sequentially ordered by time to the best of our ability.

It can be seen that Table 124 presents a somewhat confusing mixture of both strong faunal dependence in 46.1 percent of the cases and very low dependence in 38.4 percent of others. The fluctuations in faunal utilization values do not correspond to either an increase *or* decrease over time as suggested by Speth and Scott (1985:141). However, we examined the spatial locations of the sites looking for differences in utilization between elevational zones such as valleys and mountain areas (Fig. 100). We see that the upper Rio Bonito Valley is the location of the two sites that exhibit the two lowest indices–Angus and the Rio Bonito pithouse. Further downstream, faunal exploitation is greater, but never more than moderate. The Peñasco Valley also shows a low utilization of fauna. Sites displaying the highest indices of fauna are located near Roswell. This result is not unexpected because bison, in particular, are the most readily available on the surrounding plains. The Corona area displays a high utilization index as does the north flanks of the Capitan Mountains. The Nogal Mesa area ranges from moderate to heavy in utilization through time. Why these areas exhibit these differences (except for Roswell) is not clear.

Looking at Figure 100, the only obvious patterning is a heavy faunal utilization on Roswell area sites. Explanation for why Corona and Capitan areas are also high, while Rio Bonito and Peñasco areas are low is lacking. Probably contributing to this wide range in indices are various faunal collection biases, screening differences, and completeness of excavations or reporting of faunal assemblages. Driver (1990:259) submits that there could also be a temporal change in the availability of bison, in particular. Our data, however, do not bear this out; bison show widely varying percentages on different sites (Table 124) of the same time period. However, the basic patterning does seem to be one of heavy use of fauna on sites by ca. A.D. 1150 with several notable exceptions. As Speth and Scott (1985) and Driver (1990) have hinted, there may have been an unusual trading arrangement between some of these heavy faunal-using sites and the Pecos River area. This possibility is readable in our data. The King Ranch site and potentially Bloom Mound (both near Roswell) have very high large game indices.

Driver (1990:248) states that many sites have only selected faunal parts represented in their assemblages. Ribs and hump meat (of bison) are vastly overrepresented. He suggests that these choice parts were transported to the sites from the Plains, perhaps in trade or through hunting expeditions. He prefers the hypothesis of trading large game from the Pecos Valley to the mountains of the Sierra Blancas. Possible trade exchange items included corn or piñon nuts (Driver 1990:257). This idea is intriguing and may explain the presence of large amounts of fauna on some sites and not on others even when they are in the same locale and roughly contemporary. Why some sites would choose to participate in such a trade relationship and not others is not understood at this time, however. Were they socially excluded, were they too small in population (but see Filingin site), was agricultural dependency overriding the concern for the lack of fauna?

To conclude, faunal dependency remained strong on many sites in the Sierra Blanca region regardless of whether the resource was obtained

Table124. Indices for Faunal Utilization Over Time

	Penasco	Tortolita	Rio Bonito Pithouse	King Ranch	Filingin	Crockett Canyon	Hiner 1	Angus	Phillips	Salas	Block Lookout	Bonnell
Bison	.6	2.9	1.5	1.8	37.5	.5	15.5	.1	8.7		37.0	9.5
Large game	41.4	44.1	25.3	71.9	37.5	58.1	65.8	16.4	64.7	60.0	43.2	16.2
Rabbits	58.0	52.9	39.6	12.5	8.3	29.6	18.7	61.9	26.6	40.0	19.8	44.3
Rodents												
Small game			33.3	14.4		11.6		21.4				
VALUES	.42	.47	.26	.81	.90	.58	.81	.16	.73	.60	.80	.36

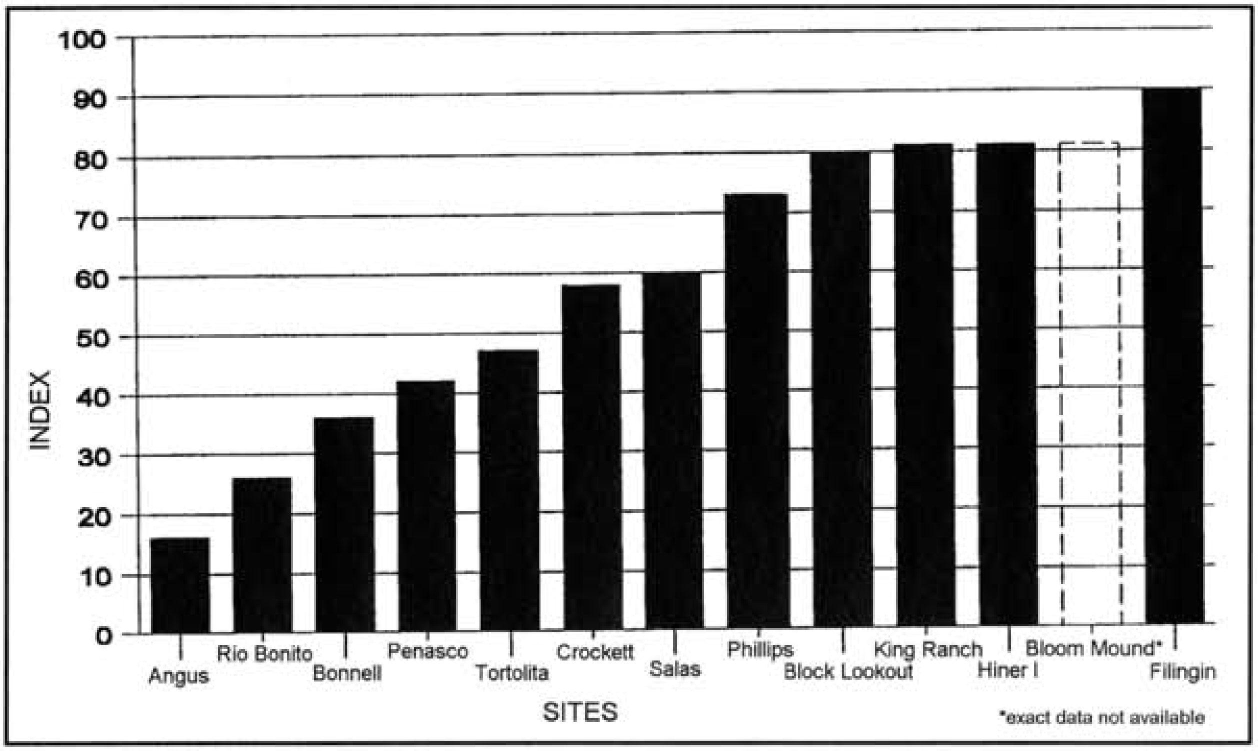

Figure 100. Ranking of sites by faunal dependency.

through hunting or trade. However, on several sites (Angus included), there was a definite lack of heavy faunal utilization. Reasons for this occasional dearth of fauna are unknown as environmental perturbations do not seem to have been a factor nor does overpopulation of these areas. In contrast, many excavated sites have produced great quantities of corn along with faunal remains. It would seem that faunal resources were always important in Sierra Blanca subsistence adaptations, even with the adoption of agriculture. Some sites (such as Angus) may have made the transition to strong agricultural dependency along with a diversified use of wild plant foods because of faunal resource stress.

Conclusions

The Angus site provided good data for examining changing architectural and ceramic use through time in the Sierra Blanca region. While 19 radiocarbon dates were obtained for the site and multiple occupations were identified, placement of the site into the currently used phase system for the Sierra Blancas was not possible. We devised a different classification system, based on sequential ordering of ceramics, to chronometrically place the Angus site within a usable time frame.

The largest surprise during analysis of site materials was the intimation that there may have been a post-Pueblo occupation of the site by Athabaskan peoples at ca. A.D. 1425 as suggested by seven radiocarbon dates, some Athabaskan Utility Ware pottery, and remodeling of rooms with these later dates. The dates seem early for Athabaskan occupation, but early dates are regularly turning up in other areas of New Mexico, and should not be summarily dismissed.

For future research, we submit that more study needs to be concentrated on the temporal placement of sites in the Sierra Blanca region. As mentioned earlier, no Archaic or early pithouse sites have been dated, and only a very low percentage of later sites. Excavations in the region have not been extensive and may partially account for this paucity of data. But until a solid database of chronometrically ordered sites is obtained, we can only continue to guess at original settlement dates for the region and by whom, the beginning use of ceramics, or temporal variations among similar appearing sites or sites in different locales. The Angus site data should make some contribution to that end.

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APPENDIX 2. BURIAL INFORMATION

Burial 1
Provenience: Room 2, FS 7234; sealed subfloor pit.
Burial Type: Articulated primary.
Age and sex: Female 50+ (Todd stage 10, Suchey-Brooks stage 6, auricular surface stage 7-8).
Representation: Burial 1 is in fair to good condition and fairly complete, missing ends of some long bones and vertebrae from deterioration. Portions of ribs and hand and foot bones are missing, some from deterioration, some probably from rodent activity. Deterioration is particularly evident where she came in contact with ground below.
Dentition: Most teeth were lost antemortem and all but the area of the mandibular left canine are well remodeled. The maxillary right central and lateral incisors and the left canine were lost postmortem or shortly before. The right maxillary canine is impacted. It is visible in the anterior maxilla where it rests at an angle above the lateral incisor and first premolar. Two teeth remain, the maxillary left central incisor and mandibular right canine. Both are heavily worn at steep angles. Three or four abscesses, two maxillary, two mandibular, are well remodeled. The maxillary incisor has two small interproximal caries. Non-linear array of pits are present on the canine, linear pits on the incisor, and a diffuse boundary opacity on the incisor.
Degenerative: Diffuse osteoporotic pitting is found on the frontal, parietals, and occipital. Vertebral osteophytes range from elevated rings to curved spicules. There is slight to extensive spicule formation on all major joint surfaces, porosities on most, and resorptive foci are common. Eburnation occurs in the left knee joint and osteochondritis dissecans on both distal femora.
Trauma: A small (4.9 by 4.4 mm) remodeled compression fracture is located just above right orbit. There is also a probable depressed fracture of left occipital condyle so that postcondylar foramen is filled with bone. This could be congenital but is more likely traumatically induced. Facets on the left side of the atlas and axis vertebrae that are enlarged to compensate and have resorptive foci. There is spondylolysis of lumbar 4.
Postmortem Marks: Definite carnivore damage is present on several body parts. Chewing, gouges, and a few punctures are found throughout. The most problematical marks are a series of marks on a scapula.
Comments: Some bone in "Burial 8" could be from this individual.

Burial 2
Provenience: Room 3, Feature 7025; FS 7303; unsealed subfloor pit.
Burial Type: Articulated primary.
Age and Sex: Female 18-22 years (auricular surface stage 1 or 2, unfused medial clavicle, sacrum: unfused S3-S4, fusing S1-S2, S2-S3).
Representation: Burial 2 is in poor condition with most surfaces eroded. She is missing the posterior cranium, much of the upper arms and thorax, pelvis, knee, and ankle areas, most due to deterioration but some probably from rodent activity.
Dentition: Dentition is nearly complete with the postmortem loss of the maxillary right canine and second premolar. No caries or abscesses are present. Defects occur in the crowns of the mandibular third molars, and hypoplasias, pits, or opacities in most anterior teeth. There is also the agenesis of the mandibular left lateral incisor.
Degenerative: Very slight lipping is present on the proximal metacarpals. Most joint surfaces are deteriorated.
Other: The sternum has a large sternal foramen (8 mm diameter) that is not united at base.
Postmortem Marks: Sparse evidence of carnivore chewing and gouging is present on a few elements.
Comments: Also in this pit were a complete tibia and distal femur from a fetus or newborn ("Burial 7").

Burial 3
Provenience: Room 3, Feature 7026, FS 7304, unsealed subfloor pit with heavy rodent disturbance.
Burial Type: Scattered/disarticulated.
Age: About 6 months (size compared to an aged Anasazi burial from La Plata (LA 37603 B2.2)).
Representation: Burial 3 is in poor condition with very poor representation -- portions of the left ilium, ischium and femur, rib and sternum fragments, a metacarpal shaft, and a hand phalanx 1.

Pathology: Bone cortex is very thin and fragile, much thinner than "Burial 7". Woven bone on most elements could be pathological or from rapid growth.

Burial 4
Provenience: Feature 5002, FS 5606; slight depression at base of midden.
Burial Type: Articulated primary.
Age and sex: Male 50+ (auricular surface stage 7, suture closure).
Representation: Burial 4 is in poor to fair condition and is missing most joint surfaces, those body parts that came in contact with the soil below, and most hand and foot elements. There is much breakage.
Dentition: All maxillary teeth were lost premortem and completely remodeled. Remaining mandibular teeth include the right second premolar through the lateral incisor and the left canine. No caries are present. There is considerable wear on the lateral incisor but wear is fairly minor on the other teeth. Apical abscesses occur on the left mandible below both premolars. Linear arrays and single pits are present on the canines.
Degenerative: Extensive spicules are present on thoracic and lumbar vertebral bodies. Extensive lipping also characterizes most joint surfaces with eburnation on both elbows (humerus and radius).
Trauma: A small (6 by 7 mm), mostly remodeled depression fracture is located on the right frontal.
Other: Button osteoma (4 by 4 mm) is present on the left parietal near bregma.
Postmortem Modification: Carnivore chewing, punctures, and gouges are present on several elements. Cut-like marks or slices are on the left humerus.

"Burial 5" (Human bone found scattered throughout the Feature 3000; all are consistent with an older large individual and treated as a burial in this analysis.)
Burial Type: Scattered/disarticulated.
Provenience: Scattered throughout Feature 3000; FS 3091, 3118, 3177, 3185, 3193, 3571.
Age and Sex: Male 35-50+ (Todd stage 8 or 9; auricular surface stage 6?).
Representation: Very fragmentary bone in good to fair condition, scattered from 97 to 99N, 92 to 94E, mostly in Level 1 but some in Level 2. Parts include: a hyoid body, fragments of the left ischium and right pubis, parts of two thoracic vertebrae, parts of three ribs, a left proximal humerus fragment, distal fragments of the right tibia and fibula, a right metacarpal fragment, pieces of a left talus, the proximal end of a left first metatarsal, and a calcaneus fragment. All are old breaks that are not at all crisp. There is no evidence of carnivore damage.
Degenerative: Evidence of degenerative changes include: an elevated ring on the thoracic vertebra, slight lipping on fibula and talus, and surface porosity and resorptive foci on fibula.
Pathology: Reactive, woven bone is present on the interior surface of a rib fragment. This could be from a rib fracture that became infected but the fracture is not on the piece found. The end of this piece is highly rounded and polished, probably postmortem.

"Burial 6" (Parts of at least two children; no parts are duplicated but right and left tibia diameters at the nutrient foramen are different enough to suggest two similarly aged individuals.)
Burial Type: Scattered/disarticulated.
Provenience: Scattered throughout Room 3 and the general area. FS 7189, 7209, 7219, 7229, 7250, 7279, 7322, 7350, 7362.
Age: 1.5-2.5 years (dental development 3 ± 1yr, size comparable but stouter than an Anasazi child, LA 37592 B1, aged 1.5 to 2.5 years).
Representation: Parts are in fair to good condition and include: three cranial case fragments, a maxillary fragment and left deciduous second molar, right mandibular ramus and unerupted first molar, parts of two lumbar vertebrae, fragments of left and right ribs, much of a right radius and right femur, midshaft portions of both tibiae, lower shafts of both fibulae, and a tarsal.
Dentition: Three teeth include the deciduous left maxillary molar and the mandibular right lateral incisor and a fully developed crown for right permanent first molar.
Pathologies: Woven bone (endocranial lesions) on the interior of the cranial case fragments.
Postmortem Modification: Slices and cuts on two fibulae, a right radius, and a left tibia. The distal right femur is cut off at an acute angle and has chop-like marks.

"Burial 7"
Provenience: Room 3, Feature 7025 (unsealed subfloor pit), FS 7303.
Burial Type: With Burial 2.
Age: New born to four months. Tibia length = 65.2 mm. Ubelaker gives a range of 59.5 to 94.0 mm for newborn to six months (1978:49).
Representation: Complete tibia and distal femur only. Parts are in good condition.
Comments: Not the same individual as Burial 3. Bone is much denser and probably from a slightly younger individual.

"Burial 8"
Provenience: Rooms 1, 2, 3, 4 (mostly Rooms 2 and 3), FS 7123, 7131, 7174, 7179, 7184, 7189, 7196, 7200, 7219, 7350, 7351, grids 72 to 77N, 105-108E, Levels 2 and 3.
Age and Sex: Adult, at least one female (based on size). Some from Room 2 are probably part of Burial 1 (e.g. one of the manubria), some from Room 3 could be from Burial 2. A third small adult is definitely indicated by the presence of three manubria and atlas vertebrae between the two burials and the scattered bones.
Representation: Condition is mostly good. Room 1 produced only a small rib fragment. Room 2 had parts of two manubria, a rib shaft, two metacarpals, two first hand phalanges, a second hand phalanx, a third hand phalanx, and a metatarsal. Those from Room 3 are an axis vertebra, a thoracic vertebra transverse process, a rib shaft fragment, a first hand phalanx, a piece of mostly cancellous bone, probably from an innominate or large tarsal, and a medial cuniform. Room 4 had a proximal end of a left rib 11.
Degenerative: Slight lipping on the axis vertebra facets, a proximal rib facet, and the proximal surfaces of the hand elements. Slight porosity on the rib facet and periarticular resorptive foci on the metacarpals.
Postmortem Marks: A rib shaft from Room 3 has cut-like marks and possible carnivore damage on the margins. A fifth metatarsal from Room 2 has a gouge and linear mark on the medial shaft, probably carnivore damage.

FS 13
Provenience: Room 1 of the 1956 excavations, level 2.
Burial Type: Unknown.
Age: Around 1 to 2 years, based on size.
Representation: One piece of a left parietal and four small cranial case fragments in fair condition.
Pathologies: The broken edge of the parietal fragment has periostitis along the inferior edge. The lesions are active and extend partially through the cortex into the cancellous bone.

Feature 5000
Provenience: Feature 5000, 98N 90, 91, and 93 east. FS 5560, 5574, 5597.
Burial Type: Scattered/disarticulated.
Age and Sex: One is from a child 1.5 to 2.5 years, one is a small adult, probably a female, and the third is from an adult or large child.
Representation: Parts include the lateral part of the basilar occipital from a child, a nearly complete right third metacarpal from a small adult, and a rib shaft fragment from an adult.
Postmortem Marks: The metacarpal shaft has fine V-shaped marks, possibly cuts, on the palmar aspect of the shaft.

APPENDIX 3. BURIAL MEASUREMENTS

Cranial measurements (mm) for the LA 3334 adult burials

Measurement	Burial 1♀	Burial 2♀	Burial 4♂
Maximum cranial length	154		
Maximum cranial breadth	135		
Bizygomatic diameter	126	117	131
Basion-bregma height	131		
Cranial base length	96		
Basion prosthion length	90		
Maxillo-alveolar breadth		63	
Maxillo-alveolar length	48	44	
Biauricular breadth	119		132
Upper facial height	61	66	62
Minimum frontal breadth	88		99
Upper facial breadth	99	91	111
Nasal height	44	47	48
Nasal breadth	21	24	27
Orbital breadth	35	37	37
Orbital height	36	33	34
Biorbital breadth	92	94	102
Interorbital breadth	23	25	29
Frontal chord	107		
Parietal chord	102		
Occipital chord	82		
Foramen magnum length	34		
Foramen magnum breadth	28		
Mastoid length	31		39R*
Chin height	26	32	33
Height of mandibular body	25	30	32*
Breadth of mandibular body	11	9	15
Bigonial width	94	83*	
Bicondylar breadth	116	109*	
Minimum ramus breadth	32	35	

Measurement	Burial 1♀	Burial 2♀	Burial 4♂
Maximum ramus breadth	43	46R	40
Maximum ramus height	53		
Mandibular length	92		108
Mandibular angle	113	119	115

R = right element
* = estimated

Postcranial measurements for the LA 3334 adult burials

Measurement	Burial 1♀	Burial 2♀	Burial 4♂	Burial 5♂
Clavicle: max length			152*	
AP dia midshaft	9R	8R*	12	
SI dia midshaft	8R	7R*	10	
Scapula: breadth	97			
Humerus: max length	280		296R*	
Vert head dia	39		45R*	45
Max dia midshaft	21		23R	
Min dia midshaft	15		17R	
Radius: max length	206			
AP dia midshaft	10	8*		
ML dia midshaft	14	10		
Ulna: AP dia	11	10R	14R	
ML dia	14	13R	16R	
Physiological length	195			
Min circumference	33	23	37	
Sacrum: ant sup breadth	112			
Max dia base	47	44*		
Innominate: height	186			
Iliac breadth	128*			
Pubis length	70			
Femur: max length	388			
Bicondylar length	386			
Max femur head dia	40		46	
Epicondular breadth	70			
AP subtroch dia	22	20*	32	

Measurement	Burial 1♀	Burial 2♀	Burial 4♂	Burial 5♂
ML subtroch dia	26	27*	27	
AP midshaft dia	24	22*	28R*	
ML midshaft dia	23	21*	28R*	
Midshaft circum	78	69	88	
Tibia: length	318R			
Max prox ep breadth	69R			
Max dist ep breadth	42R			
Max dia at nut foram	29R	29	40R	
Min dia at nut foram	22R	17	26R	
Circum at nut foram	81	78R	103R*	
Fibula: max dia midshaft	15*			

R = right element
* = estimated

Comparative measurements for the Henderson site and Gran Quivira, Mound 7

Measurement (mm)	Henderson Site				Gran Quivira			
	females		males		females		males	
	mean (n=)	range	mean (n=)	range	mean (n=)	range	mean (n=)	range
Max cranial length	165 (3)	155-172			167(27)	167-177		
Max cranial breadth	138 (3)	134-141			135(24)	124-141		
Bizygomatic diameter	132 (3)	129-136	143 (2)	139-147	129(20)	123-136	139(14)	128-146
Basion-bregma height	133 (2)	131-136			132(19)	122-142		
Basion prosthion length	103(3)	99-108						
Maxillo-alveolar	54(3)	53-56						
Upper facial height	67(3)	66-68	69(2)	68-71	68(33)	60-79	75(24)	68-82
Minimum frontal breadth					90(30)	82-99	93(26)	84-107
Nasal height	50 (3)	49-51	52 (2)	52	48(35)	42-54	52(29)	49-58
Nasal breadth	25 (3)	23-26	28 (2)	28	25(35)	23-28	26(27)	22-28
Orbit breadth	39 (3)	38-39	41 (2)	40-43	37(29)	33-41	39(25)	35-42

Measurement (mm)	Henderson Site				Gran Quivira			
	females		males		females		males	
	mean (n=)	range	mean (n=)	range	mean (n=)	range	mean (n=)	range
Orbit height	33 (3)	33-34	34 (2)	33-35	34(33)	30-38	35(24)	31-38
Biorbital breadth	98(3)	95-103	99(2)	98-101				
Interorbital breadth	24(3)	22-28	21(2)	19-24				
Masstoid length	25(4)	22-27	33(3)	30-34				
Chin height	32(3)	31-32	33(2)	33-34	34(39)	30-39	37(32)	32-42
Bigonial width	88(3)	80-94			93(31)	80-107		
Bicondylar breadth	125(4)	114-141			116(27)	98-125		
Minimum ramus breadth	35(4)	32-36						
Mandibular length					100(27)	92-114	107(23)	100-116
Clavicle max length			158(3)	155-161			154(27)	135-167
Scapula breadth	97(3)	95-101						
Humerus max length	283(3)	279-285	328(3)	319-344	282(45)	248-302	306(26)	283-325
Humerus vert head dia	38(4)	37-40	47(2)	46-47	38(42)	33-42	45(27)	42-49
Humerus max dia midshaft	22(4)	20-25	24(3)	21-27				
Humerus min dia midshaft	14(4)	13-15	16(3)	15-17				
Radius max length	231(4)	214-254			221(39)	196-245		
Ulna min circumference	31(4)	30-34	33(2)	30-36				
Inominate height	195(3)	184-209						
Femur max length	400(2)	393-408						
Femur bicond length	394(3)	387-400			396(37)	338-425		
Femur max head dia	40(4)	38-42	49(3)	47-50	39(43)	33-44	45(28)	40-47
Femur AP subtroch dia	22(3)	21-25	27(3)	26-27				
Femur ML subtroch dia	22(4)	21-25	27(3)	26-27				

Measurement (mm)	Henderson Site				Gran Quivira			
	females		males		females		males	
	mean (n=)	range	mean (n=)	range	mean (n=)	range	mean (n=)	range
Femur AP midshaft dia	26(4)	24-33	32(4)	32-33				
Femur ML midshaft dia	24(4)	21-27	26(4)	23-28				
Femur midshaft circum	78(4)	74-85	91(4)	89-93				
Tibia length	341(4)	322-369			332(38)	284-368		
Tibia max dia at nut for	35(4)	33-42	39(4)	35-42				
Tibia min dia at nut foram	20(4)	18-22	24(4)	22-29				

Sources: Henderson Site - Rocek and Speth 1986:151, 162, 180, 184, 185
Gran Quivira - Reed 1981:185, 187, 188, 191, 195