MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

The Roswell South Project: Excavations in the Sacramento Plain and the Northern Chihuahuan Desert of Southeastern New Mexico

Regge N. Wiseman

with contributions by

Nancy J. Akins
Byron T. Hamilton
Pamela J. McBride
Susan M. Moga

Yvonne R. Oakes
Principal Investigator

ARCHAEOLOGY NOTES 237

SANTA FE 2003 NEW MEXICO

ADMINISTRATIVE SUMMARY

In June 1997, the Office of Archaeological Studies, Museum of New Mexico, began data recovery operations at seven prehistoric sites (LA 44565, LA 44583, LA 116467, LA 116468, LA 116469, LA 116470, and LA 116471) and two historic sites (LA 89153 and LA 116473) for the New Mexico State Highway and Transportation Department (NMSHTD) in Chaves and Eddy Counties, New Mexico. The sites lay within proposed improvements to U.S. 285 between Roswell and Carlsbad. This report details the findings at the prehistoric sites. The findings at the historic sites are presented in Wiseman (2001).

LA 44565 and LA 44583, on the Brantley Reservoir preserve, are administered by the U.S. Bureau of Reclamation. LA 116467, LA 116468, LA 116469, LA 116470, and LA 116471 are on NMSHTD land acquired from private sources and private land. Site locations can be found in Appendix 7.

The archaeological fieldwork started on June 7, 1997, and ended on October 31, 1997. An additional week of work was conducted at LA 116469 in May 1998 when it was discovered that more of the site lay within the highway project than was originally anticipated. In all, 85 days were spent in the field.

MNM Project No. 41.647 (Roswell South)
NMSHTD Project No. SD-WIPP-285-2(210)78, CN 2783
JPA J00343/97
NMCRIS No. 86464
State of New Mexico Archaeological Excavation Permit SE-127 (May 27, 1997, to May 26, 1998)
U.S. Bureau of Reclamation Brantley Reservoir Cultural Resource Use Permit (August 21, 1997)

ACKNOWLEDGMENTS

I would like to thank the following individuals for their assistance in bringing this project to completion:

Field staff: Byron Hamilton, assistant supervisor; and James Quaranta, Phil Alldritt, Bob Sparks, and Chris Sparks.

Laboratory analysis: Byron Hamilton, lithic debitage and materials identification; Eric Blinman, lithic data number-crunching; Nancy Akins, faunal and human remains from LA 116471; Susan Moga, faunal remains from LA 44565 and LA 116469; Pamela McBride, ethnobotany; William "Bill" Blanchard, dry-screening soil samples for radiocarbon assays and preparing artifacts for repository; and Laura Rick, lithic data entry.

Office and Production Department: Cameron Cunningham, fiscal and personnel matters; Delinda Andermann and Kathleen Yount, front office; Ann Noble, graphics; and Tom Ireland, editing.

Local assistance (Carlsbad): George Markle, M.D., for permission to excavate at LA 116471; and Roy Pettes, Dailey Jones, and Harvey Hicks for information about previous diggers at LA 116471.

Assistance from colleagues in other organizations: Rolla Shaller, access and advice concerning the Jack Hughes files; the Panhandle-Plains Museum; West Texas A&M University; and Barney Burns, University of Arizona, and Mark Rosacker, Living Desert State Park, Carlsbad, for information about previous diggers at LA 116471.

Hunter-gatherers are more remarkable for the way they allocate natural resources (the land and its products) through social relations which have as their basic "materialist" teleology the reproduction of people, not goods. (Morton 1988:20)

CONTENTS

FIGURES

TABLES

INTRODUCTION

On April 17, 1995, the New Mexico State Highway and Transportation Department (NMSHTD) authorized the Office of Archaeological Studies (OAS) to begin data recovery at nine cultural resource locations, including seven prehistoric sites and two historic sites (Fig. 1 and Appendix 7; Wiseman 1997). These sites lie partly within the limits of NMSHTD Project SD-WIPP-285-2(210)78 (CN 2783) in Chaves and Eddy Counties, New Mexico. The project area is owned or administered by the NMSHTD, the Bureau of Reclamation, or private owners. The current volume presents the results of the work at the prehistoric sites. The historic sites are described in a separate volume (Wiseman 2001).

Archaeological fieldwork commenced on June 7, 1997, and was completed on October 31, 1997. The fieldwork was supervised by Regge N. Wiseman, assisted by Byron T. Hamilton. Other OAS staff who provided assistance at different points during the field phase are Natasha Williamson (historic sites), James Quaranta, and Philip Alldritt. Local labor, employed for varying lengths of time, included Frank Ramirez, Pete Chavez, and Richard Sanchez of Midway, New Mexico, and Abel Chavarria and Richard Benevidez of Carlsbad.

The prehistoric sites occur in two general groupings. The northern group, located on the Sacramento Plain just south of Roswell and west of Dexter, includes two sites and one enigmatic collection of prehistoric pottery. LA 116467, dating to the eleventh and/or twelfth centuries, may have been a structural site, though only the western margin of the site and no structures remained intact at the time of the OAS excavations. A hearth, three extramural pits, and extensive refuse were documented. At LA 116469, the OAS team excavated five hearths and an associated artifact scatter that represents at least two occupations, one in the middle of the first millennium A.D. and the other in the eleventh century A.D. LA 116468 consisted of four potsherds (three of them unusually large) that represent two different time periods. That, and the fact that they were scattered in a drainage bottom, lead us to suspect that they are a recent phenomenon and do not constitute a valid prehistoric site.

The southern group of sites, located within the northern edge of the Chihuahuan Desert, has two subgroups, one consisting of two sites just north of Carlsbad and the other consisting of two sites 12 km farther north at Rocky Arroyo. Just north of Carlsbad, the OAS team investigated one mortar at LA 116470, a multiple mortar site where most of the mortar holes lie outside the highway right-of-way. The second site north of Carlsbad, LA 116471, proved to have two components, one dating about 1000 B.C. and the other dating to the fourteenth century A.D. At LA 44565, at Rocky Arroyo, the OAS team excavated three hearths and an associated artifact scatter dating to at least two periods, one Late Archaic (ca. 1700 B.C.) and the other to the historic period. Only a small part of nearby LA 44583 lies within the highway project, and only a few 1 m grids were excavated. The excavated part appears to be prehistoric, but other than that, dating is not possible. Prior to construction of U.S. 285 in the twentieth century, LA 44565 and LA 44583 were probably one site.

The final draft of this report was completed in early 2001. Between that time and its publication, a shorter paper focusing on Punto de los Muertos (LA 116471) appeared in *Journal of Big Bend Studies* (Wiseman 2003). The discussion in that paper varies somewhat from that given here and reflects more recent thinking with regard to the prehistoric occupation of southeastern New Mexico.

NATURAL ENVIRONMENT

In some ways the physical appearance of the Pecos Valley, excluding towns and farms, has not changed much over the past 100 years, especially to the casual eye. It was, and still is, a plains environment with broad expanses of grass and scrubland punctuated by water courses that support occasional trees. But to the scientist, changes in the biotic environment have been profound (Burgess 1977).

The north project sites--LA 116467, LA 116468, and LA 116469--are situated on small, short, unnamed, ephemeral drainages that begin and end in alluvial topography. Today, because of land leveling for agriculture, these drainages do not reach the Pecos River, which is several kilometers east of the sites.

The south project sites--LA 116470 and LA 116471--are situated along the Pecos River immediately north of Carlsbad. LA 44565 and LA 44583 are situated on the north bank of Rocky Arroyo about 2 km upstream from its confluence with the Pecos. All south project sites sit on the first terrace or low hills bordering their respective streams at elevations from 975 m to 1,000 m (3,200 to 3,300 feet) above mean sea level.

The surface geology of the overall project area consists of mixed alluvial sediments deposited by the Pecos River during the geologic past. In the south project area, sedimentary outcrops (mainly limestones and dolomites) of the Yates, Seven Rivers, and Queens formations (Permian) form rocky hills and ridges to the southwest, west, and northwest of the sites (Dane and Bachman 1965).

Soils in the north project area are Calciorthids (Maker et al. 1974). These thermic, calcareous soils are shallow to relatively deep depending on the topographic situation. They are derived primarily from limestone but can be productive of plants and crops if sufficient moisture is present. In southeastern New Mexico, that generally requires irrigation. Modern commercial farming in the Pecos Valley takes place on these soils. In the vicinity of the north project sites, the deeper soils having farming potential are in the narrow drainage bottoms next to the sites.

Soils in the south project area belong to the Calciustolls-Rock Land association near the boundary with the Calciorthids association. These thermic soils are shallow and rocky and occur on "strongly sloping and rolling to very steep uplands underlain mainly by limestone bedrock" (Maker et al. 1974). Very limited acreages of Pachic Calciustoll, Pachic Haplustoll, and/or Cumulic Haplustoll soils occur along the course of the South Seven Rivers, but these tracts in the vicinities of the project sites are too small for any but garden farming.

According to pioneer accounts (Shinkle 1966), the vegetation of the Pecos Valley at the time of Euroamerican settlement consisted of a grama-dominated grassland with trees common only along certain watercourses such as the Rio Hondo. Kuchler (1964) posits that the potential natural vegetation of the north project area was Creosote Bush-Tarbush (*Larrea-Flourensia*) association. Many of the minor species of this association (i.e., yucca, agave, sotol, and some species of cactus) that are most useful to man do not occur or do not occur in useful numbers in the Roswell area but are very common in the vicinity of Carlsbad.

The north project sites lie within Dick-Peddie's (1993) Desert Grassland association (mainly black grama and soaptree yucca), and the south project sites are within his Chihuahuan Desert Scrub association (mainly creosote and tarbush). However, he notes in his discussion (Dick-Peddie 1993:131ff.) that the Chihuahuan Desert in southern New Mexico has spread at the expense of Desert Grassland over the past 150 years, mainly because of livestock grazing pressure. Because a very slight climatic shift also occurred during the past 150 years, the changes brought on by overgrazing could not be reversed to normal vegetative conditions (i.e., Desert Grassland). Whether this particular problem involves any of the individual project site locales is uncertain at this time.

In the south area, the potential natural vegetation is the Trans-Pecos Shrub-Savannah (*Flourensia-Larrea*) association (Kuchler 1964). This association contains many of the same species as the Creosote Bush-Tarbush association, but species patterning varies. Perhaps more importantly, the nearby foothills of the Guadalupe Mountains provide a greater variety and abundance of certain plant (and animal) species in the Oak-Juniper association (*Quercus-Juniperus*), which would have been useful to the inhabitants of the sites in the south area.

Prior to intensive agricultural development in the late 1800s, surface and underground water sources in the Roswell-Carlsbad region were especially productive. As far as we can tell today, the occupants of the north project sites lacked permanent water in the vicinity of the sites, though reliable water was available at the Pecos River, 4 km to the east. The south project sites are better situated for water because of their proximity to the Pecos River, the South Seven Rivers, and Rocky Arroyo.

In most years the Pecos River runs year round, but because of several dams and water storage reservoirs between its headwaters in northern New Mexico and the project area, water flow is generally less than it might be under natural conditions.

The South Seven Rivers drain the north end of the Guadalupe Mountains. In addition, artesian springs once added significant quantities of water to this system and probably provided water to the lower reaches most of the year. Today, with the lowering of the water table, the lower South Seven Rivers channel carries water only after episodic rain storms.

Rocky Arroyo heads in the central Guadalupe Mountains. As recently as the late 1800s, different stretches of this drainage had water available from springs and bedrock catchments through much of the year. However, in its lower reaches, water was available mainly during the spring snow melt and in the rainy season of late summer.

Another natural attraction of the Pecos Valley was its variety and abundance of wildlife. Early pioneers described large herds of antelope, numerous cottontails and jackrabbits, and an abundance of fish (Shinkle 1966). The Pecos River formed the western boundary of the range of the great bison herds that frequented the southern Great Plains, though small herds and individuals moved west of the river as well.

The Pecos River is also a natural flyway for migratory birds. The Bitter Lakes Wildlife Refuge is a modern example of brackish-water wetlands that occur all along this stretch of the Pecos River. These wetlands harbor an abundance of ducks, geese, and other species, especially during the spring and fall. The north project sites are several kilometers west of this important resource zone, but the south project sites are adjacent to the zone along the Pecos and the lower reaches of some of the larger tributaries.

The climate of Roswell and Carlsbad today is characterized by mild winters and hot summers. The mean January temperature ranges from 3.3 to 5.5 degrees C (38 to 42 degrees F) in Roswell and Carlsbad, respectively; that of July is 25.5 to 27.2 degrees C (78 to 81 F); and the yearly mean is 14.7 to 17.0 degrees C (58 to 63 F). The average frost-free season exceeds 200 days (Tuan et al. 1973).

Precipitation is currently summer dominant. The mean normalized annual amount is 295 mm (11.5 inches), with 210 mm (8 inches) falling in the growing season, from April through September (U.S. Department of Commerce 1965).

A graphing technique compares mean annual temperature and precipitation for Roswell and Carlsbad on a monthly basis (Fig. 2). Both cities have weather records dating back to the late 1800s, Roswell with a 95-year record and Carlsbad with an 80-year record (data from beginning of records to 1960; Gabin and Lesperance 1977). Since Roswell and Carlsbad are similarly situated in the Pecos Valley, with Roswell to the north and Carlsbad 115 km to the south, it is not surprising that the curves are very similar and that the differences are due mainly to latitude. Thus, Roswell is somewhat cooler year round and has slightly greater annual precipitation.

The only other difference, and one that could be significant to nonindustrial societies, is in the distribution of precipitation throughout the year. Although both cities currently have summer dominant precipitation, rainfall in the Roswell area is a little more evenly spread throughout the growing season (April through October).

An annual precipitation of 11-13 inches is generally insufficient for dryland farming. Thus, growing crops in the vicinity of all project sites would be unpredictable, if not impossible, except during exceedingly wet periods. Even then, only small-scale farming along the drainages below the sites would be possible.

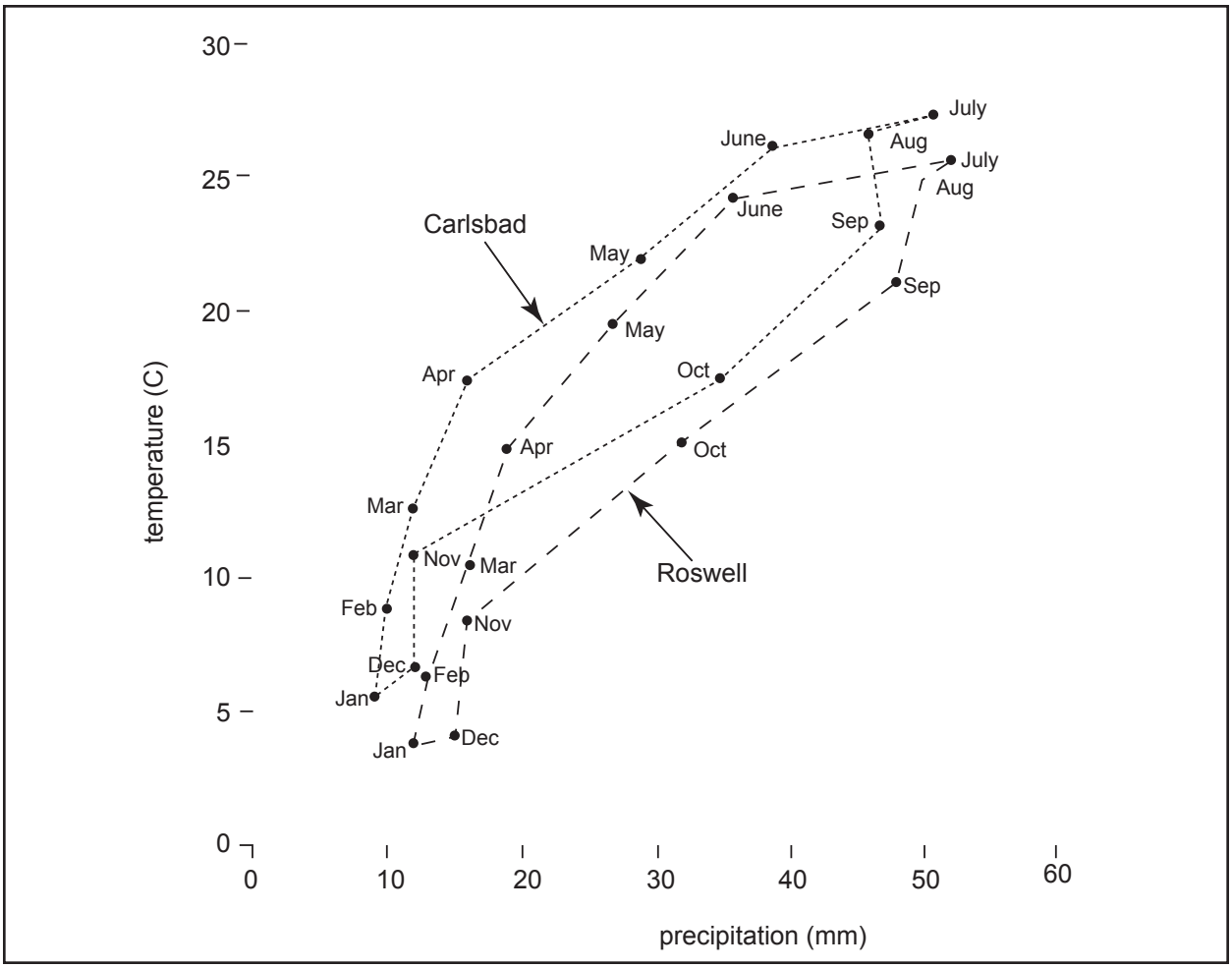


Figure 2. Mean annual temperature/precipitation curves, Carlsbad and Roswell.

CULTURE HISTORY

The following culture history outline of the Pecos Valley is distilled from a number of sources. For the prehistoric period, these include Stuart and Gauthier (1981), a general study of New Mexico archaeology; Sebastian and Larralde (1989), an overview of east-central and southeastern New Mexico; Kelley (1984), a more specific study of the Sierra Blanca region west of Roswell; Jelinek (1967), the Pecos River north of Roswell; Katz and Katz (1985a), the Pecos River south of Roswell; and Leslie (1979), the region east of the Pecos River and especially the southeastern corner of New Mexico. The primary references used for the historic period are Katz and Katz (1985b) and Shinkle (1966). The reader desiring more information is referred to those volumes for further details.

Human occupation of southeastern New Mexico began with the Llano complex ("Clovis Man") of the Paleoindian period, which dates to at least 13,000 years ago. These people and their successors of the Folsom period hunted large animals such as mammoths and now-extinct forms of bison and maintained a nomadic or seminomadic lifestyle. Although most accounts of Paleoindians refer to them as big-game hunters, it is a virtual certainty that the people collected and consumed wild vegetal foods and small animals as well as large animals.

The retreat of the Pleistocene glaciers and resultant warming of the more southerly latitudes resulted in a shift in human adaptation to what archaeologists call the Archaic period. This adaptation was more eclectic and focused on smaller animals such as deer and rabbits. The appearance of grinding tools and specialized burned-rock features suggests a greater reliance on plant foods. This long period--not systematically investigated in the Fort Sumner and Roswell areas yet--is better defined in the Carlsbad area and is described in some detail later.

The prehistoric pottery period in southeastern New Mexico, after about A.D. 500, has not yet been investigated as a coherent or singular whole, largely because the region is so vast. The discussion below divides the Pecos Valley region into three sectors: Fort Sumner, Roswell, and Carlsbad. Of these, the Roswell and Carlsbad areas pertain directly to the north and south areas, respectively, of the current project. The Fort Sumner data, especially those pertaining to the Crosby and Roswell phases, are included here because the remains extend down to Roswell and provide perspective for the discussions to follow. The study of Crosby and Roswell phase peoples may relate to the question of local indigenous inhabitants versus colonizers, possibly Lincoln phase peoples from the Sierra Blanca area and/or Trans-Pecos peoples from the Carlsbad area.

Fort Sumner Area

Arthur J. Jelinek (1967) defined a Late Prehistoric (i.e., pottery period) sequence along the Pecos River below Fort Sumner. Architecture is present in most phases, but the structures and the pottery seem to reflect cultural events in central New Mexico. These small villages of pithouses, and later on, small pueblos of cimiento construction, were abandoned about A.D. 1250 or 1300, when, as Jelinek (1967) suggests, the people quit farming to hunt bison full-time.

While Jelinek focused his attention on sites 50 km north of the project area, surveys closer to Roswell led him to postulate two separate but related phases for the Roswell area: the Crosby phase and the Roswell phase. He does not present singular, coherent descriptions of the Crosby and Roswell phases, but compares them to the equivalent phases in his Fort Sumner sequence. The descriptions given here are gleaned from various statements scattered throughout his report.

The Crosby phase is equivalent to the Early and Late Mesita Negra phases in the north and dates ca. A.D. 1000 to 1200. The type site for the phase, Site P9, is a few kilometers east of our project sites (Jelinek 1967). It is characterized as a "concentration of several hundred flakes and/or sherds and occasional indications of permanent architecture," but elsewhere, he states that the sites "appear to represent temporary camps." Crosby phase sites differ from Mesita Negra phase sites in that the pottery assemblage is dominated by Roswell Brown rather than Middle Pecos Micaceous Brown of Mesita Negra phase sites. The lithic assemblage is like that of Mesita Negra phase sites. The two projectile point styles identifiable to this phase are wide, corner- and side-notched arrow (?) points with convex blade and basal edges. The reader is left wondering about the validity of the Crosby phase, for Jelinek (1967:67) states that it is "distinct" but then questions it on ceramic grounds.

The Roswell phase is equivalent to the Early and Late McKenzie phases in the north and dates ca. A.D. 1200 to 1300 (Jelinek 1967). The two sites listed for this phase, P7 and P8, are characterized as "concentrations of several thousand flakes and/or sherds with little or no indication of permanent architecture." We presume that "permanent architecture" refers to pithouses or pueblos, such as those excavated closer to Fort Sumner. Roswell phase sites differ from Mesita Negra phase sites in that the pottery assemblage is dominated by Roswell Brown, Jornada Brown, and Chupadero Black-on-white rather than the McKenzie Brown and Middle Pecos Black-on-white of McKenzie phase sites. The lithic assemblage,

including numbers of small end scrapers, is like that of Mesita Negra phase sites. The three projectile point styles identifiable to the Roswell phase are wide, side-notched arrow points with convex blade edges and a convex basal edge, the same blade style but with a straight basal edge, and a triangular, multi-side-notched form.

Roswell Area

Late Prehistoric (pottery period) sites in the immediate vicinity of Roswell appear to reflect the oasislike character of the area. That is, local natural resources are especially favorable to more intensive occupation and presumably greater population stability than in surrounding areas. It is not surprising, then, that a number of sites known or suspected of having architecture are present, and that they have the character (substantial trash deposits, much pottery, pithouses, pueblo-style dwellings, corn horticulture) of the more sedentary Jornada Mogollon peoples to the west. For this reason, Jane Kelley (1984) has tentatively included the Roswell locality within the geographic reach of her Lincoln phase, which dates to the late thirteenth, fourteenth, and perhaps early fifteenth centuries. Somewhat earlier remains (e.g., Rocky Arroyo site, Wiseman 1985) also generally fit the Sierra Blanca/Jornada Mogollon configuration and can be tentatively included with them.

Other pottery-period sites with structures, however, such as King Ranch (Wiseman 1981), the Fox Place (Wiseman 1991), and the Townsend Site (LA 34150, recent excavations by Nancy Akins of the OAS) are enigmatic and currently unassignable to an existing culture chronology. These three sites are of special interest with regard to the question, posed later on, of the relationship between the prehistoric horticulturists and hunter-gatherers of the region.

These Late Prehistoric remains in the vicinity of Roswell contrast with the extensive scatters of artifacts that are commonly found in the sand dune country east of the Pecos River (such as the Bob Crosby Draw site) and on the Sacramento Plain north, west, and south of Roswell (Stuart and Gauthier 1981). It is currently unclear how these scatters relate to either Jornada Mogollon or Southern Plains manifestations. Given the geographic location of the sites, they could have been occupied by peoples from either culture area. How do we make a determination? Some progress is being made in this direction (Speth 1983; Rocek and Speth 1986), but we are far from the last word on the matter.

The Roswell locality evidently was abandoned by farmers in the A.D. 1300s or early 1400s. But because of its incredible water and faunal resources, the area had to figure prominently in all subsequent hunting and gathering patterns of the region between then and the coming of the Spaniards in the late 1500s and 1600s.

Carlsbad Area

In the Carlsbad area an Archaic sequence, including hunter-gatherers dating to the pottery period (Katz and Katz 1985a), is evidently related to the Trans-Pecos culture area immediately to the south in Texas. The sequence starts with the Middle Archaic, rather than the Early Archaic, suggesting that there may have been an occupational hiatus between the Paleoindian and the Avalon phase (3000-1000 B.C.). Little is known about the peoples of the Avalon phase other than the fact that they inhabited the floodplain near the river channel during at least part of the year, camped and constructed hearths in the open, and consumed one or more species of freshwater shellfish. The subsistence orientation at these sites was clearly riverine. Projectile points are currently unknown for this phase.

Late Archaic peoples of the succeeding McMillan phase (1000 B.C. to A.D. 1) are better known in that more sites with a wider variety of remains have been documented. Sites may contain burned-rock scatters, hearths (1 m diameter clusters of small rocks), and/or burned-rock rings averaging 10 to 12 m in diameter. Previously named projectile point styles associated with the McMillan include the Darl and the Palmillas types of the Texas sequence. Subsistence involved exploiting both riverine and upland plant and animal species.

The Terminal Archaic Brantley phase (A.D. 1 to 750) saw a continuation of the previous patterns and a greater use of burned-rock rings. Although this suggests that certain upland resources such as agave and sotol were becoming more important in the diet, the ratio of riverine to upland sites remained the same, with the emphasis still on floodplain living. Projectile point types commonly associated with the Brantley phase include the previously known San Pedro style; a newly described provisional type, the Pecos point; and several less standardized, but nevertheless familiar, styles of points commonly found in the region.

During the Globe phase (A.D. 750 to 1150), the first phase denoted by pottery, occupation of the floodplain environment reached its zenith. Three major changes also occurred in the material culture at this time: the appearance of brown ware pottery, the bow and arrow, and two types of circular habitation structures, one called “stone enclosures” and the other wick-iup floors or bases. In addition, the subsistence system changes from a riverine base, supplemented by upland foods, to one that emphasized upland products supplemented by riverine foods. Projectile point styles are dominated by the corner-notched arrow tips called

Scallorn. In many ways, the Globe phase appears to have been transitional between earlier and later adaptive patterns.

During the succeeding Oriental phase (A.D. 1150 to 1450), occupation along the river in the Carlsbad area started to diminish. The people who remained in the area continued in some cases to inhabit stone enclosures and used painted pottery such as Chupadero Black-on-white, Three Rivers Red-on-terracotta, and El Paso Polychrome imported from areas to the west and northwest. Otherwise, they retained their essentially Archaic, hunter-gatherer lifestyle. Why the local culture of Carlsbad/Guadalupe Mountains region did not continue to develop along the same lines as those to the north and west remains to be determined.

The Phenix phase (A.D. 1450 to 1540) and the Seven Rivers phase (post-A.D. 1540) are predicated on projectile point styles only: Garza-like and Toyah-like points in the former and metal points in the latter. Katz and Katz (1985a) admit that distinguishing between the two may be dubious in practice. They were able to assign only one site to each phase, indicating that Native American use of the riverine habitat in the Carlsbad area was minimal, mostly oriented toward hunting and perhaps succulent plant exploitation, and focused mainly (?) on Rocky Arroyo.

Where many of the people went, assuming that a diminution of sites and cultural remains indicates at least partial abandonment of the Carlsbad segment of the Pecos Valley, also remains to be determined. The period represented by the Phenix and Seven Rivers phases (the latter including the early Spanish explorations in the late 1500s) is unknown archaeologically. Abandoned *rancherías* described by early Spanish explorers for the Seven Rivers locale certainly indicate the presence of hunter-gatherers during the protohistoric and early historic periods (Schroeder and Matson 1965), but these specific inhabitants, possibly Jumanos (Hickerson 1994), effectively disappeared from the area before more detailed accounts and relationships could be recorded. This is assuming, of course, that they were not the Mescalero Apaches who were so closely identified with the entire region later.

European Entry into Southeastern New Mexico

From Spanish contact until after the American Civil War, roaming Apaches, Comanches, Kiowas, and other Plains tribes kept Euroamerican settlement of southeastern New Mexico in abeyance. Following the Civil War, westward mass movement of Americans and eastward drifting of small groups of New Mexico Hispanics led to settlement of the region. Cattle ranching was the first economic activity, but by about 1890, drought had reduced its effectiveness and overall importance.

Farming, especially in the Roswell area, provided an increasingly important base for the local economy, especially after the discovery of artesian water in about 1890. Development of an irrigation system based on this water promoted widespread farming throughout the valley between Roswell and Carlsbad and resulted in a rapid influx of people.

The railroad reached Carlsbad in 1891 and Roswell in 1894, irreversibly setting the course for urbanization of the area. At the turn of the century, the region's economy became firmly based in agriculture, stock raising, and in the mid-twentieth century, the production of oil and gas.

PREVIOUS ARCHAEOLOGICAL WORK IN THE PROJECT REGION

Except for a vast number of small-scale contract archaeological projects associated with oil and gas exploration, archaeological investigations in the project region have been few in number. The list below, presented by area, includes some of the more significant investigations to date.

North Project Area (Roswell)

- Akins (in prep.). Excavations at the Townsend site (LA 34150) north of Roswell in 1997 revealed small pithouses, wickiup floors, extramural hearths and pits, and cultural debris dating to two or more periods: the Archaic (?), plain brown ware, and painted pottery.

- Bullock (1999). Excavations at four Late Prehistoric pottery-period sites in the plains east of Roswell. The largest site had a wickiup floor.

- Hannaford (1981). Testing of 20 lithic artifact sites west of Roswell.

- Jelinek (1967). Survey and excavation along the Middle Pecos River northeast of Roswell. Defined culture sequence from Paleoindian to Late Prehistoric for Fort Sumner section of Pecos River. Excavations focused on Late Prehistoric (pottery) phases.

- Kelley (1984). Excavation at Bloom Mound southwest of Roswell. Excavation in pueblo and socioreligious structure dating to A.D. 1300s.

- Kemrer and Kearns (1984). Sample survey of the Abo Oil Field north of Roswell. Documented a wide range of site types, all probably camp sites, lithic material collection/quarry areas, and food collecting sites. No structural sites identified with certainty.

- Maxwell (1986). Testing of the Townsend site north of Roswell. Recovered hearths, artifacts, and animal bones from three time periods defined by radiocarbon dates: 490-250 B.C. (prepottery), A.D. 460-820 (pottery and corner-notched arrow points), and A.D. 1200-1400 (pottery and side-notched arrowpoints). Bison bones associated with earliest and latest periods.

- Parry and Speth (1984) and Speth (1983). Excavation of the Garnsey Spring Campsite (pottery-period and possibly some Late Archaic remains) and the protohistoric Garnsey Bison Kill, east of Roswell.

- Phillips et al. (1981). Survey of the Two Rivers Reservoir, southwest of Roswell. Documented lithic material quarries, camp sites, food-collecting sites, and probable pottery-period structural sites.

- Rocek and Speth (1986). Excavation at the Henderson site, southwest of Roswell. Excavation in surface rooms and pit structures dating to A.D. 1200s and 1300s.

- Schermer (1980). Excavations at several sites in the Haystack Mountain area northeast of Roswell. Test excavations at several pottery-period camp sites. Darts point at several of the sites may indicate Archaic occupations as well.

- Wiseman (1985). Excavation at the Rocky Arroyo Village, south of Roswell. Excavation of a large, deep pit structure in a small village dating to the A.D. 1200s.

- Wiseman (1988). Summary of excavations at the King Ranch site at Roswell. Small, shallow pithouses in a *ranchería* (?) site dating somewhere between A.D. 1150 and 1300.

- Wiseman (2000a): Excavation at the Bob Crosby Draw site (LA 75163), northeast of Roswell. Excavation of a portion of a multicomponent dune site dating to A.D. 800-1350, perhaps earlier; analyses in progress.

- Wiseman (2002). Excavation of the Fox Place site at Roswell. Excavation of part of a large village containing numerous tiny pit structures and one large, deep ceremonial pit structure, all dating to the A.D. 1200s and early 1300s.

- Wiseman (in prep.). Excavation of the Los Molinos site (LA 68182) at Roswell. Excavation of a substantial midden associated with 70+ bedrock basin metates and mortars that date to A.D. 800-1350, perhaps earlier.

South Project Area (Carlsbad)

- Applegarth (1976). Excavation of several caves and shelters in the Guadalupe Mountains in New Mexico.

- Ferdon (1946). Excavation of Hermit's Cave in Last Chance Canyon of the Guadalupe Mountains in New Mexico.

- Henderson (1976). Survey report for the Brantley dam site and reservoir on the Pecos River between Carlsbad and Artesia, New Mexico.

- Howard (1930, 1932, 1935). Excavations at several caves in the Guadalupe Mountains, New Mexico, and Texas.

- Gallagher and Bearden (1980). Excavation of open sites in the Brantley Reservoir on the Pecos River between Carlsbad and Artesia, New Mexico.

- Katz (1978). Survey and assessment of sites in Guadalupe National Park, Texas.

- Katz and Katz (1985a and 1985b). Excavation and cultural synthesis of prehistoric and historic resources in the Brantley Reservoir on the Pecos River between Carlsbad and Artesia, New Mexico.

- Kemrer (1998). Excavation at a ring midden complex in Indian Basin of west-central Eddy County, New Mexico.

- Lord and Reynolds (1985). Excavation of three open sites in the Waste Isolation Pilot Project area east of the Pecos River in southeastern Eddy County, New Mexico.

- Mallouf (1985). Cultural synthesis of the eastern Trans-Pecos Texas, including the Guadalupe Mountains and adjacent Pecos River of New Mexico.

- Mera (1938). Survey and excavations in caves and open sites in the Guadalupe Mountains and in the open country east of the Pecos River, all in New Mexico.

- Oakes (1982). Excavation at three dune sites east of the Pecos River in northeast Eddy County.

- Oakes (1985). Excavation at five dunes sites east of the Pecos River in northeast Eddy County.

- Riches (1970). Survey of caves, shelters, and open sites in the Guadalupe Mountains.

- Roney (1985). Based on excavations at Hooper Canyon Cave in the Guadalupe Mountains and survey of open sites in the upper Rocky Arroyo.

- Sebastian and Larralde (1989). Cultural overview, assessment, and synthesis of the prehistory and history of the Roswell District.

- Staley (1996). Testing and excavation at 14 dune sites in the Laguna Plata area of east central Eddy and west central Lea Counties, New Mexico.

- Zamora (2000). Excavation of a hilltop lithic quarry and a prehistoric hunter-gatherer site with structures east of the Pecos River at Carlsbad. Dates to second half of the first millennium A.D.

RESEARCH DESIGN AND DATA RECOVERY PLAN

This section is quoted essentially verbatim from the original planning document (Wiseman 1997), although certain minor clarifications in language have been made. The sections regarding the historic sites investigated on this project have been omitted because those sites are considered in a separate final report (Wiseman 2001).

Before the subsequent fieldwork was completed, it became obvious that Feature 1 of LA 116471 (Punto de los Muertos) was probably not a stone enclosure as anticipated during the writing of the data recovery plan. In fact, we are still not sure what to call this feature and its contents, in large part because of the destruction caused by vandals over 30 years ago.

Problem Orientation

The conventional view of southeastern New Mexico archaeology assigns the prehistoric sites in the current project to the Jornada Branch of the Mogollon culture, which was originally described for south-central New Mexico, the El Paso area of far West Texas, and the northern part of the Mexican state of Chihuahua (Lehmer 1948). John Corley suggested that all of southeastern New Mexico should be called the "Eastern Extension" of the Jornada-Mogollon (Corley 1965; Leslie 1979). The Eastern Extension takes in the Guadalupe Mountains, the Pecos Valley, and the plains east of the Pecos Valley to the New Mexico/Texas line. The original formulation of the Eastern Extension was based in part on architecture and the dominance of Jornada-Mogollon pottery in sites of the region, traits that were considered to indicate a southwestern origin.

But southeastern New Mexico contains a diversity of archaeological remains spread over two major biotic zones (Great Plains, Chihuahuan Desert) and 20,000 sq mi (56,000 sq km). We can now see the folly in suggesting that cultural remains over such a vast region were in some way homogeneous. No other region in the Southwest is treated in this manner. The more we learn about the archaeology of regions of comparable size, the more differences we find and the more justified we are in refining taxonomic structures. That time has arrived for southeastern New Mexico, but the task will not be easy or simple. Refinement is necessary for sharpening our perspective on the prehistoric cultures and peoples of the region and permitting us to delve more deeply into the processes and dynamics of their adaptations.

By ignoring state lines and looking solely at site types and contents, several differences between the Guadalupe-Brantley area and the rest of the so-called Jornada-Mogollon, including the Eastern Extension, become immediately evident. Pottery is relatively rare on most sites in the Guadalupe-Brantley area. Ring middens, or specialized earth ovens, used to bake desert succulents and dispose of massive quantities of burned rocks are the best known features at many of these sites. Southwestern-style pithouses and pueblos and corn horticulture are unknown or unproven in spite of over 60 years of investigation in the area. The key sites and their contents are clearly much more like those farther south in Trans-Pecos Texas than they are those of the central Jornada-Mogollon region to the west and the Sierra Blanca region to the northwest.

The bulk of the sites, however, fit a more generic mold. From surface evidence these sites, with their hearths and scatters of artifacts, look pretty much like camp sites in other regions of New Mexico and are less readily assigned to specific cultures on the basis of survey data alone. Only recently have excavations been finding architectural remains, and these lack direct correlates with Jornada-Mogollon structures. Instead, they are small, circular, and generally more like what we would expect for hunting-and-gathering societies (Wiseman 1981, 1988, 1991; and the Carlsbad Relief Route and Roswell-North projects conducted in 1997 by the OAS).

Other, more meaningful characterizations of the differences between Trans-Pecos and Jornada-Mogollon sites can be made when excavation data become available. Jornada-Mogollon sites are those of farmers who lived in pithouse or pueblo architecture and made large quantities of pottery. Farming, though greatly supplemented by wild products, provided important nutrients in the form of corn and, at least in some areas in some time periods, beans and squash. In southeastern New Mexico, unquestionable Jornada sites are most often in mesic environments such as the Sierra Blanca, Capitan, Jicarilla, Gallina highlands or in the well-watered oasis of the premodern Roswell locale. In these areas, the life zones, called Upper Sonoran and Transition by Bailey (1913), are characterized by mesic grass species, woodlands, and forests.

The peoples who occupied Trans-Pecos sites, on the other hand, evidently were full-time hunters and gatherers of wild plants and animals. Clear evidence of farming or pottery making has not been found in Trans-Pecos sites (including the Guadalupe Mountains; cf. Roney 1995), though one might expect corn to have been occasionally obtained in trade from Jornada-Mogollon people, as were pottery and other durable items. Durable structures other than occasional stone enclosures were not used by the Trans-Pecos until late in prehistoric and early historic times and only in restricted areas along the Pecos River and the Rio Grande. More portable or easi-

ly constructed shelters such as brush wickiups were used by these more transient people. Their environment was primarily the Chihuahuan Desert, a series of xeric vegetation communities and landforms centered in northern Mexico but extending northward into Texas, New Mexico, and southeastern Arizona.

It is all well and good that we can define two different archaeological cultures and attribute them to more or less specific biotic zones. However, specific boundaries, both of cultures and of plant and animal communities, are harder to define simply because both appear to be characterized by transition zones, rather than by discrete beginnings and endings. In plant and animal ecology, these transition zones, called "ecotones" (Odum 1971), are characterized by a mixture of species from the adjoining biotic areas, as well as species that are found only within the ecotone itself. The same may be true of human populations and their cultures.

In our project area, the problem is manifest in what appears to be the interdigitation (cultural ecotone?) of sites of the two cultures. For instance, the Neff site (Wiseman 1971), on the Rio Felix ten miles (16 km) southwest of the north project area, is denoted by the Neff style Livermore point, and I now believe it represents a northward intrusion of Trans-Pecos peoples. Livermore points were first documented in the Texas Big Bend country, and sites producing large numbers of these and related points have been found in the Guadalupe Mountains (Applegarth 1976). If we take a serious look at the material culture inventory of the sites in and about the Guadalupe Mountains, as well as the biotic setting, we should be calling these remains Trans-Pecos, not Jornada-Mogollon or Eastern Extension of the Jornada-Mogollon.

Another example of this cultural ecotone is the northernmost ring-midden site (currently unrecorded at the Archeological Records Management Section in Santa Fe) along the Rio Hondo 30 miles (48 km) west of Roswell, well within the supposed territory of the Roswell-Sierra Blanca Jornada-Mogollon culture. Of special note, the site is also within a relict patch of Chihuahuan Desert. The Neff site, mentioned above, is within a belt of grassland between that relict patch of Chihuahuan Desert and the desert proper at Carlsbad.

While interdigitation of sites from two or even three different cultures along the boundary of those cultures can perhaps be expected if the peoples of both cultures were on friendly terms, we might be witnessing a more important reason for cultural interdigitation or "mixing" in this part of southeastern New Mexico. We suspect that the two cultures are primarily adapted to specific biotic niches that are complementary, rather than conflicting. That is, if each group focused on different species of plants, competition would be reduced or even eliminated, (though competition for animal foods might still be a point of contention).

This brings us back to the fact that Trans-Pecos culture occurs primarily in the Chihuahuan Desert. By way of contrast, the closest manifestation of the Jornada-Mogollones, represented by Kelley's Glencoe, Corona, and Lincoln phases, occurs primarily in the more mesic environments of the Sierra Blanca country (piñon-juniper and ponderosa pine associations) and the well-watered Roswell locale (Upper Sonoran grasslands).

The research proposed for the current project has two main objectives. The first requires us to determine which culture--Jornada-Mogollon or Trans-Pecos--each site belongs to. This may require us to discover and develop criteria that will permit us to make the assignment to one culture or the other in the absence of key diagnostics of the two cultures as we currently know them. During this process, we will be able to investigate the nature of the adaptations where the sites occur. Sites of the north group are situated on very small drainages in the middle of the Sacramento Plain, well outside the environments (rivers and playas/dune fields) usually investigated by archaeologists conducting research (as opposed to cultural research management projects). While most of the sites in the south group are in expected environmental situations for that area (along the Pecos River and Rocky Arroyo), LA 116471, though on a rocky ridge, is *not* on the highest promontory of that ridge, as is usually the case with stone enclosure sites.

These deviations from known patterns require explanation. The current project investigates the culture ecological framework by focusing on the aspects of settlement and subsistence practices. Perspective on these matters draws on the works of Kelley (1984) for the Roswell-Sierra Blanca country, Jelinek (1967) for the Pecos Valley between Roswell and Fort Sumner, Katz and Katz (1985a) for the Brantley-Guadalupe Mountains region, and several projects recently conducted by the Office of Archaeological Studies for the New Mexico State Highway and Transportation Department, namely, the Roswell Relief Route, Roswell Northwest, Roswell North, Dunahoo Hills, Bob Crosby Draw, Seven Rivers, Red Lake Tank, and the Carlsbad Relief Route projects.

Problem Domains

The following domains are being studied through a series of highway projects in southeastern New Mexico. They involve basic questions that will allow us to characterize, compare, and contrast the prehistoric societies in the region. By standardizing the questions, data gathering techniques, and analyses over a number of projects

within the region, we should be able to gather a substantial, coherent body of information that is usually not possible when archaeological work is conducted by a number of investigators over a series of years. The long-term benefits should be numerous.

The overall goal is to make substantial contributions to our knowledge and understanding of culture process, dynamics, and change through adaptation to this rigorous environment by the full-time hunter-gatherers and the farmers of the region. Ideally, by the end of our studies, we should know more about the "shadow" groups (the Jumanos and perhaps the Teyas) encountered by the first Spanish expeditions to the region in the A.D. 1500s and 1600s. These groups then "disappeared," or more likely moved on, before they could be documented in place.

Problem Domain 1: Settlement and Site Types

What structures, storage pits, other types of pits, and thermal features (hearths, cooking pits, etc.) are present at the sites? Were some or all of the project sites occupied more than once during the prehistoric period? If so, we need to discover not only what kinds of features are present, but also which ones were contemporaneous and which were not. Were the activities or site function(s) during each component the same or different? At this stage in the investigations we have few observational data and facts from which to answer these questions. More intensive work will probably greatly modify our perceptions and interpretations of the prehistoric components at all of the project sites.

Once individual components are defined, we can then proceed to document the activities that took place during each occupation. The cultural features (storage pits, other types of pits, hearths, baking pits, etc.), associated artifactual materials, and the patterning of these remains are critical in defining site types through an analysis of the activities represented. Important subsidiary studies will assist in determining site type, as well as overall subsistence patterns, and include floral and faunal data, as discussed below.

Problem Domain 2: Artifact Assemblages

What types of tools and manufacture debris are present? What are the relative abundances of the various types? On the basis of the artifacts and their patterning within the sites, what types of activities took place there? How do these assemblages compare with those from other sites in the region?

The types of artifacts at a site help define the kinds of activities that took place at each specific location (component). Manos and metates imply grinding of plant foods, projectile points imply hunting, types of projectile point fragments imply carcass preparation and consumption, and scrapers imply hide dressing. Multipurpose tools such as hammerstones, awls, and drills, and manufacture debris such as chipped lithic debris and some types of fragmentary artifacts imply a host of generalized activities involving the manufacture or maintenance of items associated with day-to-day living. A wide range of artifact and debris types implies a base camp/habitation situation, and fewer artifact and debris types imply special-activity sites. The percentages of each category will provide a *very rough* index to the relative frequency of occurrence of each activity at the site.

Caution is required in interpreting the data in this manner because of the effects of tool use-life on artifact assemblage composition (Schlanger 1990). This line of interpretation makes several assumptions about the data and the activities they represent, and it also greatly simplifies a number of complex variables and conditions. Nevertheless, with these details carefully worked out, we can then compare the project sites with other sites and culture sequences in southeastern New Mexico (see Problem Domain 6).

Problem Domain 3: Subsistence

What biotic communities were being exploited? Were the inhabitants of the sites exploiting all available biotic communities or only selected ones? Were cultigens being grown and/or consumed? In what season or seasons were the sites occupied?

Plant and animal remains recovered at archaeological sites provide first-line evidence for reconstructing various aspects of the human quest for food. Animal bones and the charred remnants and pollen of plants will be studied to identify the species present and the biotic zones exploited, and to characterize the diet and food-preparation techniques. Floral and faunal data also have the potential of providing data on the season of the year in which they were collected or hunted. Since it is unlikely that the data from the project sites constitute a total view of the diet throughout the year or through time, it will be necessary to compare these results with those of other projects in the region to gain a better understanding of the total subsistence system.

As mentioned in an earlier section of this document, it is imperative that we establish whether or not domestic plants were grown in the Guadalupe-Brantley region. Leslie's (1979) assessment of the structural sites in the vicinity of Hobbs in far southeastern New Mexico, though without benefit of flotation and pollen recovery techniques, suggests that corn was not being grown east of the Pecos River within New Mexico. The

WIPP Project (Lord and Reynolds 1985), between Leslie's sites and the Pecos River, excavated three non-structural sites but failed to find evidence of cultigens in flotation and pollen samples.

The unconfirmed reports of corn found in the Guadalupe Mountains (Roney 1995) have already been mentioned. Kemrer (1998) reported finding a corn cupule fragment and a possible corn kernel fragment in a domestic area associated with ring middens in Indian Basin of the Guadalupe Mountains district.

Corn was clearly being grown within the Pecos Valley at Roswell (Kelley 1984, Appendix 6; Rocek and Speth 1986; Wiseman 1985) and probably near Fort Sumner as well (Jelinek 1967). Corn pollen has even been recovered from a prehistoric camp site northeast of Roswell (Wiseman 1996b). Thus, if cultigens are documented for the project sites, then relative quantities may help us determine if the site occupants were farmers or full-time hunter-gatherers. Relatively large numbers of domestic remains would indicate that the people were farmers. Small amounts of cultigens would be less clear, for hunter-gatherers could have obtained them in trade from farmers. By the time of the first European contact, a pattern of exchange of southwestern farming products (and other items) for Plains food products (and other items) was well established, as is discussed in Problem Domain 4.

Problem Domain 4: Exchange and Mobility

Materials and artifacts can provide important clues about the territories and movements of peoples and their relationships with other groups.

Materials present within sites but not available in a region are indicative of exchange relationships with other people or a mobility pattern that permits a group to acquire these items during their yearly round. Judging which situation is applicable to the project sites is difficult and will require careful comparison with data from the Roswell region. If we can determine whether the site occupants acquired the goods through trade or by direct access, we will gain perspective on the territory they used and therefore on the identity of the people themselves.

The absence of exotic materials is another matter entirely. In small sites and sites of short occupation, the absence of exotic materials can be misleading simply because such items may not have found their way into the archaeological record. Or, perhaps the occupants simply did not acquire exotic materials. Either way, we may never know at any specific site. But this is precisely where comparisons with other assemblages in the region and the long-term accumulation of excavation data from numerous sites, both large and small and of all types, is necessary for acquiring perspective and eventually resolving the problem.

One of the unexpected results from studies of lithic raw materials obtained by several recent projects in the Roswell area is that locally available materials, even if from the same general source such as the San Andres formation, can have detectable differences from place to place. When thoroughly researched by acquiring samples from the vicinity of sites and the sites themselves, it appears possible to determine the subareas and resources used by a group or groups within the "home range."

At the present time we are experimenting with ultraviolet light to characterize the bulk lithic debris from sites. We have extended this study to the Carlsbad area since the Pecos River and the San Andres formation, both major sources of lithic knapping materials, are primary features of the surface geology there as well. If our preliminary results are verified by future studies, then we will have one more domain of information for looking at the question of group territory by discriminating the use of specific subareas by the various groups.

Problem Domain 5: Dating the Occupations

Since it is possible that all project sites were occupied on one or more occasions during the prehistoric period, dating individual features and components is crucial. At the individual feature level, we need to determine which are contemporaneous (or approximately so) and which are not. This will enable us to discover the presence of multiple components and determine the dates of each. This in turn will permit documentation of site and region use through time, whether or not these uses changed through time, and if they did change, the directions, intensity, and hopefully the reasons for those changes. Dating information will also permit us to assess the chronologies developed by Kelley (1984), Jelinek (1967), Katz and Katz (1985a), and Leslie (1979).

The dating situation is critical in southeastern New Mexico where tree-ring dating (dendrochronology), the most accurate and preferred dating technique, works poorly or not at all (W. Robinson, pers. comm., 1975). Relatively few absolute dates derived by other techniques are currently available (Sebastian and Larralde 1989). Recent advances in radiocarbon dating make it the most viable technique for southeastern New Mexico at the present time. Obsidian hydration and thermoluminescence have been tried in the region, but because these techniques are fraught with problems and are not generally reliable in my opinion, they will not be used in this study.

During excavation, charcoal will be recovered from as many features and cultural situations as possible. Because of the importance of dating the project sites, we will submit both very small samples and bulk samples (carbon-stained sands) for accelerator mass spectometry (AMS) dating if necessary.

Problem Domain 6: Assessing Cultural Affiliation

As discussed in an earlier section of this document, we have reason to believe that more than one cultural configuration ("culture") is represented in the archaeological remains of southeastern New Mexico, rather than just the one (Jornada-Mogollon) usually cited in the literature. Four culture sequences have been defined within and on the borders of our project area: the Sierra Blanca Jornada-Mogollon (Kelley 1984), the Middle Pecos in the Pecos Valley north of Roswell (Jelinek 1967), the Brantley-Guadalupe Mountains region (Katz and Katz 1985a; the northern Trans-Pecos in my opinion), and the Eastern Extension of the Jornada-Mogollon on the Southern Plains east of the Pecos Valley (Corley 1965; Leslie 1979).

In the case of sites with structures known as stone enclosures, no specific culture has been defined because the material culture, especially pottery (when present), usually consists of the types made by farmers living nearest to that particular site. For instance, Sitio Creston at Las Vegas, New Mexico, produced prehistoric Taos-like pottery (Wiseman 1975), and SMU 108 in the Brantley Project produced Jornada-Mogollon pottery (Katz and Katz 1985a).

It is therefore tempting to postulate that the stone enclosure form may be the primary cultural identifier at stone enclosure sites. Further, we postulate that stone enclosure sites represent gradual southward movement of a specific socioeconomic group along the Plains/Mountains boundary. This might account for changes in some aspects of material culture (e.g., projectile point forms) and inventory (pottery types) while at the same time preserving other aspects (structure form).

Cultural assignment based on geographic location may not work in the project area because of the culture-interdigitation problem discussed earlier. This is only true, of course, if the sites do not contain diagnostic features or items attributable to a specific culture. At our present level of knowledge about our sites, only LA 116471 with its stone enclosure provides a clue to possible cultural affiliation. As mentioned above, that question, the affiliation of stone enclosures, is not satisfactorily settled at this time.

In the current absence of definitive criteria for assigning cultural affiliation, our excavations will be looking at several factors that will assist us in making this determination for each site. The criteria in Table 1 are compiled from published sources and recent studies conducted by the OAS in the Roswell region. The characterizations presented rely heavily on the original definitions and implications given in the early studies that defined the sequences (i.e., Lehmer 1948; Kelley 1984; Jelinek 1967; Corley 1965; Leslie 1979; and Katz and Katz 1985a). The time period considered here is the late pottery period, meaning after A.D. 1000 or 1200.

Table 1. Criteria for assigning cultural affiliation to prehistoric sites in southeastern New Mexico

Jornada Mogollon (El Paso region)

- Architecture: large, deep pithouses; pueblos of substantial construction.
- Burned rock: incidental. Major accumulations of burned rock. Burned rock sites are known in the Tularosa Basin but are not included within the formal definition of Jornada Mogollon culture.
- Farmers who grew corn in some abundance.
- Pottery: large quantities produced and used; numerous painted types, many of them imported; utility pottery dominated by El Paso Polychrome.
- Metates large, heavy basin type with generally large, heavy manos.
- Arrow points prevail (Harrell, Washita).
- Stone scrapers: present but not standardized as to size and shape.
- Trade items from the Plains are not discussed.

Sierra Blanca region (New Mexico)

- Architecture: large, deep pithouses; pueblos of substantial construction.
- Burned rock: incidental. Major accumulations of burned rock.
- Farmers who grew corn in some abundance.
- Pottery: large quantities produced and used; numerous painted types, many of them imported; utility pottery dominated by Jornada Brown (Glencoe phase) and Corona Corrugated (Lincoln phase).
- Metates: large, heavy basin type with generally large, heavy manos. Kelley (1984) states that trough metates are the most common type, but most of the metates I have seen from the Sierra Blanca are the "deep basin" type.
- Arrow points prevail (Fresno, Harrell, Washita).
- Stone scrapers: present but not standardized as to size or shape.
- Trade items from the Plains are rare; they include

very low percentages of Plains-style scrapers and lithic materials (Alibates, Tecovas, Edwards).

Middle Pecos

- Architecture: large, shallow pithouses; pueblos of flimsy construction.
- Burned rock: incidental. Major accumulations of burned rock such as ring middens. Sites with burned rock are known for the Middle Pecos but are not specifically included in the definition of the Middle Pecos sequence.
- Farmers to some extent; some corn noted and presumed grown in region.
- Pottery: moderate quantities of several types that Jelinek (1967) believes were made in the region; few painted types; plain brown types dominant.
- Metates: heavy, large basin type and small, shallow basin type.
- Arrow points prevail (Harrell, Washita).
- Stone scrapers (Plains end scrapers) common in late prehistoric periods.
- Trade items and lithic materials from Plains not discussed.

Trans-Pecos (northern sector)

- Architecture: No structures documented in literature; however, pithouses were reported for the Delaware Mountains in an unpublished pipeline project.
- Burned rock: major accumulations of burned rock, both as features (ring middens, hearths, etc.) and refuse (concentrated or scattered).
- Farming: evidently none; corn unknown for prehistoric sites.
- Pottery may or may not be present; when present, can include southwestern and/or central Texas types.
- Metates: small, shallow basins on thin rock and small one-hand manos.
- Arrow points prevail (Perdiz, Toyah, Harrell, Washita, Livermore, etc.).
- Stone scrapers (Plains end style) uncommon (?).
- Trade items: Southern Plains lithic materials (especially Edwards) common; southwestern and central Texas pottery occasionally present in small numbers.

Eastern Extension

- Architecture: early, large, shallow pithouses and late, small, deep pithouses; late, small pueblos of flimsy construction).
- Burned rock: present but only as refuse.
- Farming: evidently none.
- Pottery: dominated by plain brown types (early) and Ochoa Corrugated (late).
- Metates: small basins on thin rocks and small one-hand manos.
- Arrow points: corner-notched and side-notched styles common.
- Stone scrapers: Plains-style end scrapers common.
- Trade items: Plains lithic materials common (Alibates, Tecovas, Edwards); pottery from central and north Texas and from Southwest may occur.

Problem Domain 7: Examining a Cultural Boundary Zone

If we are successful in satisfying Problem Domains 1 through 6, we should be able to begin examining prehistoric occupation of the project area in the context of cultural mingling. Examination of the conditions surrounding that mingling, or interdigitation, is important to our overall understanding of regional prehistory. Are the different adaptations based on simultaneous exploitation of different ecological niches, as we suspect, resulting in relatively peaceful coexistence and perhaps even cooperation between or among peoples? Or did the groups have serial use of the project area and thereby avoid contact with one another? (Serial occupancy could have been from one season to the next or over periods of years.) Dating of individual features and sites is of the utmost importance to success in this domain of inquiry.

Site-Specific Research

Our perceptions and expectations about the sites before excavation, which follow, were based on observations of the site surfaces made by the site recorder(s) and during the visit by the OAS team.

LA 44565 (Rocky West, South Area)

Approximately half of this site lies within the proposed highway construction zone. At least one probable hearth and part of a major concentration of lithic artifacts will be excavated. We should recover substantive information about site features and organization of space. Datable materials (carbon) may be forthcoming. The artifacts will inform us about site function through analysis of artifact types and about exchange and/or group movements through lithic materials. Past experience with sites of this type has shown that much more information is usually present below surface than is suggested by surface information alone. Virtually all of the area of the major surface artifact concentration will be excavated by shovel-skimming. All features will be

excavated separately with hand tools.

LA 44583 (Rocky East, South Area)

A small, undisturbed strip of this site lies within the proposed highway construction zone. Only a couple of artifacts were noted on the surface of this strip during the OAS visit. The best-looking spot for artifact recovery and possible feature discovery will be selected for excavation by shovel-skimming. If, after the first five contiguous 1 by 1 m squares, no substantive artifact or other data returns are realized, excavations will cease at this site. If conditions warrant, the entire area of the site within the right-of-way will be excavated by shovel-skimming. Any features will be excavated separately with small hand tools. The data potential of this site is the same as that of LA 44565.

LA 116467 (Site 7, North Area)

Most of this site lies within the highway right-of-way and will be excavated. Although only surface artifacts are evident at this site, its situation next to a fertile drainage, a large number of potsherds, and the concentration of artifacts suggest the presence of subsurface features such as hearths, pits, and perhaps structures. The fact that the site is slightly buried (except where traversed by the utility trench) suggests excellent potential for the recovery of intact deposits, including feature fills, activity areas, details of site organization, datable materials, and the preservation of at least some perishable materials (charred plant remains, animal bone, etc.). A large area of this site will be excavated by shovel-skimming, but all features will be dug using small tools.

LA 116468 (El Follon, North Area)

This site is clearly the most enigmatic of the project. As mentioned in an earlier section, the presence of several large sherds scattered over a comparatively large area and the site situation in the bottom of a drainage suggests some form of modern derivation or else a site type heretofore unknown in the region. Our approach here will be the same as for LA 44583. The strip trench will intersect a large part of the cobble concentration to determine whether it represents a structure, as suggested by the recording archaeologist. If sufficient reason is found within the excavated 5 m squares, a much larger area will be opened up to examine site content and structure. This site has the potential of yielding intact subsurface deposits and features such as hearths, as well as details of site organization and materials amenable to dating and the reconstruction of subsistence patterns.

LA 116469 (Site 9, North Area)

Only a small part of this large site is currently within the proposed highway construction zone. The remains within the right-of-way include one hearth and scattered artifacts. The ground surface appears to have been scraped in the past in conjunction with highway construction, raising the question of whether this part of the site has intact features. Our work will involve hand excavation of the hearth to determine its condition and potential for yielding materials suitable for dating and botanical analyses. If we find that this part of the site has the potential of yielding information important to regional prehistory, we will open up the area surrounding the hearth to document artifact patterns and recover all associated materials.

One thing about this site is clear. Outside the current right-of-way, it is intact and has excellent potential for yielding significant information on intrasite patterning, intact hearths, and possibly biotic remains useful for reconstructing subsistence patterns, determining site function, and dating the occupation(s). The quantities of burned rock in addition to the hearths raise the possibility that this site belongs to the Trans-Pecos culture, making it important to the research goals of this project.

LA 116470 (La Tertulia de las Molineras, South Area)

Only one mortar hole and a small fraction of the artifact scatter at this site lie within the current right-of-way and proposed construction zone. Our excavation plan is to record the mortar hole in detail, collect the surface artifacts, and excavate at least one 1 by 1 m square near the mortar hole to determine whether subsurface deposits are present. If so, we will expand our excavations to recover evidence of site structure and content. The contents of the mortar hole will be collected and examined for plant residues that will explain the use of the mortar and at least a limited set of subsistence practices of the site inhabitants.

LA 116471 (Punto de los Muertos, South Area)

The stone enclosure at this site, even though disturbed by previous diggers, provides an important opportunity to examine a rare form of habitation in the Brantley-Guadalupe region. This single-room structure and much of the associated artifact scatter lie within the proposed construction zone. We have the opportunity to document all details of construction, internal organization, and associated artifacts and other cultural materials. The disturbed areas within the structure reveal a darkly stained fill containing fragmented animal bone and artifacts. Deposits such as these are uncommon in

the region and present an excellent opportunity to examine a range of plant and animal materials useful for reconstructing subsistence patterns and dating the occupation. Although we will do some shovel-stripping outside the structure, we anticipate finding few or no subsurface deposits: the site is situated on a rocky knoll that lacks significant soil development. As usual, all surface artifacts will be pinflagged, mapped, and collected.

FIELD AND LABORATORY METHODS

All surface artifacts were pinflagged. A grid system with main datum and baselines along the two major axes was then established. Next, surface artifacts were collected across the site in 2 by 2 m squares.

Excavations centered on individual features and included stripping the soil from the surrounding area in a radius of at least 5 m from the edges of the features. Shovels were used to excavate 1 by 1 m squares, and all fill was screened through 1/8-inch wire mesh.

Vertical excavation control was not necessary because all features were on or within a few centimeters of the modern surface. The one exception was the stone enclosure at LA 116471, which, in spite of having up to 0.5 m of fill, had been thoroughly disturbed by vandals. No stratified fill was found in any of the sites.

Cultural features such as hearths, pits, and at least one structure (stone enclosure) were present at several of the sites. Special attention was given to obtaining soil samples for dating, flotation analysis, and pollen analysis. In all cases, these samples were taken only from contexts that were clearly relatable to prehistoric activities and amenable to preservation of the target materials. Flotation and dating samples were not taken from ambiguous contexts such as general eolian deposits, which could well contain charcoal from natural grass fires and the like.

During the excavations, photographs, drawings, and notes were made as needed to document work progress, impressions, initial interpretations, features, and details uncovered during the work. Subsidiary maps were prepared for each excavation area and include all cultural features, excavation units, and modern features (highway markers, fencelines, etc.).

Human Remains and Sensitive Objects

Because of the supposedly ephemeral nature of the sites, we did not anticipate finding human remains at any of the project sites, but they were encountered at LA 116471. Accordingly, we notified the Eddy County Sheriff and the State Historic Preservation Officer as stipulated by the applicable laws and regulations. Also, the conditions outlined in the following documents were met: Historic Preservation Division Rule 89-1 ("Regulations for the Issuance of Permits to Excavate Unmarked Human Burials in the State of New Mexico"); and Museum of New Mexico Rule 11, as amended April 2, 1991 ("Collection, Display, and Repatriation of Culturally Sensitive Materials"; Appendix 1).

The human remains recovered from LA 116471 were not handled or photographed in the field except as part of scientific data recovery by authorized persons. Photographs of the remains were not allowed by or released to the news media, the general public, or other unauthorized persons. The only person authorized to take photographs of human remains and sensitive materials is the person designated by the project supervisor to take documentary photographs as part of the data recovery plan. Information regarding the presence and removal of human remains was not publicized in any manner.

Laboratory Analysis

All items except bone were washed in water. Animal and human bone were dry-brushed to remove clods and grains of dirt but were not washed.

All collections from all proveniences were sorted by general artifact type (lithic debitage, sherds, formal artifacts, etc.), tabulated, and scrutinized for rare or unusual artifact types and materials. In the original version of the data recovery plan, we stated that we would subsample for analysis any artifact or material category numbering in the tens of thousands of items. Otherwise, all items in each category with less than 10,000 items were to be analyzed.

Only one category of materials, the faunal and human elements from the fill of Feature 1 (presumed stone enclosure), LA 116471, exceeded 10,000 items. Because of the extremely fragmentary nature of all bones in the deposits, identification of human versus animal fragments was not possible in the absence of a specialist. In fact, it never occurred to the staff that human remains would also be highly fragmented. Regrettably, much of the human material was inadvertently mixed with the animal material in the provenience sacks. Given the necessity of identifying and removing all human remains, plus the excellent and rare opportunity provided by the wealth of animal materials, we decided in favor of full analysis of all remains and against sampling.

Once all of the analyses were completed, the results were synthesized and used to address the research questions.

Animal Bone

Analysis of the animal bone provided several types of information pertinent to answering research questions. Paramount for our purposes, it informed us about the species present, the relative proportions of species taken (the subsistence "mix"), hunting strategies, and seasonality.

Faunal remains were analyzed for species, age, sea-

son of death, taphonomy, and evidence of butchering, cooking, and consumption. An attempt was made to determine which elements were used by the prehistoric occupants of the sites and which were postoccupational intrusives.

Chipped Stone Debitage

A key aspect of the chipped stone debris analysis was to reconstruct the core-reduction technology. We needed to know what the sizes, shapes, and internal imperfections of the raw material units were and how they affected the sizes, shapes, and other characteristics of the end products, especially the flakes and the artifacts produced from them.

This type of analysis is necessary because of the nature of the raw materials available to the prehistoric people in southeastern New Mexico and for looking at and evaluating similarities and differences in metric and nonmetric attributes of flakes, cores, and chipped stone artifacts throughout the region. The chipped stone analysis permits us to answer research questions concerning artifact production technology and exchange, mobility, and, potentially, social relations.

The chipped stone debris was analyzed for type (core, flake, angular debris), subtype (types of cores and flakes), material, metric dimensions (length, width, thickness, weight), platform characteristics, cortex, termination type, heat treatment, intentional retouch, and use-wear.

Lithic material identification is gaining increasing importance in southeastern New Mexico archaeology. Ongoing research, building on research conducted in part by Eastern New Mexico University, is focusing on the use of detailed observations and ultraviolet light to identify imported materials such as Edwards chert, Tecovas chert, Alibates material, Ogalalla chalcedony, Long Arroyo chalcedony, and materials from the Delaware Mountains and Van Horn regions of West Texas. Preliminary results indicate that bulk site collections of local (mostly San Andres) cherts under ultraviolet light may permit us to discern intraregional movements and contacts.

Lithic debitage exhibiting evidence of use-wear was analyzed first as manufacturing debris, then set aside and analyzed, described, and discussed in functional terms in a separate section on informal artifacts. The functional information was combined with the functional information derived from the analysis of the formal tools (see below) to address the question of site function.

Dating

Each radiocarbon sample was sorted by plant species. Once the quantity of each species was known, we selected samples using the following priorities. The baseline factor determining which priority was met was suitable sample size relative to the need for dating each specific feature. The costs of the different dating techniques vary widely ($250 to $600 per sample), making this an important consideration as well.

First-priority samples are comprised of a single species of plants that use the 3-carbon (3C) metabolic pathway during photosynthesis. Second-priority samples are comprised of two or more 3C plants. Third-priority samples are pure samples of 4-carbon (4C) and/or CAM plants. Fourth-priority samples contain mixtures of 3C, 4C, and/or CAM plants. Last-priority samples are comprised of charcoal powder for which plant species and therefore photosynthetic pathway are unknown. The selected samples were then submitted to Beta-Analytic, Inc., for dating (Appendix 2). AMS and bulk-sediment techniques were used where necessary.

Formal Artifacts

All artifacts typeable to traditional categories of curated tools (projectile points, drills, manos, metates, etc.) were analyzed according to assumed anticipated primary function. We readily acknowledge that many individual artifacts were ultimately used in a variety of ways, but the primary function, judged by design characteristics (shape, material, etc.), will be the main criterion for assignment. This criterion takes precedence simply because the artisan had a specific use or limited set of uses in mind when he decided on a specific design.

In some cases, artifacts were put to secondary uses because they were no longer needed for, or could no longer function properly in, their primary roles. By analyzing artifacts and assemblages from the standpoint of anticipated primary roles or needs we can ascertain what activities the people expected to perform, and probably did perform, at a given location. Use-wear studies and other evidence of secondary uses can assist us in confirming anticipated uses and in discerning uses in addition to those for which the tools were designed. The two kinds of evidence, then, can give us a more complete picture of the functions of the individual artifacts, associated features, and sites.

Formal artifacts were analyzed for type (primary function inferred from design characteristics), material (stone, bone, shell, pottery, etc.), metric dimensions (length, width, thickness, weight), use-wear, and other attributes that provide clues about use (burning, break-

age type, pigment, etc.) and, therefore, site function.

Human Remains

Although we did not anticipate finding human remains in the project sites, we did encounter some at LA 116471. The following procedures were implemented.

In the laboratory the human remains were treated in accordance with the provisions outlined in the following documents: Historic Preservation Division Rule 89-1 ("Regulations for the Issuance of Permits to Excavate Unmarked Human Burials in the State of New Mexico"); Museum of New Mexico Rule 11, as amended April 2, 1991 ("Collection, Display, and Repatriation of Culturally Sensitive Materials"); and New Mexico statutes pertaining to the treatment of human remains (pursuant to Section 18-6-11.2 NMSA 1978).

As stated in an earlier section, most of the human remains escaped identification until the laboratory phase because of their very fragmentary nature. However, they were not handled or photographed in the laboratory except as part of scientific data recovery by authorized persons. Knowledge of and photographs of the human remains were not released to the news media, the general public, or other unauthorized persons. On the Roswell South project, the only person authorized to take photographs of human remains and sensitive materials was the project supervisor. The only photographs, drawings, and notes made were for documentary purposes as discussed in the data recovery plan.

The following nondestructive observations and studies were conducted on the human remains: standard measurements, sex, age, pathologies, and anomalies.

We also needed to more precisely date the human remains themselves to compare them to the animal remains and other cultural materials. This comparison was necessary to establish whether the human remains represented one or more events and how those events related temporally to the events represented by the burning of the animal bones and other cultural materials. The major problem that has to be resolved is whether the humans had been cannibalized, or whether they had been cremated as a part of mortuary behavior. The only way to do this was to date two small pieces of human bone by the radiocarbon technique, which is destructive. A letter to the Historic Preservation Division requesting advice on the matter of dating these human fragments was submitted in advance of the dating procedure. Because of the resulting dates, which indicate that the human remains were burned during two or more events, Nancy Akins's analysis (this report) concludes that the extreme fragmentation and burning of the human bone likely resulted from mortuary behavior, not cannibalism.

Plant Materials

Plant remains, as documented through pollen, microscopic plant fragments from flotation samples, and macroremains (large enough to be seen with the unaided eye) provide information on wild species collected, domesticated species grown, the relative proportions of wild and domestic species used (the subsistence "mix"), wild-plant collecting strategies, and seasonality.

The floral materials were analyzed to the lowest taxonomic level possible, and plant part was identified. An attempt was made to determine which remains were used by the prehistoric occupants of the sites and which were deposited after occupation.

Pottery

Pottery provides a relative date of occupation, indicates socioeconomic ties with pottery-producing villages, and documents certain activities (food service, cooking, storage, etc.) that may have taken place at the sites--all important in researching exchange, social relations, and absolute dating.

The analysis monitored several attributes, including temper, paste, surface finish, vessel form, and pottery type. The degree of success in the analysis rested heavily on the nature of the sherds themselves and the natural processes they have undergone since the site was occupied. All are small, and many are eroded, limiting the kinds and quality of information that can be gleaned from them.

Disposition of Records, Artifacts, and Other Remains

All collections, except human remains and grave goods, were submitted to the Museum of New Mexico Archaeological Research Collection.

When this report went to press, the final disposition of the human remains was being determined through consultation among the appropriate state and Native American agencies.

All paper records and photographs were submitted to the Archeological Records Management Section at the Laboratory of Anthropology, Museum of New Mexico, in Santa Fe.

LA 116467 (SITE 7)

LA 116467, or Site 7, is unique in our knowledge and expectations about prehistoric occupation in the Roswell region. It is located on the south slope of a low hill situated north of a small, unnamed, intermittent drainage. The site is well within the desert grasslands of the Sacramento Plain and 8 km west of the nearest known permanent water source, the Pecos River. The nearest large tributaries of the Pecos that head in the mountains are the Rio Hondo, 22 km to the northwest, and the Rio Felix, 20 km to the south. Yet, both surface and subsurface investigations at LA 116467 have documented unexpectedly numerous potsherds representing at least 25 different pottery vessels of several types and several prehistoric features, all suggesting a farming site. Under these circumstances, we would also expect to find structures. The elevation of the site is 3,580 feet (1,091 m).

This site was exposed primarily by a utility trench that brought prehistoric pottery and lithic artifacts to the surface inside the existing highway right-of-way. Artifacts and a few burned rocks were scattered over an area measuring 68 m north-south and at least 16 m east-west (Figs. 3 and 4). The vast majority of artifacts, however, were concentrated within an area measuring 42 m north-south. The site extends a few meters westward outside the highway right-of-way. Much of the site, if not most of it, originally lay to the east, where the old highway cut now exists.

Fieldwork

Four tasks were completed at this site: (1) surface counts and collection of artifacts from 560 sq m of surface area from the top of the hill to the bottom of the south-facing slope; the density plot of these data identified the nature and extent of the surface materials and was used as a guide to excavate the area of primary artifact concentration; (2) surface counts of burned rocks; (3) excavation of 145 sq m (essentially all) of the primary artifact concentration; and (4) excavation and recording of four prehistoric cultural features.

The equivalent of 145 1 by 1 m squares was shovel-scraped to compact soil at depths of 3 to 8 cm below modern surface. All fill was screened through 1/8-inch wire mesh.

The site matrix consisted of one natural stratum, an eolian deposit of fine tan silty clay. Cultural items (pottery sherds, flakes, cores, and fragments of formal artifacts) were concentrated within this stratum. Cultural features (hearths and cache pits [?]) were excavated into the underlying, more compact stratum of the same composition.

A medium gray stain noted by the survey archaeologists (Marshall 1997) was also noted during the excavation between 70S and 92S at the lower end of the site on the gentlest slope. It was not clear whether the coloration derived from natural or cultural sources, though it should be noted that the greatest number of artifacts was found in this part of the excavations.

Features

The four prehistoric cultural features, including one hearth and three small cache pits (?), were found more or less clustered at the north, upslope end of the excavated area (Fig. 5). All were dug into the compact soil stratum underlying the loose surface stratum.

Hearth (Feature 3)

This small, circular pit measured 28 cm in diameter and 9 cm deep (Fig. 6a). The in-sloping sides and round bottom were not plastered or otherwise lined. The charcoal-stained fill contained fairly abundant charcoal bits and flecks but lacked burned rock. No artifacts were recovered from the fill. The one radiocarbon date obtained from the fill of this feature has a single calibrated intercept date of A.D. 1455.

Pit 1 (Feature 1)

This small, bell-shaped pit measured 40 cm in greatest diameter (25 cm orifice diameter) and 41 cm deep (Fig. 6b). Its capacity is roughly estimated at 33.5 liters, or 8.8 gallons. The sides and bottom were not plastered or otherwise lined. At the time of excavation, fill contained the gravels and galleries of an ant colony. No artifacts were recovered from the fill. The few bits of charcoal present could not be trusted to be contextual and were not collected.

Pit 2 (Feature 2)

This small, deep, oval pit measured 42 by 30 cm, was 23 cm deep, and had an estimated capacity of 29.0 liters (7.7 gal) (Fig. 6c). The vertical sides and slightly concave bottom were not plastered or otherwise lined. At the time of excavation, the fill in the northern half of the pit contained the gravels and cemented galleries of an ant colony. The fill in the southern half was light gray sediment. No artifacts were recovered from the fill. The few bits of charcoal that were present could not be trusted to be contextual and were not collected.

Figure 3. LA 116467 (Site 7), looking southwest. The caliche in the highway cut does not extend under the site.

Figure 4. Surface stripping, LA 116467 (Site 7), looking south.

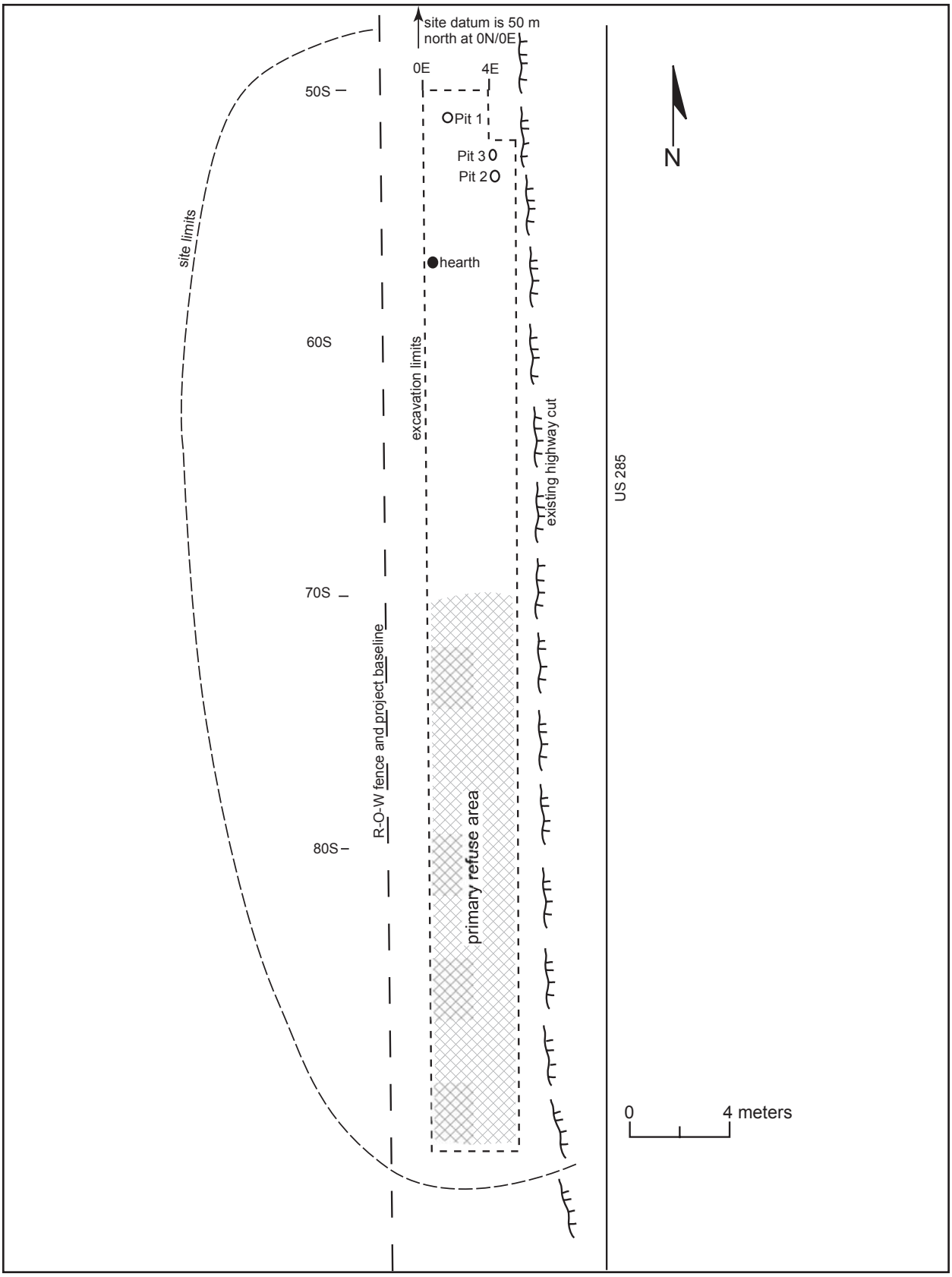


Figure 5. LA 116467 (Site 7).

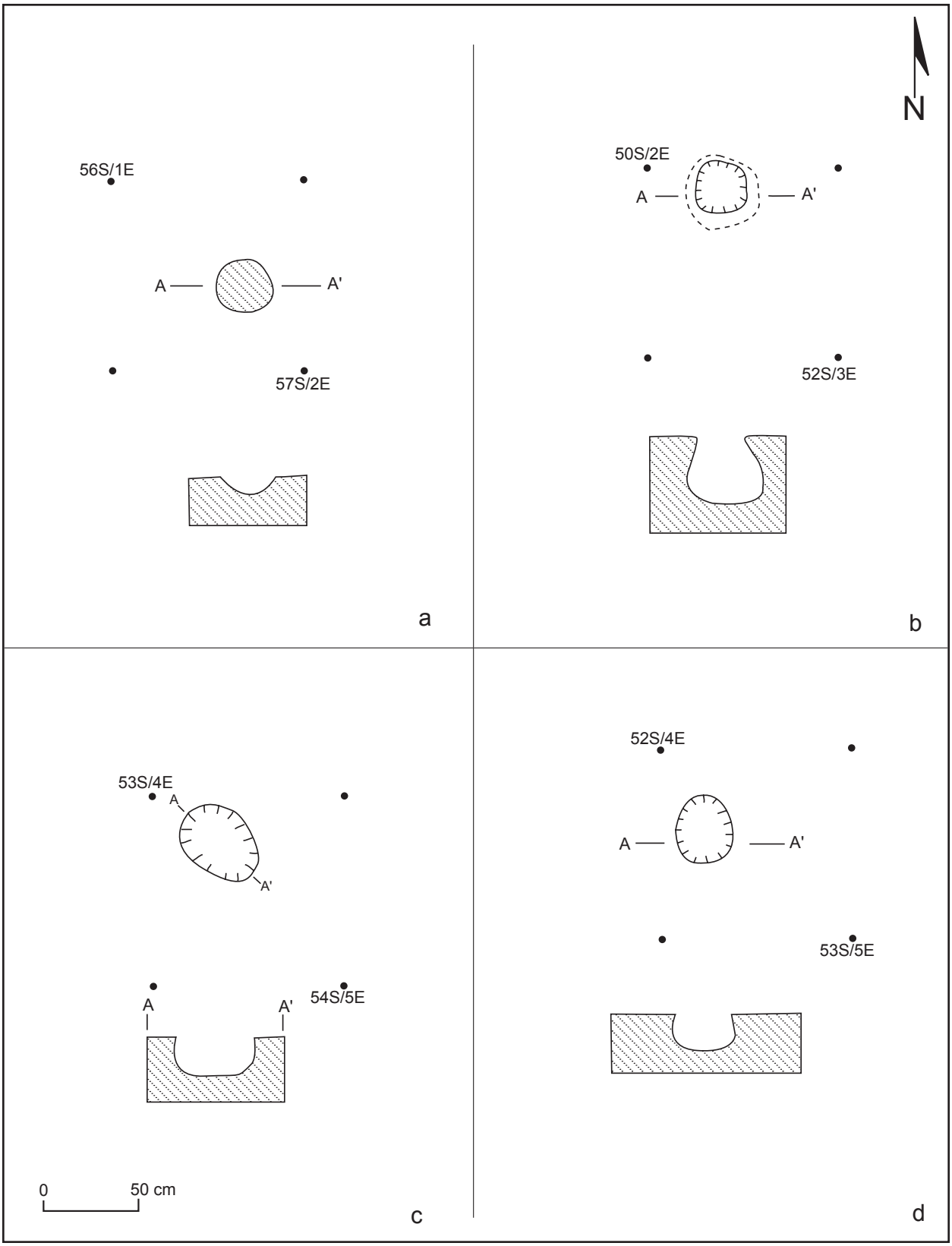


Figure 6. Plans and profiles of features, LA 116467 (Site 7). (a) Hearth, Feature 3; (b) Pit 1, Feature 1; (c) Pit 2, Feature 2; (d) Pit 3, Feature 4.

Pit 3 (Feature 4)

This small, deep, oval pit had slightly undercut sides (1 to 2 cm) and a nearly flat bottom (Fig. 6d). It measured 35 by 30 cm, was 20 cm deep, and had an estimated capacity of 21 liters (5.5 gal). The sides and bottom were not plastered. The rather soft, fine silty clay fill was light gray and contained some gravels and small bits and flecks of charcoal. No artifacts were recovered from the fill. The one radiocarbon date obtained from the fill of this feature has a single calibrated intercept date of A.D. 1420.

Cultural Materials

The nearly 600 artifacts from the surface and excavations include pottery sherds, flakes, cores, pieces of shatter, a mano fragment, a projectile point fragment, and a biface fragment.

Mano

This fragmentary one-hand specimen displays remnants of one, well-ground grinding surface with a moderately convex cross section (Fig. 7c). Measurements are 51+ by 56+ by 28+ mm. Material is off-white sandstone. Slight gray coloration suggests secondary use as a hearth stone.

Projectile Point

This side-notched dart point (?) is 33 by 16 by 5.5 mm, weighs 2.8 g, and is made of white chalcedony with sparse orange inclusions (Fig. 7a). The minimum stem width (from notch to notch) is 12 mm.

Flake Tools

Flake tools are flakes of various sizes and shapes that have one or more edges displaying use-wear, intentional retouch, or a combination of use-wear and intentional retouch. This class of artifact includes items with both micro-wear/retouch (i.e., those that require a microscope for study) and macro-retouch. Aside from the use-wear/retouch, these flakes are not otherwise modified or shaped.

Flake tools are typed according to several descriptive attributes that focus primarily on the individual edges with use-wear or intentional retouch: (1) tool type: unifaces, bifaces, unifaces/bifaces, and notches; no projections (graver and burin-like tools) were noted; (2) manifestation type: use-wear, intentional retouch, or a combination; (3) edge configuration: straight, convex, concave, sinuous, irregular, serrated.

There were 18 flake tools with a total of 20 individual edges (Table 2). The number of edges per whole flake (N=8) varies as follows: one (N=7, 88 percent), and two (N=1, 12 percent). Unifacial edges predominate (N=16, 80 percent), followed by bifacial edges (N=2, 10 percent) and notches (N=2, 10 percent). Use-worn edges (N=12, 60 percent) are the most common, followed by intentionally retouched edges (including one notch; N=6, 30 percent), and combination use-worn/intentionally retouched edges (including one notch; N=2, 10 percent). No flakes with both unifacial and bifacial wear along the same edge were recovered.

Only eight whole flakes are present by which to gauge the lengths of the use-wear and intentional retouch (Table 3). Lengths regardless of edge configuration and use-wear/intentional retouch type range from 10 to 26 mm. The notches are 5 to 6 mm across and 1 to

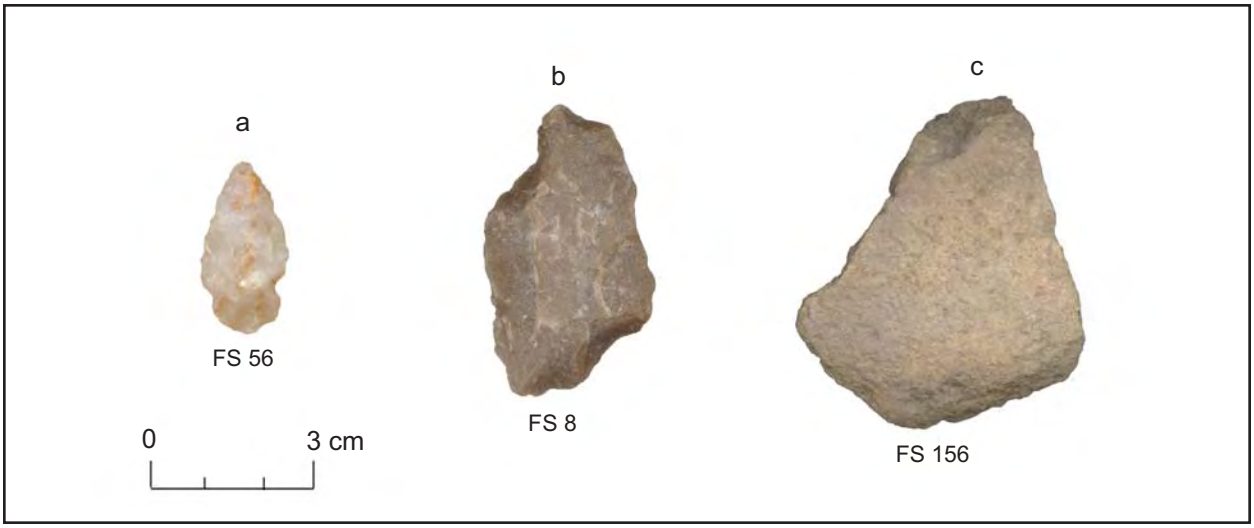


Figure 7. Artifacts, LA 116467 (Site 7): (a) dart; (b) thick biface; (c) mano fragment.

Table 2. Flake-tool edge types by use/retouch type, Site 7

	Use-wear	Intentional Retouch	Use-wear and Intentional Retouch	Total
Unifacial				
straight	6	2	-	8
convex	3	1	1	5
concave	1	-	-	1
sinuous	-	-	-	-
irregular	-	-	-	-
serrated	2	1	-	3
Bifacial				
straight	-	-	-	-
convex	-	1	-	1
concave	-	-	-	-
sinuous	-	-	-	-
irregular	-	-	-	-
serrated	-	-	-	-
Notch	-	1	1	2
Total	12	6	2	20

Table 3. Use-wear edge-length data for whole flake tools, Site 7

Edge Type	Number of Edges	Mean Length (mm)	Range (mm)
Unifacial:			
straight	4	19.25	14-26
convex	2	10	10
concave	1	19	19
sinuous	-	-	-
irregular	1	15	15

2 mm deep.

Materials represented among the flake tools include nine items of local gray chert, four of other chert, four of chalcedony, and one of rhyolite.

All of the flake tools were recovered from the main refuse accumulation at the south end of the site (i.e., at the foot of the hill).

The 18 flake tools constitute 5.7 percent of the 314 total pieces of lithic debitage (cores, flakes, etc.) recovered during the excavations.

Pottery

The pottery assemblage from Site 7 totals 295 sherds and no whole or restorable vessels (Table 4). Over half are plain wares (mostly Jornada Brown and South Pecos Brown), and the rest includes Chupadero Black-on-white, Three Rivers Red Ware (mostly red-washed/slipped brown, but also some San Andres Red-on-terracotta and Three Rivers Red-on-terracotta), a local variety of Corona Corrugated (Jornada Corrugated), El Paso Polychrome, Crosby (?) Black-on-gray, Mimbres Style III Black-on-white, and possibly San Francisco Red. An attempt was made to determine the minimum number of vessels (MNV) of the painted, slipped, and corrugated pottery types, but not the plain wares (Table 5).

Two attributes clearly distinguish the Site 7 brown ware sherds from those of other sites in the region: the ubiquity of Sierra Blanca gray syenite temper and the high frequency of dark to black pastes.

Although many of sherds have off-white and light gray feldspars, the particular manifestation (i.e., visual appearance) of their combination with certain mafic minerals leaves little doubt that they derive from Sierra Blanca gray syenite even though they have few grains of medium to dark gray feldspar. The medium to dark gray feldspar, especially as well-formed individual crystals with or without hematite rosettes or staining, is what really sets Sierra Blanca gray syenite apart from other syenites in the Sierra Blanca region and elsewhere in the Southwest as far as is currently known.

The dark pastes are intriguing and indicate that firing temperatures were not hot and/or long enough to remove the carbon in the clays. While this phenomenon is not unusual in Sierra Blanca region pottery, the high frequency is unusual. This may mean that these vessels were made away from the mountains, perhaps in the rolling hills or plains where fuel was at a premium, resulting in shorter firing times. The firing temperatures were obviously high enough to achieve a usable product, especially by southeastern New Mexico standards.

Chupadero Black-on-white. Sherds of this type dominate the white ware industry at Site 7. All but one sherd is tempered with crushed sherd. Temper grain sizes vary from fine or very fine to medium and even coarse. Most sherds have fine or medium temper or both. Sherd 176 is the exception; its primary constituent is Capitan alaskite, with little very fine sherd.

Although estimating MNV is difficult, it looks as if seven different vessels–five jars and three (?) bowls--are represented. Most are represented by single sherds, but one appears to be represented by eight sherds.

Crosby Black-on-white. This bowl sherd has Chupadero-like paste, but the exterior surface finish and design characteristics are, at best, marginal for Chupadero. Perhaps Jelinek (1967) would include it under his Crosby Black-on-gray type. MNV = 1 bowl.

El Paso Brown and/or Polychrome. A few examples of El Paso Polychrome are present in the LA 116467 collection. Several more sherds with El Paso characteristics are also present. It is not known whether they belong to brown vessels or polychrome vessels. However, the fact that so few sherds attributable to El

Table 4. Summary of pottery recovered from Site 7

Pottery Type and Vessel Form	Number	Percent
Chupadero Black-on-white		6%
jar	16	
bowl	2	
Other black-on-grays/whites		1%
Crosby Black-on-gray (?) bowl	1	
Mimbres Style III bowl	1	
Three Rivers Red Ware, painted		4%
San Andres Red-on-terracotta bowl	2	
Three Rivers Red-on-terracotta bowl	1	
unspecified red-on-terracotta variant bowl	1	
red-on-terracotta (?)	8	
Three Rivers Red Ware, slipped		7%
Red washed/slipped brown		
bowl	16	
jar	3	
indeterminate vessel form	1	
Possible San Francisco Red	1	
Red-on-browns		1%
Jornada Red-on-brown jar	1	
South Pecos Red-on-brown jar	1	
red-on-brown, unspecified	2	
El Paso Brown Ware		10%
polychrome jar	10	
brown/polychrome	15	
questionable examples	4	
Jornada Indented Corrugated	3	1%
Jornada Series Plain Brown Ware		67%
Jornada Brown		(40%)
polished	102	
unpolished	5	
questionable examples	12	
Jornada/South Pecos		(14%)
Jornada/South Pecos*	27	
South Pecos/Jornada*	16	
South Pecos Brown		(12%)
"typical" examples	29	
questionable examples	5	
Unidentified brown	10	3%
Total	295	100%

* First name indicates the type represented by the dominant attributes.

Table 5. Minimum number of vessels (MNV), Site 7

Pottery Type and Vessel Form	MNV	Percent
Chupadero Black-on-white		26%
jars	5	
bowls	3	
Crosby (?) Black-on-gray bowl	1	3%
Mimbres Style III Black-on-white bowl	1	3%
Three Rivers Red Ware		
Painted designs		13%
San Andres Red-on-terracotta bowl	1	
Three Rivers Red-on-terracotta bowl	1	
Red-on-terracotta*		
bowls	1	
jars**	1	
Red slipped/washed		23%
bowls***	5	
jars	1	
Possible San Francisco Red	1	
Jornada Red-on-brown	1	3%
South Pecos Red-on-brown	1	3%
El Paso Polychrome jar	1	3%
Jornada Indented Corrugated	1	3%
Jornada Series Plain Brown Ware		16%
Jornada Brown****		
polished	1	
unpolished	1	
Jornada/South Pecos****		
Jornada/South Pecos	1	
South Pecos/Jornada	1	
South Pecos Brown****		
"typical" examples	1	
Unidentified brown****	1	3%
Total	31	99%

* Sherds that lack full line widths by which to assign to specific type.
** Described under Jornada Red-on-brown in text.
*** One vessel may be San Francisco Red.
**** One or more of these categories may be greatly underestimated.

Paso are present in the collection suggests that all belong to polychrome vessels.

Nine sherds are definitely attributable to the polychrome, and all have the outward appearance of representing a single vessel. It is difficult to be certain from the standpoint of the paste and temper. The painted surfaces on all of the sherds, on the other hand, have very similar colors and shades of colors. At first glance, two different shades of red are present, but both occur on one sherd, thereby confirming that only one vessel is probably represented. The red colors, according to Munsell, are 10R 4/3 (weak red) and 10R 4/4 (also weak red).

One sherd is of particular interest. It possesses what appears to be the bottom edge of the design panel, in this case a black line or fraction of a large solid black element or a section of slipped surface that is a minimum of 15 mm across. The bottom line is aligned with the thickness gradient, which at this point almost certainly represents the point of greatest diameter on the jar. Appropriately, the thickness of this sherd changes from 2.5 mm on the upper side to 5 mm (and continuing to thicken) on the bottom side.

Unfortunately, no rim sherds of El Paso Brown or Polychrome were recovered from LA 116467.

Jornada Brown and South Pecos Brown. These two types and their combinations, Jornada/South Pecos and South Pecos/Jornada, comprise the majority of sherds at this site. They share the same range of temper types and general range of fracture characteristics but differ with regard to surface finish and average temper grain size.

The main difference between the two as used here is whether or not the surfaces, especially the exterior surfaces, are floated and thereby hide most of the temper grains. Jornada surfaces are floated, and South Pecos surfaces generally are not.

In previous analyses segregation of the two types on the basis of temper particle size and number has been fairly straightforward. The Site 7 Jornada sherds, however, often tend to have more medium-sized grains, occasional large ones, and overall fewer grains than what is generally typical of Jornada. The latter has profuse small grains. The difference, of course, has every-

thing to do with the crystal sizes in the raw material and how easily they separate or even crumble upon grinding. Jelinek (1967) apparently noted the same tendency toward larger temper grains in the Jornada of his Middle Pecos sites, 50 km or more north of Site 7.

Thus, for the Site 7 sherds, temper grain size is a less critical attribute for segregating Jornada from South Pecos than would usually be the case. Classic Jornada temper (profuse, tiny fragments of mostly off-white feldspars) is present in 17 percent (N=20) of the Site 7 Jornada, definitely placing it in the minority.

The presence or absence and degree of surface polishing is also important. Jornada is usually well polished and sometimes quite lustrous. South Pecos normally has little or no polishing, though at some sites a good polish is sometimes found.

The clays are part of the problem. South Pecos often has clays that shrink noticeably during firing, pulling the surface inward toward the core of the paste and leaving temper grains as raised islets. The raised position of these grains is then accentuated by hairline cracks in the surface of the clay that radiate out in several directions. Jelinek (1967) considers this attribute to be specific to South Pecos.

In instances where a sherd possesses attributes of both types, then the combination term South Pecos/Jornada or Jornada/South Pecos is used, depending on which set of characteristics is dominant. South Pecos/Jornada sherds have large temper grains and the resulting ragged edge fracture and a good to excellent surface polish. Jornada/South Pecos sherds have relatively fine temper grain sizes and fairly even edge fractures, but also large numbers of temper grains showing on the surfaces (i.e., surfaces are not floated to hide temper and provide a smoother finish).

By the end of the pottery analysis, one aspect of the pottery had become quite clear, at least in this assemblage: most of the sherds attributable to Jornada, South Pecos, Jornada/South Pecos, and South Pecos/Jornada may well have been made by the same potter(s). Only the few classic examples of Jornada, those possessing profuse, fine crystalline temper, are exempt. Likewise, few sherds typed as South Pecos are classic in the sense that they have blocky pastes and radiating cracks on the surfaces. The clear-cut differences that occur in many collections occur infrequently in the Site 7 collection. This is not so surprising, since Jelinek (1967) suggests and the Site 7 assemblage seems to confirm that South Pecos Brown derived from Jornada Brown.

A brief look at the tempering materials of the Jornada Brown group is instructive. The following temper types were distinguished: (1) Primary constituent gray feldspar with smaller amounts of white or off-white feldspars, with or without clear feldspars, with or without mafics. (2) Gray feldspar only, plus mafics and quartz. (3) Gray feldspar only, plus mafics. (4) Primary constituent(s) off-white feldspars, smaller amounts of gray feldspar, quartz, and mafics. Gray feldspar may be light-colored and translucent. (5) Same as number 4 minus gray feldspar. (6) White or off-white crystalline rock that may or may not be Capitan alaskite. White and clear spars, with or without quartz and mica. (7) Variations on most of the above, plus apple-green grains of epidote or apatite. Figure 8 illustrates temper types by category: Jornada Brown (all variations), Jornada/South Pecos, South Pecos/Jornada, and South Pecos Brown (all variations). Given the small sample sizes (from 29 to 117), it is not surprising that there seems to be a lack of uniformity in the curves.

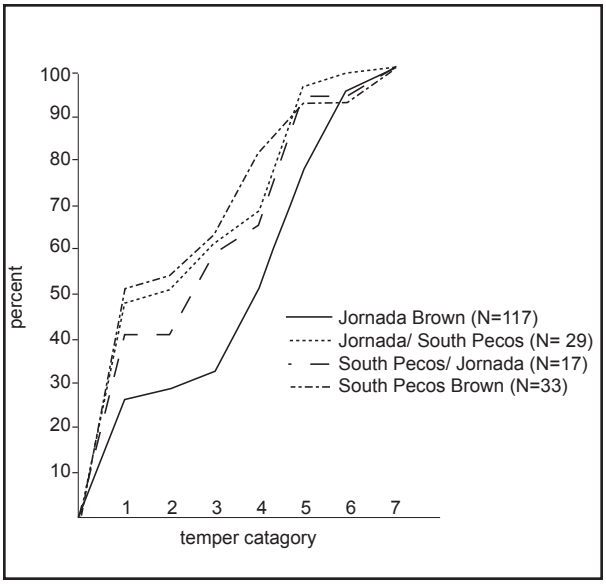


Figure 8. Temper in Jornada-series pottery, LA 116467 (Site 7).

Nonetheless, the curves for South Pecos, South Pecos/Jornada, and Jornada/South Pecos are more similar to one another than to Jornada Brown. The primary difference is that Jornada Brown has a lower percentage of sherds in which gray feldspar is the leading constituent. While the gray feldspar, especially that attributable to Sierra Blanca gray syenite, is one of the foremost tempering materials of South Pecos Brown, it is also found in Jornada Brown (as well as Three Rivers Red-on-terracotta, etc.).

Also, the sizes of the temper grains is important in distinguishing the two types. South Pecos has large grains, and Jornada has small to medium grains. Other than the difference in gray feldspar content, the curves are sufficiently similar to confirm the idea of a close relationship (perhaps the same manufacturers) of all four products at this site.

As mentioned earlier, the incidence of dark and black pastes in the Jornada series sherds from Site 7 seems greater than normal and merits discussion. The word "seems" is used here because I have not systematically investigated this aspect until now. If correct, "typical" Jornada and South Pecos sherds are medium to dark in color as defined below. Black is uncommon, if not rare.

The need to investigate the incidence of dark to black pastes derives mainly from the question of Plains-made pottery in southeastern New Mexico sites. Many examples of known Plains and Trans-Pecos sherds examined by the writer have very dark to black pastes, a criterion that might be used to identify them. The significance of very dark and black pastes in pottery presumably lies in the fact that this darkness, sometimes tar black, indicates little to no combustion of naturally occurring carbonaceous material in the clays. This in itself suggests the limited availability of fuel for firing pottery that one would expect in a Plains environment.

Figure 9 illustrates percentages of black, dark, and medium coloration of paste by pottery category: Jornada, Jornada/South Pecos, South Pecos/Jornada, and South Pecos. Characterization of degree of darkness

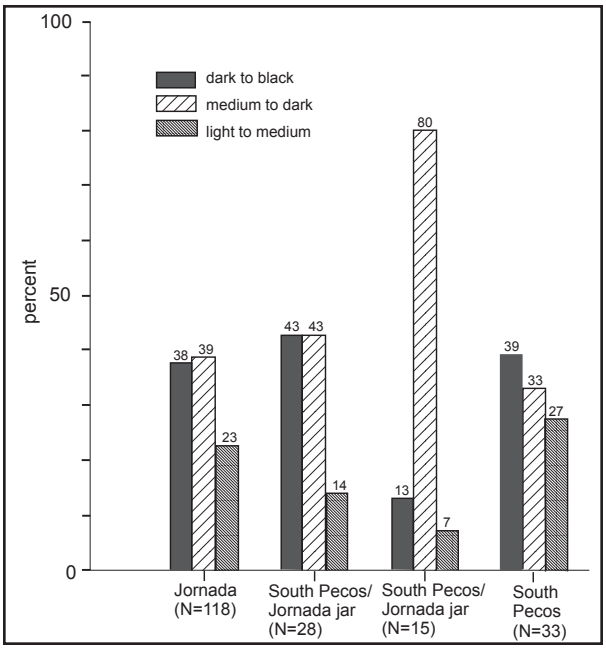


Figure 9. Paste color in Jornada-series pottery, LA 116467 (Site 7).

in these sherds was somewhat subjective, as follows:

• Black. Definitely black, usually so much so that the tempering materials are difficult to see and often impossible to identify visually, even under 30-power magnification. Sherds with black cores and thin marginal colors next to the surfaces (i.e., zoned pastes) are scored as black. Sherds having a thin carbon streak in an otherwise colored paste are scored according to the majority color of the paste.

• Dark. So dark that the original color (color that would be obtained upon better firing) can just be discerned. The amount of carbon in these examples is so high that it is difficult to characterize the color according to Munsell or any other commercial system.

• Medium. True color is fairly obvious and can be characterized by the Munsell system to a fairly reliable degree, though some interpretation may be required.

• Light. This degree of darkness was not manifested in the Site 7 Jornada assemblage, and it rarely applies to the pottery under consideration here (Jornada series). Good firings resulting in clear colors were rarely achieved on the utility pottery in the region as a matter of choice and fuel conservation. Light, clear coloration was often achieved for painted types such as Three Rivers Red-on-terracotta, indicating a willingness to use the quantities of fuel required to burn out all carbon. I have noted some assemblages of Jornada wherein at least some plain vessels were fired to the light orange color, suggesting that, in some instances, the darker colors of the majority of Jornada vessels may have been desired and not merely a product of fuel rarity or conservation.

In three of the four pottery categories, the percentages of black and dark pastes are similar, ranging from 38 to 43 percent. Dark sherds are equally numerous, ranging from 33 to 43 percent. Medium pastes are clearly in the minority, ranging from 14 to 27 percent. The exception to all this, and one for which we have no ready explanation, is the South Pecos/Jornada group. These sherds are dominated by dark pastes (80 percent), with correspondingly small representations of black (13 percent) and medium (7 percent) pastes. In all cases, poor firing, resulting in little or no removal of natural carbon from the clays, is the norm.

Only systematic documentation of future assemblages will show whether the LA 116467 Jornada series sherds are as unusual in this respect as they now appear to be. It might also be noted that this attribute agrees with the thesis that all of these sherds, or the vessels they represent, were made by the same group of potters, as previously discussed.

Jornada corrugated. The term Jornada indented corrugated has not been formally defined as yet in the literature. However, three sherds in the Site 7 assemblage have the profuse, fine leucocratic temper and paste typical of classic Jornada Brown but with a diffi-

cult-to-describe exterior surface finish. That surface finish appears to be a haphazard attempt to produce indented corrugations by means of leaving some of the coil boundaries flattened but intact and gently wavy. Indentations were attempted by means of irregularly spaced dimples, at least as the small sherds seem to indicate. The three sherds are from a single vessel.

Occasionally, truly indented corrugated sherds with Jornada Brown temper have been noted in sites in the southeastern New Mexico. Jelinek (1967) does not note the presence of a corrugated variant in his description of Jornada Brown. However, he does note a corrugated variant in what he calls Roswell Brown, a type which I long ago dropped from usage simply because distinguishing between Jornada and Roswell was not found to be readily possible or particularly useful. In many ways, I consider Roswell Brown simply to be the classic form of Jornada Brown, as best seen in the type site, LA 2000. Jelinek (1967) recognizes the close relationship between these materials.

Inspiration for making a true indented corrugated pottery using Jornada paste presumably came from one of two regions: central New Mexico (Corona Corrugated) or southwestern New Mexico (Mimbres Corrugated). I have always assumed that Corona Corrugated was the inspiration because Chupadero Black-on-white, the primary Late Prehistoric black-on-white pottery in southeastern New Mexico, initially came from central New Mexico.

However, certain Corona Corrugated variations share specific characteristics with Mimbres Corrugated and differ markedly from contemporary Anasazi corrugated types. The similarities include sloppy dimensions and spacing of indentations and polishing over the finished indentations. It is therefore possible that even Corona was inspired by Mimbres Corrugated, making the development of Jornada Corrugated a de facto product of Mimbres Corrugated as well. Hayes et al. (1981) correctly date the inception of Corona Corrugated to A.D. 1225.

Jornada Red-on-brown. One sherd was separated for special attention because it is from a short-necked, early-form jar with a Jornada Brown paste (the classic profuse, fine-crystalline material). The form, so common to Jornada Brown, is a jar with a short neck that constricts towards the orifice. The red decoration is limited to the lip and narrow bands extending down both surfaces--interior and exterior--for distances of 9 (interior) to 16 mm (exterior) below the lip. No other decoration is to be found on the remainder of the sherd, which represents the neck to 45 mm below the lip.

Red-washed brown. The sherds in this group are somewhat variable in their pastes, but the greatest variation is in surface finish presence/absence and degree of polish, and in the shades of red and the thickness of application of the slip. Basically all sherds that are not thought to be one of the imported pottery types (e.g., San Francisco Red) are believed to be locally made.

The finish, especially of the decorated surfaces, is uniformly smooth in that it is not lumpy or full of vugs and other imperfections. Polish ranges from little or no polish to extremely well polished or lustrous. The finish of undecorated surfaces is even more varied in that some are merely smoothed though somewhat lumpy, while on others the undecorated surfaces are as well finished as the decorated surfaces.

The red decorative material varies from a streaky wash to a fairly thick slip. Munsell readings were made on sherds having color that is sufficiently intense (i.e., not streaky) and covers a large enough area to permit reasonable accuracy. Slip colors according to Munsell include 10R 4/3 and 4/4 (both weak red); 2.5YR 4/2 (weak red), 4/4 (weak red), 4/6 (red), 4/8 (red), 5/2 (weak red), 5/4 (reddish brown); and 5YR 4/3 (reddish-brown).

Both bowls and jars are represented among the sherds, though bowls dominate as usual. Not all sherds could be evaluated in the MNV study because some are too small for satisfactory comparison of surface qualities. However, at least eight vessels are represented, making this one of the most abundant painted types at Site 7.

Sherds in this group have not been systematically named over the years other than by the general term used here. Jelinek (1967) noted red-washed/slipped variants of Jornada Brown, Middle Pecos Micaceous Brown, Roswell Brown, McKenzie Brown, and South Pecos Brown, but he does not suggest specifically naming them as such. Bussey et al. (1976) named a new type called Jornada Red, but that seems to apply mainly to terracotta-colored vessels with red slips or washes. Presumably these vessels were made by the potters who also made Three Rivers Red-on-terracotta.

The manufacture dates for locally made red-washed/slipped brown pottery in southeastern New Mexico have not been established. It shows up on some early sites as the only painted pottery in an otherwise plain brown assemblage. This fact, plus the occurrence of reputed San Francisco Red (highly polished red slip) and Mogollon Red-on-brown sherds on southeastern New Mexico sites, led Mera (1943) to suggest that red-slipping of brown vessels derived from the Mimbres-Mogollon of southwestern New Mexico. Anyon et al. (1981) date the inception of San Francisco Red to the Georgetown phase (A.D. 550-650), and Mogollon Red-on-brown to the San Francisco phase (A.D. 650-750) in southwestern New Mexico. Unpolished red-slipped brown vessels occur even earlier (Cumbre phase, A.D.

200-550) in the Mimbres-Mogollon.

Mera (1943) remarks that the first production of red-washed/slipped brown pottery in southeastern New Mexico could not be dated at that time, but correctly points out that it would have to start later than the appearance of San Francisco Red in southeastern New Mexico as a trade product. The problem remains unresolved to this date, though a date after A.D. 600 or 700 seems likely.

The end date of manufacture of red-washed/slipped pottery in southeastern New Mexico is based on the apparent fact that these vessels continued to be made on an occasional basis practically to the "abandonment" of southeastern New Mexico in the A.D. 1300s or early 1400s (see data for various sites in Kelley 1984). Either that or a consistent but small number of heirloom pieces survived nearly to the end in many villages. The point is, red-washed/slipped vessels seem to occur throughout the prehistoric sequence in southeastern New Mexico. However, there is some evidence that red-washed/slipped pottery was more common early in its period of manufacture, when other painted types were less readily available. At least this is the working assumption for now.

San Francisco (?) Red. Sherd 76 has a highly polished exterior surface and a paste and temper that may not be local. For the most part, painted types in Three Rivers Red Ware, including red-washed/slipped ones, are generally better finished on the decorated surfaces and less well so on the undecorated ones. However, other red-on-terracotta bowl sherds from Site 7 have unusually well-smoothed and -polished exteriors, as well as the more typical ones, yet the tempers are more clearly local in origin. Is Sherd 76 actually San Francisco Red? Perhaps so, but a dimpled exterior surface like that common to San Francisco Red would be more convincing. For the time being, Sherd 76 will be tallied as a local, red-washed/slipped brown.

South Pecos Red-on-brown. This sherd has a red design on a South Pecos paste. The type follows Jelinek's (1967) usage under variants of South Pecos Brown.

The Site 7 pottery assemblage in regional perspective. Given the dating situation just described, will the Site 7 assemblage as a whole help us to date the site relative to other sites in the region? Figure 10 (see also Appendix 3) presents cumulative graphs for sites in five areas of southeastern New Mexico: the lower Rio Hondo at Roswell, the Southern Middle Pecos northeast of Roswell, the Rio Ruidoso at Glencoe, the upper Rio Bonito southwest of Capitan, and the Capitan Mountains north of Lincoln. Each graph shows the curve for Site 7 and three assemblages from the area (dotted lines represent the absence of the type at that site). Cumulative graphs are one means of visually comparing and assessing the degree of similarity among assemblages.

Pottery assemblages from Jelinek's (1967) Southern Middle Pecos area and the Garnsey Spring Campsite (Parry and Speth 1984) are among the most homogeneous of any discussed here. Sites P-7 and P-8 have virtually identical curves, while the Garnsey Spring Campsite is similar in all respects except for having more brown ware and less Chupadero. In all three instances, the aggregate of brown ware and Chupadero is similar. We suspect that this indicates that the better-fired Chupadero, once available, took over many of the functions involving liquids, especially water handling and storage.

In the lower Rio Hondo we see that the curve for the Fox Place is most similar to that for Site 7. A series of radiocarbon and archaeomagnetic dates for the Fox Place (Wiseman 2002) indicates major occupations during the mid to late A.D. 1200s and early 1300s, with sporadic (?) later occupations. The primary differences between the Fox Place and Site 7 assemblages is that Site 7 has considerably more brown ware and much less Chupadero Black-on-white, though here as in other assemblages the combined percentages of these two types (brown ware plus Chupadero) are nearly the same at both sites.

On the other hand, Rocky Arroyo and Bloom Mound have little or no brown ware and considerably more El Paso Polychrome than LA 116467. While a time difference may provide a partial explanation (all three sites are later than Site 7), something else is also going on, especially with the extraordinarily large amount of El Paso Polychrome at Bloom Mound.

The Rio Ruidoso data, drawn from the stratified, late Glencoe phase Bonnell site, are represented by three assemblages from the fills of as many structures. The assemblages from Houses 9 and 13 date to the latest period of occupation, presumably the 1300s. The House 12 assemblage is earlier, probably dating some time in the 1200s, and clearly the most like that of Site 7. The assemblages from Houses 9 and 13 have less brown ware and slightly more Chupadero. Houses 9 and 13 both have Lincoln Black-on-red, which Site 7 lacks. Additionally, House 9 has far more indented corrugated, and House 13 has far more El Paso Polychrome. Of the four, only House 9 produced Rio Grande Glaze.

The Mimbres Black-on-white and relatively high percentages of red-washed/slipped brown sherds in all four assemblages could indicate that elements of all four probably overlap in time. Or they could signify culturally mixed deposits. However, the Lincoln and Rio Grande Glaze in the fills of Houses 9 and 13 generally date later than Site 7 and the fill assemblage of House

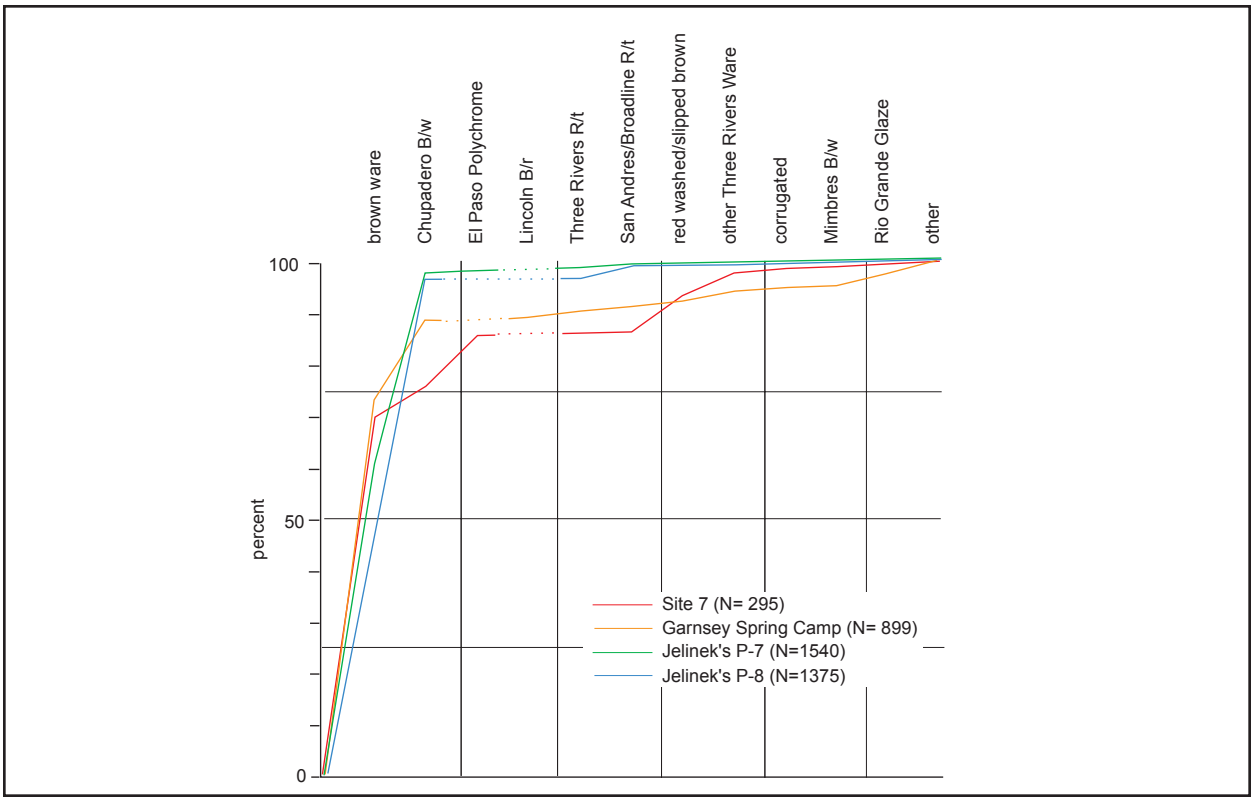


Figure 10. Comparison of LA 116467 (Site 7) pottery assemblages with sites along Pecos River.

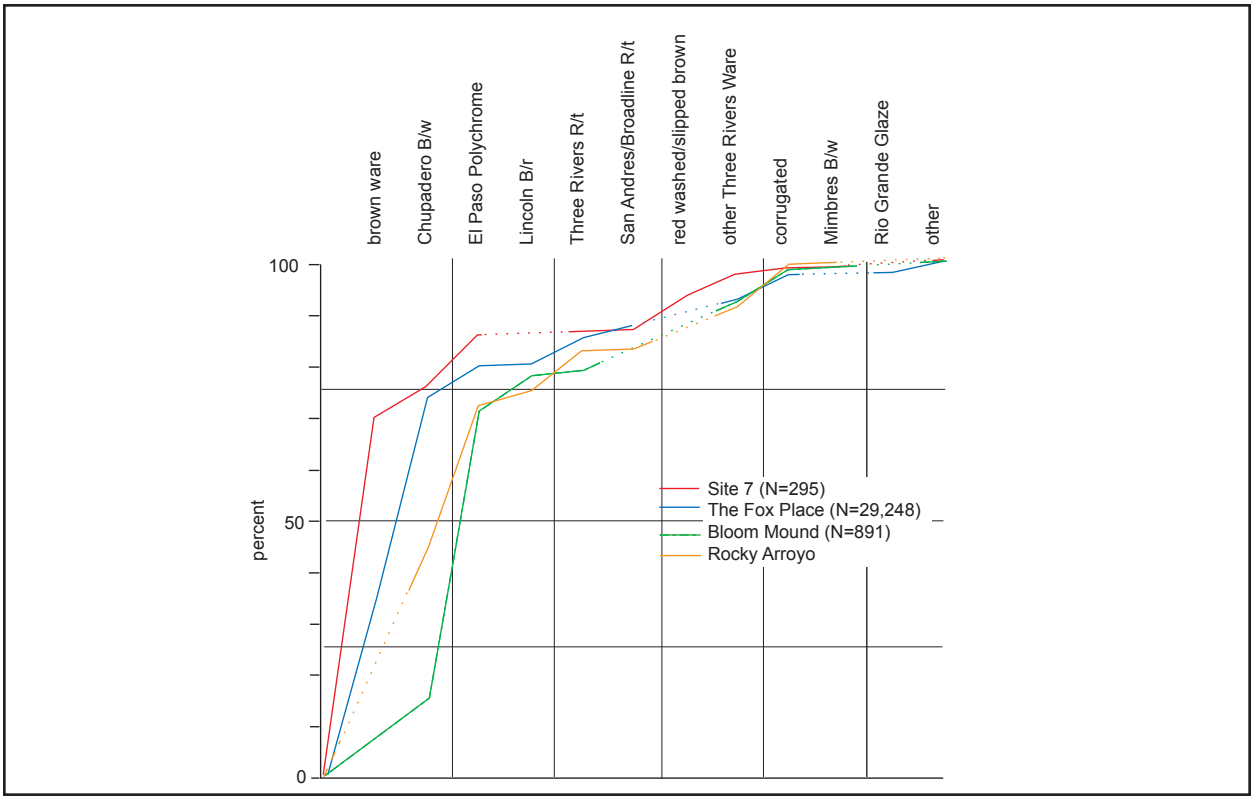


Figure 10 (continued). Comparison of LA 116467 (Site 7) pottery assemblages with late sites in the Pecos Valley.

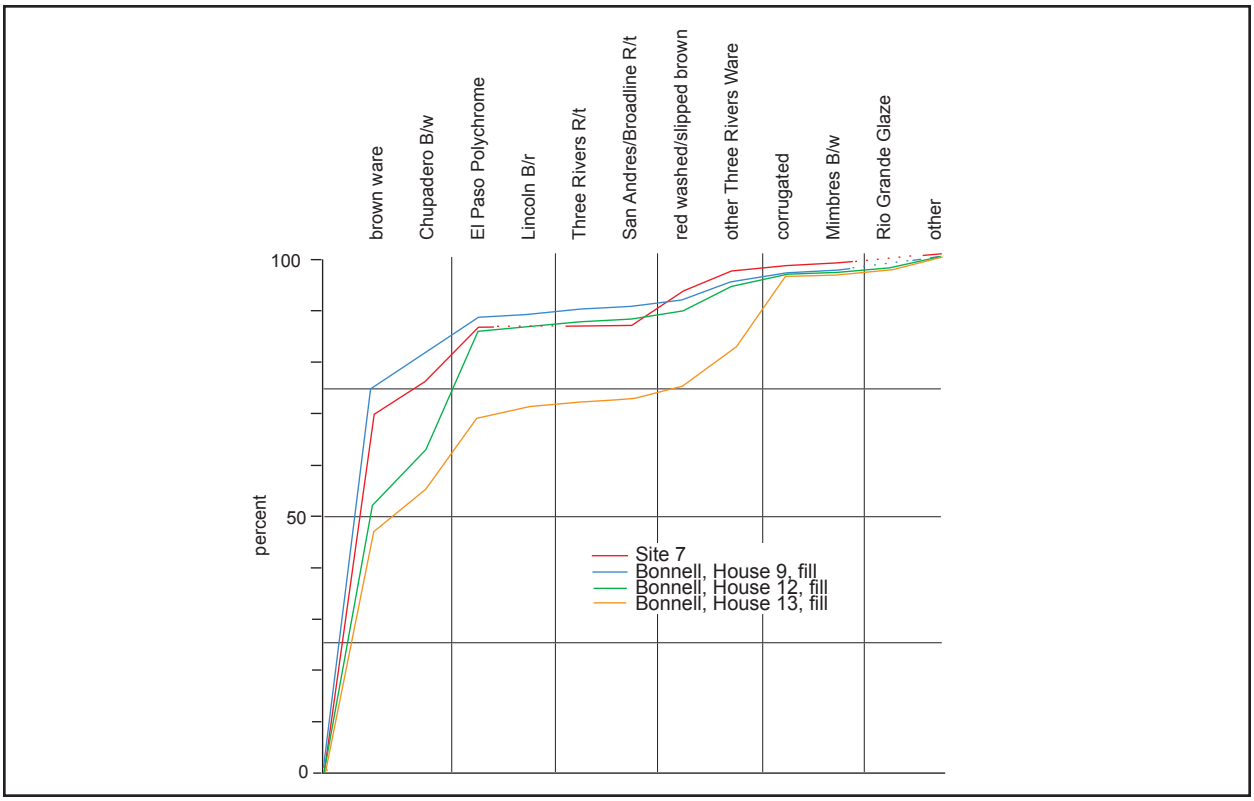


Figure 10 (continued). Comparison of LA 116467 (Site 7) pottery assemblages with Glencoe phase sites on Rio

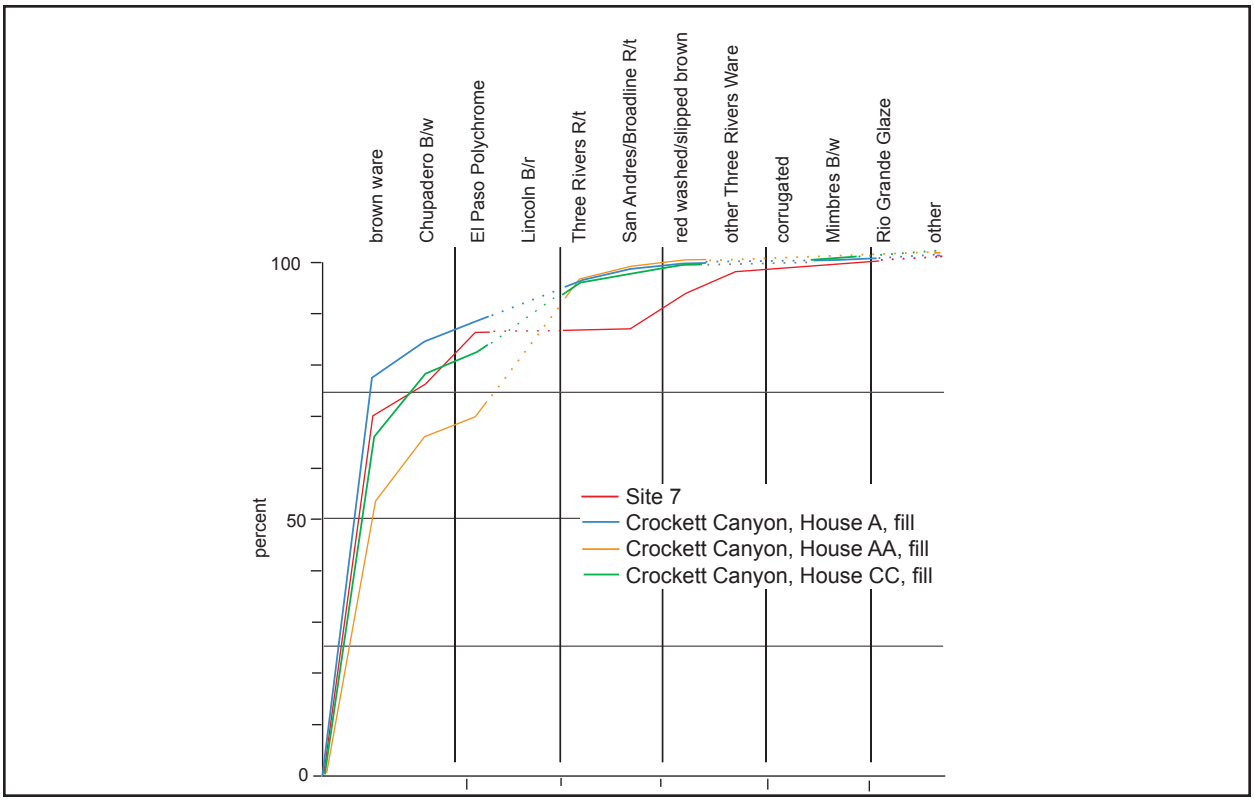


Figure 10 (continued). Comparison of LA 116467 (Site 7) pottery assemblages with Glencoe phase sites on the upper Rio Bonito.

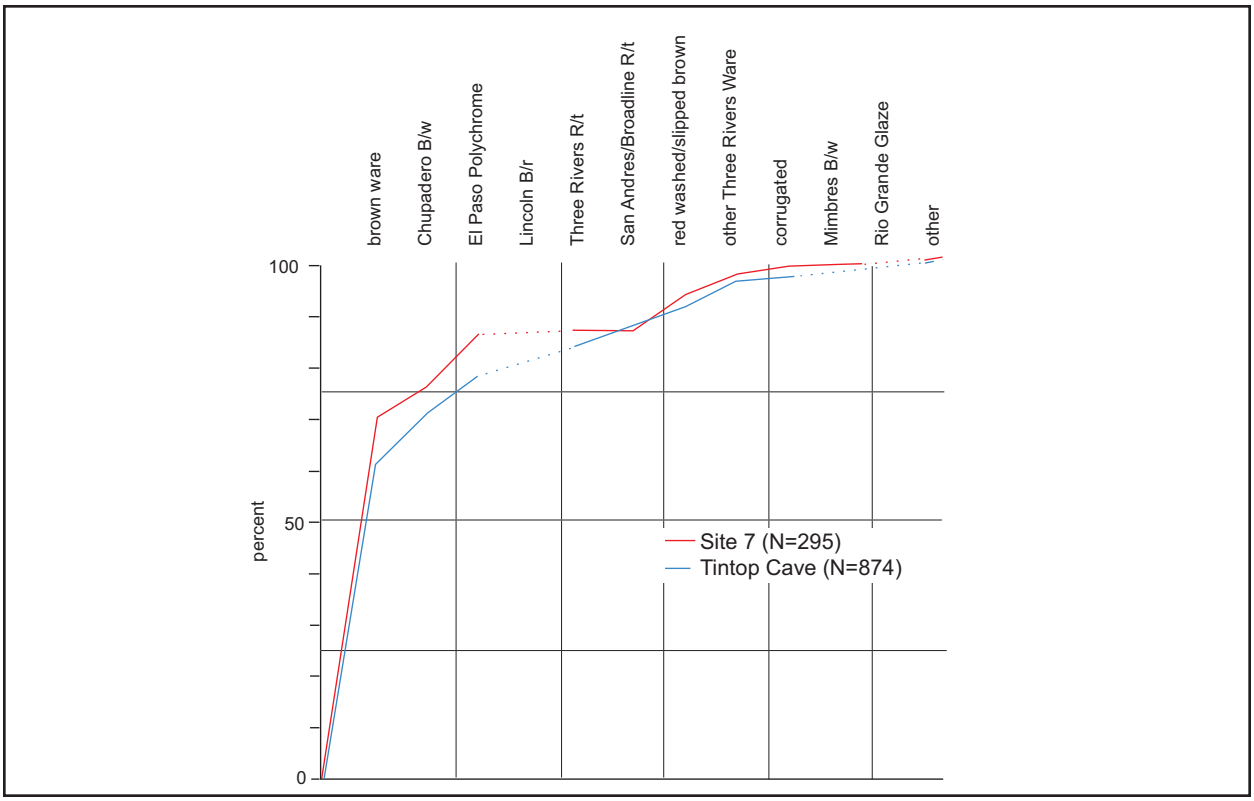


Figure 10 (continued). Comparison of LA 116467 (Site 7) pottery assemblages with Tintop Cave, in the upper Rio Hondo Valley.

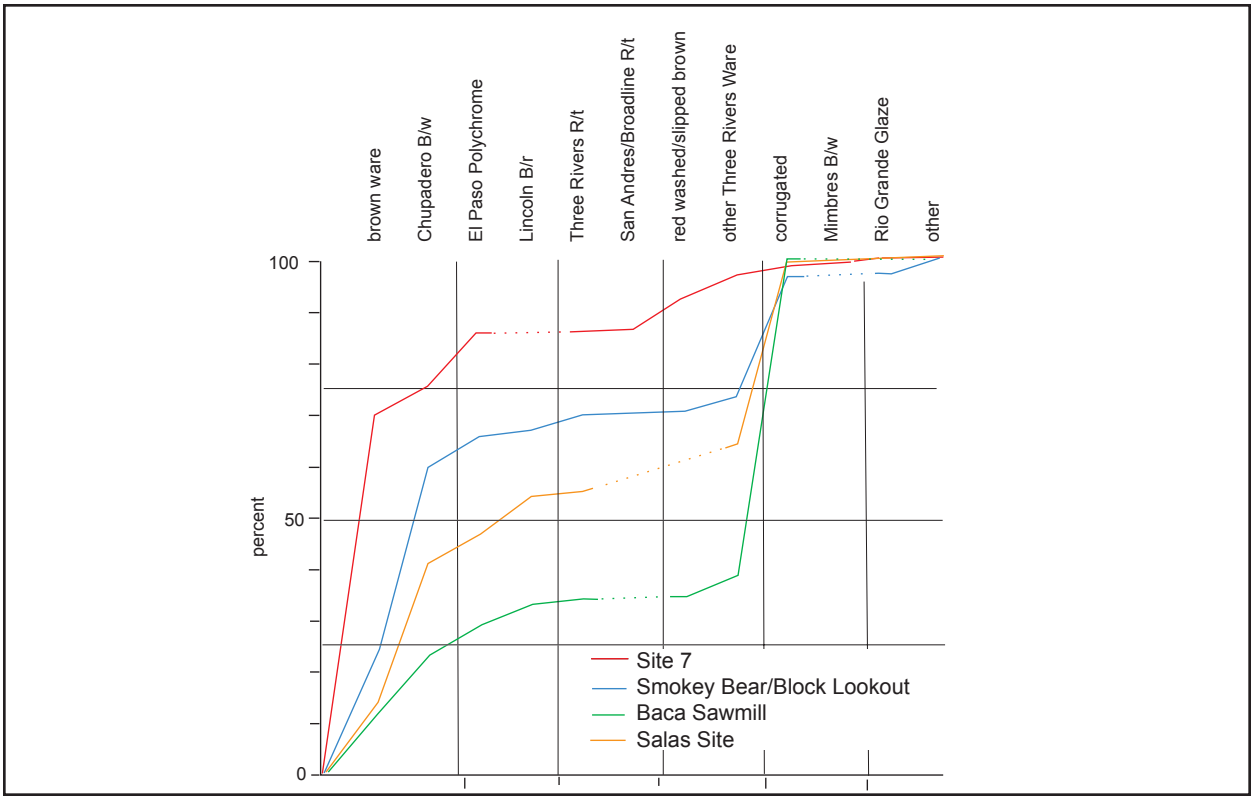


Figure 10 (continued). Comparison of LA 116467 (Site 7) pottery assemblages with Lincoln phase sites.

12. Thus, trash accumulated longer in Houses 9 and 13, resulting in an overall later date for these assemblages.

The upper Rio Bonito graph is drawn from three structures at the Crockett Canyon site. The overall pottery assemblage from the site appears to be a little earlier than the overall assemblage from the Bonnell site, leading Wiseman (1992:172) to suggest a middle Glencoe phase occupation. Although two archaeomagnetic samples from Crockett Canyon were dated, only the A.D. 1200 ± 16 date from the hearth of Pithouse A is relatively unambiguous and probably believable. The other, from the hearth of Room S2, has two possibilities: A.D. 1100 ± 24 and A.D. 1360 ± 24. Neither date is particularly acceptable, and the combined floor and fill pottery assemblage of 11 sherds is no help.

At any rate, the fill assemblages from the three structures at Crockett Canyon and Site 7 are similar except in two respects: the percentages of Three Rivers Red-on-terracotta and brown wares. The three Crockett Canyon assemblages have 8 to 26 percent Three Rivers, and Site 7 has less than 1 percent. The quantity of brown ware varies greatly; those from Site 7 and House CC fill are most similar. Again, mixing of deposits may be affecting these data.

The curve for Tintop Cave (Wiseman 1996a), a presumed hunter-gatherer site on the middle Rio Hondo, differs from Site 7 only in that Tintop has slightly more brown ware. Otherwise, the curves would be virtually identical.

The curves for the Lincoln phase pueblos in the Capitan Mountains diverge the most from the Site 7 curve. All three differ from Site 7 in that they have much smaller quantities of brown ware, much larger quantities of Chupadero and indented corrugated, an absence of Mimbres, and small but important numbers of Lincoln and Rio Grande Glaze (though the Baca site lacks Rio Grande Glaze). According to the pottery, these pueblos were occupied late in the prehistoric period and measurably later than Site 7.

In summary, the cumulative curve for the Site 7 pottery assemblage is similar to curves for some sites and quite different from those of other sites. In some cases, the curves nearly match in some sectors but diverge in others. That is, the relationship of pottery assemblages throughout a given region is not a straightforward phenomenon; factors other than time are evidently involved. We suspect that many of these other factors revolve around where certain types were produced and issues of accessibility through trade.

For instance, two sites that are geographically fairly close to one another and essentially contemporaneous have very different quantities of a pottery type known to have been made in the same region. Thus, we suspect that Three Rivers Red-on-terracotta was made at or very near the Crockett Canyon site but not at the Bonnell site. Bonnell is in another valley 24 km east of Crockett Canyon, yet both are well within the Sierra Blanca highlands. Both also fit readily into Kelley's (1984) Glencoe phase.

Another phenomenon of interest is the fact that in sites having fairly large quantities of brown ware and greater or lesser amounts of Chupadero White Ware (including Jelinek's Crosby Black-on-gray and Middle Pecos Black-on-white), the combined percentages of the brown and white wares are similar, regardless of the actual ratios of the two wares.

As mentioned earlier, we believe that this indicates that the white wares replaced brown wares as vessels for handling liquids, especially water. Both wares are known to have been manufactured in the Sierra Blanca highlands, starting with Jornada Brown presumably as early as A.D. 450 or 500. Chupadero Black-on-white followed several hundred years later. Both types evidently were manufactured concurrently in the region for a period of 200 to 300 years or until some time in the mid to late 1300s.

Returning to the question of overall similarities, the Site 7 assemblage is most similar to middle Glencoe phase assemblages from sites such as Crockett Canyon, Tintop Cave, and the earlier components at the Bonnell site. Similarities also exist with assemblages from presumed Roswell phase sites in the Southern Middle Pecos that Jelinek dates prior to A.D. 1300. The greatest dissimilarities involve Lincoln phase sites, the major occupations of which date to the 1300s and possibly later. Thus, a pre-1300 date for Site 7 is clearly indicated *by the pottery*.

The cultural affiliation of Site 7 is more problematic. On ceramic grounds, the best evidence at this time is for an affiliation with the Glencoe phase sites and Tintop Cave on the east slopes of the Sierra Blanca and the Sacramento Mountains to the west. Site 7 also appears to relate well to the Fox Place, but the particulars remain to be more fully investigated.

Chipped Lithic Manufacturing Debris

Cores, flakes, shatter, pieces of shatter, and a single biface fragment constitute the bulk of the artifacts recovered from Site 7 (Table 6). The analysis of these materials, following the standard analysis I have used in the Roswell region over the past 20 years, focuses on reconstructing the lithic technology and the identification of materials and sources. The raw materials and definitions used to classify and analyze chipped lithic debris are described in Appendix 4. Descriptions and discussions of the gray chert sourcing study and a model of core-reduction technology believed to apply to the

Table 6. Lithic manufacturing debris, Site 7

Type of Debris	Number	Percent
Cores	21	6.7%
Single platform	9	2.9%
Two platforms adjacent	4	1.3%
Two platforms parallel	-	-
Three platforms	-	-
Tested cobble/pebble	2	0.6%
Flake core	6	1.9%
Flakes	250	79.6%
Core reduction	245	78.0%
Biface thinning	-	-
Decortication	3	1.0%
Platform preparation	-	-
Potlid flake	1	0.3%
Indeterminate	1	0.3%
Shatter	43	13.7%
Total	314	100.0%

Roswell region can be found in Wiseman (2002). The cores, core-reduction flakes, and biface-thinning flakes are described below. Pieces of debitage bearing use-wear or intentional retouch are described in the section on tools.

Thick biface. This reworked item was originally a larger, parallel-sided biface (Fig. 7b). Broken and reworked at both ends, it now measures 53.5 by 31 by 11.5 mm, weighs 19.0 g, and is made of medium-dark gray-brown quartzite. Presumably, this item was at one time being fashioned into a projectile point.

Cores. The 21 cores include six subtypes (Table 6). The single-platform core is the most common. Materials are varied but are dominated by local gray chert (Tables 7 and 8). Sizes vary (Table 9), and all dimensions are significantly correlated. However, none of the correlations are higher than the low 0.8s, indicating that the shapes of these cores are not as well controlled as they might be. The one heat-treated core and one possibly heat-treated core represent nearly 10 percent of the core assemblage (Table 8).

Core-reduction flakes. Slightly over 50 percent (N=124) of the 245 core-reduction flakes are complete. Summary statistics (Table 10) indicate that, on average, they are small, somewhat longer than wide, and of moderate weight (4-5 g). A Pearson Correlation matrix (2-tailed) (Table 10) indicates that although all the values are significant, the flake dimensions are not especially strongly correlated, suggesting generally poor standardization of shapes.

The primary materials are local cherts. Heat treatment was rarely used, the total positive and "possible" cases totaling only 10 percent. Single flake-scar platforms are the most common, accounting for nearly two-thirds of the flakes. Over 80 percent of the flakes have feathered or modified-feathered terminations. Nearly half of the complete flakes lack dorsal cortex, and nearly a quarter of them have 51 percent or more cortex (Tables 8 and 11).

Local gray chert. The results of the local gray chert study are presented elsewhere in this volume.

Faunal Materials

Faunal remains are limited to a mussel shell fragment and one small fragment of bone. We assume that both belong to the prehistoric occupation. The mussel shell fragment is probably from *Cyrtonaias tampicoensis*, a freshwater species often present in prehistoric sites of the region. It was recovered from Sq 89S/5E.

The bone fragment, from the metapodial of a medium-to-large mammal, showed no evidence of burning, butchering, or other processing by humans. It was recovered from Sq 79S/4E.

Plant Remains

Only fuel wood was identified among the charcoal remains from the hearth and the Pit 4 fill. The hearth produced saltbush and/or greasewood charcoal. The pit produced both saltbush/greasewood and a small amount of unknown nonconifer charcoal.

Comments

The relatively large number of artifacts at LA 116467 (Site 7), including numerous pottery sherds, is unusual, in large part because the site is so far from the presumed primary areas of prehistoric habitation along major water courses. Additionally, two different occupations may be indicated by the pottery: Mimbres Black-on-white for the earlier one, and Chupadero Black-on-white, El Paso Polychrome, and Corona Corrugated for the later one. A side-notched "dart" point and both mussel shell and animal bone indicate animal-food acquisition and preparation, while a mano fragment suggests the acquisition and processing of plant foods.

The site is situated along a fertile-appearing drainage, which presents the possibility that the inhabitants engaged in farming. Analyses of the flotation remains were unable to resolve this question because only fuelwood was represented. Suffice to say that the site situation and large numbers of pottery sherds are more reminiscent of a farming artifact assemblage than one produced by hunting and gathering. If so, I suspect that the site also had structures that were removed by early episodes of highway construction.

Table 7. Lithic debitage classes, Site 7 (frequency)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	14	108	-	4	30	156
Other chert	1	44	-	1	7	53
Chalcedony	1	39	-	-	5	45
Limestone	-	-	-	-	-	-
Siltite/quartzite	4	12	-	-	-	16
Other	1	42	-	-	1	44
Total	21	245	0	5	43	314
Heat Treatment						
No	18	212	-	3	28	261
Yes	1	15	-	-	4	20
Possibly	1	7	-	1	3	12
Indeterminate	1	11	-	1	8	21
Total	21	245	0	5	43	314

Table 8. Lithic debitage classes, Site 7 (percentage)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	66	44	-	80	70	50
Other chert	5	18	-	20	16	17
Chalcedony	19	16	-	-	12	15
Limestone	-	-	-	-	-	-
Siltite/quartzite	5	5	-	-	-	4
Other	5	17	-	-	2	14
Total	100	100	0	100	100	100
Heat Treatment						
No	85	87	-	60	65	82
Yes	5	6	-	-	9	7
Possibly	5	3	-	20	7	4
Indeterminate	5	4	-	20	19	7
Total	100	100	0	100	100	100

Table 9. Complete cores, Site 7

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	34.95	28	17.86	22.69
SD	9.25	6.98	7.47	20.47
Range	30	24	30	69.8
Number	21	21	21	21

Correlation Matrix of Dimensions (Pearson's r, 2-tailed test)				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Length	1			
Width	.8230*	1		
Thickness	.6585*	.7457*	1	
Weight	.8308*	.8382*	.8254*	1

* Significant at .001 level.

Table 10. Complete core-reduction flakes, Site 7

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	22.15	19.56	6.38	4.15
SD	10.82	7.71	3.65	7.96
Range	75	42	22	71.2
Number	123	123	123	123

Correlation Matrix of Dimensions (Pearson's r, 2-tailed test)				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Length	1			
Width	.6432*	1		
Thickness	.7848*	.7259*	1	
Weight	.8408*	.6689*	.7959*	1

* Significant at .001 level.

Table 11. Core-reduction flakes, Site 7

Attribute	Number	Percent
Platform Types		
Cortex	29	23%
Single flake scar	60	48%
Multiple flake scar	3	2%
Pseudo-dihedral	4	3%
Edge/ridge-like remnant	13	10%
Pointed	5	4%
Destroyed during detachment	10	8%
Total	124	100%
Distal Termination Type		
Feathered	58	47%
Modified feathered	24	19%
Hinged or stepped	42	34%
Total	124	100%
Dorsal Cortex		
0%	49	40%
1-10%	17	14%
11-25%	20	16%
26-50%	12	10%
51-75%	15	12%
76-90%	4	3%
91-99%	3	2%
100%, including platform	2	2%
Total	122	100%

LA 116468 (EL FOLLON)

LA 116468 (El Follon) consisted of several prehistoric pottery sherds, one piece of burned (?) rock, and a lithic flake or two inside the existing highway right-of-way. It is situated on a low rise in the bottom of a short, unnamed, ephemeral drainage, also the location of LA 116467 (Site 7). The survey archaeologist (Marshall 1997) suggests that a concentration of cobbles in one part of the site may have been a structure.

Fieldwork

OAS field activities started with a thorough examination of the surface of the site and pinflagging of artifacts. Five artifacts, including four sherds and one possible flake, were found scattered in a more or less linear pattern measuring 25 m north-south and at 5 m east-west (Fig. 11). A cobble concentration measuring about 6 m in diameter was situated along the artifact alignment.

A site datum was then established and the artifacts piece-plot mapped and collected. Even though the cobbles in the concentration looked to be deposited naturally or moved to their location by heavy equipment (an earlier episode of road building?), an extensive trowel test was made and a set of cobbles in a dense cluster was exposed. The test showed no staining or other cultural indicators among, around, or under the cobbles. We concluded that they are not cultural and that no feature such as a structure or hearth is present.

Cultural Materials

Five items were found and collected from the surface of the site.

Pottery

Four sherds represent four different pottery types: Jornada Red-on-brown, Jornada Corrugated, red-slipped brown, and Jornada Brown. The first three are, for shallow sites such as El Follon, rather large (24 by 20 mm to 58 by 34 mm); all three are rim sherds and have a common temper, white crystalline crushed rock composed mainly of white and clear feldspars similar to Capitan alaskite. The Jornada Brown sherd is small (14 by 12 mm, or the size of a nickel) and more in keeping with the "normal" size of sherds found in shallow, open sites. Its temper is medium-sized grains of gray and white feldspars with some small mafic fragments. All four sherds are good examples of the types named.

Chipped Stone Manufacturing Debris (?)

A tabular fragment of dark gray rhyolite recovered from the site surface lacks all attributes of flakes produced by humans during tool manufacture. It measures 39 by 45 by 9.5 mm.

Although many flakes of rhyolite in prehistoric assemblages that are clearly produced by man lack the full panoply of flake attributes, few (especially the large ones) lack all flake attributes. Given the fragment's proximity to the highway, we suspect that it is related to highway construction, not to prehistoric human behavior.

Comments

The drainage-bottom topographic situation of LA 116468 (El Follon) and the nature of its remains are enigmatic. Even though it is on a small drainage that lacks a substantial headwater area, a cloudburst anywhere in its headwater could flood it.

The cobbles of the possible structure sit on the surface, not in it as would be expected for an intact or partly intact structure. These cobbles are all thoroughly coated with calcium carbonate, indicating that they were once buried. A trowel test among the densest concentration of cobbles failed to reveal any cultural remains. We can only conclude that the cobbles are natural and that they came to their resting place by means of water transport (less likely) or as part of an earlier episode of road building (more likely). They are not prehistoric.

The artifacts are another matter. Although the piece of rhyolite is questionable as a prehistoric artifact, the pottery sherds are definitely authentic. The strange aspect is that all but one are unusually large for local sites (though certainly not unheard of), all but one are rim sherds (the kinds of sherds people collect from sites), and their distribution on the site was long and linear.

The sherds may have come to this location as part of LA 116467 (Site 7), 150 m to the north. The sherds could have been pushed to their current location during construction of the highway roadcut. Aside from this possibility, we do not know how these sherds got there, but we do not believe that they came to be there as the result of prehistoric human activity. In essence, we do not accept this location as a valid prehistoric site.

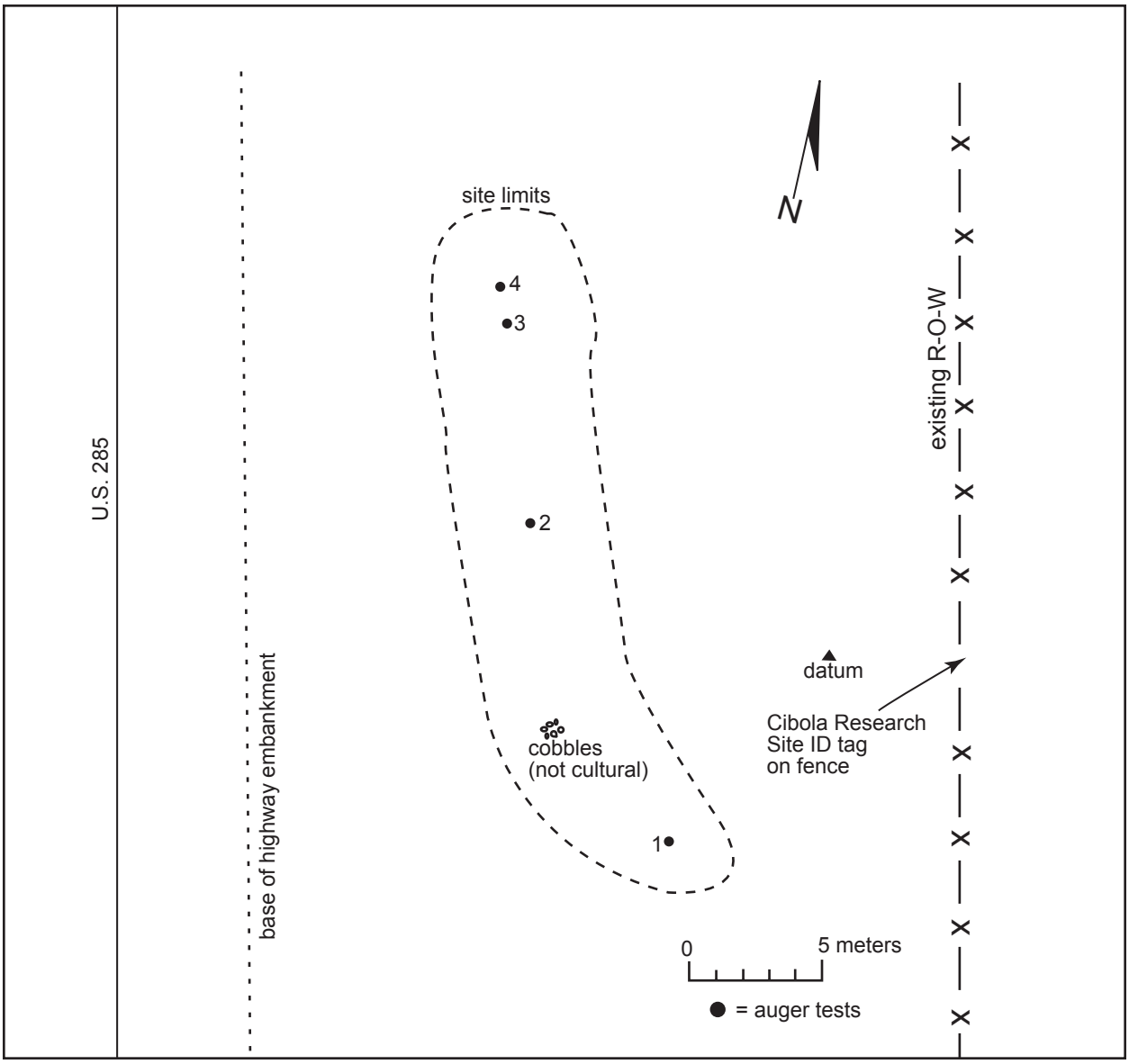


Figure 11. Site map, LA 116468 (El Follon).

LA 116469 (SITE 9)

LA 116469 is situated on both banks of a small, unnamed, intermittent drainage that begins a few kilometers to the southwest and ends at the Pecos River 8 km to the east. The nearest large tributary of the Pecos that heads in the mountains is the Rio Felix, 7 km to the south. The topography is the gently rolling desert grasslands of the Sacramento Plain. The elevation is 3,530 feet (1,075 m).

From surface indications, the site consists of a linear series of burned-rock hearths and associated prehistoric artifacts spaced along the drainage. The hearths and artifacts cover an area of 55 by 30 m along the north bank and 105 by 20 m along the south bank (Figs. 12 and 13). The south site area probably extends even further south (away from the drainage), but it is obscured by grass and soil in that direction. Only 15 to 18 m of the west end of the south site area protrudes into the project zone and was investigated during this project (i.e., the area within the existing right-of-way).

Artifacts noted by the survey archaeologist (Marshall 1997) include over two dozen flakes and cores, two one-hand manos, and half a dozen pottery sherds. At that time, pottery types were identified as one sherd of Chupadero Black-on-white and an unspecified number of plain brown sherds, suggesting an occupation from A.D. 1100 to 1400 and perhaps earlier. No Chupadero was recovered by our work, but we did find two reduced-fired brown ware sherds that might appear to be Chupadero at a glance.

In the survey and planning stages, the ground surface of the site appeared to have been scraped, probably in conjunction with previous highway construction. This immediately raised the question of whether the part of the site lying within the current project area was intact, and therefore, whether data recovery should be initiated. Fortunately, it was.

Because of confusion about the placement of a temporary fence during construction, two excavation phases were conducted at this site, one in late July and early August 1997, and the other in May 1998. The techniques and approaches to the work during both phases were basically the same except in two respects. During the first phase (west sector), the surface artifacts were piece-plotted, and a 1/4-inch screen was used. During the second phase (east sector), the surface artifacts were collected in 1 by 1 m squares, and a 1/8-inch screen was used.

Fieldwork

Fieldwork consisted of (1) collection of surface artifacts from 500 sq m of surface area; (2) shovel-scrape excavation of 206 sq m of site area; and (3) excavation and recording of five hearths (Fig. 14).

Two hundred six 1 by 1 m squares were excavated to compact soil at depths that varied from 3 to 5 cm below modern surface. One grass-stabilized soil accumulation in the southern part of the site was removed in part by hand to the compact soil. West-sector fill was screened through 1/4-inch wire mesh, while that from the east sector was screened through 1/8-inch mesh. This difference was unintended, but the 1/8-inch screen was unavailable at the time the west sector was excavated.

The site matrix in both sectors consisted of one cultural stratum, a 4 to 5 mm thick eolian deposit of tan fine silty clay. Cultural items (pottery sherds, flakes, cores, and pieces of angular debris) were concentrated on top of and within this material. The underlying hardpan is the same material as the eolian layer, but it lacks cultural materials.

Features

Five hearths were dug into compact soil underlying the eolian deposit. Only Hearths 1 and 4 had burned rock and were observable on the surface. Hearths 2, 3, and 5 lacked rock and were concealed until exposed in the excavations. The basin-shaped pits of all five had been dug into the top of the compact soil.

Hearth 1 (Feature1)

This hearth was partly eroding on the surface prior to the project. It consists of an irregular concentration of burned rocks basically surrounding a shallow pit filled with slightly charcoal-stained fill (Fig. 15a). No artifacts were in the fill. Hearth 1 measured 40 cm north-south by 50 cm east-west and 5 cm deep (basin with fill). All fill was collected for botanical samples and dating. The one radiocarbon date obtained from the fill of this feature has a single calibrated intercept date of A.D. 560.

Hearth 2 (Feature 2)

This, large, shallow basin hearth lacked rock in its fill (Fig. 15b). The fill was mostly crumbly clay with scattered charcoal bits, an occasional small pocket (diameter 1 cm) of charcoal bits and stain, and artifacts (flakes, sherd, bone). Hearth 2 measured 55 cm in diameter and 9 cm deep. All fill was collected for botanical samples and dating. The one radiocarbon date obtained from the fill of this feature has a single calibrated intercept date of A.D. 1035.

Figure 12. LA 116469 (Site 9), looking east. The site extends past the large mesquite shrub.

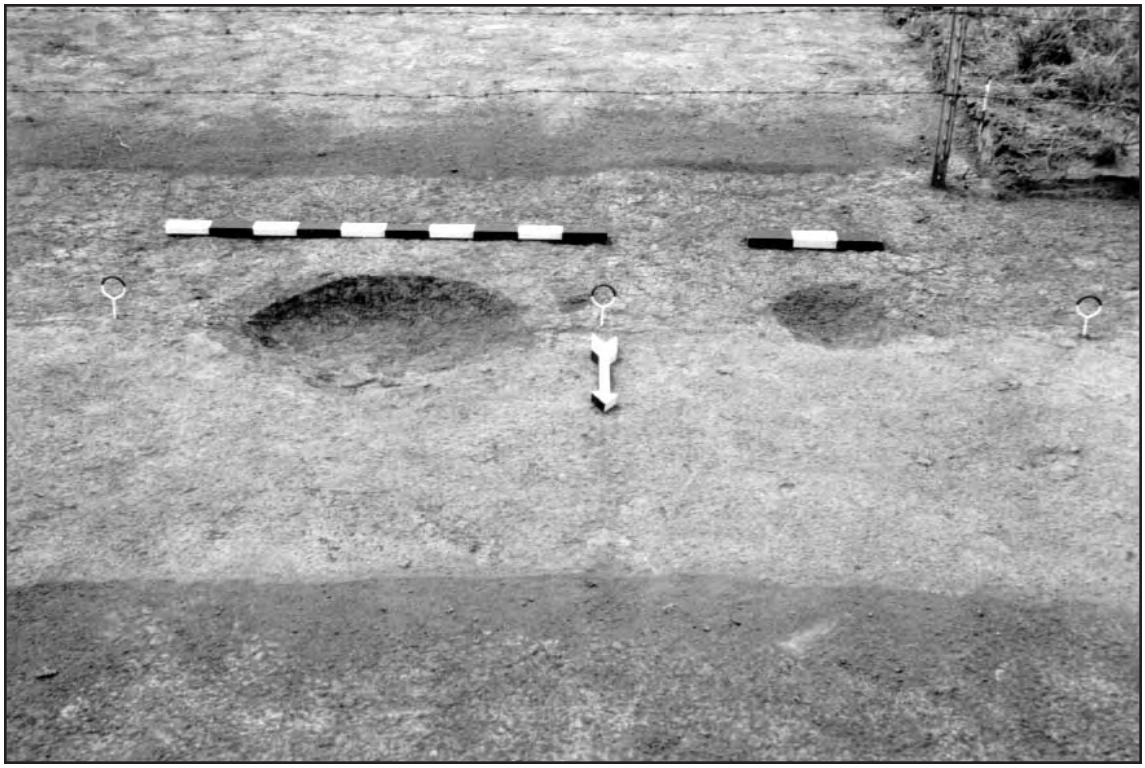


Figure 13. Hearths 2 and 3, LA 116469 (Site 9).

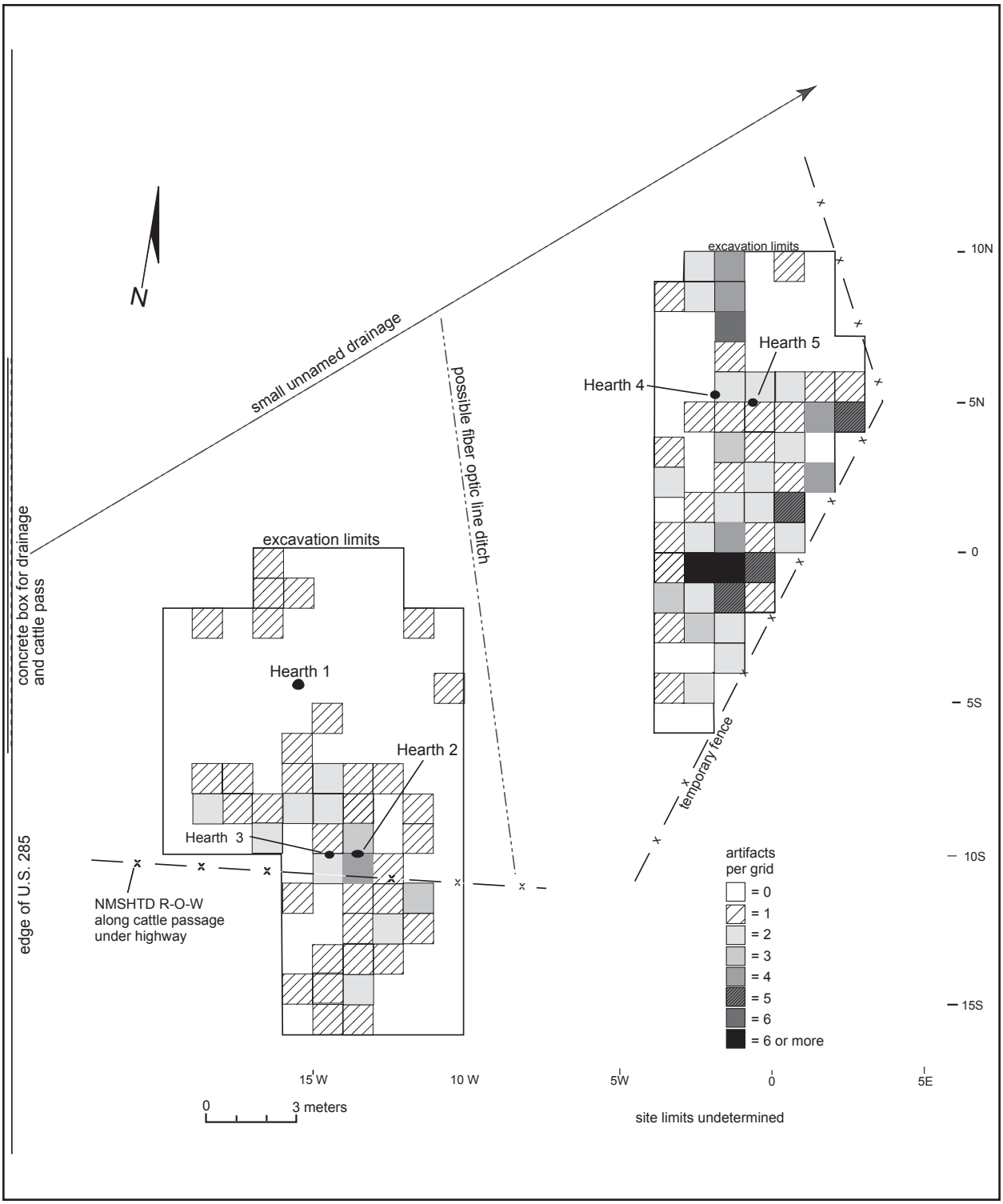


Figure 14. Map of LA 116469 (Site 9).

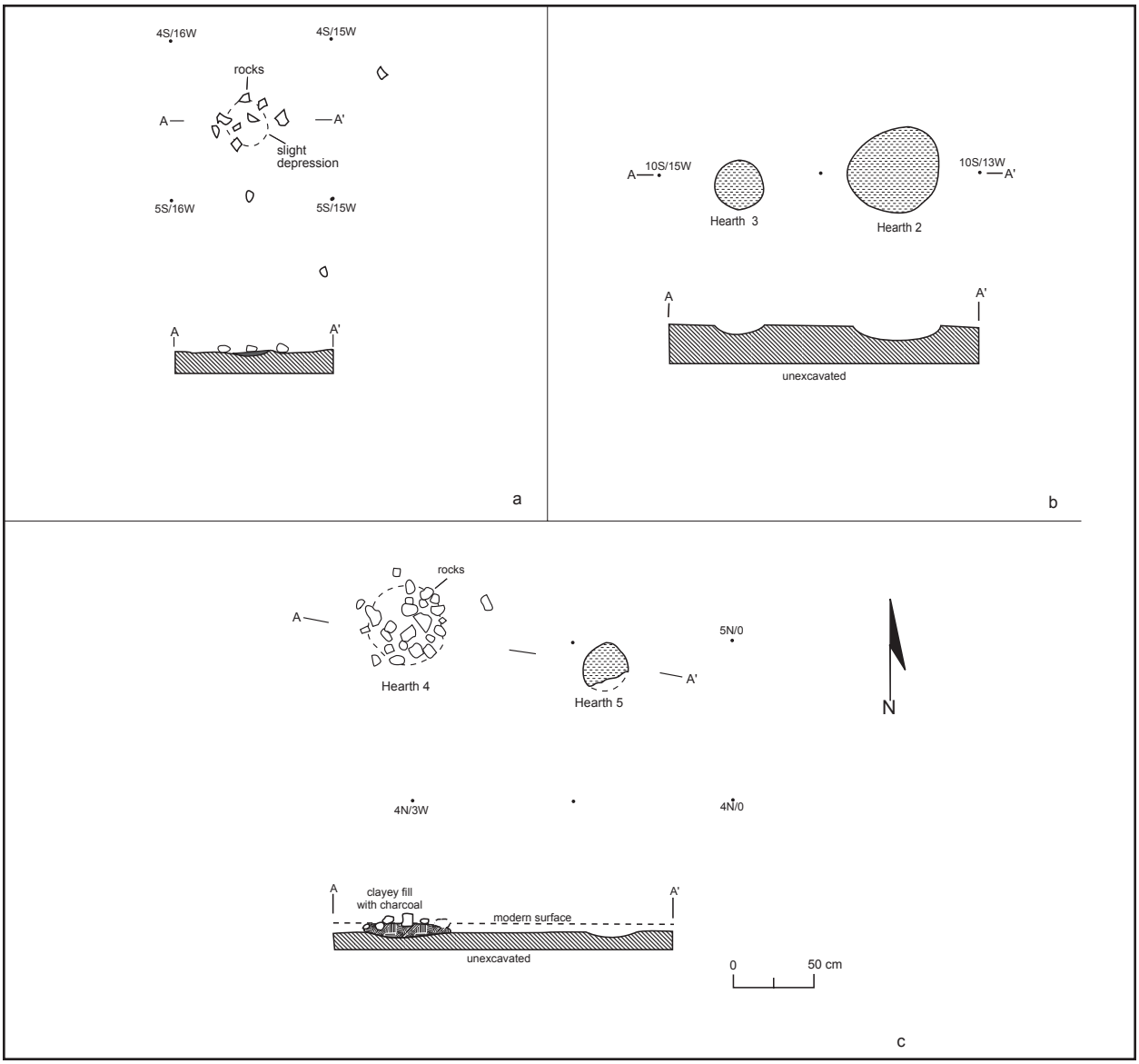


Figure 15. Features, LA 116469 (Site 9): (a) Hearth 1; (b) Hearths 2 and 3; (c) Hearths 4 and 5.

Hearth 3 (Feature 3)

This, small, shallow basin hearth lacked rock in its fill (Fig. 15b). The fill was mostly crumbly clay with scattered charcoal bits. No artifacts were in the fill. Hearth 3 measured 30 cm in diameter and 5 cm deep. All fill was collected for botanical samples and dating. The one radiocarbon date obtained from the fill of this feature has a single calibrated intercept date of A.D. 1035.

Hearth 4 (Feature 4)

This hearth was exposed on the surface prior to the project. A tight concentration of burned rocks lay in the upper fill of a shallow pit filled with slightly charcoal-stained fill (Fig. 15c). No artifacts were in the fill. Hearth 4 measured 50 cm north-south by 50 cm east-west and 13 cm deep (top of highest rock to bottom of basin). The basin was slightly smaller, measuring 45 by 45 by 3 cm. All fill was collected for botanical samples and dating. The one radiocarbon date obtained from the fill of this feature has a single calibrated intercept date of A.D. 660.

Hearth 5 (Feature 5)

This, small, shallow basin hearth lacked rock in its fill (Fig. 15c). The fill was mostly crumbly clay with scattered charcoal bits. No artifacts were in the fill.

Hearth 5 measured 30 cm in diameter and 3 cm deep. All fill was collected for botanical samples and dating. The one radiocarbon date obtained from the fill of this feature has a single calibrated intercept date of A.D. 1040.

Cultural Materials

The 233 artifacts from the surface and excavations of Site 9 include flakes, cores, pieces of shatter, pottery sherds, a projectile point fragment, and a grinding stone fragment. The artifacts and their proveniences are shown in Figures 16, 17, and 18.

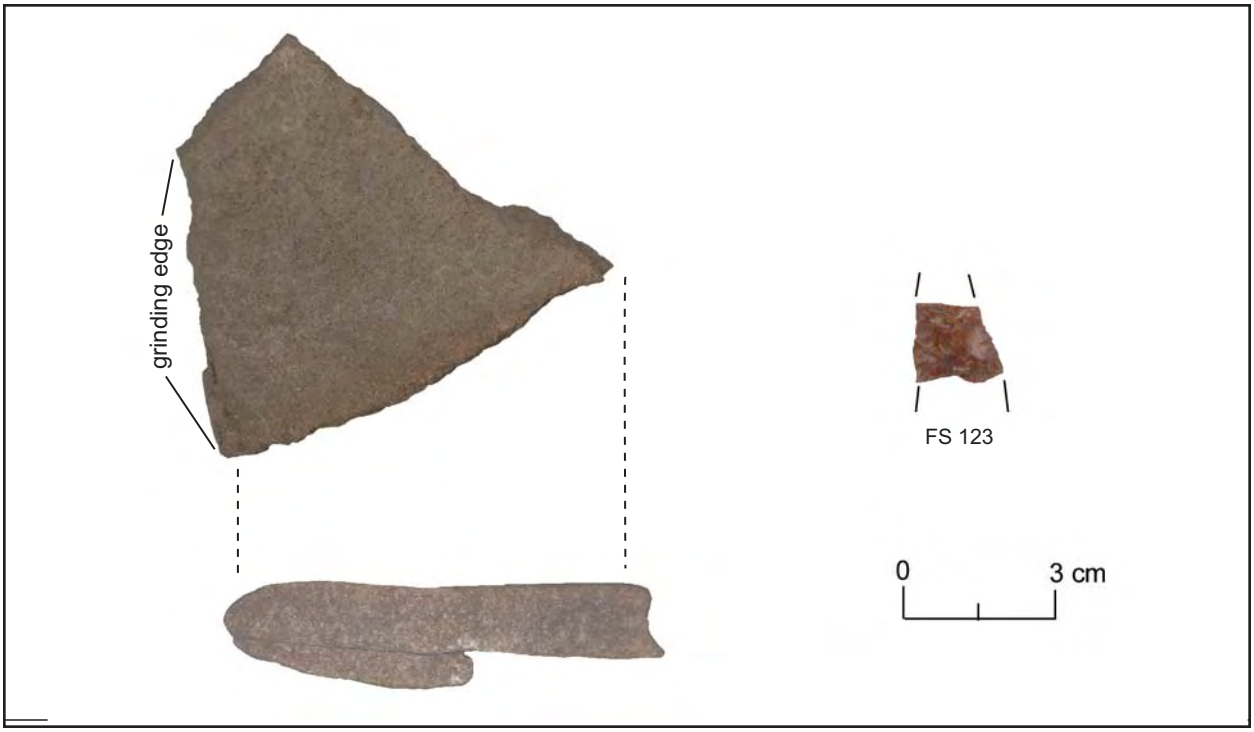


Figure 16. Artifacts, LA 116469 (Site 9): left, grinding stone fragment; right, projectile point fragment.

Grinding Stone (?)

A small fragment of medium grayish-red quartz sandstone has one roughly shaped edge and limited traces of wear on one surface, possibly indicating brief use. The amount of grinding wear is too small to suggest that it derived from grinding foodstuffs. Its dimensions are 58+ by 50+ by 15+ mm. Reddish-gray smudges suggest that it is burned. The artifact was found on the surface of 7S/11W.

Projectile Point

The mid-blade fragment of a small projectile point clearly belongs to an arrow point or an arrow point preform. It is too small, narrow, and delicate to belong to a dart point. Made of dark red chert with occasional light gray spots, it measures 11+ by 12+ by 3 mm and comes from the fill of 4N/1E, about 2 m from Hearth 5.

Flake Tools

Flake tools are flakes of various sizes and shapes that have one or more edges displaying use-wear, intentional retouch, or a combination of use-wear and intentional retouch. This class of artifact includes items with both micro-wear/retouch (i.e., require a microscope for study) and macro-retouch. Aside from the use-wear/retouch, these flakes are not otherwise modified or shaped.

Flake tools are typed according to several descriptive attributes that focus primarily on the individual edges bearing use-wear or intentional retouch. The sorting criteria are as follows: (1) Artifact type: unifaces, bifaces, unifaces/bifaces, and notches. No projections (graver and burinlike tools) were noted. (2) Manifestation type: use-wear, intentional retouch, or a combination. (3) Edge configuration: straight, convex, concave, sinuous, irregular, and serrated.

There are four flake tools with a total of four individual edges. All are unifacial edges; one is use-worn, and three are intentionally retouched. No flakes with both unifacial and bifacial wear along the same edge

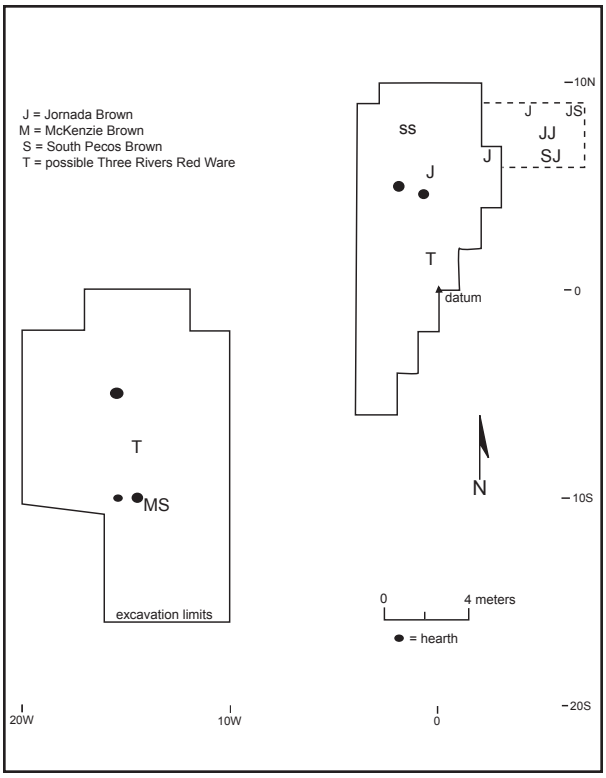


Figure 17. Surface and subsurface pottery distribution, LA 116469 (Site 9).

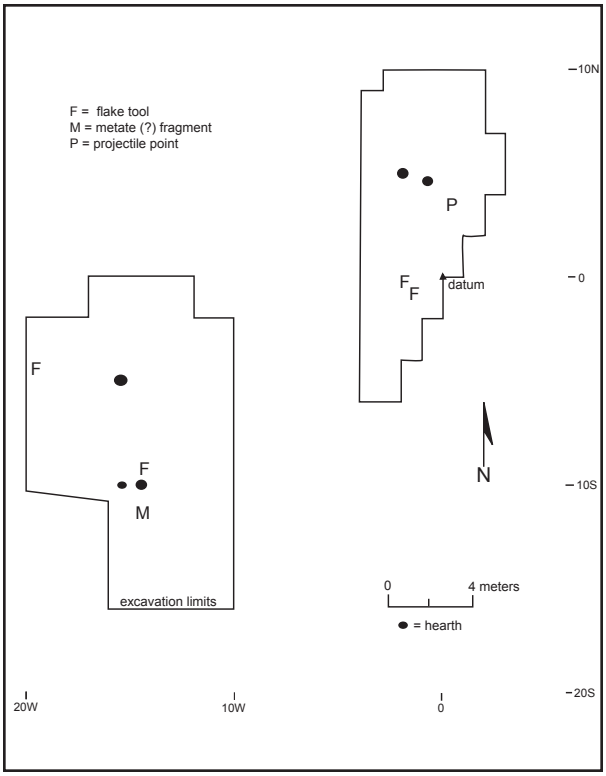


Figure 18. Surface and subsurface artifact distribution, LA 116469 (Site 9).

were recovered. Edge configurations include one straight, two concave, and one irregular. Only one flake is whole, and the length of its use-wear is 13 mm. The length of the intentional retouch on the three fragmentary flakes ranges from 8 to 16 mm (mean of 13 mm).

All flake tools are of local gray chert.

Flake tools were recovered from west of Hearth 1, adjacent to Hearth 2, and south of Hearths 4 and 5.

The four flake tools constitute 1.9 percent of the 216 total pieces of lithic debitage (cores, flakes, etc.) recovered during the excavations. All were recovered from the primary artifact concentration at the south end of the site.

Pottery

Fifteen sherds were found at Site 9 and no whole or restorable vessels (Fig. 17; Table 12). Types and wares include South Pecos Brown, Jornada Brown, McKenzie Brown, and Three Rivers Red Ware/Jornada Brown.

Table 12. Pottery and MNV data, Site 9

Pottery Type/Provenience	Number	MNV
Three Rivers Ware/Jornada Brown		2
7S/14W, 0-4 cm	1	
2N/0, 0-5 cm	1	
McKenzie Brown, Hearth 2 fill	1	1
Jornada Series Brown Ware		
Jornada Brown:		
7N/3E, surface	1	1
9N/7E, surface	1	1
multiple proveniences, one vessel		1
6N/0, 0-5 cm (rim)	1	
7N/6E, surface	1	
8N/6E, surface	1	
8N/6E, surface	1	
9N/5E, surface	1	
South Pecos Brown:		
10S/13W, 0-5 cm	1	1
8N/1W, surface	1	1
8N/1W, 0-5 cm	1	1
multiple proveniences, one vessel		1
7N/6E, surface	1	
9N/7E, surface	1	
Total	15	10

The sherds recorded as Three Rivers/Jornada generally have reddish surfaces, making assignment to one type or the other uncertain. Although we suspect that all of these sherds belong to plain (i.e., Jornada) vessels, we use the combination term here because of the slight possibility that painted vessels were present at the site. Painted vessels, of course, raise the possibility that the occupations represented by the sherds date to a narrower time period towards the end of the Late Prehistoric period.

Since only 15 sherds were recovered from this site,

determination of MNV (minimum number of vessels) was simple. Ten different vessels are represented: four South Pecos Brown, two Three Rivers Red Ware/Jornada Brown, three Jornada Brown, and one McKenzie Brown.

The only rim sherd is from a Jornada Brown jar. Although this sherd almost certainly is from a Jornada Brown vessel, it has two Three Rivers Red Ware characteristics: finely ground temper and a flattened lip. Otherwise, the surface colors are browns, and absolutely no color (red paint) was observed on the sherd. Since the surfaces and the lip are well preserved, we should have been able to detect paint if it was originally present.

Chipped Stone Manufacturing Debris

Cores, flakes, shatter, and pieces of material constitute the bulk of the artifacts recovered from Site 9 (Table 13). The analysis of these materials, following the standard analysis methods that I have used in the Roswell region over the past 20 years, focuses on reconstructing the lithic technology and the identification of materials and sources. The raw materials and definitions used to classify and analyze chipped lithic debris are described in Appendix 4. Descriptions and discussions of the gray chert sourcing study and a model of core-reduction technology believed to apply to the Roswell region can be found in Wiseman (2002). Pieces of debitage bearing use-wear or intentional retouch are described in the section on tools.

Table 13. Chipped stone manufacturing debris, Site 9

Category	Number	Percent
Cores	9	4.2%
Single platform	2	0.9%
Two platforms adjacent	1	0.5%
Two platforms parallel	3	1.4%
Three platforms	2	0.9%
Tested cobble/pebble	-	-
Flake core	1	0.5%
Flakes	176	81.5%
Core reduction	168	77.8%
Biface thinning	2	0.9%
Decortication	1	0.5%
Platform preparation	3	1.4%
Potlid flake	-	-
Indeterminate	2	0.9%
Shatter	31	14.4%
Total	216	100.0%

Cores. The nine cores include five subtypes (Table 13). The two-platforms parallel core is the most common, but not significantly so because of the small sample size. Materials are varied but are dominated by local gray chert (Tables 14 and 15). Sizes vary (Table 16). Width:thickness, width:weight, and thickness:weight are significantly correlated. The lack of correlation of length with width, thickness, or weight is interesting. No cores show unambiguous evidence of intentional heat treatment (Tables 14 and 15).

Core-reduction flakes. Only 39 percent (N=66) of the 168 core-reduction flakes are complete. Summary statistics (Table 17) indicate that, on average, they are small, somewhat longer than wide, and of moderate weight (4-5 g). A Pearson Correlation matrix (2-tailed) (Table 17) indicates that, although all the values are significant, the flake dimensions are not strongly correlated, suggesting generally poor standardization of shapes.

Other characteristics of the core-reduction flakes are summarized in Table 18. The primary materials are local gray cherts. Heat treatment was rarely used; the total positive and "possible" cases total only 6 percent. Single flake-scar platforms are the most common, accounting for nearly two-thirds of the flakes. Three-quarters of the flakes have feathered or modified-feathered terminations. A little over 40 percent of the complete flakes lack dorsal cortex, and nearly 20 percent have 51 percent or more cortex.

Biface-thinning flakes. Like the other debitage categories, the two biface-thinning flakes are of local cherts (Tables 14 and 15). Neither is heat-treated.

Exotic lithic materials. No lithic materials known to originate outside southeastern New Mexico were recovered from Site 9.

Local gray chert. The results of this study are presented elsewhere in this volume.

Faunal Remains

Eight fragments of jackrabbit and small mammal (the same jackrabbit?) were recovered from the excavations.

Plant Remains

Only fuelwood was identified among the charcoal remains from the five hearths. In every case, saltbush and/or greasewood are indicated. In addition, Hearth 1 had a small fragment of unidentified nonconifer wood.

Table 14. Lithic debitage classes, Site 9 (frequency)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	6	103	2	5	20	136
Other chert	2	57	-	1	8	68
Chalcedony	1	6	-	-	2	9
Limestone	-	-	-	-	-	-
Siltite/quartzite	-	2	-	-	-	2
Other	-	-	-	-	1	1
Total	9	168	2	6	31	216
Heat Treatment						
No	7	146	2	4	26	185
Yes	-	6	-	1	-	7
Possibly	-	4	-	-	1	5
Indeterminate	2	12	-	1	4	19
Total	9	168	2	6	31	216

Table 15. Lithic debitage classes, Site 9 (percentages)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	6	61	100	83	65	63
Other chert	2	34	-	17	26	31
Chalcedony	1	4	-	-	6	4
Limestone	-	-	-	-	-	-
Siltite/quartzite	-	1	-	-	-	1
Other	-	-	-	-	3	1
Total	9	100	100	100	100	100
Heat Treatment						
No	78	87	100	66	84	86
Yes	-	4	-	17	-	3
Possibly	-	2	-	-	3	2
Indeterminate	22	7	-	17	13	9
Total	100	100	100	100	100	100

Table 16. Complete cores, Site 9

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	39.33	29.11	19.22	29.57
SD	12.71	6.57	8.17	29.24
Range	33	19	28	75.5
Number	9	9	9	9

Correlation Matrix of Dimensions (Pearson's r, 2-tailed test)				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Length	1			
Width	0.6047	1		
Thickness	0.5593	.9716*	1	
Weight	0.7017	.9633*	.9471*	1

* Significant at .001 level.

Table 17. Complete core-reduction flakes, Site 9

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	21.82	19.17	6.74	4.32
SD	11.83	8.64	4.56	5.94
Range	47	39	21	30.6
Number	66	66	66	66

Correlation Matrix of Dimensions (Pearson's r, 2-tailed test)				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Length	1			
Width	.8004*	1		
Thickness	.7742*	.6358*	1	
Weight	.8193*	.7110*	.8760*	1

* Significant at .001 level.

Table 18. Core-reduction flakes, Site 9

Attribute	Number	Percent
Platform Types		
Cortex	11	17%
Single flake scar	39	59%
Multiple flake scar	1	2%
Pseudo-dihedral	1	2%
Edge/ridge-like remnant	9	14%
Pointed	2	3%
Destroyed during detachment	3	5%
Total	66	100%
Distal Termination Type		
Feathered	41	62%
Modified feathered	9	14%
Hinged or stepped	16	24%
Total	66	100%
Dorsal Cortex		
0%	28	42%
1-10%	11	17%
11-25%	10	15%
26-50%	6	9%
51-75%	6	9%
76-90%	2	3%
91-99%	2	3%
100%, including platform	1	2%
Total	66	100%

Comments

The presence of Site 9 (LA 116469) at this location is somewhat surprising, in large part because it is so far from the presumed primary areas of prehistoric habitation along major water courses. Two or even three separate occupations in the excavated part of the site may be indicated by the differences in hearth types (small pits with and without associated burned rock) and the fact that the two nonrock hearths lie close together within a trash (lithic artifact) disposal area. The presence of animal bone indicates animal food acquisition and preparation, while a ground stone fragment suggests the acquisition and processing of wild plant foods.

All known aspects of Site 9 suggest that it was a favored camp site that was used for short periods of time, perhaps overnight, a few days, or a week or two at a time. Furthermore, the site was used during two very different time periods, one about the middle of the first millennium A.D. and the other between A.D. 1100 and 1450.

LA 44565 (ROCKY WEST; BR-28)

LA 44565, a shallow hearth and artifact scatter, is situated on the edge of the north terrace of Rocky Arroyo, a major, intermittent channel that drains the central Guadalupe Mountains to the west and enters the Pecos River 2.5 km east of the site. Local vegetation is Chihuahuan Desert dominated by creosote. Riparian species grow on the floodplain of Rocky Arroyo immediately south of the site. The site measures 35 by 40 m. Its elevation is 3,270 feet (997 m).

Excavations at this site uncovered four hearths, a remnant of an organic trash deposit, and a thin scatter of lithic artifacts (Fig. 19). Virtually the entire site was excavated, less the peripheral artifact scatter and, if they exist, any features that were not observable through visual examination of the site surface.

Fieldwork

Four tasks were completed at this site (Fig. 20): surface counts and collection of prehistoric artifacts from 1,380 sq m of surface area; generation of a surface artifact density plot to guide excavations; excavation of 397 sq m of site area; and excavation and recording of four prehistoric cultural features and the remnant of an organic stain.

Three hundred ninety-seven 1 by 1 m squares were excavated to compact soil at depths that varied from 5 to 10 cm below modern surface. Parts of several small brush-stabilized sand accumulations were removed in whole or in part by hand to the level of the surrounding ground surface. All fill was screened through 1/8-inch wire mesh.

The site matrix consisted of one natural stratum, an eolian deposit of tan fine silty clay. Cultural items (flakes, cores, and fragments of formal artifacts) were concentrated within this material. Cultural features (hearths, trash deposits) also occurred within this matrix and/or rested on the underlying, more compact stratum of the same composition.

Features

The four cultural features are all hearths, including two large burned-rock clusters, one small burned-rock cluster, and one small basin with no associated rock. A second small basin hearth may have been present, but it could not be defined through excavation because of rodent disturbance.

The Feature 1 area organic stain and hearth or hearths underlying it were discovered only through excavation. Before its discovery, no clues to the existence of this shallow deposit were noted on the surface.

Hearth 1 (Feature 1a, north hearth)

This small, circular basin hearth was excavated into the top of the compact stratum (Fig. 21a). It measured 23 cm in diameter and 6 cm in depth. The sides and bottom were not plastered. They were not reddened and showed no other evidence of burning. The soft fill was moderately to heavily charcoal stained but lacked artifacts. One radiocarbon date (Beta-118880) with four calibrated intercepts was obtained from the fill of this hearth: A.D. 1690, 1735, 1815, and 1925, with a bifurcated one-standard-deviation range of A.D. 1670-1780 and 1795-1945.

Hearth 1 (Feature 1, south hearth)

The possible existence of the south hearth (Feature 1 in Fig. 21a), also in the Feature 1 area, is predicated on a concentration of charcoal-stained fill that occurred within a relatively deep, restricted pocket. This pocket appears to have been a fire pit within the top of the compact stratum. At the time of excavation it was distorted by rodent burrowing, and rodent feces occurred throughout the fill. The overall measurements of the pocket are 70 by 45 by ca. 20 cm. Two radiocarbon dates were obtained from the fill of this feature. One produced a calibrated intercept date of 1730 B.C., with a one-standard-deviation range of 1760 to 1670 B.C. The other produced a modern date, which illustrates its recently contaminated character.

Hearth 2 (Feature 2)

This tight concentration of burned rocks consisted of several dozen whole (ca. 50 percent), fragmentary (ca. 25 percent), and broken-in-place (ca. 25 percent) limestone cobbles resting on top of the compact soil (Fig. 21b). The top of this feature was well exposed to the elements at the time of the project. The rocks were mostly small to medium elongate cobbles (10 to 18 cm long) and large pebbles (5 to 10 cm long). They formed a layer mostly one to two rocks deep, but in places the rocks were three deep. The hearth was 2 m in diameter, and the highest pile of rocks was 15 cm high. The fill lacked staining and charcoal, probably because these materials were blown out by wind. The arrangement of the rocks suggests that the feature had two parts, a more or less circular core area in the southern half and an apronlike fan of rocks to the north. The fan of rocks appeared to have formed when they were pulled off the core area, presumably to recover food items baking among the rocks and coals in the core area. A few flakes

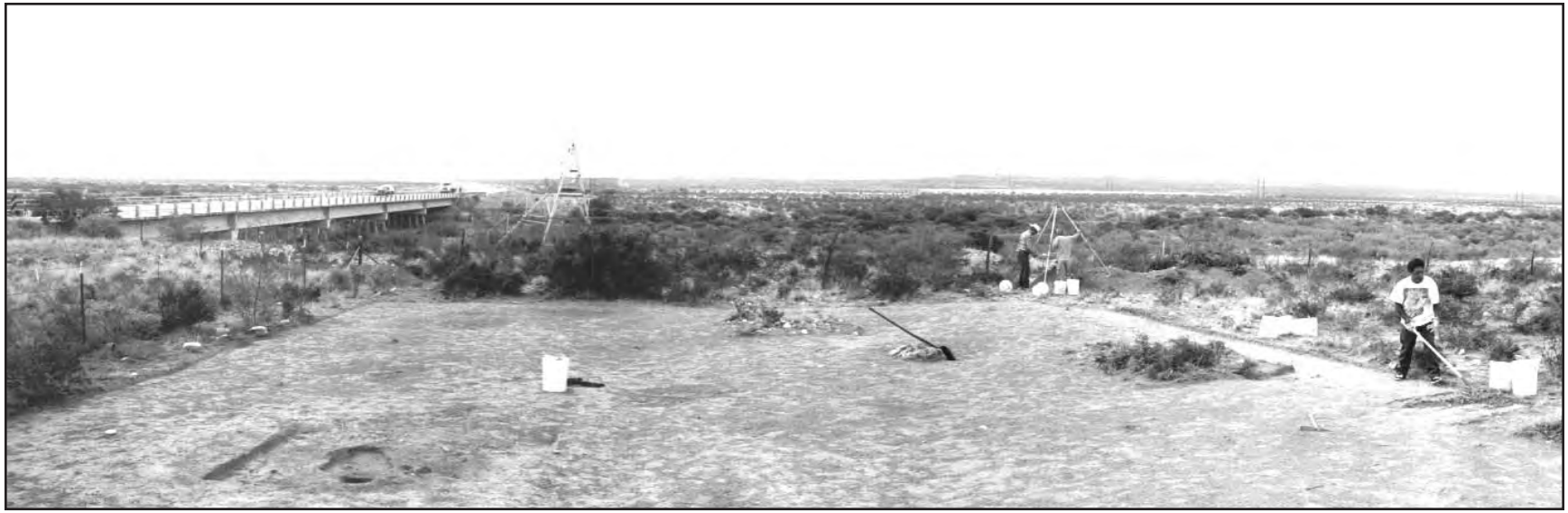


Figure 19. Panoramic view of LA 44565 (Rocky West), looking southeast to southwest.

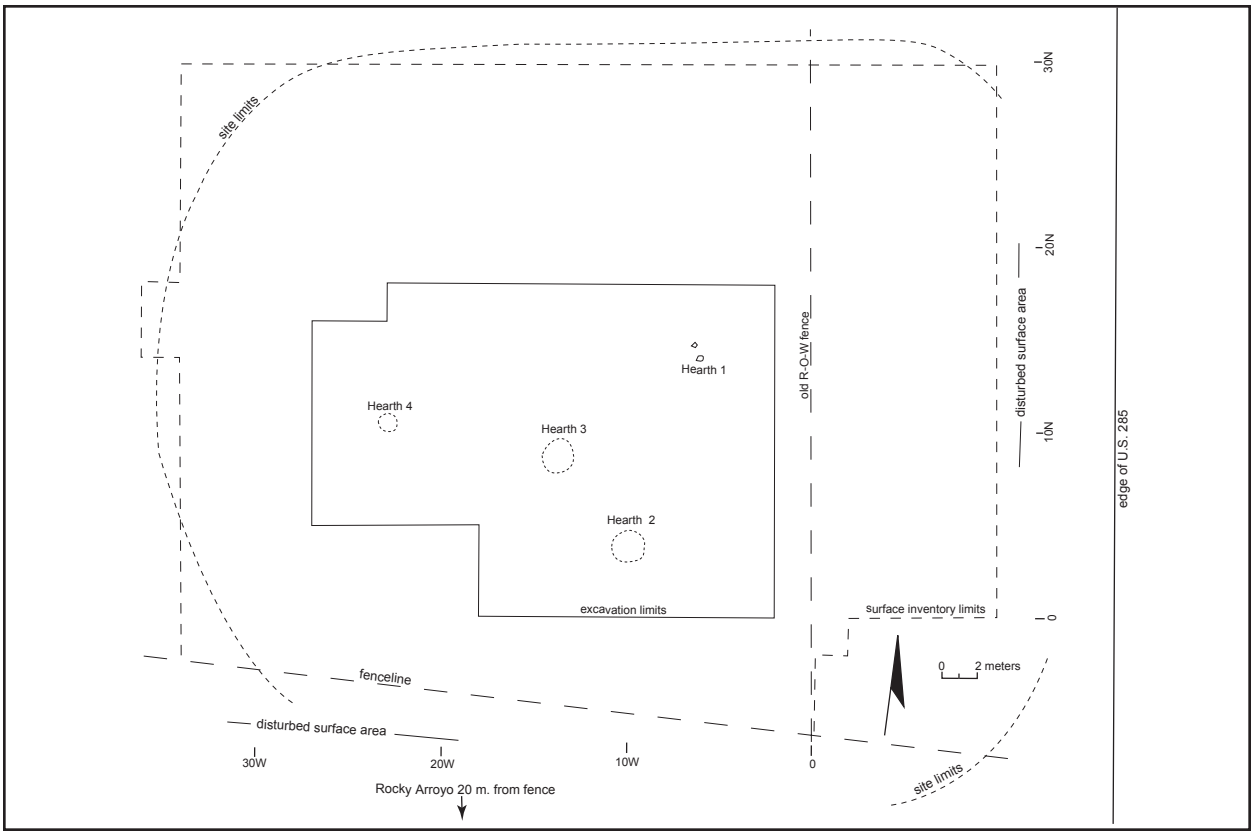


Figure 20. Map of LA 44565 (Rocky West).

were recovered from among the rocks.

Hearth 3 (Feature 3)

This concentration of burned rocks consisted of several dozen whole (ca. 90 percent) and fragmentary (ca. 10 percent) limestone cobbles resting on top of the compact soil (Fig. 21c). The feature was mostly buried at the time of the project. Most rocks were small, elongate, 10 to 12 cm long cobbles. They formed a layer mostly one rock deep but in places two rocks deep. The hearth was 2 m in diameter, and the highest pile of rocks was 10 to 15 cm high. The fill lacked staining and charcoal, probably because these materials were blown out by wind before the feature was buried.

A small concentration of larger-than-average (for this feature) burned rocks northwest of the hearth could have been removed from the feature prior to its abandonment. Or they could be a stockpile of rocks ready to be added to the hearth as needed. Judging by the color and fractured surfaces of the rocks, all had been used as hearth stones prior to their final disposition. A few flakes were recovered from among the rocks of the feature.

Hearth 4 (Feature 4)

This small concentration of burned rocks consisted of about three dozen large pebbles and small limestone cobbles from 6 to 20 cm long (Fig. 21d). This feature was completely hidden by the loose surface soil until it was discovered through shovel scraping. Its dimensions were 90 cm north-south, 105 cm east-west, and 10 cm high. The fill lacked staining, charcoal, and artifacts. One in six of the rocks was discolored and/or broken by heating. Like the larger features, this one lay in a plane, mostly one rock deep but occasionally two rocks deep.

During the shovel scraping in the vicinity of Hearth 4, three large, flat limestone and travertine stones were encountered. Hearth 4 and the three stones seemed to comprise a unit (Figs. 22 and 23). The stones, all about 30 cm in diameter and 10 to 15 cm thick, displayed no shaping, evidence of use, or wear. Yet their positions relative to Hearth 4 almost certainly signify purposeful placement.

Stain (Feature 1)

One large and five small organic stains were clustered in four contiguous squares (13N/4W, 13N/5W,

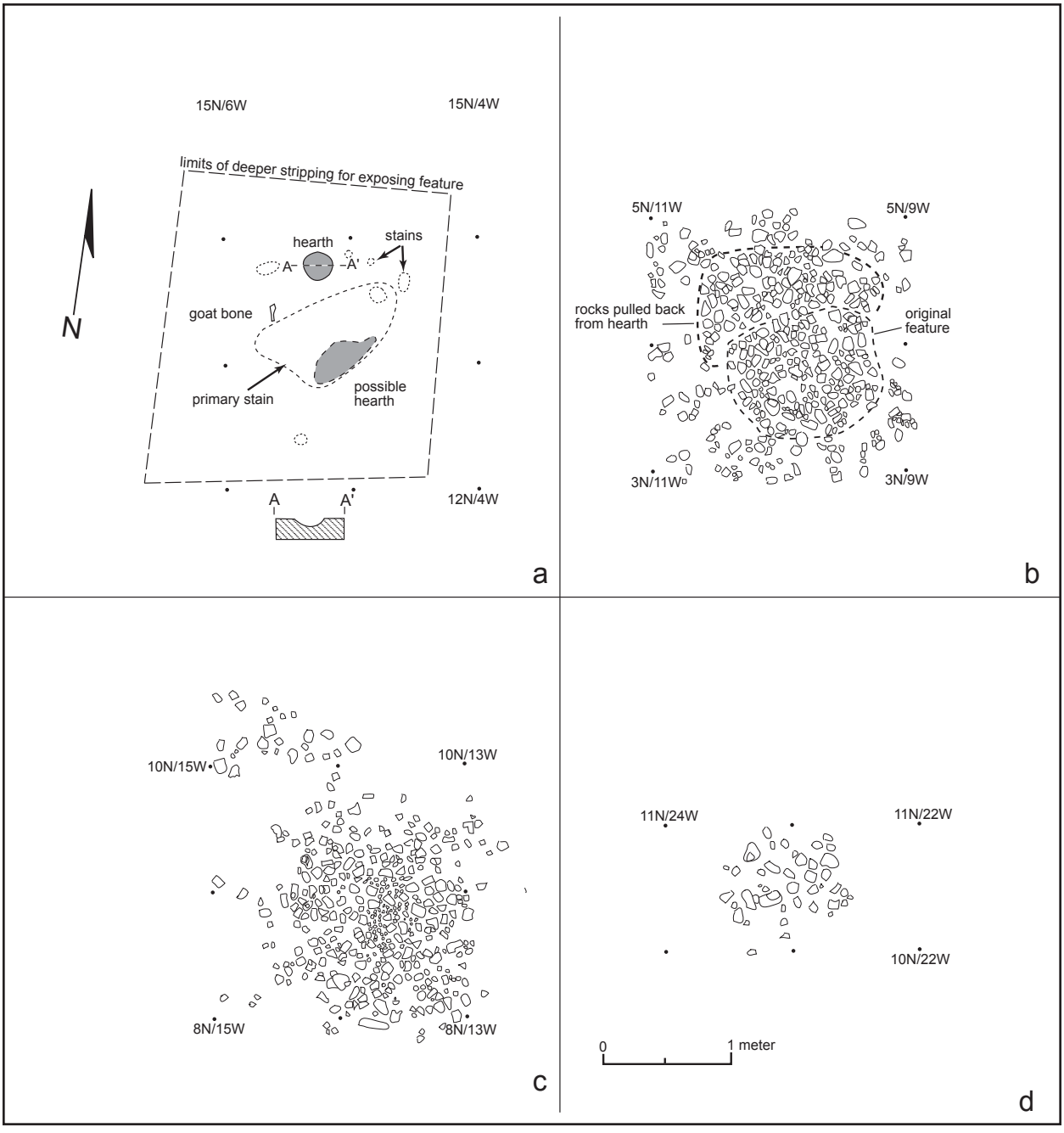


Figure 21. Features, LA 44565 (Rocky West): (a) Hearth 1 (Fea. 1a); (b) Hearth 2 (Fea. 2); (c) Hearth 3 (Fea. 3); (d) Hearth 4 (Fea. 4).

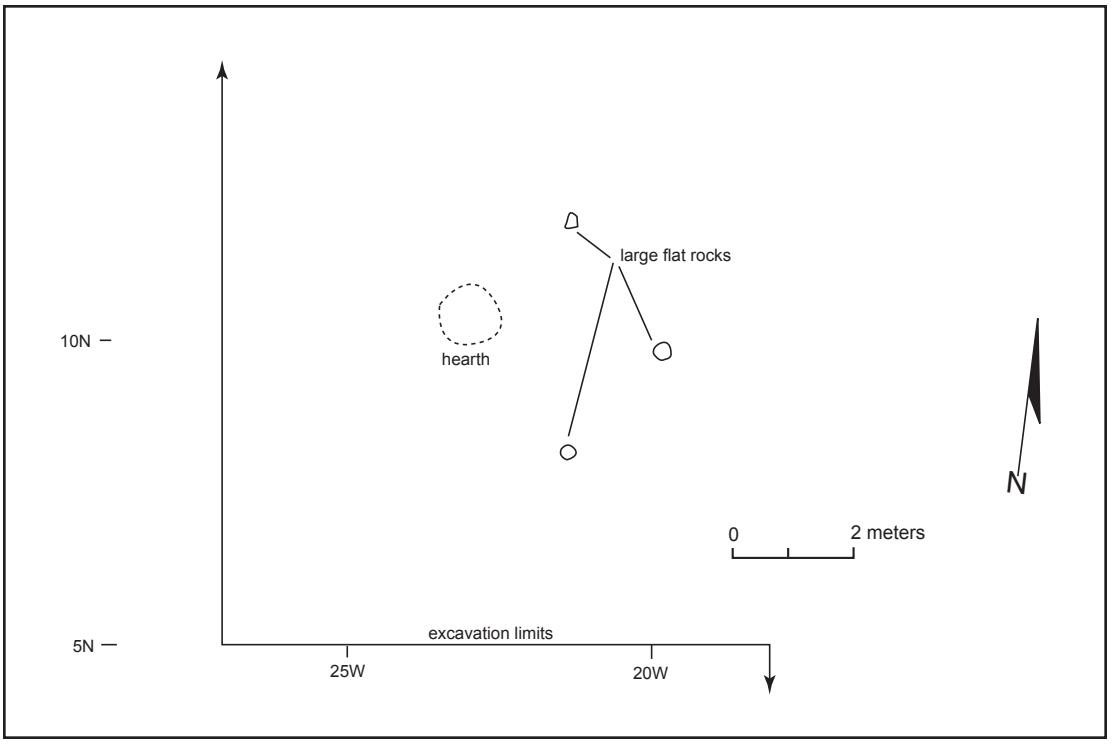


Figure 22. Large, flat stones in the vicinity of Hearth 4, LA 44565 (Rocky West).

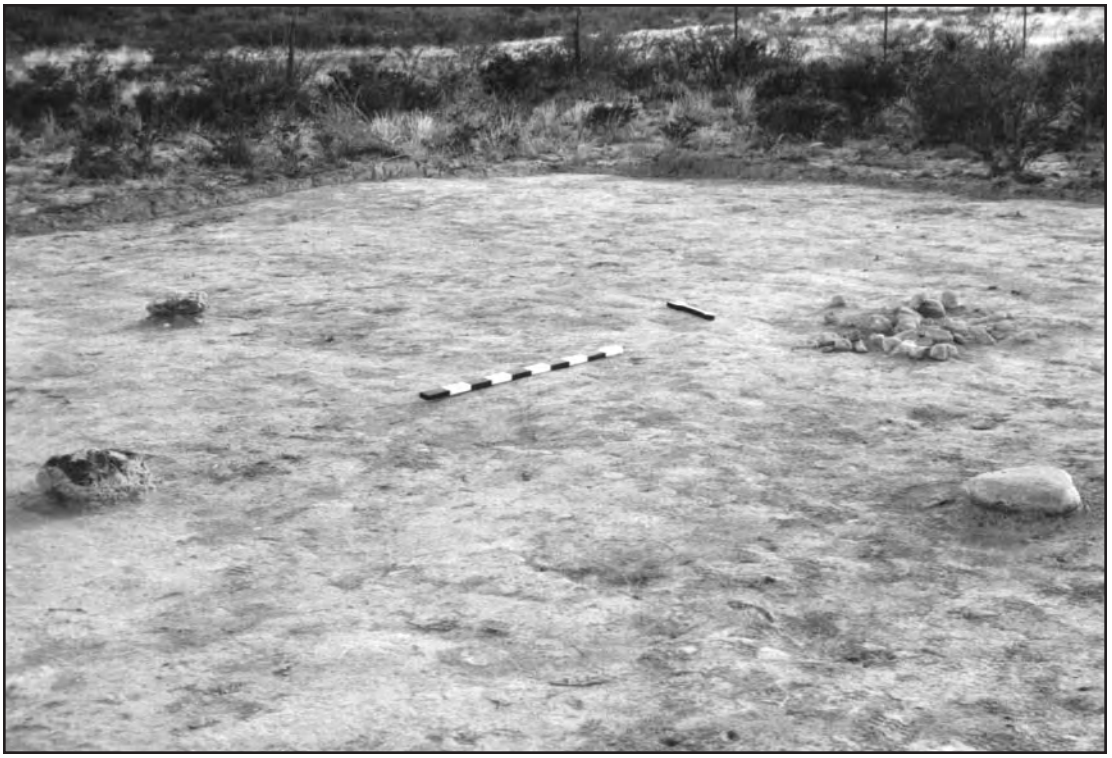


Figure 23. Hearth 4, LA 44565 (Rocky West).

14N/4W, and 14N/5W) (Fig. 21a). The small basin hearth designated Feature 1a was also within this cluster. The large stain was roughly oval and measured 125 cm northeast-southwest and 65 cm northwest-southeast. Its depth averaged 1 cm, but in the deep part along the southern margin (i.e., the suspected hearth), the depth was 18 to 20 cm.

Cultural Materials

The nearly 800 artifacts from the surface and excavations include flakes, cores, pieces of shatter, and a half dozen formal artifacts, including projectile points, biface fragments, and scrapers (Fig. 24). No pottery or grinding equipment was recovered.

Seven complete and fragmentary chipped lithic artifacts were recovered from the surface and excavations. All presumably relate to hunting and animal-product processing, especially hide scraping. The proveniences of all formal artifacts and flake tools are shown in Figure 25.

Projectile Point

The thickness of this tip fragment suggests that it belonged to a dart point (FS 280; Fig. 24a). It is medium gray chert (local), measures 12+ mm long, 9+ mm wide, and 3+ mm thick, and comes from 12N/17W, 0-5 cm.

End Scrapers

Two items are complete, true end scrapers (working edges on distal edges of flakes), but both are too short and thick to be classified as typical Plains end scrapers. Both also have heavily damaged working edges that are no longer usable or in a condition to be rejuvenated because the angles are roughly 90 degrees. FS 41 (Fig. 24b) is made of local light gray and dark gray local chert, measures 37 by 42 by 12 mm, weighs 17.1 g, and comes from the surface of 14N/30W. One lateral edge has minor unifacial chipping, perhaps to facilitate hafting. FS 149 (Fig. 24c) is made of coarse, local medium-dark gray chert, measures 38 by 34 by 15 mm, weighs 20.0 g, and comes from 9N/3W, 0-5 cm. One lateral edge has minor unifacial nibbling, probably to facilitate hafting.

Flake Tools

Flake tools are flakes of various sizes and shapes that have one or more edges displaying use-wear, intentional retouch, or a combination of use-wear and intentional retouch. This class of artifact includes items with both micro-wear/retouch (i.e., those that require a microscope for study) and macro-retouch. Aside from the use-wear/retouch, these flakes are not otherwise modified or shaped.

Flake tools are typed according to several descriptive attributes that focus primarily on the individual edges bearing use-wear or intentional retouch: (1) Type (unifaces, bifaces, unifaces/bifaces, and notches); no projections (graver and burin-like tools) were noted. (2) Manifestation type (use-wear, intentional retouch, or a combination). (3) Edge configuration (straight, convex, concave, sinuous, irregular, serrated).

There are five flake tools with a total of five individual edges. All are unifacial edges. Three are use-worn, one is intentionally retouched, and one (a notch) has both use-wear and intentional retouch. Edge configurations include two straight, one convex, one irregular, and one notch.

Three flakes are whole. The lengths of the use-wear on the two straight edges are 4 and 6 mm (mean of 5 mm). The length of the intentional retouch on the one convex edge is 17 mm. The use-worn/intentionally retouched notch on the one flake is 6 mm across and 2 mm deep.

Four of the flakes are of local gray chert, and the fifth is of fine, light to medium gray siltite/quartzite.

The flake tools were concentrated near Hearth 3 and, to a lesser extent, Hearth 4.

The five flake tools constitute 0.8 percent of the 629 total pieces of lithic debitage recovered during the excavations. All were recovered from the primary artifact concentration at the south end of the site.

Chipped Lithic Manufacturing Debris

Cores, flakes, shatter, and various bifaces constitute the bulk of the artifacts recovered from Rocky West (Table 19). The analysis of these materials, following the standard analysis methods I have used in the Roswell region over the past 20 years, focuses on reconstructing the lithic technology and the identification of materials and sources. The raw materials and definitions used to classify and analyze chipped lithic debris are described in Appendix 4. Descriptions and discussions of the gray chert sourcing study and a model of core-reduction technology believed to apply to the Roswell region can be found in Wiseman (2002). The cores, core-reduction flakes, biface-thinning flakes, and exotic materials are described below. Pieces of debitage bearing use-wear or intentional retouch are described in the section on tools.

Roughout bifaces. Two roughouts or initial-stage bifaces were probably going to be made into projectile points. The complete specimen (FS 83; Fig. 24d) is

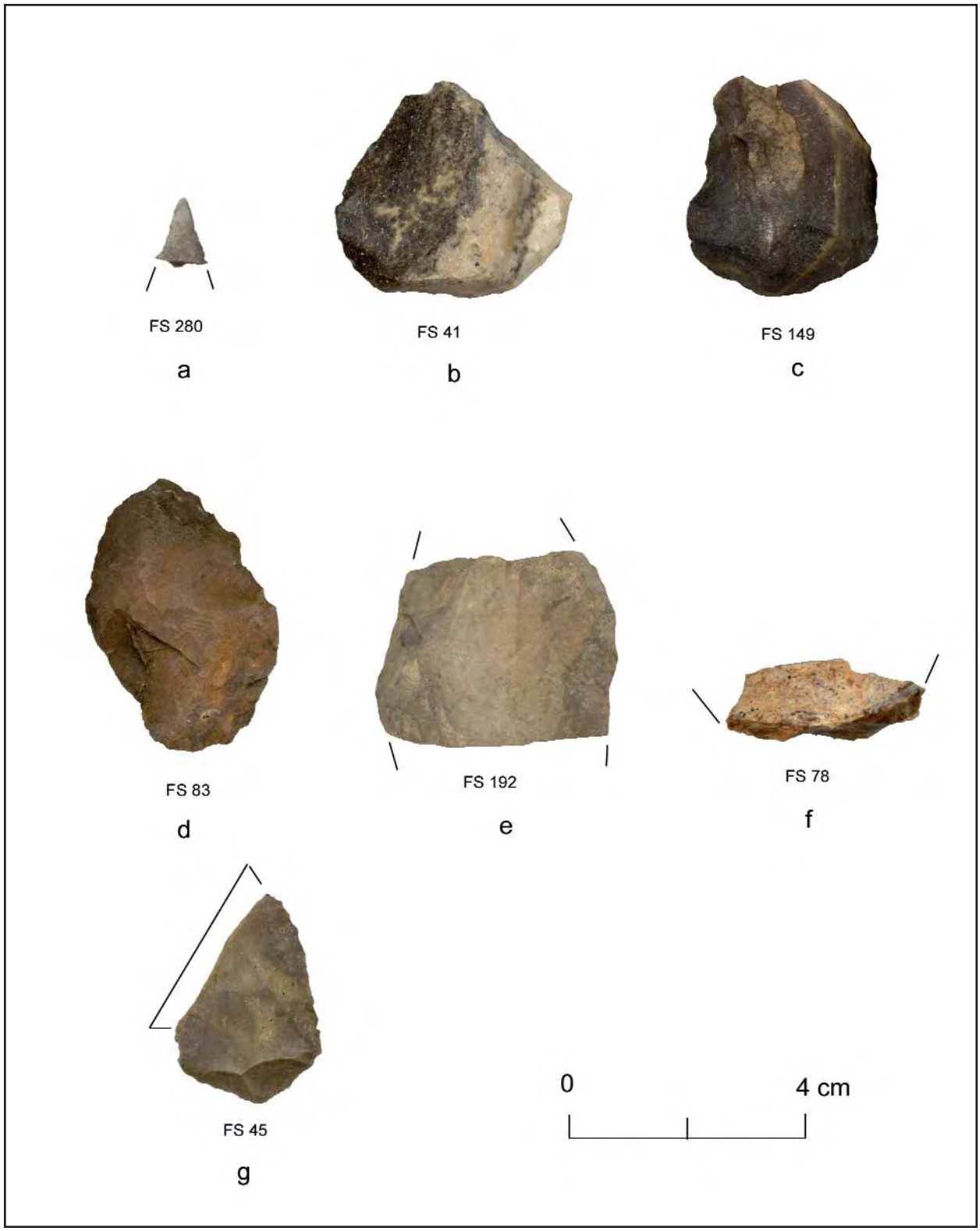


Figure 24. Artifacts, LA 44565 (Rocky West): (a) projectile point tip; (b) end scraper; (c) end scraper; (d) rough-out biface; (e) thick biface; (f) large biface fragment; (g) small biface.

Table 19. Lithic manufacturing debris, Rocky West

Type of Debris	Number	Percent
Cores	50	7.9%
Single platform	23	3.7%
Two platforms adjacent	8	1.3%
Two platforms parallel	-	-
Three platforms	1	0.2%
Tested cobble/pebble	7	1.1%
Flake core	11	1.7%
Flakes	458	72.8%
Core reduction	430	68.4%
Biface thinning	8	1.3%
Platform rejuvenation	1	0.2%
Decortication	3	0.5%
Platform preparation	6	1.0%
Potlid flake	2	0.3%
Indeterminate	8	1.3%
Shatter	121	19.2%
Total	629	100.0%

made of coarse, local medium-dark gray-brown chert, measures 48 by 31 by 13 mm, weighs 18.2 g, and comes from the surface of 10N/8E (2 by 2 m). The midsection fragment (FS 192) is made of coarse, local medium gray and brown chert (Fig. 24e). It measures 33+ mm long, 41+ mm wide, and 15+ mm thick and comes from 14N/3W, 0-5 cm.

Large biface. FS 78 is the basal edge of a biface broken from the main artifact by an outre passé fracture (Fig. 24f). It is made of heat-treated, local gray chert (now light orange and deep, dark red), measures 16+ by 34+ by 9+ mm, and comes from the surface of 24N/4E (2 by 2 m).

Small biface. A small biface has size and shape of a small dart or large arrow point preform (late stage biface) (FS 45; Fig. 24g). However, it has one entire lateral edge that represents a manufacture snap fracture of an earlier artifact. The flaking associated with the earlier knapping episode is strongly reminiscent of Paleoindian workmanship (long, broad, shallow flake scars) and may represent a Paleoindian preform broken during manufacture. The reworking along one face of the other lateral edge is also well done, though it probably occurred during the occupation of Rocky West. The knapper was unable to overcome the original fracture plane and discarded the item. This artifact is made of local medium brown-gray chert, measures 35 by 25 by 7 mm, weighs 5.4 g, and comes from the surface of 16N/34W (2 by 2 m).

Cores. The 50 cores include five subtypes (Table 19), of which the single-platform core is the most common. Materials are varied but are dominated by local gray chert (Tables 20 and 21). Sizes vary (Table 22), and all dimensions are significantly correlated. Because all of the values are in the 0.8s and 0.9s, we consider the shapes of these cores to be well controlled, especially compared to those from Sites 7 and 9 of this project. That is, the cores were reduced in such a systematic fashion that the knapper(s) were able to control the geometry of both the cores and the flakes removed from them. Greater control in this sense means that the knappers were more consistently able to obtain the desired sizes and shapes of flakes. In so doing, they also made more efficient use of the material and produced less waste. The one heat-treated core represents only 2 percent of the core assemblage (Tables 20 and 21).

Core-reduction flakes. Slightly less than one-third (N=135) of the 430 core-reduction flakes are complete. Summary statistics (Table 23) indicate that, on average, they are small, slightly longer than they are wide, and relatively heavy (9-10 g). A Pearson Correlation matrix (2-tailed) (Table 23) indicates that, although all the values are significant, the flake dimensions are not strongly correlated, suggesting generally poor standardization of shapes.

The primary materials of the core-reduction flakes are local cherts. Heat treatment was rarely used, and the total positive and possible cases total only 6 percent. Single flake-scar platforms are the most common, accounting for less than one-half of the flakes. Over 60 percent of the flakes have feathered or modified-feathered terminations, meaning that failed detachments account for nearly 40 percent of the complete flake assemblage. Nearly half of the complete flakes lack dorsal cortex, and a quarter of them have 51 percent or more cortex (Tables 19, 20, and 24).

Biface-thinning flakes. Eight biface-thinning flakes were recovered from Rocky West (Tables 19 and 20). Three are local gray chert, two are other cherts, two are chalcedony, and one is possible Edwards chert. All but one local gray chert flake came from the vicinity of Hearth 4. One local gray chert flake came from 2 to 3 m south of the possible south hearth in Feature 1. One local gray chert flake and the possible Edwards chert specimen appear to be heat-treated. The proveniences of these flakes are shown in Figure 25.

Exotic lithic materials. Lithic materials known to originate or suspected of having originated from sources outside southeastern New Mexico are present in the Rocky West assemblage and, by southeastern New Mexico standards, are relatively numerous. These include seven pieces of Edwards chert from central or west-central Texas, four pieces of possible Edwards chert, and two pieces of clear black obsidian. The obsidian is probably from the Jemez Mountains of north-central New Mexico or the Rio Grande gravels in the Las Cruces area of south-central New Mexico. Together,

Table 20. Lithic debitage classes, Rocky West (frequency)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	31	299	3	10	100	443
Other chert	2	35	2	2	8	49
Chalcedony	1	14	2	7	3	27
Limestone	-	-	-	-	-	-
Siltite/quartzite	1	74	-	-	5	80
Other	15	8	1	-	5	29
Total	50	430	8	19	121	628
Heat Treatment						
No	47	361	6	12	104	530
Yes	1	20	2	5	5	33
Possibly	-	6	-	1	4	11
Indeterminate	2	43	-	1	8	54
Total	50	430	8	19	121	628

Table 21. Lithic debitage classes, Rocky West (percentage)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	62	70	38	53	83	70
Other chert	4	8	25	10	7	8
Chalcedony	2	3	25	37	2	4
Limestone	-	-	-	-	-	-
Siltite/quartzite	2	17	-	-	4	13
Other	30	2	12	-	4	5
Total	100	100	100	100	100	100
Heat Treatment						
No	94	84	75	64	86	84
Yes	2	5	25	26	4	5
Possibly	-	1	-	5	3	2
Indeterminate	4	10	-	5	7	9
Total	100	100	100	100	100	100

Table 22. Complete cores, Rocky West

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
All Cores				
Mean	51.5	42.52	28.46	133.47
SD	24.16	22.49	14.83	189.16
Range	90	84	61	673
Number	48	48	48	48
Flake Cores				
Mean	47	38.64	19.73	67.46
SD	23.39	21.39	8.61	102.56
Range	71	69	28	349.8
Number	11	11	11	11

Correlation Matrix of Dimensions (Pearson's r, 2-tailed test)				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
All Cores				
Length	1			
Width	.8230*	1		
Thickness	.6585*	.7457*	1	
Weight	.8308*	.8382*	.8254*	1
Flake Cores				
Length	1			
Width	.9693*	1		
Thickness	.9043*	.9544*	1	
Weight	.8239*	.9157*	.8584*	1

* Significant at .001 level.

Table 23. Complete core-reduction flakes, Rocky West

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	23.07	19.58	7.08	9.14
SD	14.43	12.15	4.93	22.23
Range	70	64	25	166.8
Number	135	135	135	135

Correlation Matrix of Dimensions (Pearson's r, 2-tailed test)				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Length	1			
Width	.8461*	1		
Thickness	.8599*	.8150*	1	
Weight	.7476*	.8025*	.7000*	1

* Significant at .001 level.

Table 24. Core-reduction flakes, Rocky West

Attribute	Number	Percent
Platform Types		
Cortex	23	17%
Single flake scar	63	47%
Multiple flake scar	4	3%
Pseudo-dihedral	2	1%
Edge/ridge-like remnant	24	18%
Pointed	7	5%
Destroyed during detachment	12	9%
Total	135	100%
Distal Termination Type		
Feathered	59	44%
Modified feathered	24	18%
Hinged or stepped	52	39%
Total	135	100%
Dorsal Cortex		
0%	64	47%
1-10%	10	7%
11-25%	17	13%
26-50%	10	7%
51-75%	14	10%
76-90%	5	4%
91-99%	5	4%
100%, including platform	10	7%
Total	135	100%

these 13 pieces constitute 2.1 percent of the total debitage assemblage. The proveniences of the Rocky West pieces are shown in Figure 25.

The seven Edwards chert pieces include three core-reduction flakes, two possible biface-thinning flakes, and two indeterminate flake fragments. Most came from the vicinities of Hearths 1 and 2, suggesting that they belong to the occupations of one or both hearths.

The four possible Edwards pieces include one biface-thinning flake and three indeterminate flake fragments. Two came from near Hearths 1 and 2 and the seven Edwards flakes, increasing the likelihood that they are Edwards chert. The other two pieces came from the vicinity of Hearth 4, suggesting an association with that hearth.

The two obsidian pieces include one core-reduction flake and one indeterminate flake fragment. Both appear to have belonged to the Hearth 4 occupation.

Local gray chert study. The results of this study are presented in a separate section elsewhere in this volume.

Faunal Materials

Animal bone was recovered from several areas of the site. The 381 specimens, representing at least seven species and a number of more general taxa, are described and discussed by Susan Moga elsewhere in this report.

Plant Remains

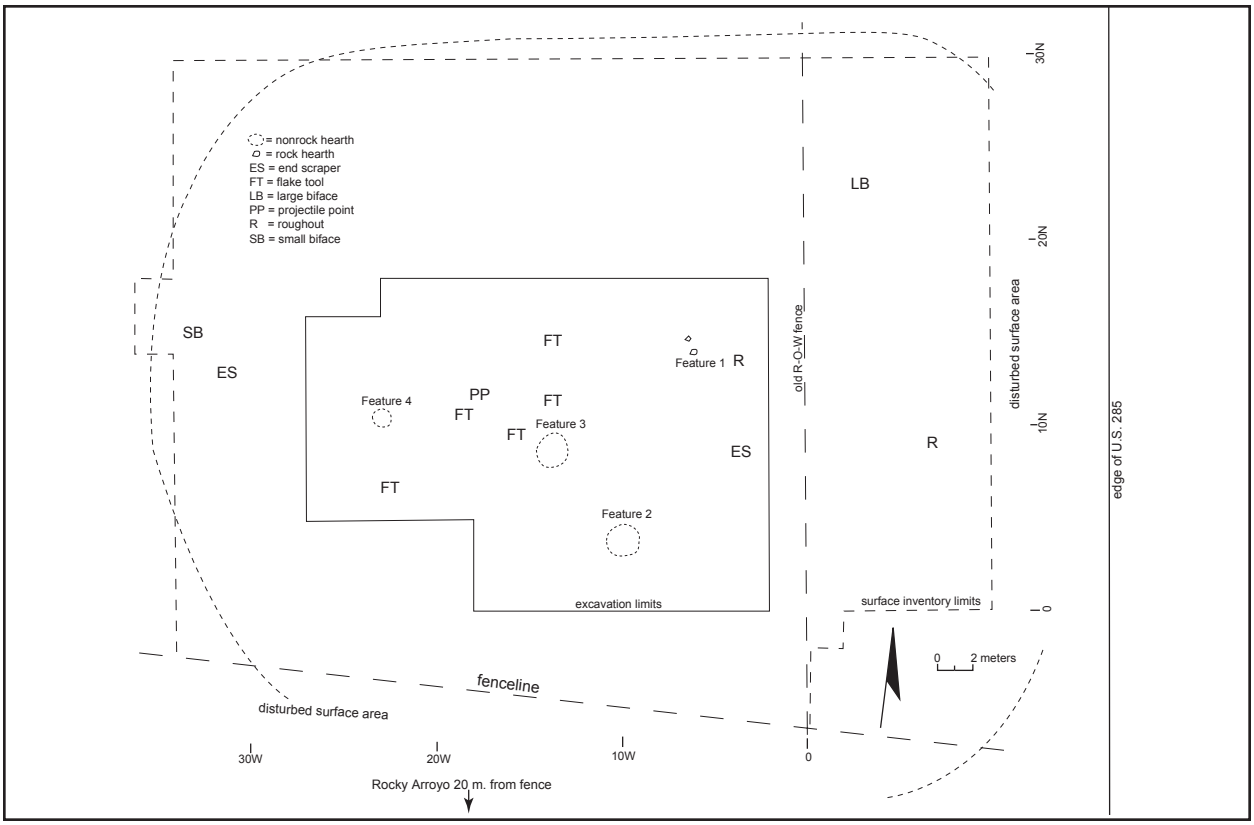
Plant remains recovered from Feature 1 include one cultigen (cotton) and a number of wild species, most of which served as fuel. They are discussed elsewhere in this report.

Comments

The types of hearths (rock versus nonrock) and paucity of cultural debris suggest two or more prehistoric and historic occupations. The rock hearths lacked accumulations of ash and charcoal, suggesting the occupations were short, perhaps reflecting overnight stays or stays lasting a few days at most.

Few activities evidently took place, as indicated by the limited inventory of artifacts associated with the acquisition and processing of animal foods and products. Both dart points and arrow points indicate the atlatl and bow were used and are additional evidence for both Archaic and Late Prehistoric/historic occupations. The absence of grinding equipment indicates that preparation of seed foods did not take place at the site.

If the two large burned-rock "hearths" were used as small baking facilities, then we suspect that leaf-succulent foods were processed in them. Evidence of this type of association was obtained from a similar feature at LA 8053 (Wiseman 2001).



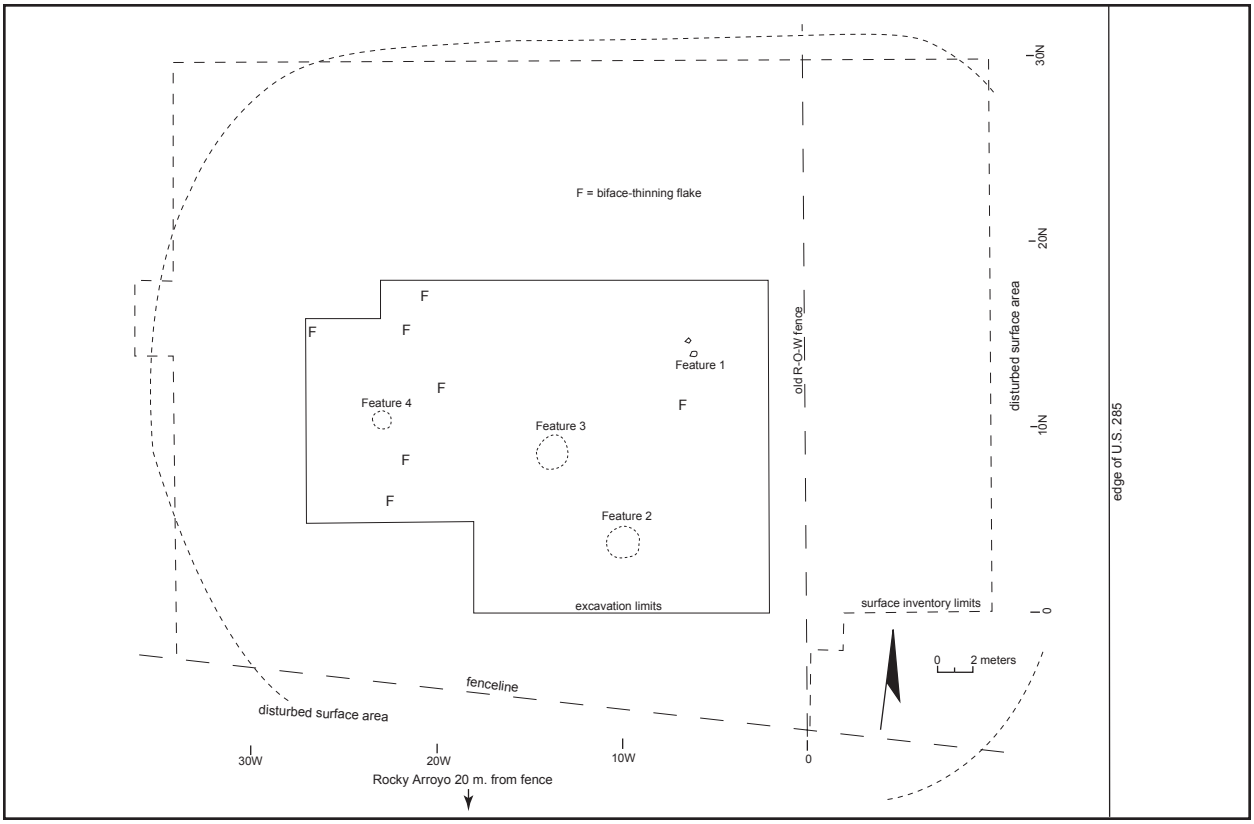
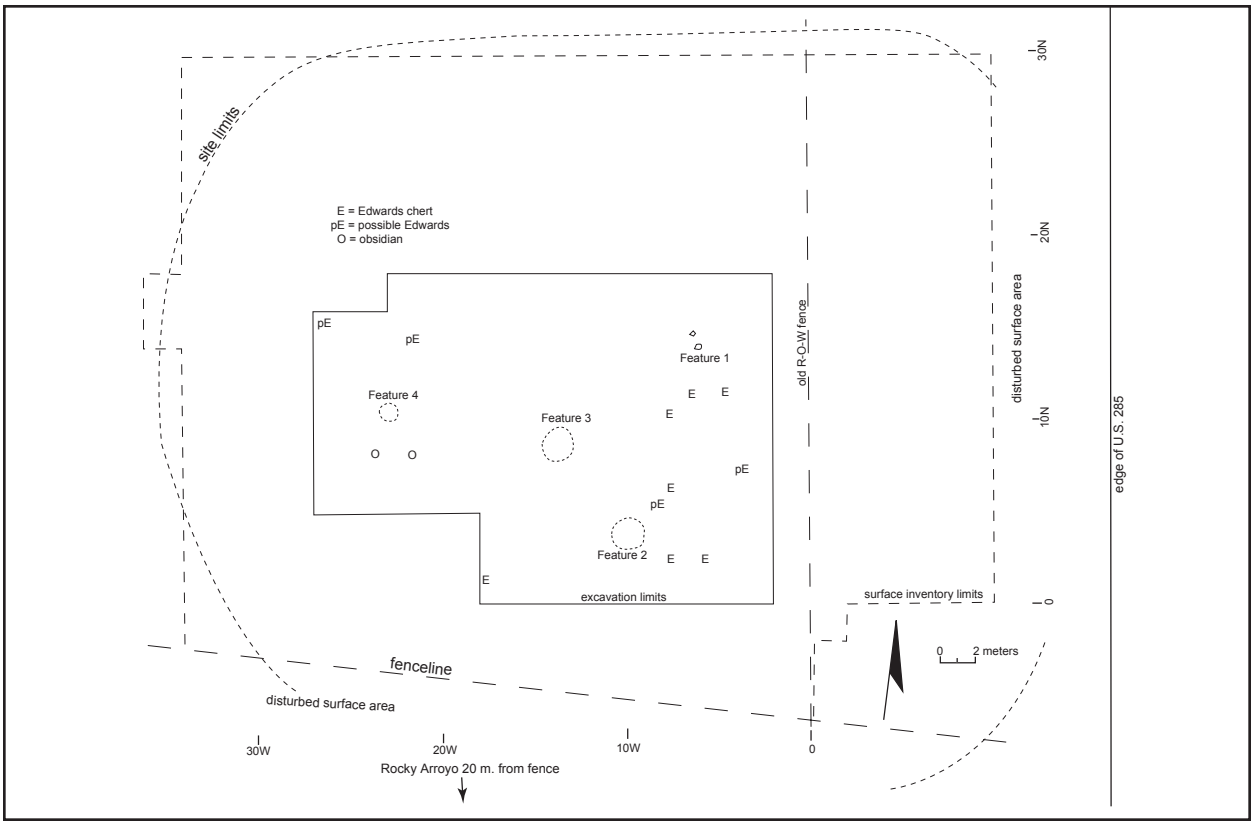


Figure 25 (above and on following page). Surface and subsurface distribution of artifacts, biface-thinning flakes, and exotic lithic materials, LA 44565 (Rocky West).


site limits
E = Edwards chert
pE = possible Edwards
O = obsidian
pE
pE
O
Feature 1
Feature 4
E
E
Feature 3
E
O
O
pE
E
pE
Feature 2
E
E
E
excavation limits
old R-O-W fence
disturbed surface area
edge of U.S. 285
30N
20N
10N
0
surface inventory limits
0
2 meters
fenceline
disturbed surface area
30W
20W
10W
0
Rocky Arroyo 20 m. from fence

LA 44583 (ROCKY EAST; BR-48)

LA 44583 (Rocky East), a rock feature and artifact scatter, is on the edge of the north terrace of Rocky Arroyo, a major intermittent channel that drains the central Guadalupe Mountains to the west and enters the Pecos River 2.5 km east of the site (Fig. 26). The local vegetation is Chihuahuan Desert dominated by creosote. Riparian species grow on the floodplain of Rocky Arroyo immediately south of the site. The site measures 35 by 40 m, and its elevation is 3,270 feet (997 m).

Rocky East lies immediately east of U.S. 285 and due east of Rocky West (LA 44565). Since both sites were cut by the highway, it is entirely possible that they originally constituted a single site. However, since they were initially recorded as separate sites, this division has been retained here.

Rocky East is defined by a "ring" of river cobbles and other stones that Etchieson (1983) thought were historic and Marshall (1997) thought were prehistoric. Both Native American and historic items are at the location (outside the project area), indicating that both archaeologists are correct.

Several dozen flakes and cores scattered over the site area represent a prehistoric component. A burned-rock hearth probably belongs to this undated occupation, but it could also belong to the historic occupation.

Within the current right-of-way, Rocky East has been truncated by scraping associated with the U.S. 285 bridge over Rocky Arroyo. Only a 1.5 m wide strip along the fence remained undisturbed at the time of this project. Since the new construction is to be confined to the existing right-of-way, archaeological investigations were limited to that 1.5 m wide strip.

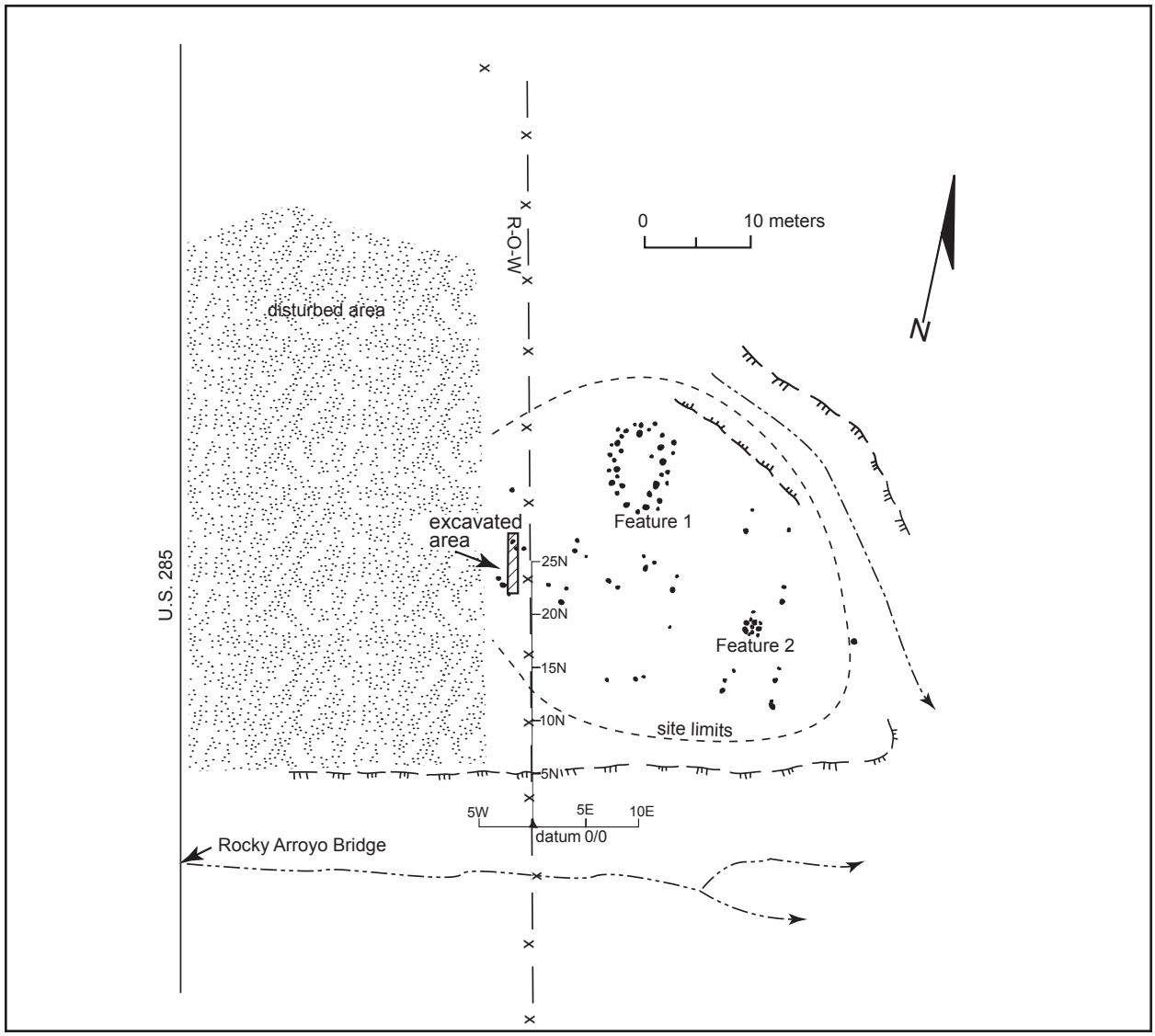


Figure 26. Site map, LA 44583 (Rocky East).

Fieldwork

Work at Rocky East was limited to the narrow strip along the existing right-of-way fence. Two tasks were completed: mapping and collection of prehistoric artifacts from the site surface within the existing right-of-way; and excavation of five 1 m squares.

Five contiguous 1 m squares were shovel-scraped along the right-of-way fence between 22N and 27N (Fig. 26). Depending on depth to compact soil, excavations varied from 5 to 10 cm below the modern surface. All fill was screened through 1/8-inch wire mesh.

The site matrix consisted of one natural stratum, an eolian deposit of tan fine silty clay. Cultural items (flakes, cores) were concentrated within this material. No cultural features (hearths, trash deposits) were noted on the surface or in the excavations within the project area.

Cultural Materials

Only a few flakes and cores were recovered from the surface and excavations. No historic artifacts were recovered from the surface of the excavations of Rocky East. More materials are present in the main part of the site east of the right-of-way fence, but they could not be collected or studied because they lie outside the project area.

Chipped Lithic Manufacturing Debris

Cores, flakes, and shatter constitute the only artifacts recovered from Rocky East (Table 25). The analysis of these materials, following the analysis methods I have used in the Roswell region over the past 20 years, focuses on reconstructing the lithic technology and the identification of materials and sources. The raw materials and definitions used to classify and analyze chipped lithic debris are described in Appendix 4.

Eighteen pieces of knapping debris were recovered from the surface and excavations of the part of Rocky East that lay within the highway project. Two are cores, ten are core-reduction flakes, four are biface-thinning flakes, and two are pieces of shatter. Only the two cores, two pieces of shatter, and one core-reduction flake are whole.

The relatively high number of biface-thinning flakes is curious. Two are of the same material, a light to medium gray, coarse siltite/fine quartzite. The third is a light to medium brown, coarse siltite/fine quartzite, and the fourth is a black siltite. Thus, at least three different bifaces are represented among the four biface-thinning flakes.

The local gray cherts are the most common material (Tables 26 and 27), followed closely by the siltites/quartzites, and distantly by other cherts.

Local Gray Cherts

All of the gray cherts recovered from Rocky East gave cold (dark velvety purple) responses to ultraviolet light. See elsewhere in this volume for a discussion of these results.

Comments

The limited work at this site and the absence of diagnostic materials, features, and datable materials preclude ascertaining site function, cultural affiliation (other than Native American), and dates. This site may actually have been part of a larger site that included Rocky West.

Table 25. Lithic manufacturing debris, Rocky East

Type of Debris	Number	Percent
Cores	2	11.1%
Single platform	1	5.6%
Two platforms adjacent	1	5.6%
Two platforms parallel	-	-
Three platforms	-	-
Tested cobble/pebble	-	-
Flake core	-	-
Flakes	14	77.8%
Core reduction	10	55.6%
Biface thinning	4	22.2%
Platform rejuvenation	-	-
Decortication	-	-
Platform preparation	-	-
Potlid flake	-	-
Indeterminate	-	-
Shatter	2	11.1%
Total	18	100.0%

Table 26. Lithic debitage classes, Rocky East (frequency)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	1	6	-	-	2	9
Other chert	1	1	-	-	-	2
Chalcedony	-	-	-	-	-	0
Limestone	-	-	-	-	-	0
Siltite/quartzite	-	3	4	-	-	7
Other	-	-	-	-	-	0
Total	2	10	4	0	2	18
Heat Treatment						
No	2	10	4	-	2	18
Yes	-	-	-	-	-	0
Possibly	-	-	-	-	-	0
Indeterminate	-	-	-	-	-	0
Total	2	10	4	0	2	18

Table 27. Lithic debitage classes, Rocky East (percentage)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	50	60	-	-	100	50
Other chert	50	10	-	-	-	11
Chalcedony	-	-	-	-	-	0
Limestone	-	-	-	-	-	0
Siltite/quartzite	-	30	100	-	-	39
Other	-	-	-	-	-	0
Total	100	100	100	0	100	100
Heat Treatment						
No	100	100	100	-	100	100
Yes	-	-	-	-	-	0
Possibly	-	-	-	-	-	0
Indeterminate	-	-	-	-	-	0
Total	100	100	100	0	100	100

LA 116470
(LA TERTULIA DE LAS MOLINERAS)

This bedrock-mortar site has 12 mortar holes arranged in two groups (Fig. 27). Both groups are in a limestone ledge situated along a short, western tributary of the Pecos River. The tributary heads on the slope of the low hill 100 m or so west of the site. The mortars and artifacts cover an area measuring 30 m northeast-southwest and 15 m wide. The survey archaeologist reported finding a dozen flakes and cores in the vicinity of the 12 deep mortars (Marshall 1997). The vegetation at the site is Chihuahuan Desert. The elevation is 3,240 feet (988 m).

The mortars are set in a mostly linear pattern along the edge of a bedrock outcrop. The length of the site is 22 m, and the width is 5 m. Only one mortar lies within the present right-of-way and proposed construction zone.

Fieldwork

Three tasks were accomplished at LA 116470 (Fig. 27): (1) mapping of the entire site; (2) measuring the diameters of all mortars; and (3) excavation of the one mortar that lies within the highway project.

The excavated mortar (Mortar Hole 1 on the map) contained soil and growing plants. Excavation showed that the bottom of the hole had split away, leaving a gap between the walls and the bottom. The gap, which runs along a natural bedding plane in the limestone, has probably increased because of root pressure from the plants growing within and near the mortar.

Loamy fill entered the crack from the outside as well as through the orifice of the mortar. Accordingly, no soil or rock samples were taken as originally planned because of concerns about contamination. However, two cultural items were recovered when the fill was screened through 1/8-inch wire mesh.

Feature

Only one of the mortar holes lay within the highway project and was excavated. However, the opportunity was taken to measure the orifices of all of the mortar holes (Table 28).

Measurements of the orifices and depths were made to the nearest centimeter. Orifice dimensions were made along the slope diameter as defined by Wallace (1983), and depths were measured from the inflection point on the upslope or highest side when a mortar was in a sloped surface. Most mortars were in virtually horizontal surfaces. The differences between the upslope and downslope depths were less than 5 cm and in many cases only 1-2 cm.

Mortar Hole 1 has walls that taper slightly inward with depth and a decidedly concave bottom (Fig. 27). As mentioned above, the bottom has split along a horizontal bedding plane in the limestone and dropped 4 to 5 cm downward. Thus, the depth before the split was 29 cm.

Table 28. Dimensions of mortar holes

Mortar	Length (cm)	Width (cm)	Depth (cm)
Tertulia de las Molineras (LA 116470)			
1	26	24	29
2	24	23	-
3	24	23	-
4	27	21	-
5	15	13	-
6	25	24	-
7	25	23	-
8	22	20	-
9	25	25	-
10	20	19	-
11	23	12+	-
12	25	24	-
Punto de los Muertos (LA 116471)			
North	16	15	7
Middle	20	18	18
South	24	24	25

Material Culture

A fragment of a thick biface or roughout and one flake fragment were recovered from the fill of Mortar Hole 1.

Biface

A small, corner fragment of a thick biface or roughout is made of medium brownish-gray fossiliferous chert (not Edwards) (Fig. 28). It measures 23+ mm long, 14+ mm wide, and 8+ mm thick.

Flake

This fragment (platform missing) of a biface-thinning flake is made of purple quartzite. It measures 8.5+ mm long, 6+ mm wide, and 1+ mm thick.

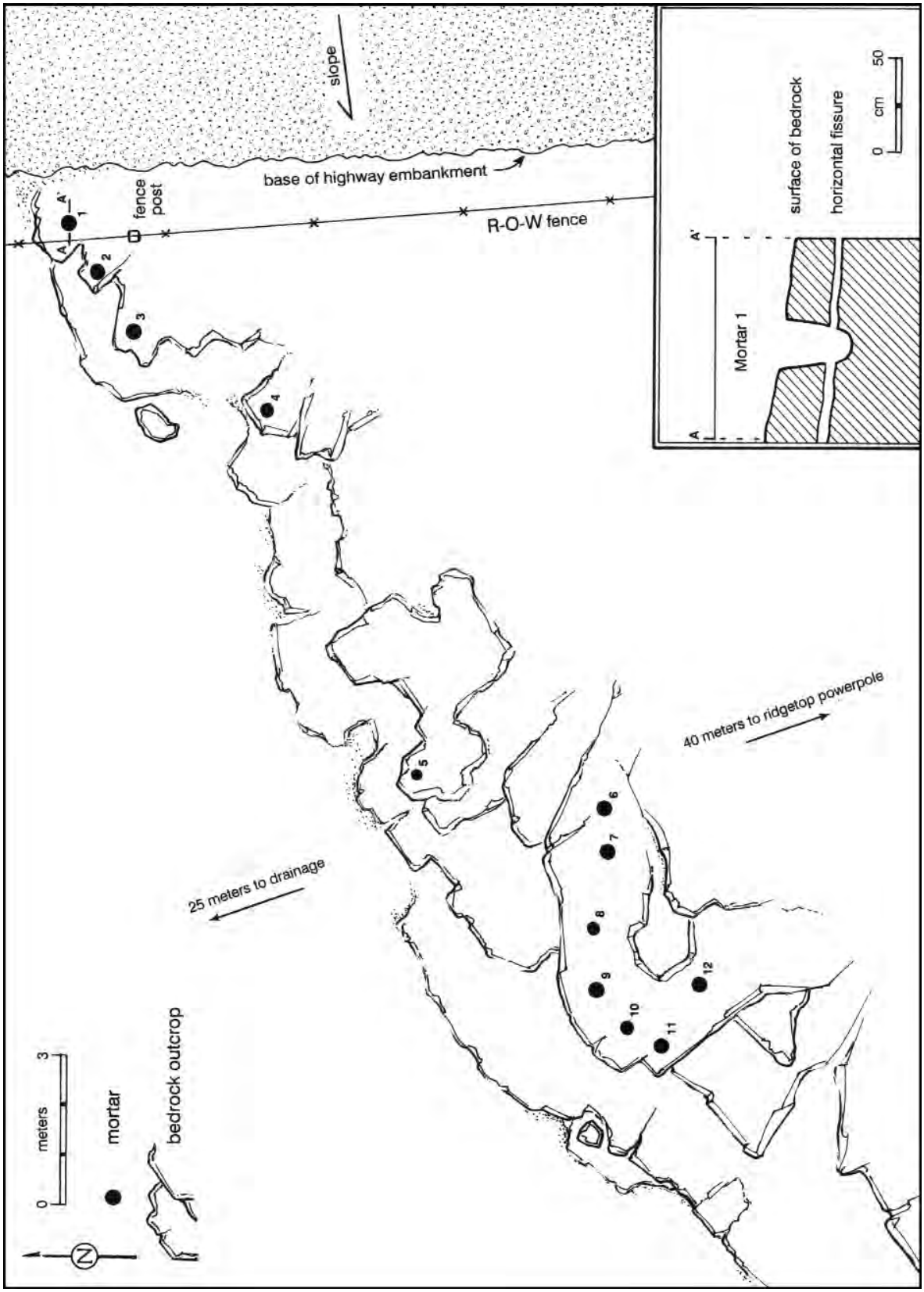


Figure 27. Site map, LA 116470 (Tertulia de las Molineras).

Comments

A number of bedrock-mortar sites have been reported in southeastern New Mexico and adjacent parts of Texas (Boyd 1997; Fletcher 1931; Forrester 1991; Henderson 1976; Katz and Katz 1985a). They are reported to be fairly common in the Carlsbad region, where they are typically found along major streams at the mouths of canyons (Roy Pettes, pers. comm., 1998). Yet, these incompletely understood features are truly the orphans of Southwestern and Texas archaeology, for they are plagued by two major problems: difficulties in defining their cultural and temporal affiliations, and a dearth of information as to what materials were ground in them.

These problems, which persist in the current study, are discussed in some detail in Wiseman (2000b).

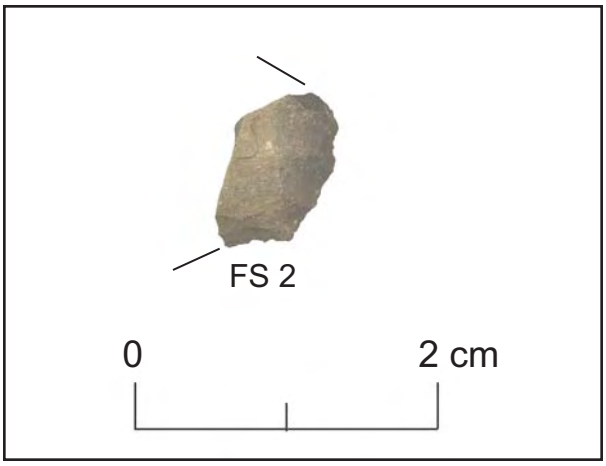


Figure 28. Corner fragment of biface or roughout, LA 116470 (Tertulia de las Molineras).

LA 116471 (PUNTO DE LOS MUERTOS)

Punto de los Muertos has been variously recorded and described as both a ring midden and a stone enclosure (Marshall 1997; Wiseman 1997). Three mortar holes and a lithic and sherd artifact scatter are also present. The site is situated on a high knoll overlooking the Pecos River immediately to the east (Fig. 29). The site covers an area of 110 m northwest-southeast by 50 m wide. The vegetation is Chihuahuan Desert. The elevation is 3,170 feet (966 m) and 9 m above the valley bottom.

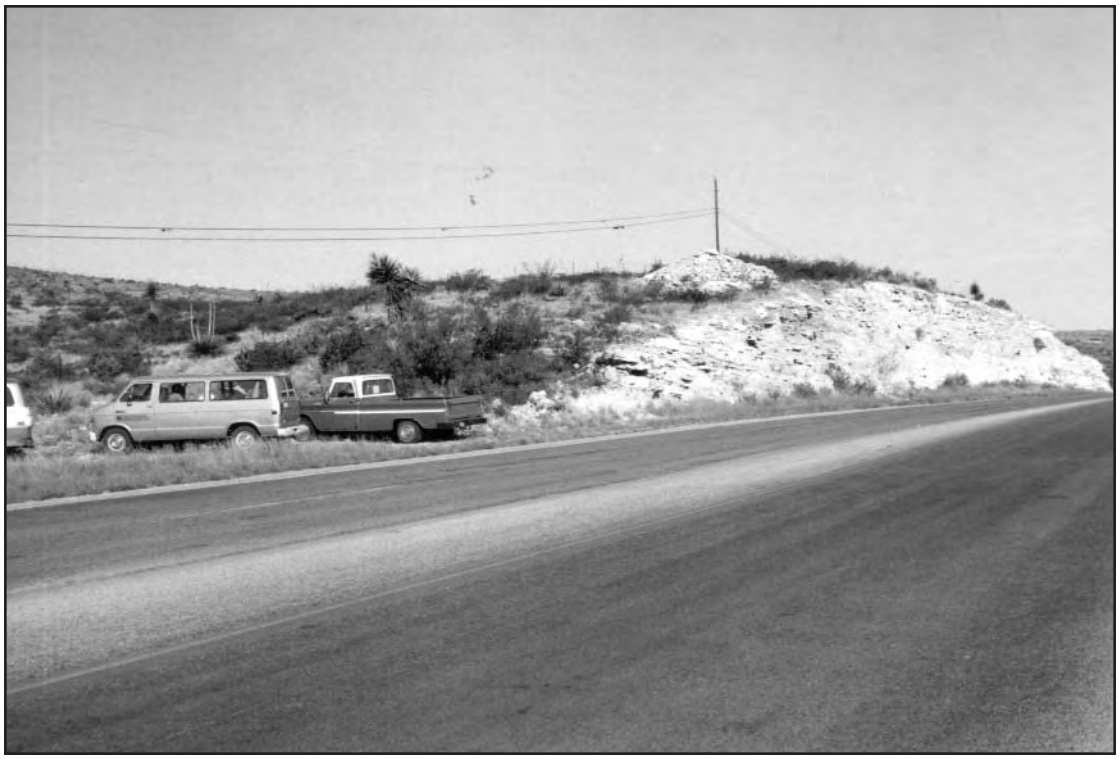


Figure 29. LA 116471 (Punto de los Muertos), looking northwest. The rock feature (Feature 1) is hidden behind the modern rock pile (white mound).

At the beginning of the excavations, we believed that the rock feature was a stone enclosure (Figs. 30, 31). Fairly early on, we began to notice the presence of burned rocks mixed in among larger unburned rocks. Many of these unburned rocks were portable slabs of bedrock. We are unsure of the original configuration of the rock feature that we have opted to call Feature 1. The contents of Feature 1 are quite unlike anything previously reported in southeastern New Mexico.

Attempts to locate people who had seen the site prior to its destruction by vandals failed. I checked the Bill Balgeman papers in the Family History Center in Carlsbad and the Jack Hughes papers at the Panhandle-Plains Museum at West Texas A&M University in Canyon, Texas. I also talked to a number of knowledgeable local people, including Roy Pettes, Harvey Hicks, Barney Burns, Mark Rosacker, and Dailey Jones.

Information was forthcoming from only two sources. Roy Pettes, after checking with a friend, stated that the site was dug approximately 30 years prior to our work, or some time in the late 1960s. The following quote was obtained from Jack Hughes's field notes for site A1647, which, from other statements in the notes, clearly refers to Punto de los Muertos: "On the W side of the cut, on the crest of the bench, under the fence line, is a stone ruin that has been much dug. Found a few flakes and a sherd with orange interior surface" (April 2, 1978, Panhandle-Plains Museum, West Texas A&M University, Canyon, Texas).

Fieldwork

Three tasks were completed at this site (Fig. 32): (1) surface counts and collection of prehistoric artifacts from 982 sq m of surface area; (2) excavation of most of Feature 1; and (3) excavation and recording of three bedrock mortars.

Twenty-three 1 by 1 m squares and three 1 by 2 m squares were excavated to caliche substrate within the

Figure 30. Rock feature (Feature 1), in vegetation across center, LA 116471 (Punto de los Muertos).

Figure 31. Looking north across rock feature, LA 116471 (Punto de los Muertos).

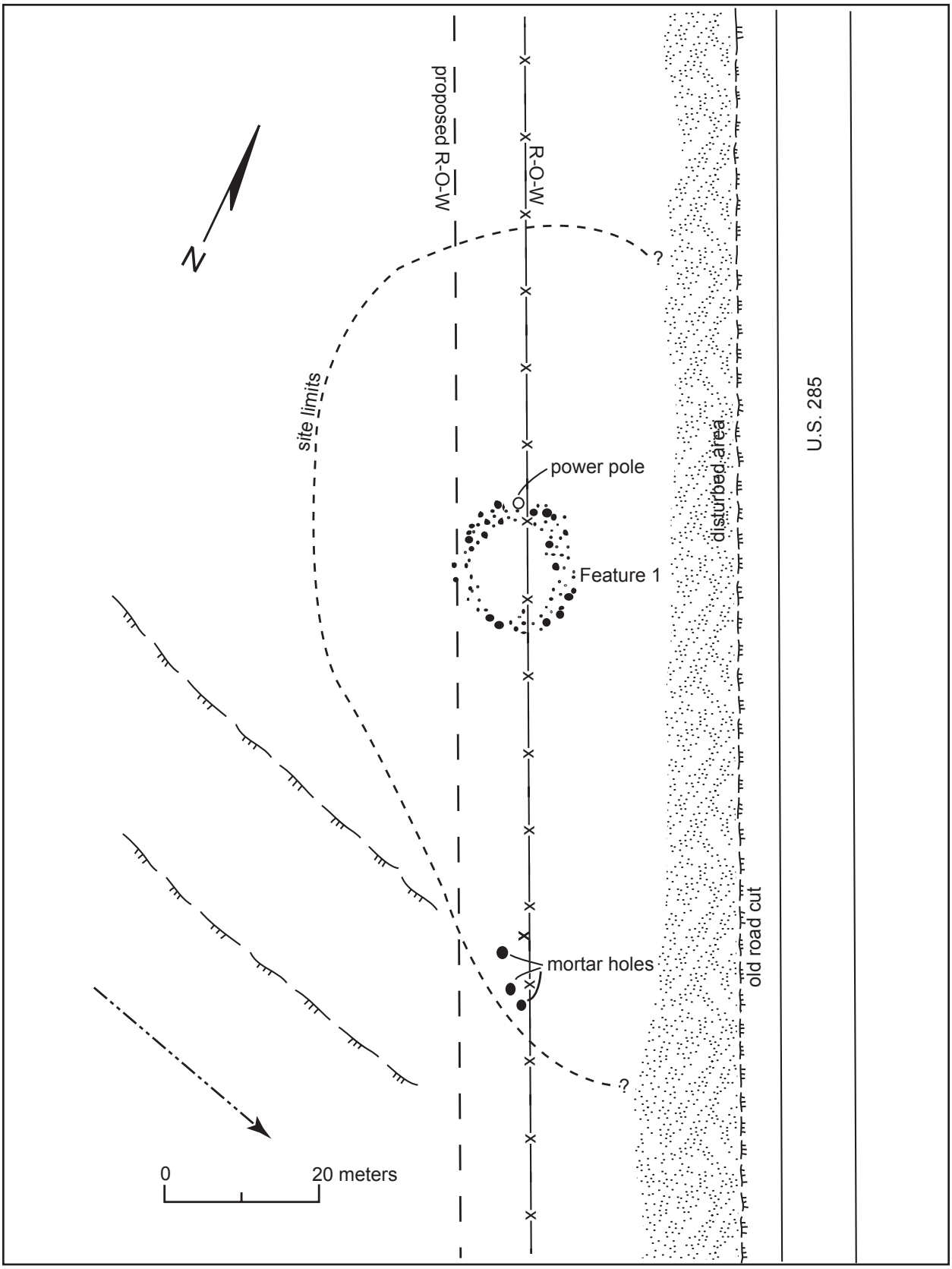


Figure 32. Site map, LA 116471 (Punto de los Muertos).

interior space of Feature 1. Excavation depths varied according to the position of the unit with regard to the structure walls and interior space. Surficial evidence of pothunting suggested and excavation confirmed that virtually all of the fill had been thoroughly turned and displaced. We had not anticipated that most of the stones in the north, west, and south sectors of this possibly circular to oval feature had been removed. The eastern sector was found to be more or less intact. The fill, screened through 1/8-inch wire mesh, produced a wealth of cultural items and information.

The fill of the structure consisted of moderately charcoal-stained silty clay and large numbers of small to large rocks. Some of these rocks, especially the smaller ones, were discolored and fractured by heat. Cultural items (highly fragmented animal and human bones, flakes, cores, pottery sherds, and formal artifacts) were concentrated within this matrix.

Features

Two types of features were investigated at LA 116471: the rock feature and three bedrock mortars.

Rock Feature (Feature 1)

The results of our excavations in Feature 1 are inconclusive (Fig. 33). At the beginning of this project, we believed that the feature had originally been a slightly mounded, annular ring of piled rocks, similar to structures known as stone enclosures in southeastern Colorado and northeastern New Mexico (Wiseman 1975). Such features have been documented in southeastern New Mexico, as well; those at site SMU-108 near Brantley Reservoir are particularly good examples (Katz and Katz 1985a).

Other indicators fit our expectations that Feature 1 at Punto de los Muertos was a stone enclosure. A number of blocky, large and small limestone rocks had evidently come from the center of the feature and had been piled up on its south edge by vandals (Fig. 34). These rocks would have been perfect for the construction of a stone enclosure. Presumably, the dark cultural fill and other materials that were piled at various points around the periphery of Feature 1 also came mostly from inside the ring. We believed that by excavating from the central, pothunted area outward in all directions we would be able to locate remnant sections of this rock ring and thereby confirm that it was a stone enclosure. This expectation was not met for several reasons:

1. The bottom of the central part of the rock feature turned out to be powdered to slightly consolidated caliche, with no definite floorlike or prepared bottom surface. The level of the caliche along the northwest margin of our excavation rose 10 to 20 cm, as might be expected if we were approaching the true limit of the feature in this direction, but towards the supposed eastern limit, we encountered horizontal sheets of what we presumed to be in situ limestone bedrock (Fig. 33). These rock sections gave every appearance of being natural in arrangement rather than placed by humans. Yet, after the new highway cut was made (basically along our 1E line), no vestige of limestone bedrock was seen, and only caliche remained, thereby calling into question our initial assumption that the rock was in situ. Regardless, the upper surfaces of these rocks, slightly rough and natural in appearance, definitely did not show wear or other alteration by humans in a manner consistent with the use of their surfaces as a floor.

2. The presumed western limit of Feature 1 was found to be basically destroyed by the previous diggers. Virtually no rocks remained in situ in this area. Aside from a slight change in color intensity from medium to light gray, and a distinct diminution of artifact and bone fragment numbers, no definite changes in texture or hardness were noted; nor did we find a wall or readily recognizable western limit of the feature. Thus, the same fill, albeit somewhat lighter in color and possessing fewer cultural items, continued westward beyond our excavations. We had to cease westward excavations at this point, at the project limit.

3. The composition of the fill at the presumed northern limit of Feature 1 can be characterized as moderate quantities of unburned limestone rocks of various sizes and shapes, resting in haphazard, nonstacked arrangements and "floating" in fairly copious quantities of fill (the rock-to-fill ratio was approximately 1:1). Most of the rocks and fill exposed in the north face of our excavations at or near the presumed northern limit of the feature are obviously in disturbed condition, having been deposited there by vandals as they threw rocks and fill out of the central part of the feature. A crushed aluminum beer can indicates this disturbed fill was at least 0.5 m deep and extended to within 10-20 cm of the caliche substrate described in (1) above. The surface of the ground at the northern limit of our excavation was 10 to 20 cm higher than that supposedly outside or beyond Feature 1. Thus, no wall or recognizable limit of Feature 1 was found within the northern part of the excavation.

4. The presumed eastern limit of Feature 1 was demarcated by a concentration of unmodified, unburned limestone rocks of various sizes and shapes haphazardly piled (?) on top of the limestone bedrock (Figs. 35 and

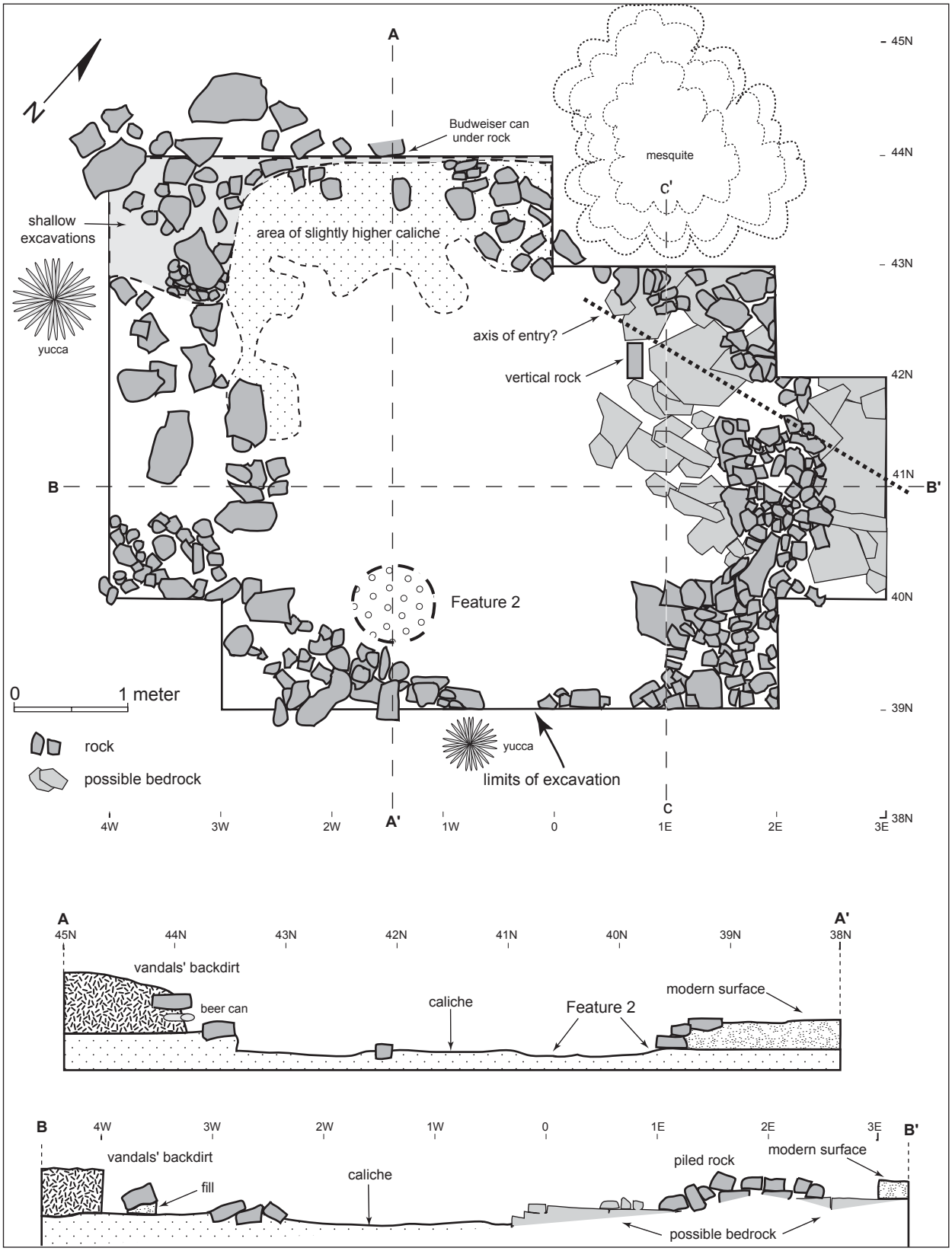


Figure 33. Map and Profiles AA' and BB' of rock feature, LA 116471 (Punto de los Muertos).

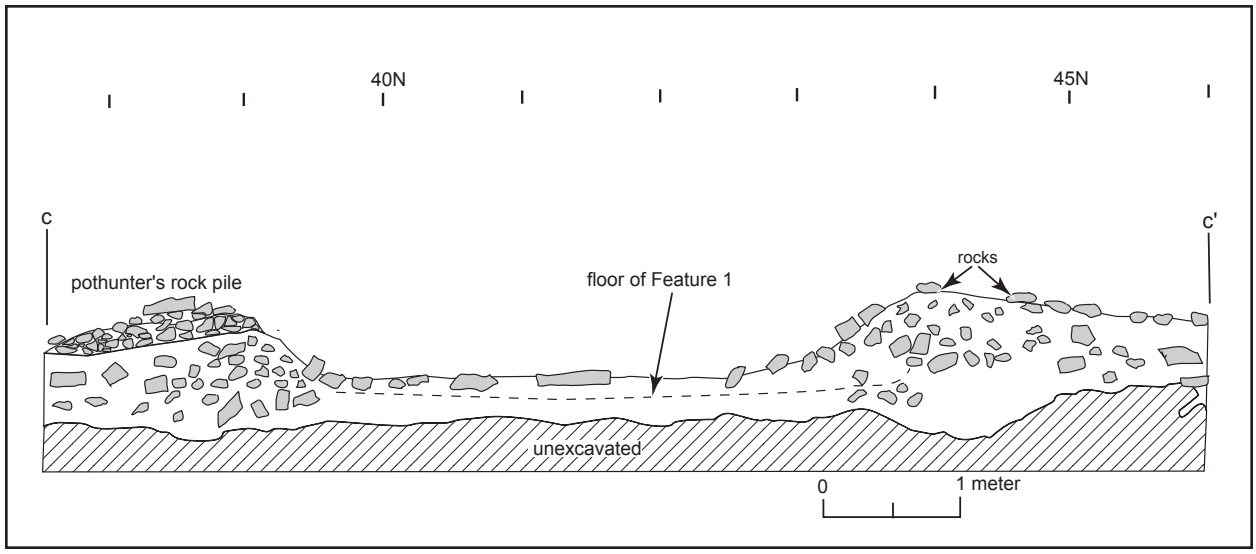


Figure 33 (continued). Profile CC' of rock feature, LA 116471 (Punto de los Muertos).

36). Here the rock-to-fill ratio decidedly favored the rocks. Yet on average the rocks were small and lacked any semblance of order or purposeful arrangement.

One of the more salient aspects of this potential wall was the presence of a long, unmodified, tabular stone set on end next to and along the south side of a horizontal slab of bedrock (Fig. 37). The effect was that of an entry, with the vertical slab potentially constituting a door jamb and the horizontal bedrock a door tread. At least two large, horizontal limestone rocks lay to the east of the bedrock slab in positions that could indicate their use as a path. The trouble with this scenario is that the bedrock segment and the two slabs lacked any sign of wear or smoothing, which we would expect for a door tread and stone path. This is particularly puzzling given the soft nature of the stone and the delicate, natural surface-modeling of this particular bedrock.

Figure 34. Pile of rocks removed from fill of rock feature, LA 116471 (Punto de los Muertos).

5. Excavation at/near the presumed southern limit of Feature 1 revealed an increased concentration of unmodified, unburned limestone rocks of various sizes and shapes in a haphazard pile. This jumble of rocks, however, was even less convincing as a wall than that exposed in the eastern sector. Also, as noted in the western sector, the overall fill color shifted to a lighter shade of gray, and the number of cultural items diminished noticeably.

If the rock feature (Feature 1) at Punto de los Muertos was a stone enclosure, we could not prove it through excavation. Nor could we discover what the rock fea-

Figure 35. Excavated east "wall" of rock feature, looking east, LA 116471 (Punto de los Muertos).

Figure 36. Excavated east "wall" of rock feature, looking south, LA 116471 (Punto de los Muertos).

ture was, what it may have looked like previous to extensive vandalism, or how it had functioned. This situation has severely hampered our ability to interpret the site and the remains found within the rock feature fill. Given the nature of those remains, particularly the human materials, this is especially unfortunate.

Bedrock Mortars

Three mortar holes were located in bedrock outcrops between 48S/25E and 54S/27E at the south end of the site (Fig. 38). The middle and southern mortars were deep and contained sufficient loamy soil to grow small shrubs and rather healthy prickly pear cacti. The bottoms of these mortars had split away prior to excavation, presumably because of pounding stress during use. The split is along a natural bedding plane in the limestone. The width of the split (4 cm) was probably increased by root pressure from the plants growing within and near the mortars. Loamy fill entered the cracks from the outside as well as through the orifices of the mortars. Accordingly, no soil or rock samples were taken as originally planned because of the possibility of contamination. The third mortar was started but not developed; it contained no fill, and the bottom is fully exposed to the weather, making preservation of cultural residues unlikely.

Figure 37. Vertical rock (possible door jamb) in east "wall," with horizontal rock (possible tread) to right, LA 116471 (Punto de los Muertos).

Measurements of the orifices and depths were made to the nearest centimeter (Table 28). Orifice dimensions were made along the slope diameter as defined by Wallace (1983), and depths were made from the inflection point on the upslope or highest side when a mortar was in a sloped surface. Most mortars were in sloped surfaces. The differences between the upslope and downslope depths was less than 5 cm and in many cases only 1 to 2 cm (i.e., the bedrock surfaces are nearly flat and/or horizontal).

South Mortar. The largest of the three mortars has an orifice diameter of 24 cm and a depth of 25 cm (corrected for split in bedrock). The sides slant slightly inward, and the bottom is concave. The bottom had dropped 4 cm when a cleavage plane in the limestone split away. Two Jornada Brown sherds that fit together (old break) were recovered from the fill. The sherds came from the locus where the upper body joins the neck of a large jar. The vertical provenience (high or low) of these sherds within the mortar fill is not known, for fill was removed and screened as a unit.

Middle Mortar. This mortar has orifice dimensions of 20 by 18 cm and a depth of 18 cm (corrected for split in bedrock). The sides slant slightly inward, and the bottom is concave. The bottom had dropped 4 cm when a cleavage plane in the limestone split away.

North Mortar. This mortar was just being started at the time of abandonment. It has orifice dimensions of 16 by 15 cm and a depth of 7 cm. It lacked fill except for a few rock fragments.

The mortars are arranged in a line along the bedrock exposure. The middle and south mortars are quite close to each other (0.7 m center to center), while the north mortar is 5.50 m from the middle mortar. All of the mortars are situated in the largest, most substantial segments of this fragmented outcrop, suggesting that the stability of the rock was an important consideration in placing the mortars. The yucca and juniper between the middle and north mortars were removed to determine whether they were growing in mortars. They were not.

Like the mortars at the nearby Tertulia de las

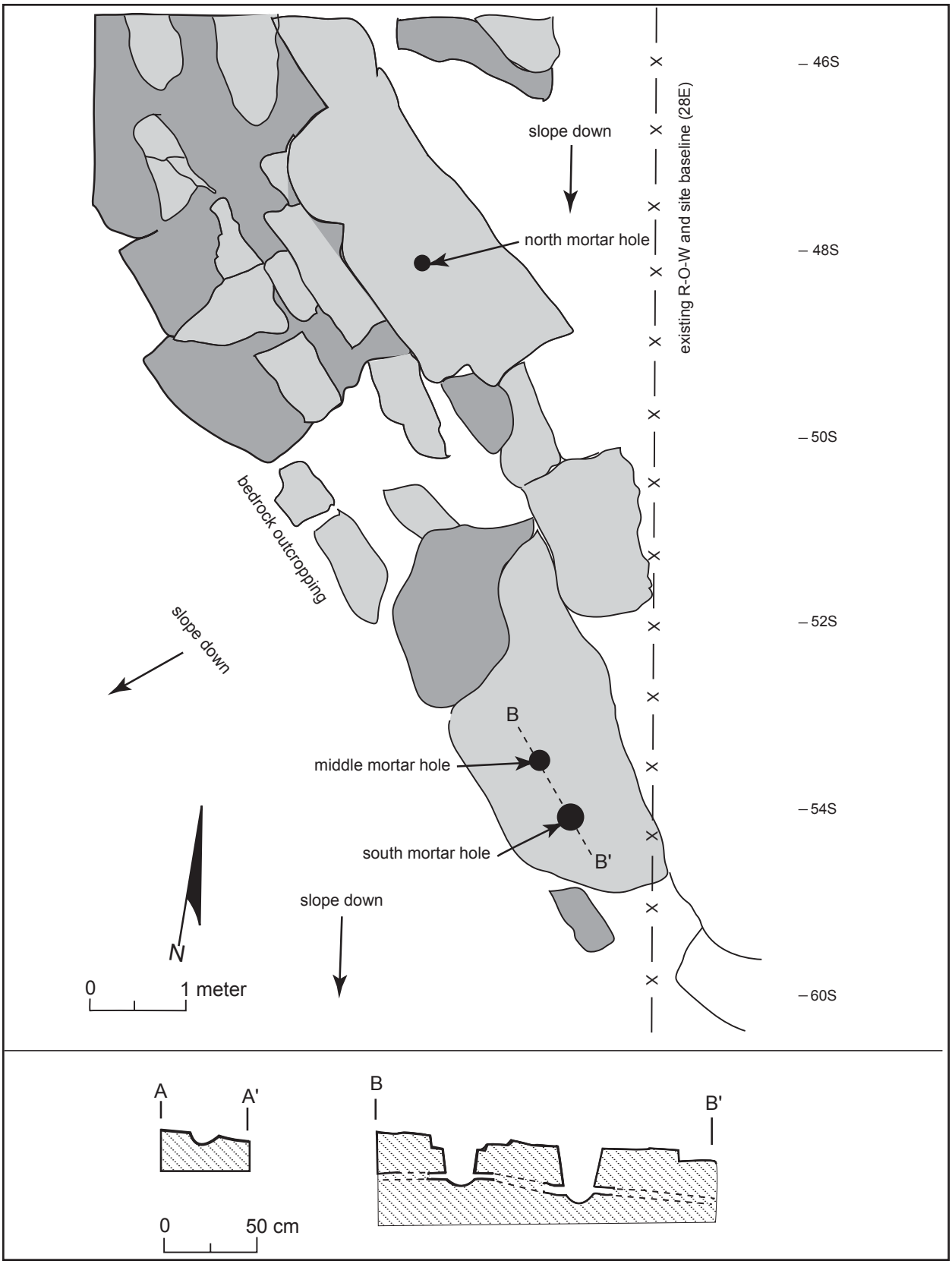


Figure 38. Map of mortars, LA 116471 (Punto de los Muertos).

Molineras site (LA 116470), the LA 116471 mortars merit exploration in terms of their numbers and grouping. We suspect that they may embody information on socioeconomic group composition and numbers, thereby providing hints about local band sizes. These and other ideas are explored in some detail in Wiseman (2000b).

Cultural Materials

Hundreds of artifacts and thousands of bone fragments were recovered from the site surface and the excavations in Feature 1 and the south mortar. The artifacts include flakes, cores, pieces of shatter, projectile points, biface fragments, scrapers, pottery sherds, a ground stone fragment or two, and several dozen ornaments. Each class of artifact is described below under its assumed category of activity. The section is organized in this manner to facilitate discussion of the activities that took place at the site and to highlight those activities that evidently did not take place at the site.

Hunt-related Artifacts

These artifacts may have been used to procure and process animals for food, clothing, and tools. Data on individual artifacts are in Appendix 5.

Projectile points. The eight projectile points include one complete and six fragmentary darts and one arrow point. All of these items appear to have been made from local or regional cherts and siltites. One possible exception is the complete point made from an Alibates look-alike material (FS 358). Sources of Alibates-like materials have been documented in several east-central and northeastern New Mexico counties, including De Baca (Yeso), Quay (Tucumcari), and Union (Baldy Hill).

Of these, only the Yeso source could contribute material to the Carlsbad region through natural means, in this case, as cobbles and gravels washed down the Pecos. However, it does not seem likely that a cobble large enough to make FS 358 could have made it down the river from Yeso to Carlsbad, given the amount of material required. Even if it had, it would likely be full of internal fracture planes caused by tumbling action and violent collisions with other cobbles, rendering it unsuitable for making large items. Therefore, the projectile point was probably made elsewhere and transported to the site.

The dart points (Figs. 39a-39e) have straight or slightly expanding stems and stylistically appear to belong to the McMillan and/or Brantley phases (Late Archaic, 1000 B.C.-A.D. 1 and Terminal Archaic, A.D. 1-750, respectively; Katz and Katz 1985a). Only the complete dart point (FS 358, Alibates look-alike material), which can be typed as a Williams point in the Texas sequence (Turner and Hester 1993), had good context (within 10 cm of bottom of Feature 1). All other points are from disturbed fill or the surface outside Feature 1.

The one fragment classified as an arrow point is a mid-blade fragment. It could be from an arrow point preform or a finished arrow point. The item was recovered from Feature 1 fill, between the modern surface and the top of the east "wall." Its association with the fill of Feature 1 appears to be good.

Backed knife. The one backed knife is reminiscent of the two- and four-bevel knives common to Late Prehistoric bison-hunting cultures of the Southern Plains. On the two- and four-bevel knives, the beveled edges were actually the working edges. They were beveled as a material-conservation measure, sacrificing edge sharpness for tool longevity.

The backed knife from LA 116471(Fig. 39f) is similar to beveled knives in that it has one steeply beveled edge, but in this case, the bevel may have been created to provide a dull edge for finger pressure during use. The other edge has 27 mm of use-wear opposite the steep retouch. Perhaps the steep edge was also used for cutting, though it is quite sharp and lacks evidence of use-wear. The point is acute and very sharp. The item is thin and well made in spite of the relatively coarse grain of the material. Presumably it was hafted or could have been. The provenience is 42N/2W of the Feature 1 fill.

End scrapers. Two of the three small end scrapers are virtually the same--nearly square and about the size of gunflints for flintlock firearms (Figs. 39g-39i). The distal (working) edges are steeply retouched, and the lateral edges are shaped by chipping to varying degrees. The third end scraper is longer and therefore closer to the classic shape of the Late Prehistoric, bison-hunting end scrapers of the Southern Plains. One of the smaller scrapers came from the site surface, and the other came from 41N/0 of the Feature 1 fill. The larger scraper came from a cleft in the bedrock in 42N/3E immediately outside the east wall of Feature 1.

Plant-related Artifacts

Since metates and manos were not recovered at LA 116471, the bedrock mortars constitute the only evidence of plant processing at the site. However, we have no certain way of knowing whether the mortars were used by the occupants of Feature 1. One way to establish a connection would have been to find stone pestles during the excavation of Feature 1, but none were found. It is possible that small fragments of these items were overlooked because of the sheer quantity of dark-fill-encrusted rocks in the fill. The only possible indicator of contemporaneity between the mortars and Feature

1 was the recovery of Jornada Brown sherds from the fill of the South Mortar. Even this is not conclusive because of the possibility of postoccupational introduction.

Another possible reason for the failure to find pestles is that they were made of wood, not stone. Cabeza de Vaca witnessed the use of a wooden pestle during the early 1530s in southwest or south Texas (Covey 1997). In archaeological contexts, a wooden pestle was found with a wooden mortar from the vicinity of Pandale in the Lower Pecos, Texas region (Collins and Hester 1968). Wooden pestles could not be expected to survive except under exceptional circumstances such as dry rockshelters and caves.

Utility Artifacts

These items have a variety of possible uses, as opposed to specific or limited uses. For instance, items usually known as "bone awls" have been ethnographically documented in leather and hide working, basketmaking, and gaming.

Awls. Four tips and six midsections of awls were recovered from the fill of Feature 1 (Figs. 39j-39k). Three are sharp-pointed, and the third is blunt. This suggests at least two uses, such as for piercing hides for making leather containers and for making spaces to insert weaving elements during the manufacture of sandals, mats, and baskets. All 10 awls were made from slivers of medium animal long bones and, in one instance, possibly a rib. Two are calcined and one is burned black.

Flake tools. Flake tools are flakes of various sizes and shapes that have one or more edges displaying use-wear, intentional retouch, or a combination of use-wear and intentional retouch. This class of artifact includes items with both micro-wear/retouch (i.e., require a microscope for study) and macro-retouch. Aside from the use-wear/retouch, these flakes are not otherwise modified or shaped.

Flake tools are typed according to several descriptive attributes that focus primarily on the individual edges bearing use-wear or intentional retouch: (1) Type: unifaces, bifaces, unifaces/bifaces, and notches. No projections (graver and burin-like tools) were noted. (2) Manifestation type: use-wear, intentional retouch, or a combination. (3) Edge configuration: straight, convex, concave, sinuous, irregular, and serrated.

There are 36 flake tools with 39 individual edges (Table 29). The number of edges per whole flake (N=16) varies as follows: one edge (N=14, 88 percent), and two edges (N=2, 12 percent). Unifacial edges predominate (N=37, 95 percent), with only one bifacial edge (2.5 percent) and one notch (2.5 percent). Use-worn edges (N=19, 49 percent) are the most common, followed by intentionally retouched edges (N=13, 33 percent), and combination use-worn and intentionally retouched edges (including one notch; N=7, 18 percent).

Only 16 whole flakes are present by which to gauge the lengths of the use-wear and intentional retouch (Table 30). Lengths regardless of edge configuration and use-wear/intentional retouch type range from 3 to 32 mm. The notch is 4 mm across and 2 mm deep.

Materials represented among the flake tools include 24 local gray chert, 5 other chert, 2 chalcedony, 3 siltite/quartzite, 1 rhyolite, and 1 clear black obsidian.

All but nine of the flake tools came from the fill of the highly disturbed rock feature, Feature 1.

The 36 flake tools constitute 1.1 percent of the 3,422 pieces of lithic debitage (cores, flakes, etc.) recovered during the excavations.

Reamer. A small Chupadero Black-on-white jar sherd is unmodified except for a reamer-like projection on one corner (Fig. 39l). It was ground to shape presumably by smoothing the interior of a 4-5 mm diameter hole. It is of the size, shape, and length that would fit most repair holes on pottery vessels. One or more pairs of these holes are made on either side of a crack in the vessel wall, an element of hide or fiber is passed through and tied to prevent further splitting, and the vessel is then ready for limited service (i.e., for holding dry or sticky materials but not liquids).

Miscellaneous Artifacts

This category includes items of unknown function and items that may not have been intended as tools or else were broken during manufacture.

Incised bone items. Artifacts 304 and 364 (Figs. 39m and 39n) may have been part of an ornament or part of a decorated utilitarian item. Both, though fragmentary, are 2 cm long and were evidently made from ribs. Shallow but definite lines were incised into both faces. Both are burned black. Judging by the difference in decorative schemes on one face, they appear to be from two different artifacts. One came from the backdirt pile in the northwest sector of Feature 1, and the other came from 41N/3E.

Unifacially edged tools. One true uniface and one biface with two unifacially retouched edges were recovered. Both items may be unfinished tools, and one may not have been intended as a tool. Unifaces obviously intended as tools are described under "end scrapers."

The true uniface (FS 305a) is a large, triangular, purple quartzite flake with both lateral edges steeply, unifacially flaked (Fig. 39o). We are uncertain whether this item is a tool or a large flake that was being used as a source for small flakes (i.e., a core).

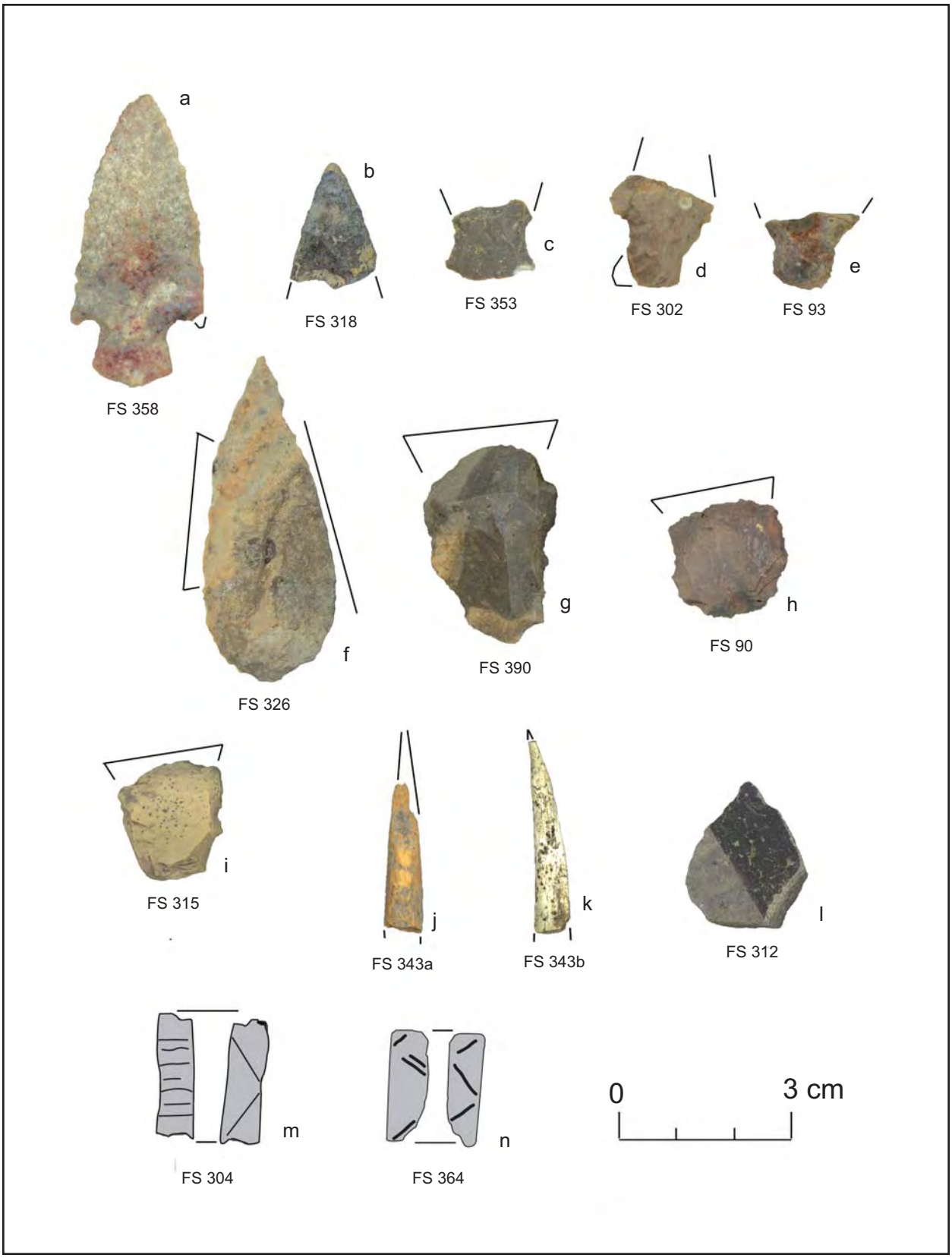


Figure 39. Artifacts, LA 116471 (Punto de los Muertos): (a-e) dart points; (f) backed knife; (g-i) end scrapers; (j-k) awls; (l) reamer; (m-n) drawings of incised bone.

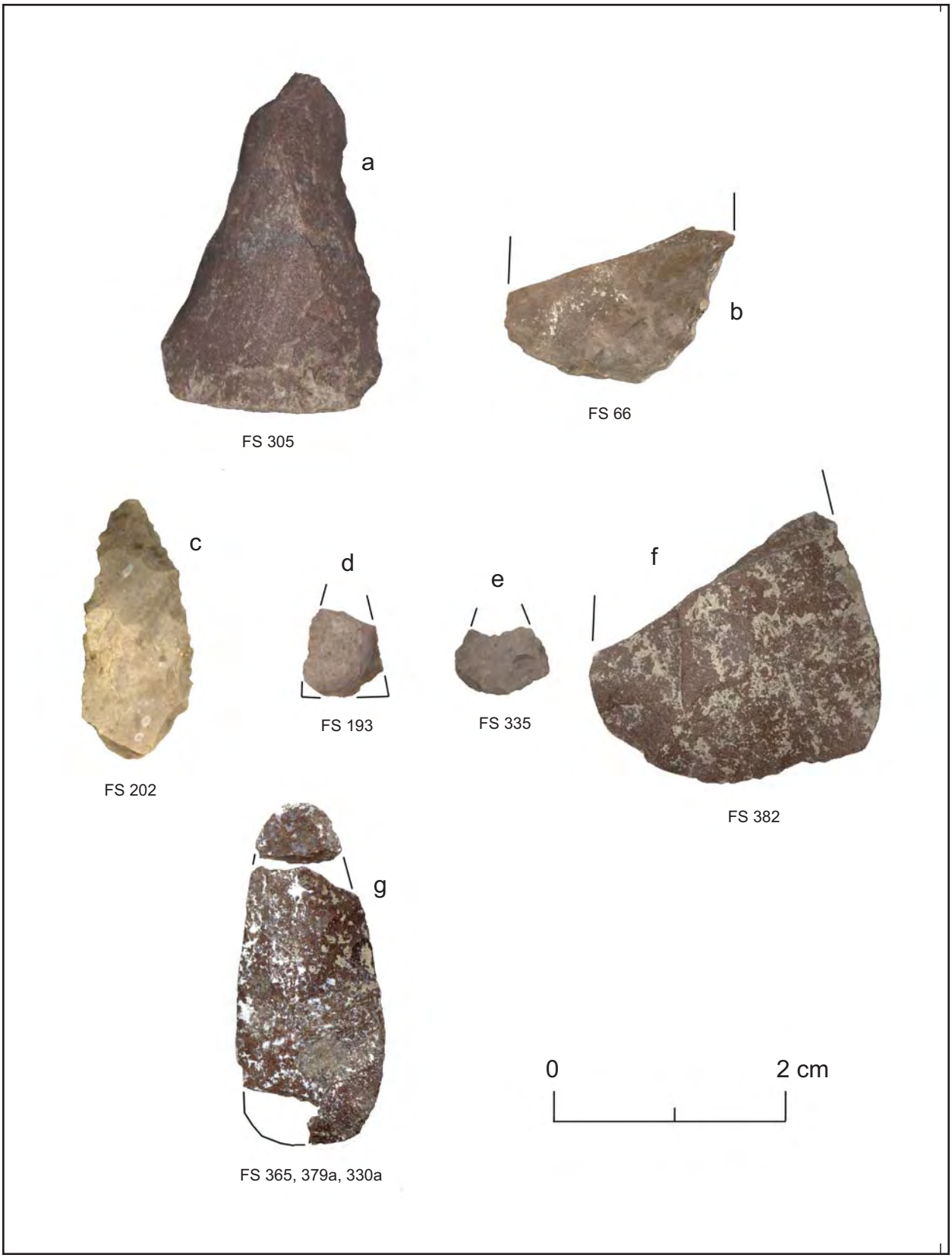


Figure 39 (continued): (o) uniface; (p) biface with a unifacial edge; (q) biface roughout; (r-s) arrow point preform (?); (t) basal fragment of large biface; (u) broken biface.

Table 29. Flake-tool edge types by use/retouch type, Punto de los Muertos

	Use-wear	Intentional Retouch	Use-wear and Intentional Retouch	Total
Unifacial				
straight	8	4	2	14
convex	6	9	2	17
concave	2	-	1	3
sinuous	1	-	-	1
irregular	1	-	1	2
serrated	-	-	-	-
Bifacial	-	-	-	-
straight	-	-	-	-
convex	-	-	-	-
concave	1	-	-	1
sinuous	-	-	-	-
irregular	-	-	-	-
serrated	-	-	-	-
Notch	-	-	1	1
Total	19	13	7	39

Table 30. Edge length of whole flake tools, Punto de los Muertos (use-wear and intentional retouch combined)

Edge Type	Number of Edges	Mean Length (mm)	Range (mm)
Unifacial			
straight	9	11.44	3-32
convex	7	17.29	7-28
concave	1	10	10

Biface with a unifacial edge. This artifact (FS 66) is a fragment of a long, thin artifact with a roughly squared base (Fig. 39p). It was made by removing large, shallow flakes from both faces to shape and thin the piece. Then the base and one lateral edge were steeply retouched to a 45-degree angle. The angle of the break suggests that the artifact was broken during this retouching process.

Ornaments

Eighty-three ornaments were recovered from the fill of Feature 1 (Table 31). The sheer number and variety of these items is highly unusual for southeastern New Mexico. Although it seems likely that most of the ornaments came from a single necklace, one or more were recovered from virtually every excavation unit in Feature 1 (N=26 units).

All ornaments identifiable to a specific class are beads. Five types are recognized here: discoidal shell beads (heishi), guitar-pick shell beads, tubular beads of two general lengths and materials (shell and stone), olivella shell beads, and small, rectangular shell beads with one end rounded.

Table 31. Ornaments recovered from the rock feature fill, Punto de los Muertos

Type and Class	Number
Beads	
discoidal (heishi)	22
guitar-pick	44
guitar-pick blank	1
tubular, long	4
tubular, short	3
olivella	5
rectangular-with-one-end-rounded	2
Miscellaneous (pendants?)	2
Total	83

Two items are obviously some form of jewelry or adornments, but they are fragmentary and missing the portions that would allow their prebreakage forms to be determined. I suspect they are pendants.

Discoidal beads. Twenty-two small, ring-shaped items are made of stone (including turquoise) or shell (Fig. 40a). All of the LA 116471 discoidal beads are shell and presumably were made in the fashion ethnographically documented for the southwestern Pueblo peoples. Necklace-length strands and strands as short as 5-10 cm have been recovered from archaeological contexts (Kidder 1932; Judd 1954). In southeastern New Mexico, discoidal beads are rarely found, probably in part because they are so small and in part because earlier excavations did not use screens or used screens with too large a mesh to catch them.

However, archaeological techniques cannot be totally to blame. The late 1930s excavations at the fourteenth-century adobe pueblo of Bloom Mound near Roswell recovered 1700 to 2100 discoidal beads. Clearly, there is a cultural component to the problem: some (most?) sites probably had few or no discoidal beads, and others like Bloom produced many. The difference is so striking that Kelley (1984) believes Bloom Mound was an early trade center similar to Pecos Pueblo. Given the variety of other exotic materials recovered from the site, this assessment is quite reasonable.

The discoidal beads from LA 116471 are fairly symmetrical (round) and display grinding marks on both faces as well as around the edges. Few are uniformly thinned, and many show tiny remnants of the original shell curvature (i.e., shallow indentations) on one or both surfaces. Under the microscope, they display a wide variety of states of preservation, ranging from new with fresh-appearing surfaces and translucent white coloration to old and worn with minute crazing and pitting in ivory-colored surfaces. If these items came from a single necklace, and have not suffered differential weathering over the intervening centuries, then it is certain that the artisan collected all the fresh and weathered shell he/she could find to make them. Diameters range from 4.5 to 5.5 mm, and thicknesses from 1 to 2 mm. Though not recorded individually, the suspension holes are 1.5 to 2 mm in diameter.

Guitar-pick beads. In these 44 oval (egg-shaped) beads, the small arc was pointed or rounded (Fig. 40b). The suspension hole is at the large end. The thirty complete specimens measure as follows: length, 7.5-12.5 mm (mean=10.75); width, 7-11.5 mm (mean=9.03); thickness, 0.5-1.5 mm (mean=0.78). Though not recorded individually, the suspension holes are 2 to 3 mm in diameter, a little larger than those of the discoidal beads.

Tubular beads. Four of these beads are long (barrel-shaped or cylindrical with slightly tapered ends), and three are short (finger-ring shape). The three short tubular beads (Figs. 40c-40e) were made by cutting sections from round shells (probably tusk shells) and grinding the edges to smooth them. On two, we can clearly see bidirectional alignment of the laminae along the length of the beads. All three are whole. They measure (length by diameter): 3 by 8 mm, 5.5 by 9 mm, and 4 by 9 mm.

The long tubular beads (Figs. 40f-40g) are barrel-shaped cylinders with both ends slightly tapered. They are made of at least two types of very light to white, exceedingly fine-grained (aphanitic) stone. Two are complete, and two are broken lengthwise. Their dimen-

Figure 40. Ornaments, LA 116471 (Punto de los Muertos): (a) discoidal beads; (b) guitar-pick beads; (c-e) tubular beads; (f-g) long tubular beads; (h) olivella shell beads; (i) rectangular-with-one-end-rounded beads; (j-k) miscellaneous items.

sions are (length by diameter): 8.5 by 9 mm, 9 by 9.5 mm, 10+ by 9+ mm, and 11.5 by 8 mm. These beads are generally shorter than most tubular beads made from bird bones.

Olivella shell beads. Five whole shells were recovered with the spires ground off to permit stringing. One complete, unburned shell (less the spire) measures 15 mm long by 7 mm greatest diameter (Fig. 40h). Another appears to have shattered during manufacture, leaving it a half shell (11.5 mm long, 7 mm diameter, unburned). Two of the five specimens are fragmentary and burned; they may belong to the same bead. The fifth is an unburned spire-end fragment.

Rectangular-with-one-end-rounded beads. Two fragments of freshwater mussel shell are ground to shape with one end squared and the other rounded (Fig. 40i). The suspension hole is at the round end. Both specimens are fragmentary, one missing the distal end, the other split in half lengthwise. Both are about the same size and together suggest a length of 9.5 mm and a width of 6 mm.

Miscellaneous items. Two unique shell ornaments are probably pendants. One is rectangular with small, shallow, incised tick marks spaced along both long edges (Fig. 40j). In this respect, it is reminiscent of a similar ornament recovered from Arroyo Hondo Pueblo near Santa Fe (Venn 1984: Fig. 40, far right). The extreme curvature across the short axis and muscle-attachment ridges on the interior surface indicate that it came from the edge of the valve next to the umbo. The distal end is intact, and the proximal end is broken. It measures 45+ by 12 by 2.5 mm.

The second miscellaneous item is elongate ellipsoidal or parabolic in shape (long, gently tapering with distal end rounded), with the proximal end missing (Fig. 40k). It curves longitudinally, showing the curvature of the valve from which it was cut. It measures 30+ by 8+ by 3 mm.

Materials and sources. The materials and points of origin of the materials used to make the ornaments can be identified in some cases but not in others. The guitar-pick beads, the two rectangular-with-one-end-round beads, and both of the miscellaneous items are made from freshwater mussel shell. Fragments and occasional complete valves of these animals are found in sites in the Pecos Valley. *Cyrtonaias tampicoensis* is one of the more likely candidates (Katz and Katz 1985a). Over 450 fragments of mussel shell were recovered from LA 116471, raising the possibility that these ornaments were manufactured at the site. The discoidal beads are made of shell, but they are too small to permit reliable species identification.

The short tubular beads appear to be made from tusk shells. If so, the beads or the shells from which they were made were traded from the coast of the west Mexican states of Sinaloa, Jalisco, and states further south (Smartt, pers. comm., 1995).

The olivella beads, long familiar to archaeologists of the Southwest and the Plains, would have been traded from the Gulf of California, the Pacific Ocean off the coast of California or Mexico, or the Gulf of Mexico. Evidently at least one species of olivella has now been documented for the Gulf of Mexico (Steele 1987). Olivellas involve a variety of species, some larger and some smaller. The LA 116471 specimens appear to belong to one of the smaller species, but loss of exterior coloration prevents easy species identification.

Manufacturing techniques. The primary shaping technique used to make all ornaments was grinding. The mussel shell items and the discoidal beads probably also required cutting the shells to obtain pieces of appropriate size to start the manufacturing process. Some examples took little effort; removal of the spire of the olivella shell was simply accomplished by rubbing it on a suitable stone. The spire was removed, and a 1-2 mm hole was created. Sometimes a small section of the main body of the shell broke away, leaving a larger, less symmetrical bead.

Suspension holes were drilled from both sides in all discoidal beads and all but one of the tubular beads, with the holes meeting in the approximate center. The result is an hour-glass-shaped hole as seen through the thickness dimension.

The one exception is the tubular or barrel bead from FS 316. We assume that it may have been bidirectionally drilled to create the hole, but that subsequent "filing" with an unknown instrument removed the interior ridge (the "waist" of the hour-glass configuration) and made a smooth, cylindrical hole through the length of the bead. Microscopic longitudinal scratches or incised marks testify to this final step.

The method of making the holes on the guitar-pick beads is unknown because these items are so thin that the technique did not leave a signature, at least not one that we can discern.

Pottery

The pottery assemblage from LA 116471 includes 14 sherds and no whole or restorable vessels (Table 32). Types and wares represented include Chupadero Black-on-white, Lincoln Black-on-red (?), Corona Corrugated, and Jornada Brown. Since few sherds were recovered from this site and since most of them are from painted vessels, it was easy to estimate the total MNVs (minimum number of vessels) for the assemblage.

The possible Lincoln Black-on-red bowl sherd is predicated on the fact that the interior surface color of

Table 32. Pottery and MNV data, Punto de los Muertos

Pottery Type/Group	Number	MNV
Chupadero Black-on-white jar	8*	1 or 2
Lincoln Black-on-red (?) bowl	1	1
Corona Corrugated	1	1
Jornada series plain brown ware		
Jornada Brown	3	3 (?)
Jornada/South Pecos Brown	1	1
Total	14	7 or 8

* One sherd was used as a reamer.

this specimen is Munsell 2.5YR 5/4 (reddish-brown) and the thickness is 6 mm. These attributes are more reminiscent of Lincoln than of Three Rivers Red-on-terracotta. The sherd lacks the painted decoration necessary for settling the question.

Given the few sherds recovered, a surprisingly large number of vessels is represented. The MNV assemblage comprises one or two water jars, one food service bowl, and three to five cooking and storage vessels.

Chipped Lithic Manufacturing Debris

The following material by-products (broken bifaces, cores, flakes, shatter) from manufacturing chipped stone artifacts were found at LA 116471.

Bifaces. Thirty artifacts represent both roughly formed and relatively finely shaped bifacial artifacts that occur in small and large sizes. Because we have only two bifaces that are complete or nearly so, the size categories are somewhat arbitrary (Appendix 5).

Among the small bifaces, some appear to be early-stage or late-stage preforms for projectile points; these are described individually as roughouts and arrow point preforms. Large bifaces may have been intended as knives or the like, but they are too fragmentary for us to be certain. Only one large biface (FS 330a/365/379a) is sufficiently complete to warrant description. Some biface fragments are too small to assign to a size category and are included in the indeterminate category. Only the large biface described below appears to be made from nonlocal material.

Biface 202 (see Fig. 39q) is a small biface called a "roughout" by some archaeologists. This early-stage biface was made from a small concretion trimmed to a thick lozenge shape. The important distinction here is that this item was made from a natural unit, not a flake. Because concretions tend to be more round than tabular, the cross sections of roughouts, and the finished projectile points, are thick relative to their widths.

Virtually identical artifacts were recovered from the Neff site (LA 5863), an arrow point manufacturing site on the Rio Felix 80 km northwest of LA 116471 (Wiseman 1971). The arrow points made from the Neff site roughouts are reminiscent of Livermore points as depicted in Turner and Hester (1993). Is this the projectile point style the LA 116471 knapper intended to make from Biface 202? Or is it simply the predictable first-stage biface derived from small cherty concretions so common in some parts of the San Andres geologic formation? I suspect the latter but am intrigued by the former possibility because of the implied relationship with peoples from the Trans-Pecos region to the south.

At the annual meeting of the Society for American Archaeology in New Orleans in 1977, Susan Applegarth (1976) suggested on the basis of the large number of Livermore-like arrow points she recovered from the Richard Brown site and Roberts Rockshelter in the Guadalupe Mountains that some people from the Trans-Pecos region of West Texas had moved north to the Guadalupe Mountains.

Continuing this idea, I have often wondered if the Neff site represents a more northerly penetration of those same people. Livermore-like points have been found throughout the region, but even in the large private collections they usually represent only a very small fraction of the total collections. In contrast, Livermore-like points constitute major portions of Applegarth's assemblages and are the only form at the Neff site.

Biface 193 is a small, thin, triangular arrow point preform (see Fig. 39r). This particular size and shape of artifact is a common find in Lincoln phase farming-village sites of the Sierra Blanca. Some archaeologists also assume it to be a finished arrow point called Fresno (Turner and Hester 1993). This shape of preform, when side-notched, would result in a Washita or Harrell point, depending on the final form of the base.

Biface 335 is another artifact that, if a preform, may represent arrow point manufacture at LA 116471 (see Fig. 39s). The markedly rounded base suggests that the finished point would have been corner or diagonally notched, with a resulting shape similar to, or perhaps a little longer than, the specimens recovered from Sitio Creston (LA 4939; Wiseman 1975). Sitio Creston, a stone-enclosure site near Las Vegas in northeastern New Mexico, is believed to date about A.D. 1000 or 1050 to 1150.

The remaining 27 items represent every conceivable portion of a biface--bases, tips, midsections, lateral edges, basal corners, and wedge-shaped sections. Fragmentary as it is, this assemblage suggests a variety of shapes, indicating a general lack of standardization of this artifact class. Although this variation may in part represent different tool types or intended tool types, we

suspect that part of the variation was also induced by the sizes and diverse shapes of the available raw materials. Evidently, FS 382 is the largest biface in the collection (see Fig. 39t).

Two different bifaces are each represented by multiple pieces that fit together. One of these, Biface 330a/365/379a, is sufficiently complete to reveal its original shape--elongate triangular with a straight base (with generously rounded corners) and rounded tip (see Fig. 39u). This item is well flaked and may be a finished tool, possibly a knife. The lateral edges are fairly dull, but we are not certain whether this is use-wear or edge-grinding for further biface reduction. The evenness of the dulling along both edges for their entire remaining lengths suggests edge-grinding.

Biface 330a/365/379a is made of a highly distinctive chert that is probably nonlocal in origin. It has a very dark red ground mass with numerous multiangular white cherty inclusions and very subtle, profuse, black speckles that occur in both the ground mass and in the white inclusions. The effect is reminiscent of cherts having igneous origins, though we do not know of a specific source for this particular material. The fragments of this artifact came from the fills of Feature 1, 41N/2W, 41N/2E, and 42N/1E.

The two fragments of Biface 305b/367a comprise a section of one lateral edge of the artifact. They came from Feature 1, 44N/2W and 41N/1E.

Debitage. Cores, flakes, shatter, and pieces of material constitute the bulk of the artifacts recovered from Punto de los Muertos (Table 33). The analysis of these materials, following the standard analysis I have used in the Roswell region over the past 20 years, focuses on reconstructing the lithic technology and the identification of materials and sources. Descriptions and discussions of the gray chert sourcing study and a model of core-reduction technology believed to apply to the Roswell region can be found in Wiseman (2002). The cores, core-reduction flakes, biface-thinning flakes, and exotic materials are described below. Pieces of debitage bearing use-wear or intentional retouch are described in the section on tools.

Cores. The 31 cores include six subtypes (Table 33). The single-platform core is the most common, followed closely by the flake core. Materials are varied but are dominated by local gray chert, with good representation of siltites and quartzites (Tables 34 and 35). The sizes of the cores as a group vary (Table 36), and all dimensions are significantly correlated. However, among these correlations, length to width is strongest at .9008. Length to thickness is relatively weak at .6836. Thus, as a group the cores are fairly well controlled in their morphology, suggesting a reasonable degree of flake standardization. The four heat-treated cores constitute 13 percent of the core assemblage (Tables 34 and 35).

Core-reduction flakes. Less than one-third (N=887) of the 2,541 core-reduction flakes are complete. Summary statistics indicate that, on average, they are quite small, somewhat longer than wide, and light (2-3 g) (Table 37). A Pearson correlation matrix (2-tailed) indicates that, although all the values are significant, the flake dimensions are not especially strongly correlated (low 0.8s to mid 0.7s), suggesting generally poor standardization of shapes (Table 37).

Table 33. Lithic manufacturing debris, Punto de los Muertos

Type of Debris	Number	Percent
Cores	31	1.0
Single platform	13	0.4
Two platforms adjacent	5	0.1
Two platforms parallel	1	<0.1
Three platforms	-	-
Tested cobble/pebble	1	<0.1
Flake core	10	0.3
Indeterminate	1	<0.1
Flakes	2860	83.5
Core reduction	2541	74.2
Biface thinning	109	3.2
Notching	1	<0.1
Platform rejuvenation	1	<0.1
Decortication	20	0.6
Platform preparation	8	1.6
Potlid	55	0.2
Indeterminate	125	3.7
Shatter	531	15.5
Total	3422	100.0

The primary materials of the core-reduction flakes are local cherts (Tables 34 and 35). Siltites and quartzites run a distant but firm second. Heat treatment was used with some frequency, and the total positive and "possible" cases total 18 percent. Single flake-scar platforms are the most common, accounting for just over half of the flakes (Table 38). Nearly two-thirds of the flakes have feathered or modified-feathered terminations. Over 70 percent of the complete flakes lack dorsal cortex, and 7 to 8 percent of them have 51 percent or more cortex.

Biface-thinning flakes. The 109 biface-thinning flakes represent nearly 4 percent of all flakes (but just over 3 percent of all debitage). Nearly 80 percent are of local gray cherts, and an additional 10 percent are of other, probably mostly local cherts. Nearly 40 percent are heat-treated. This figure is so much higher than for cores, other flakes, and shatter that it appears highly likely that heat-treating was conducted most often on

Table 34. Lithic debitage classes, Punto de los Muertos (frequency)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	15	1427	84	159	375	2060
Other chert	2	220	11	22	33	288
Chalcedony	3	89	8	10	35	145
Limestone	-	-	-	-	-	0
Siltite/quartzite	11	740	2	12	78	843
Other	-	65	4	5	10	84
Total	31	2541	109	208	531	3420
Heat Treatment						
No	24	1762	33	71	311	2201
Yes	4	282	41	41	63	431
Possibly	-	163	-	53	74	290
Indeterminate	3	334	35	43	83	498
Total	31	2541	109	208	531	3420

Table 35. Lithic debitage classes, Punto de los Muertos (percentage)

	Cores	Flakes			Shatter and Other	Site Total
		Core-reduction	Biface-thinning	Other		
Materials						
Local chert	48	56	77	76	71	60
Other chert	7	9	10	11	6	8
Chalcedony	10	3	7	5	6	4
Limestone	-	-	-	-	-	-
Siltite/quartzite	35	29	2	6	15	25
Other	-	3	4	2	2	3
Total	100	100	100	100	100	100
Heat Treatment						
No	77	69	30	34	58	63
Yes	13	11	38	20	12	13
Possibly	-	7	-	25	14	9
Indeterminate	10	13	32	21	16	15
Total	100	100	100	100	100	100

Table 36. Complete cores, Punto de los Muertos

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
All Cores				
Mean	41	33.04	19.96	47.01
SD	14.45	11.53	10.52	70.32
Range	56	50	44	312
Number	27	27	27	27
Flake Cores				
Mean	48.6	36.3	19.3	58.02
SD	16.26	13.6	10.98	94.17
Range	47	42	40	305.3
Number	10	10	10	10

Correlation Matrix of Dimensions (Pearson's r, 2-tailed test)				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
All Cores				
Length	1			
Width	.9008*	1		
Thickness	.6836*	.7998*	1	
Weight	.8330*	.8785*	0.859	1
Flake Cores				
Length	1			
Width	.9029*	1		
Thickness	.7549*	.8838*	1	
Weight	.8237*	.9220*	.9668*	1

* Significant at .001 level.

Table 37. Complete core-reduction flakes, Punto de los Muertos

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	16.18	14.7	4.31	2.85
SD	10.56	9.09	3.49	8.24
Range	72	66	23	93.9
Number	878	878	878	878

Correlation Matrix of Dimensions (Pearson's r, 2-tailed test)				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Length	1			
Width	.8001*	1		
Thickness	.8319*	.8398*	1	
Weight	.7414*	.7588*	.7644*	1

* Significant at .001 level.

Table 38. Core-reduction flakes, Punto de los Muertos

Attribute	Number	Percent
Platform Types		
Cortex	76	9%
Single flake scar	481	54%
Multiple flake scar	67	8%
Pseudo-dihedral	14	2%
Edge/ridge-like remnant	141	16%
Pointed	44	5%
Destroyed	61	7%
Indeterminate	2	<1%
Total	886	100%
Distal Termination Type		
Feathered	459	52%
Modified feathered	93	10%
Hinged or stepped	327	37%
Indeterminate	7	1%
Total	886	100%
Dorsal Cortex		
0%	621	71%
1-10%	48	5%
11-25%	74	8%
26-50%	66	8%
51-75%	25	3%
76-90%	21	2%
91-99%	16	2%
100%, including platform	3	<1%
Total	874	100%

bifaces in preparation for final reduction to the finished artifact form.

If we also compare this figure with the broken bifaces, we find that only 3 of 30 (10 percent) of the bifaces may have been heat-treated (Appendix 5). We suspect that the discrepancy indicates that more heat-treated bifaces were successfully completed into finished artifacts and that the non-heat-treated bifaces ended more often in failure.

Exotic lithic materials. Lithic materials known to have originated or suspected of originating from sources outside southeastern New Mexico are present but relatively rare in the Punto de los Muertos assemblage. These include 11 pieces of Edwards chert from central or west-central Texas, seven pieces of possible Edwards chert, one piece of Alibates material from the Texas Panhandle, one piece of possible Alibates material, one piece of possible Tecovas chert from the Texas Panhandle, and three pieces of clear black obsidian. The obsidian is probably from the Jemez Mountains of north-central New Mexico or the Rio Grande gravels in the Las Cruces area of south-central New Mexico.

Together, these 24 pieces constitute 0.7 percent of the total debitage assemblage. Basically all of these items came from the fill of the rock feature or the modern ground surface within a few meters of it.

The 11 Edwards chert pieces include seven core-reduction flakes, two biface-thinning flakes, one possible biface-thinning flake, and one indeterminate flake fragment.

The seven possible Edwards pieces include six core-reduction flakes and one indeterminate flake fragment.

The piece of Alibates material is a biface-thinning flake from Feature 1. The piece of possible Alibates material is a core-reduction flake that came from the same square in the rock feature as the Alibates flake.

The possible Tecovas piece is shatter. It came from a square in the rock feature that was adjacent to the one that produced the Alibates and possible Alibates flakes. Thus, all three could have come from the same larger piece of Alibates material or Tecovas chert, since the two materials are sometimes quite similar in appearance.

The three obsidian pieces include two core-reduction flakes and one possible biface-thinning flake. Two came from the fill of the rock feature, and the third came from the modern surface 15 m south of it.

Local gray chert study. The results of this study are presented in a separate section elsewhere in this volume.

Faunal Materials

Large numbers of animal bone fragments were recovered from throughout the fill of the rock feature. The 8,000+ specimens, representing at least 18 species and a number of more general taxa, are described and discussed by Nancy J. Akins elsewhere in this report.

Plant Remains

Virtually all of the plant remains recovered from Feature 1 are vestiges of fuelwood. These are described and discussed by Pamela McBride elsewhere in this report.

Human Remains

Numerous fragmented human bones were recovered from throughout the fill of the rock feature. In addition, following a report of human bone observed at the site in previous years by a local person, we searched for a possible burial location within the southern part of the rock feature. We found three small pieces of human bone lying on sterile deposits that might have constitut-

ed a burial (designated Feature 2; Fig. 41). These pieces were not burned, lending credence to the idea that a formal burial was exhumed by the vandals. However, other than the three small bone fragments, we have no other evidence that this was the location of a specific burial. Thus, the three bone fragments are included with the much larger volume of material from the rock feature in Nancy J. Akins's description and discussion in another section of this report.

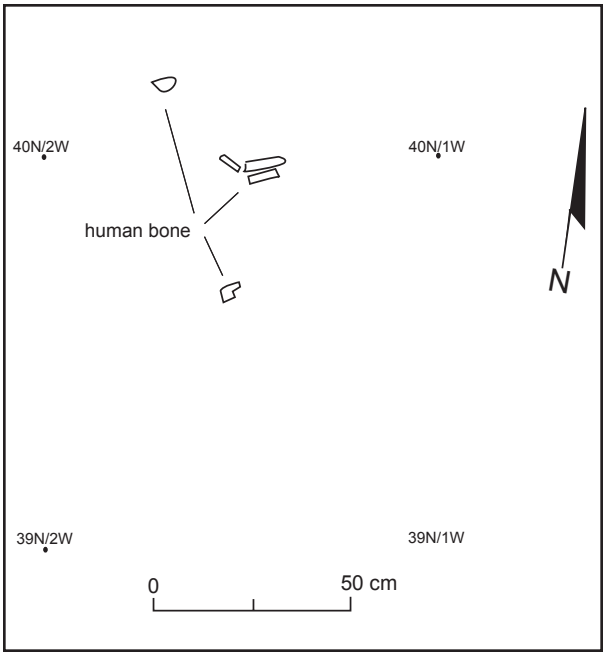


Figure 41. Feature 2, inhumation, LA 116471 (Punto de los Muertos).

Discussion

Punto de los Muertos has produced a curious combination of data that, as far as I know, has not been previously reported for southeastern New Mexico. These data are connected with the rock feature (Feature 1), the original configuration of which is unknown, with its organically stained trash fill (including large quantities of burned and unburned rocks of greatly varied sizes and shapes, animal bone, human bone, ornaments, pieces of chipped lithic debris, and a few artifacts); three mortar holes; and a fairly large surface artifact scatter (mostly lithic artifacts but some pottery sherds).

Radiocarbon assays and the artifacts indicate the site was used on at least three different occasions. The earlier one, during the Late Archaic period (ca. 1300 B.C. to A.D. 1), was probably episodic; the second was during the Transitional Archaic (sometime between A.D. 1 and 400); and the last was during the Late Prehistoric period (about A.D. 1000 or later).

We have been unable to get a clear idea of what the rock feature looked like before the vandalism that took place 30 years ago. Was it ring-shaped? Was it domed? Did it have standing slabs? Was it covered with earth, or was the rock fully exposed? A large number of unburned rocks and fill had been piled up around the periphery by the vandals, obscuring the original configuration of the feature. A number of small burned and fractured rock fragments exactly like those of annular or ring middens were also present, especially within the disturbed fill inside the feature. Most of the bottom exposed during our excavations was soft caliche. But in the eastern part, in the vicinity of the fence and the east limit of the feature, the bottom was composed of horizontal slabs of limestone bedrock. Neither the bedrock nor the caliche showed evidence of fire.

Also, in the eastern part of the feature, a single long rock slab was set vertically in a manner that was initially led us to believe it was a door jamb. However, this interpretation became suspect before excavations were completed because the east "wall" of the rock feature was found to be composed of numerous small rocks piled on top of bedrock. Some of the rocks were classic burned rocks (as in ring middens), and others were unburned blocky and tabular fragments. The pile simply was not convincing as a wall. However, this does not necessarily mean that it was not a wall. Equally discomfiting, the presumed "doorstep" next to the slab lacked the smoothing of wear from human feet. Since that particular piece of limestone bedrock was relatively soft and had a gritty surface, it should have readily shown such wear. Thus, we do not know whether the rock feature was some form of structure (stone enclosure?) or some sort of mound.

What we do know is that the fill of the rock feature contained large numbers of rocks, comparatively small amounts of fill, few artifacts and artifact manufacture debris other than ornaments, and large numbers of human and animal bone fragments. While it is possible that some of these rocks did not originate within the feature (i.e., could have originated elsewhere and been thrown into the holes dug by the previous diggers), we suspect that most or all were an integral part of the fill.

It is virtually certain that at least part of the contents of the rock feature resulted from the disposal of refuse by some prehistoric group. The large numbers of animal bones, smaller amounts of chipped lithic debris, and several types of artifacts constitute typical habitation and/or camping debris. Are some or all of the burned rocks mentioned above part of this refuse? We will probably never know if the deposition of this refuse took place before or after the construction of the rock feature, again because of the vandalism that mix-mas-

tered the feature before our work at the site.

We know from an eyewitness report that human bones were recovered by the vandals and left piled alongside the pit from which they evidently had been taken. No bones were present on the surface at that location when we started our investigations, and we are left to assume that those bones probably constituted a burial. The witness had clearly seen burials dug from other sites in the region and probably was correct in his assessment. During our work near where the witness said he saw the bones, we found three small unburned fragments of human bone, all evidently in original context at the bottom of a pothole. A small paint brush left by the looters was also at the same level and within 20 to 30 cm of one of the bones. Thus, we are confident that at least one burial (Feature 2) had been made in the fill of the rock feature. Were there more?

The amount of burned human bone recovered from the rock feature is perplexing. We have no direct way, or even a reasonable indirect way, of readily interpreting these remains without a detailed, documented context. Akins (this volume) discusses the taphonomy of the bones, suggesting that it is unlikely that cannibalism was responsible for their condition. One of the more likely explanations is that the rock feature was a burial mound. In this scenario, the habitation refuse presents a problem, as discussed below.

The problem is, no burial mounds containing multiple interments have been reported for southeastern New Mexico. As pointed out by Akins (this volume), burials of various sorts, including inhumations, cremations, and even bundle burials are known in the region. These include burials of one or two individuals. At least one cave in the Guadalupe Mountains, Cremation Cave (Mera 1938), appears to have been used solely for burial and thereby parallels the idea of a burial mound or cemetery. Village sites with substantial architecture, such as the Glencoe phase Bonnell site (Kelley 1984) and the Lincoln phase Smokey Bear ruin (also known as Block Lookout site; Wiseman et al. 1976; Kelley 1984) in the Sierra Blanca country northeast of Carlsbad also contain large numbers of burials. However, since these were villages, and burials were interred virtually anywhere (i.e., below floors, in the fills of abandoned rooms, in extramural areas, etc.), they do not constitute formal cemeteries as such. As used here, the term "cemetery" follows the modern concept of a place set aside strictly for the burial of the dead.

At least two types of locations used specifically as cemeteries have been documented in West Texas. One is an actual mound, several of which were excavated near Abilene, Texas, during the first half of the twentieth century. These may be the closest analogs to the rock feature at Punto de los Muertos. The other is the "shaft tomb," a natural, vertical cave in karstic topography used to dispose of bodies (Turpin 1988; Bement 1994). Both types of cemeteries are discussed below. Horizontal caves are also a well-known place of burial for the ancients, but because many of them were also habitations, they are also less clearly cemeteries of the sort being considered here. Cremation Cave in the Guadalupe Mountains is an exception.

Cyrus Ray and his associates unearthed a large number of prehistoric burials from numerous mounds or "cairns" in the Abilene region of west-central Texas (Ray 1931, 1932, 1933, 1936, 1937, 1939, 1946; Morrow 1936; Forrester 1951; summarized by Boyd 1996). Abilene is 400 km (250 mi) due east of Carlsbad. The burial mounds were often situated on prominent hills and points of land that yielded good views of the surrounding terrain. One or more mounds could be present at a given location. Evidently, the mounds occur in a variety of situations with respect to other types of sites--as isolates, as peripherals, and as features within sites. Each mound contained from one to five individuals, apparently of all ages and both genders. Some individuals clearly suffered violent deaths, but others did not. Most, if not all, appear to date to the Terminal Archaic and/or Late Prehistoric I periods, or from about the time of Christ to as late as A.D. 1200.

Although it is not always clear, most, if not all, of the burials were in pits in the ground, some of which had been dug into bedrock. Some bodies were in elaborate rock tombs, but others were not. All were covered with one or more large, horizontal limestone slabs. Rocks were usually piled above the horizontal slabs, in some cases with the rocks set on edge and packed so tightly together that it was difficult to pry them out during excavation. Evidently, the rocks protruded onto the surface, forming an actual mound. But, through time, many mounds became partly buried by eolian sediments trapped by the rocks. Some of the multiple-grave mounds were ringed by low stone "fences" set partly into the ground.

The bottoms of the graves ranged up to 1.5 m below the modern ground surface. The horizontal dimensions of the mounds were as little as 2 m, and for the largest multiple-grave mounds, as much as 6 m across.

Descriptions of mound fills are generally lacking. One exception, near Colorado City (300 km east of Carlsbad), Texas, is characterized as a large camp with numerous mortar holes in boulders and rock outcrops (Ray 1936). The summit of a "small mountain or high hill [that] rises abruptly" near the mortar site had a rock burial, the fill of which is described as "black." The wording implies that the fill above the actual burial chamber (of a cremation) was also black. Other materials such as artifacts and animal bone are not specifical-

ly mentioned in the fill.

In some cases, burial of several individuals at the same location took place as a single event. In others, the burials were made at different times, resulting in what can be legitimately called cemeteries. In these cemetery mound sites, the alignments of the individuals and the distances between them suggest multiple burial events. In graves where two bodies are present, one above the other, the individuals could have been buried at the same time or different times.

Within a mound, the treatment of the body was not necessarily consistent for all individuals. For instance, a single grave or cemetery may contain only inhumations, or only cremations. However, mixed treatments--inhumations and cremations, inhumations and bundle burials, and occasionally all three types in the same mound--were also found.

Most mound burials lacked funerary offerings. When offerings did occur, they most often consisted of a few bone awls, metapodial elements suitable for making awls, and freshwater mussel valves (Boyd 1996). The valves are often unmodified, but some were perforated in various ways, probably to be worn as ornaments. Rare burials, such as one cremation described by Ray (1936) for the Colorado City area, produced large numbers of objects, including dart points, long serrated arrow points, mussel-shell ornaments, oval stone ornaments, small round pebbles, lunate stones with scalloped edges, a fragment of a Harahey or beveled knife, and mussel valve fragments.

According to Boyd (1996), the evidence of violent death exhibited by certain individuals in this series of burials includes probable cut marks in the wrist area, missing hands, missing feet, burials of crania only, skeletons without heads, missing jaws, burned jaws evidently strung as necklace ornaments, partially burned bones (individuals burned in their houses?), the presence of both whole and impact-fractured projectile points, and even projectile points imbedded in bones. While some of these criteria are arguable as indicators of violence, he concludes that death through violence was relatively common during the Terminal Archaic and Late Prehistoric I periods on the Southern Plains.

In all of this, Boyd (1996) does not tackle the question of why so many methods of disposing of the dead can be present in one grave or cemetery or region. He does mention that most burials were inhumations and that bundle burials and cremations are not common anywhere within his study area.

Varied mortuary treatments also occur among sinkhole burials farther south in Texas. Bement (1994), in his study of Archaic period mortuary practices, analyzes the remains of 62 individuals recovered from one sinkhole that included all age groups and both genders. These burials had been made over a period of approximately 6,000 years, from 6000 B.C. to the time of Christ. Bement seems to favor the idea that the method of mortuary treatment was not related to the status of the individual, but rather to mobility and the scheduling of movement across the landscape:

> On the one hand, the theoretical perspective, that observed differences in the handling of the dead equate to the different social positions or personas of the deceased (Binford 1971), would imply that the sinkhole populations contained individuals of various statuses. Alternatively, different treatment of individuals could be determined in relation to mobility strategies and settlement scheduling (Charles and Buikstra 1983:132; Jirikowic 1990). In these cases, whether an individual was cremated, bundled, or left articulated was determined by the time and distance remaining before the next scheduled stop at the mortuary or aggregation site. (Bement 1994:118)

While I am attracted to the latter proposition and its implied sense of hunter-gatherer territoriality, Alvar Nuñez Cabeza de Vaca made an observation important to this discussion during his trip through Texas in the 1530s (Covey 1997:61). While among certain Gulf Coast tribes (part of the Karankawa group), he noted that all people but shamans were inhumated. Shamans were cremated. Thus, at least in some Texas groups, individuals were accorded different mortuary treatment because of "status" differences. In this case, I suspect, cremation of shamans probably came about because of their powers. If Karankawa shamans were viewed by their people as many shamans are viewed worldwide, their power could be used for witchcraft as well as curing, divining the future, and/or protecting the people from enemies. The shaman's death might release that power to commit evil unless his body were cremated. Cremation, then, might have been the way to control or destroy that power forever. See Darling (1998) for a detailed discussion of witches in the Southwest.

So what do these ideas and observations from the Abilene, Colorado City, San Angelo, and the Texas Gulf Coast regions have to do with Punto de los Muertos? Maybe nothing. But then, interesting similarities do exist between or among all of the regions, including southeastern New Mexico. This should not be surprising, for all of the regions exclusive of the Texas Gulf Coast lie within the Southern Plains culture area or along its periphery.

Similarities and potential similarities in the treatment of human remains among these regions and Punto de los Muertos include:

1. Burial location on a prominence near a major site. In the case of Punto de los Muertos, the large site is on the valley floor adjacent to the hillock where the site is located.
2. Large, unburned rock slabs associated in a low mound that covers/contains the human remains.
3. Evidence of inhumations and possible cremations (and bundle burials?) at the same locus.
4. Use of the rock feature over a long period of time, in this instance, from about 1300 B.C. to about A.D. 400.

Dissimilarities include:

1. At Punto de los Muertos, cultural trash containing large amounts of animal bone fragments (representing numerous species), lithic manufacture debris, and some burned rock in organically stained, dark gray fill in the possible "burial mound."
2. At Punto de los Muertos, generally similar characteristics shared among the animal bones and the human bones with regard to degrees of burning, fragmentation, and other taphonomic processes.

The "fit" between the rock feature at Punto de los Muertos and Cyrus Ray's Abilene burial mounds is certainly not perfect, but it has possibilities. The one vexing aspect is that the numerous animal and human remains are very similar in degree of burning and fragmentation. We believe that a number of scholars (e.g., Turner and Turner 1999) would take one look at the data as we currently know them and surmise that they constitute good evidence of cannibalism.

Bahn (1992) explicitly states that one of the strongest cases for cannibalism would be an instance just like that posed by the Punto de los Muertos materials. That is, are the human remains part of a "normal" midden, intermixed with numerous animal bones and otherwise treated like refuse? If so, he believes the case for cannibalism would be strengthened. Because of the vandalism of the rock feature before our project, we do not know how the animal and human remains related spatially and depositionally to each other within the fill. Certainly, the few dates run on both human and animal bones indicate contemporaneity in part. Thus, the possibility of cannibalism remains unresolved. Given the ardor of the debate among archaeologists as to whether cannibalism did or did not occur in the prehistoric Southwest, the conditions under which cannibalism might have occurred, and the criteria that are most appropriate for demonstrating or refuting the proposition, this situation is most unfortunate.

Postscript

Since the draft of this report was completed, a separate paper on Punto de los Muertos was written and published (Wiseman 2003). In that paper, some of the details reflect more recent thinking about this site and therefore differ from those presented here. Thus, the interpretations in that paper should be considered the "final" word.

LOCAL GRAY CHERT STUDY

R. N. Wiseman and Byron T. Hamilton

Many researchers use ultra-violet light to characterize knapping materials in an effort to relate these materials to possible source areas (see M. J. Hillsman's section entitled "Previous Research" in Wiseman 2000a). Recent studies in southeastern New Mexico have shown that cherts presumed to derive from the vast outcrops of the San Andres formation respond in ways that might be attributed to more or less specific locales within the region (see Wiseman 2000a). The assembly of a data base to investigate this proposition is just beginning, but the results to date are promising.

The method is applied only to those flakes and other types of debitage after the probable and possible examples of Edwards chert have been identified and removed from the assemblage. It divides responses of the presumed locally derived gray chert flakes to ultraviolet stimulation into four categories: no response (velvety dark purple to black), warm (dark brown), medium (amber), and bright (vibrant orange or yellow).

The numerical figures for each category are then converted to percentages and plotted on a tripolar graph. The no-response values are plotted along the A axis, and the warm-response values are plotted along the B axis. Because the medium category usually has few responses and the bright category has only rare responses (in the case of the sites of the current project, no bright responses), the values for these two categories are combined for plotting along the third axis. The results can then be compared to results from other sites in the region.

Figure 42 presents the results for the Roswell South sites (see Table 39 for data). Rocky West, Site 9, and Punto de los Muertos fall within the heavy oval line encompassing the sites within the Berrendo drainage on the north edge of Roswell; the Dunahoo Hills sites (Corn Camp and La Cresta) 9 km north-northeast of Roswell (but west of the Pecos River); and River Camp, 12 km northeast of Roswell (on the east bank of the Pecos River). These sites include a milling site (bedrock metates and mortars), a large camp, a small camp, a trading (?) camp, and a quarry with minimal evidence of overnight (?) camping.

Site 7 does not cluster with the other sites, nor does it cluster with the other three sites for which we have data. In terms of no-responses, Site 7 is most similar to the Bob Crosby Draw site, east of the Pecos River and 13 km northeast of Roswell. Bob Crosby Draw is a large multicomponent camp with occasional structures. However, Site 7 has almost no medium or bright responses.

The Site 7 assemblage results are also fairly similar to those for the Rocky Arroyo site but less so to those from the Fox Place. Both sites, located on the southwestern outskirts of Roswell, are pithouse villages, the former evidently of Jornada-Mogollon farmers, and the latter of hunter-gatherers.

These results indicate that the inhabitants of Rocky West, Site 9, and Punto de los Muertos obtained their gray chert from a source of low-response chert in an area of unknown extent southwest of Roswell. Sites with high percentages of no-response chert tend to be short-term occupations. The inhabitants of Site 7 evidently collected their chert from a place similar to that used by the people from Rocky Arroyo (north) and the Fox Place, both habitation sites. Is this kind of source the signature of more settled groups, or at least sites where larger numbers of people spent more time? Or perhaps a source of chert in the vicinity of Rocky Arroyo (north) and the Fox Place has a slightly different composition.

In all of this, the Bob Crosby Draw site is probably enigmatic and therefore does not fit what might be the emerging profile as just outlined. As discussed by Wiseman (2000a), a case can be made that the inhabitants of Bob Crosby Draw may have been slightly different culturally (more nearly Southern Plains in character) than the inhabitants of the other sites in the present study. The excavations at this site produced a higher percentage of Edwards chert and other things that set it apart.

Table 39. Response of local gray chert to ultraviolet light (percentage)

Site	None	Warm	Medium	Bright	Number
Rocky West	99	<1	<1	0	445
Site 7	75	22	3	0	146
Site 9	88	11	1	0	151
Punto de los Muertos	95	4	1	0	2407

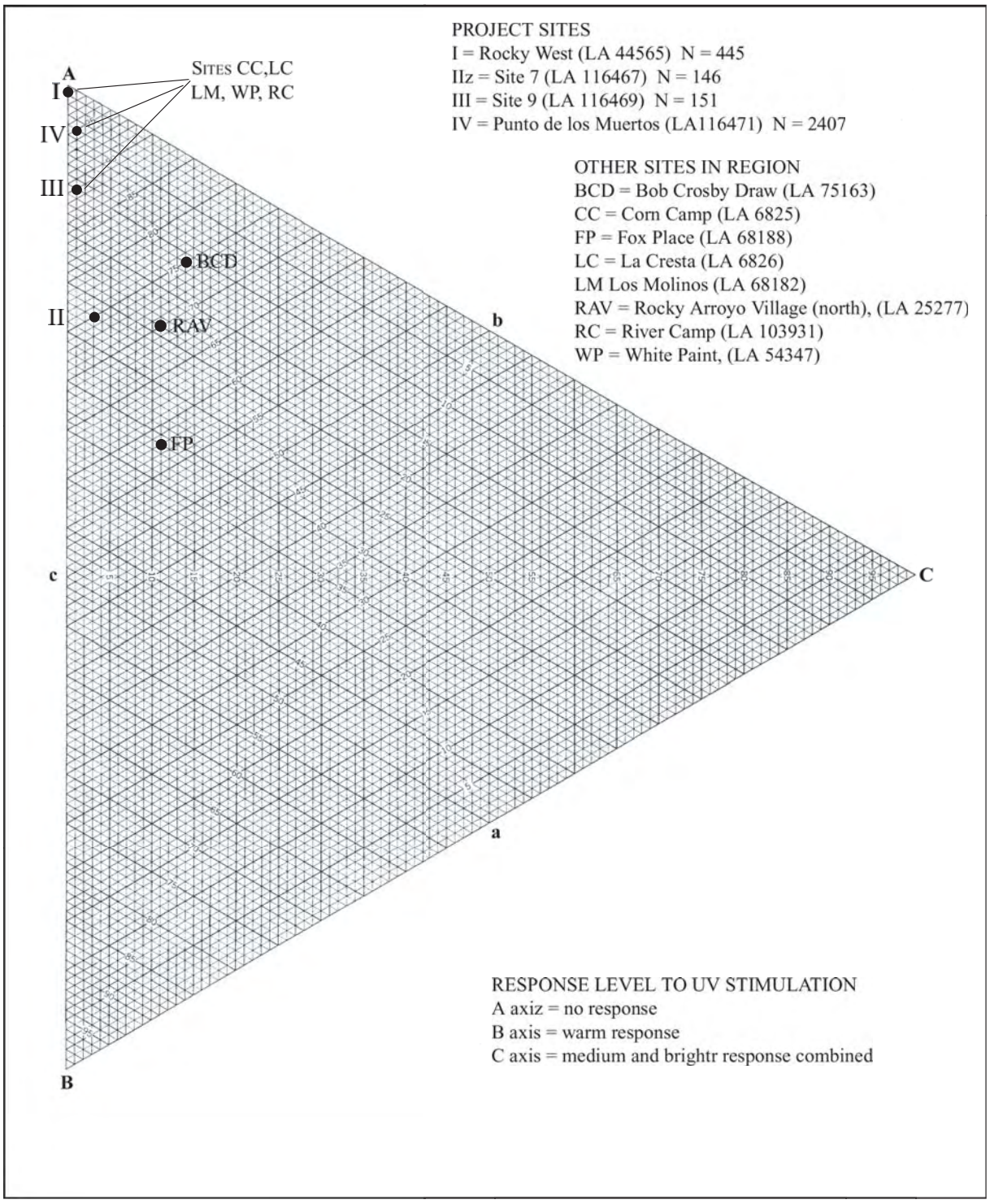


Figure 42. Tripolar plot of local gray chert assemblages.

FLOTATION SCAN ANALYSIS AND SPECIES COMPOSITION OF CHARCOAL SAMPLES

Pamela J. McBride

Radiocarbon samples collected from the fill of several hearths and a pit (LA 44565, LA 116467, and LA 116471) and Feature 1 at LA 116471 were submitted for species identification. Flotation samples from all contexts at LA 44565, the hearth at LA 116467, Features 2-5 at LA 116469, and two samples from Feature 1 fill at LA 116471 were scanned for charred plant remains. The occupations of these sites date from the Archaic to the historic periods.

Sites are in various locations from the north edge of Carlsbad on the Pecos River (LA 116471) to 15 miles north of Carlsbad (LA 44565) on Rocky Arroyo (a tributary of the Pecos). LA 116467 and LA 116469 are 15 miles south of Roswell in the heart of Chihuahuan semidesert grassland (Brown 1994), about 8-10 miles west of the Pecos River. LA 44565 and LA 116471 are in the Chihuahuan desert scrub biotic community (Brown 1994), where mesquite (*Prosopis glandulosa*), creosotebush (*Larrea tridentata*), and acacia are the dominant shrub species. Yucca (*Agave lechuguilla*), prickly pear cactus, and condalia (*Condalia* sp.) are a few of the many other species that occur in this plant community.

Today, salt cedar (*Tamarix chinensis*) is the dominant tree species growing along the banks of the Pecos River, but before the introduction of such exotic species, riparian species like cottonwood and willow would have been common. Grama (*Bouteloua* sp.), three-awn (*Aristida* sp.), curly mesquite (*Hilaria belangeri*), and vine mesquite (*Panicum obtusum*) are some of the many grass species that grow in the semidesert grassland community. Yucca, agave, beargrass (*Nolina* sp.), mesquite, and Mormon tea (*Ephedra* sp.) are among the representative shrubs and leaf succulents present.

Radiocarbon Analysis

Charcoal specimens examined prior to submission for radiocarbon dating were examined by snapping each piece to expose a fresh transverse section and identified at 45x. All charcoal from each provenience was identified and separated by taxon with the exception of very small fragments of charcoal that were impossible to identify. Charcoal from each taxon identified was weighed on a top-loading scale to the nearest one hundredth of a gram and placed in labeled foil packets. Low-power, incident-light identification of wood specimens does not often allow species- or even genus-level precision but can provide information that is useful in distinguishing broad patterns of utilization of a major resource class.

Flotation Analysis

The ten soil samples collected during excavation were processed at the Museum of New Mexico's Office of Archeological Studies by the simplified bucket version of flotation (Bohrer and Adams 1977). Volumes of flotation samples ranged from 2.3 to 6.7 liters. Each sample was immersed in a bucket of water, and a 30-40 second interval was 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.

In scanning, flotation samples are first separated by screening into major particle-size categories using a series of nested geological screens (4.0, 2.0, 1.0, and 0.5 mm mesh), and then reviewed under a binocular microscope at 7-45x. Scanning involves full sorting of material larger than 2.0 mm and most material larger than 1.0 mm. Corn kernels and cob fragments (relatively common in flotation samples) and bean and squash remains (relatively rare in flotation samples) are almost entirely restricted to these two screen sizes, so that scanning provides a reliable view of the presence or absence of cultivated taxa. Wild taxa recovered in these larger screen sizes may include twigs and seeds or berries from shrubs or trees, large seeds from perennial species like yucca or squawberry, and grass and weed seeds with particularly large seeds, such as ricegrass and beeweed. Most annual weed seeds are caught in the 0.5 mm screen, which is usually examined partially in the scanning procedure.

Scanning accurately picks up higher-frequency weed taxa such as the chenopods, pigweed, and purslane. Among particles smaller than 0.5 mm (not examined in a scan sample), botanical remains are often completely absent or else consist of fragments of seed types encountered in larger screens. Rarely, low frequencies of small seed types, such as tansy mustard or dropseed, will occur in the smallest screens without also occurring in the larger screens. For the time invested, then, scanning provides relatively reliable data on the presence or absence of species, as well as general information about relative quantities of specific taxa and about whether carbonized specimens are present. Indicators of post-depositional disturbance (modern roots and other vegetative parts, insect exoskeleton fragments, rodent and insect scats) are also noted.

Results

Disturbance indicators were consistently present in flotation samples, including insect parts and fecal pellets, snails, and roots. Uncharred seeds, grass florets, and other plant parts were abundant in samples (Table 40) and most likely represent modern intrusives. Evidence of cultural floral material was limited to tiny fragments of charcoal and probable cotton seed fragments from FS 225, Feature 1, LA 44565.

Fragments of cotton seeds were also recovered in radiocarbon samples from LA 44565. Seed fragments were identified by Lisa Huckell as cotton using three criteria. A puckered hole present on two fragments is a characteristic of cotton seeds that occurs when the embryo breaks away from the seed coat. Vertical fissures occur in cotton seeds like those noted in fragments from LA 44565. Fissures are caused by the palisade cell structure of seed walls. The palisade cell structure of the seed wall and the malpighian line or light line were observed in the seed walls of the specimens from LA 44565. The malpighian line is a zone of occlusion of the elongated palisade cells that gives the illusion of two cell layers under reflected light.

Clear evidence of the prehistoric use of cotton in southern New Mexico and the Hueco Mountains of Texas near El Paso was found at Chavez Cave and Cave 8 in the form of cotton netting and cordage (Kent 1983:268, 274). The artifacts are associated with horizons dating to what Kent terms the Mogollon 5 period, or from A.D.1000 to 1400. They could easily represent trade items. Evidence of charred cotton seeds is absent from the prehistoric record in the southern part of New Mexico.

Charred cotton seeds have been found at the late Pueblo middle Rio Grande Valley sites of Bandelier's Puaray (LA 326; Tichy 1939:161; also known as Santiago Pueblo [Vierra 1989]) and Kuaua (LA 187; Jones 1936); at the Contact Period middle Rio Grande site LA 54147; and in numerous Hohokam sites (see Huckell 1993). However, because it is unlikely that cotton was actually grown in southern New Mexico prehistorically, coupled with the extreme mixing of levels at LA 44565, the charred cotton seeds from the possible south hearth are thought to date to the historic period (Regge Wiseman, pers. comm.).

Three taxa dominate the wood assemblage from Roswell South. Saltbush/greasewood was the most common taxon identified, accounting for 54 percent by weight of the total charcoal recovered (Table 41). Juniper was the only positively identified conifer from the project. Although it was only recovered in 2 samples out of 14, juniper comprised 26 percent by weight of the total taxa recovered. Mexican crucillo was identified in 2 of the 14 samples and accounted for 12 percent by weight of the total taxa recovered. The samples examined from LA 44565 yielded the greatest number of taxa, including the only juniper, Mexican crucillo, maple, rose family, cf. cotton seed fragments, squawberry seed, and walnut shell.

The goal of the C-14 analysis was to identify a sufficient amount of shrubby wood species (at least 5 g) from each context to minimize the old wood problem of dating longer-lived coniferous species. Only two out of the 14 samples contained at least 5 g of shrubby wood. Both of these (from LA 116467) yielded saltbush/greasewood wood. Several species of shrubs that are in the Chenopodiaceae (goosefoot) family intergrade morphologically and are difficult to distinguish from each other (four-wing saltbush, greasewood, winterfat, etc.). For this reason, identification to species is avoided and specimens are placed in the combined saltbush/greasewood taxon. Saltbush is a C-4 plant, requiring isotopic fractionation to avoid age underestimation, while greasewood is a C-3 plant that does not require isotopic fractionation. This presents the archaeologist with the dilemma of not having a positive identification of genus and having to fractionate when it may not be necessary, but still having the option to date a shrubby species.

Conclusions

The rich array of taxa recovered from LA 44565 suggests that nonlocal resources were imported to the site or collected as driftwood. Maple, rose family, and walnut may have been available from the riparian habitat of the Pecos River two miles away or along Rocky Arroyo. Large amounts of juniper were recovered in samples from the possible south hearth, where cotton seeds were probably associated with the recent historic period. The vast difference in number and type of taxa recovered suggests a real variance in procurement, perhaps reflecting the collection of wood from higher elevations in the Guadalupe Mountains and carried down Rocky Arroyo or brought in by truck during the recent historic use of the site. The probable squawberry seed identified from the possible south hearth could indicate the use of the berries for food.

Results from LA 116467 and LA 116469 are similar in taxonomic composition. Saltbush/greasewood occurs in all samples examined from the two sites. Charcoal from LA 116471 is very fragmentary. The only mesquite was identified from this site along with trace amounts of saltbush/greasewood, unknown conifer, and unknown wood.

The flotation sample analysis produced evidence of uncharred disturbance elements. Charred cotton seeds recovered from the possible south hearth probably date to the recent historic period.

Table 40. Flotation scan analysis

Site	LA 44565			LA 116467	LA 116469				LA 116471	
FS Number	225	387	388	72	29	66	140a	150	332	337
Feature	1, possible south hearth	1, lower fill south hearth	1, north hearth	3, hearth	2, hearth	3, hearth	4, hearth	5, hearth	1, fill	1, fill
ANNUALS:										
Amaranthus (pigweed)	-	-	+	-	-	-	-	-	-	-
Chenopodium (goosefoot)	-	-	-	-	-	-	-	-	+++	+++
Kallstroemia (caltrop)	-	-	-	-	+	-	-	+	-	-
Portulaca (purslane)	-	-	-	-	+	+	+	+	-	-
Cultigens:	-	-	-	-	-	-	-	-	-	-
Gossypium (cotton)	7 fragments*	-	-	-	-	-	-	-	-	-
GRASSES:										
Bouteloua (grama grass)	-	-	-	-	-	-	-	-	-	floret+
grama grass	-	-	-	-	-	-	-	-	-	
Gramineae (grass family)	-	-	-	-	-	-	-	floret++	-	-
cf. *Panicum* (panic grass)	-	-	-	-	+	+	-	+	-	-
Sporobolus (dropseed grass)	-	-	-	+	-	-	-	-	-	-
OTHER:										
Euphorbia (spurge)	-	-	-	-	-	-	-	-	-	-
Euphorbia glyptosperma (ridgeseed spurge)	+	+	+	+	-	+	+	-	-	+
Solanum/Physalis (nightshade/groundcherry)	-	-	-	-	-	-	+	+	-	-
Unknown	-	-	-	-	+++	+++	-	+	-	-
PERENNIALS:										
Cactaceae (cactus family)	-	-	-	-	-	-	-	-	-	aereole+
Echinocereus (hedgehog cactus)	-	-	-	-	-	-	-	-	-	+
Larrea tridentata (creosotebush)	-	-	-	-	-	-	-	-	-	leaf+
Opuntia (prickly pear cactus)	-	-	-	-	-	-	-	-	+	embryo+
Rhus (squawberry)	-	-	+	-	-	-	-	-	-	-
Sphaeralcea (globemallow)	-	-	-	-	+	+	+	-	-	-
Talinum (flameflower)	-	-	-	-	-	-	-	-	++	+

Table 41. Species composition of charcoal submitted for C-14 analysis (weight in grams)

Site	LA 44565			LA 116467		LA 116469					LA 116471				Total	
FS Number	222, 223, 224, 225	386, 387	388	72	180, 181	23	29	66	149a/149b	150	331, 332	337, 338	357	372	Weight (g)	Percent
Feature	1, possible south hearth	1, lower fill south hearth	1, north hearth	3, hearth	4, extramural	1, hearth	2, hearth	3, hearth	4, hearth	5, hearth	1, fill	1, fill	1, fill	1, fill	48.67	97
CONIFERS:																
Juniperus (juniper)	5	7.8	-	-	-	-	-	-	-	-	-	-	-	-	12.8	26
Unknown conifer	-	1.1	0.1	-	-	-	-	-	-	-	<0.01	<0.01	-	-	1.2	2
Total conifers	5	8.9	0.1	-	-	-	-	-	-	-	<0.01	<0.01	-	-	14	28
NONCONIFERS:																
cf. *Acer* (maple)	-	0.34	-	-	-	-	-	-	-	-	-	-	-	-	0.34	<1
Atriplex/Sarcobatus (saltbush/greasewood)	-	-	-	8.3	7	0.14	3.5	0.36	3.5	3.5	<0.01	-	-	-	26.3	54
cf. *Condalia* (Mexican crucillo)	1.45	4.16	-	-	-	-	-	-	-	-	-	-	-	-	5.61	12
Prosopis (mesquite)	-	-	-	-	-	-	-	-	-	-	0.02	-	-	0.11	0.13	<1
cf. Rosaceae (rose family)	-	0.03	-	-	-	-	-	-	-	-	-	-	-	-	0.03	<1
Unknown nonconifer	0.73	0.5	0.4	-	<0.01	<0.01	-	-	-	-	0.01	<0.01	0.2	-	1.84	2
OTHER:																
Gossypium (cotton)	3 fragments	9 fragments	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monocotyledonae (monocot)	-	stems	-	-	-	-	-	-	-	-	-	-	-	-	N/A	
Juglans (walnut)	-	-	nutshell 0.47	-	-	-	-	-	-	-	-	-	-	-	0.47	1
Indeterminate	1 plant part	2 plant parts	-	-	-	-	-	-	-	-	-	-	-	-	N/A	-
cf. *Rhus* (squawberry)	-	1 seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.02	<1
Total nonconifers	2.18	5.03	0.87	8.3	7	0.14	3.5	0.36	3.5	3.5	0.03	<0.01	0.2	0.13	34.74	71

FAUNA FROM LA 44565 (ROCKY WEST) AND LA 116469 (SITE 9)

Susan M. Moga

A variety of species, both wild and domestic, were identified in the small assemblage from LA 44565. At this temporary camp site, the inhabitants consumed the local wildlife for subsistence and deposited their meal refuse into the fire. Rabbits and small mammals dominate the assemblage, with smaller numbers of bird, turtle, sheep/goat, and a few other species. Some species were represented by only one fragmented bone, so their utilization was impossible to establish.

A camp site was recorded at LA 116469. Only five bones, one from a jackrabbit and four small-mammal fragments, were collected from two nonrock hearths.

Methods

A complete analysis was performed on the 386 bones recovered from LA 44565 and LA 116469. The bone was dry brushed for cleaning and each was assigned a lot number for identification.

Faunal information was recorded by utilizing coded variables. The variables include: site, field specimen (FS) and lot numbers, count, taxon, element (body part), side, portion of the bone represented, age of the animal, criteria for aging, environmental, animal, and thermal alterations, and evidence of human processing or bone modification.

Identification of the bone was made with OAS comparative collections. Sources on New Mexico fauna (Bailey 1971; Findley et al. 1975) were consulted to determine which wild species inhabited the site area.

Taxa Recovered

Each taxon is supplied with a description, common name, count, and minimum number of individuals (MNIs). The MNI is the minimum number of animals in an identified taxon from a specified unit. The entire assemblage is considered a single unit for determining the number of individuals represented.

Unidentified Taxa

Four groups of unidentified mammals were categorized according to size range in the assemblage: small mammal (jackrabbit or smaller), small-to-medium mammal (dog or smaller), medium mammal (dog size), and medium-to-large mammal (dog, sheep, and larger). Small-mammal bones (n=136) constitute the largest number of unidentified taxa.

A high number of cottontail bones (n=63) were in the assemblage, along with 40 jackrabbit fragments and four prairie dog bones. Considering the large number of lagomorphs (rabbits) in the assemblage, the small-mammal bone fragments are probably rabbit remains.

The small-to-medium mammal category consists of 55 bones, including 47 flat bones, 7 ribs, and 1 long-bone fragment. Several of these bones exhibit thermal alterations.

Medium-mammal remains consist of several long- and flat-bone fragments, cancellous tissue, rib fragments, one digit, and a cranial fragment. Several medium-mammal bones exhibit burning.

A moderate number of medium-to-large mammal (n=30) bones, including cranial, vertebral, long and flat bones, cancellous tissue, and a tooth fragment were recorded. These fragments are probable sheep or goat (Table 42).

Black-tailed Prairie Dog (Cynomys ludovicianus)

Inhabiting short-grass plains, the black-tailed prairie dog is abundant east of the Pecos River Valley (Bailey 1971:119-120). In southern New Mexico, they are active during the winter months and become quite fat (Findley et al. 1975:132). A proximal portion of a scapula and three phalanges from a mature individual were recovered.

Desert Cottontail (Sylvilagus audubonii)

Occupying the eastern plains of New Mexico and most of the Pecos Valley, the cottontail prefers open country (Bailey 1971:54). During periods of drought they survive on dry grasses and utilize the moisture from cactus as their source of water (Chapman et al. 1982:102).

Only two individuals were represented in the assemblage, one mature and one juvenile, with a wide range of elements. Approximately two-thirds of the bones exhibit thermal alterations.

Black-tailed Jackrabbit (Lepus californicus)

Observed throughout New Mexico, jackrabbits have large populations in grasslands and deserts (Findley et al. 1975:92-94). They will travel considerable distances to obtain succulent vegetation, which is also their source of water. Jackrabbits raise several litters during a year, and their abundance makes them available to predators.

Several individuals, one mature, one juvenile, and one immature, are represented by the forty bones recov-

Table 42. Taxa recovered from Rocky West

Taxon	Common Name	Number	Percent
Small mammal	Jackrabbit or smaller	133	34.9
Small to medium mammal	Dog or smaller	55	14.4
Medium mammal	Dog size	29	7.6
Medium to large mammal	Dog, sheep or larger	30	7.9
Cynomys ludovicianus	Black tailed prairie dog	4	1
Sylvilagus audubonii	Desert cottontail	63	16.5
Lepus californicus	Black-tailed jackrabbit	39	10.2
Ovis/capra	Domestic sheep or goat	15	3.9
Capra hircus	Domestic goat	1	0.3
Family Accipitridae	Hawks and harriers	2	0.5
Phasianidae	Quails, partridges, pheasants	1	0.3
Passeriformes	Small perching birds	1	0.3
Gallus gallus	Domestic chicken	1	0.3
Testudinata	Turtles and tortoises	1	0.3
Chrysemys sp.	Painted turtle	1	0.3
Phrynosoma sp.	Horned lizards	2	0.5
Colubridae	Nonvenomous snakes	1	0.3
Gastropod	Snail	2	0.5
Total		381	100

ered from the two sites. Twenty-two of the forty bones were burnt, the majority of which exhibit heavy charring.

Domestic Sheep or Goat (Ovis/Capra) and Domestic Goat (Capra hircus)

The Spaniards introduced sheep and goats into New Mexico in 1540, but it was not until 1598 that Juan de Oñate and his settlers established sheep husbandry (Scurlock 1998:10; Carlson 1969:26).

The small sturdy churro sheep was eventually crossbred with the Spanish merino sheep to improve the quality of wool. The new sheep breed proliferated, and by 1880 wool production was a highly profitable business (Carlson 1969:33).

Goats were utilized for milk, cheese, and meat. Black goats functioned as *marcaderos* (markers) in herds of sheep. One black goat was kept for every one hundred sheep to help the herder keep track of his flock (Scurlock 1998:10-11).

Sheep and goat bones are osteologically difficult to distinguish, except for a few elements; therefore, they are placed in the combined taxon of sheep/goat (Bossneck 1970:331). A mature innominate, one of the discernible elements, was identified as goat. The obturator foramen in goats is longer than the more oval form of the sheep foramen. Even though the foramen size and shape can vary between sexes (Bossneck 1970:348), this specimen resembles several samples in our comparative collection. The inside of the innominate exhibits butchering.

Several sheep/goat fragments (n=15) were identified in the assemblage: caudal vertebra, scapula, leg bones, a phalange, and carpals and tarsals. These elements represented at least one mature individual, with minimal butchering efforts. A few bones are burned, and several exhibit environmental alterations.

Hawks and Harriers (Accipitridae)

Two specimens from this family were recorded in the assemblage. One mature and one immature phalanx, similar in attributes to those of a rough-legged hawk (*Buteo lagopus*), but smaller, could only be identified to family. The use of this bird is unknown; one of the elements was completely blackened from fire.

Quail, Partridge, and Pheasants (Phasianidae)

The members of this family vary in size. They are mostly ground-dwellers and possess limited powers of flight (Ligon 1961:94). One mature humerus was the only evidence found at this site. The bird was probably taken for its meat and feathers. Both ends of the humerus are missing, making specific identification impossible, but the remaining portion was similar in size and attributes to that of a bobwhite or Gambel's quail.

Small Perching Birds (Passeriformes)

A portion of a small-bird femur was assigned to this category. Mature in compact tissue, the element is too fragmented to determine the species.

Domestic Chicken (Gallus)

A descendant of the red jungle fowl from India (Hargrave 1972:5), the chicken was introduced into New Mexico by the Spaniards. LA 44565 produced only one immature tibia fragment.

Turtles and Tortoises (Testudinata)

New Mexico harbors a diverse population of turtles. A tiny burnt carapace fragment was difficult to identify and placed in the family Testudinata.

Present in the Pecos River, painted turtles (*Chrysemys* sp.) are dormant during the winter months, starting in October, then emerge in March or April (Degenhardt et al. 1996:100-101). One weathered carapace fragment was identified to this family.

Horned Lizards (Phrynosoma sp.)

Horned lizards occupy a variety of habitats throughout New Mexico. Approximately 100 species are assigned to this family (Degenhardt et al. 1996:138), which makes it extremely difficult to identify these tiny elements. Therefore, the two lizard fragments were placed in the family Phrynosoma.

Nonvenomous Snakes (Colubridae)

"Harmless" snakes constitute approximately 78 percent of the snake population in New Mexico. Their habitats include grasslands, rocky terrain, woodlands, wet habitats, shrublands, and deserts (Degenhardt et al. l996:260-336). One complete vertebrae was recovered at LA 44565.

Snails (Gastropods)

Two small snail shells recovered from the site are most likely intrusive.

LA 44565

Faunal materials were recovered from four areas at LA 44565 (Table 43).

Feature 1 Strip

The surface was stripped to a depth of 5 cm, and this strip produced the largest accumulation (n=333) of bone. Large numbers of small and small-to-medium mammals, and rabbits were recovered, with smaller amounts of sheep or goat, horned lizard, snake, and hawk. This area may have been an open-air trash dump.

South Hearth, Feature 1

This suspected hearth/stained area was disturbed by rodents and had a depth of 18 to 20 cm. Thirty-five bones were recovered from the "hearth" fill. The majority of bones are small mammal and rabbits. A few snail shells and sheep/goat bones were also collected, and a domestic goat innominate on the northwest surface of the feature stain.

Individual Square: 16N2W

A jackrabbit tibia was recovered from the general fill of 16N/2W.

Hearth 4 Vicinity

Seven squares were excavated northeast and southeast of Hearth 4. Twelve bones were recovered, including an assortment of fauna, including turtle, small mammals, and two types of fowl (Table 44).

LA 116469

Hearth 2

A nonrock hearth produced one jackrabbit tibia devoid of burning and three small-mammal bones with light to heavy burning.

Hearth 5

A nonrock hearth contained only one small-mammal bone that lacked evidence of burning.

TAPHONOMY

Taphonomic variables are processes that affect the condition of biological remains (Lyman 1994:1). These variables include environmental, thermal, and animal alterations.

Table 43. Fauna by provenience, Rocky West

Common Name	Feature 1 Strip	South Hearth in Feature 1	Square 16N/2W	Hearth 4 Vicinity	Total
Small mammal	115	15	-	3	133
Small to medium mammal	54	1	-	-	55
Medium mammal	29	-	-	-	29
Medium to large mammal	28	-	-	2	30
Black-tailed prairie dog	3	-	-	1	4
Desert cottontail	52	9	-	2	63
Black-tailed jackrabbit	32	5	1	1	39
Sheep or goat	13	2	-	-	15
Domestic goat	-	1	-	-	1
Hawks and harriers	2	-	-	-	2
Quails, partridges, pheasants	-	-	-	1	1
Small perching birds	1	-	-	-	1
Domestic chicken	-	-	-	1	1
Turtles and tortoises	1	-	-	-	1
Painted turtle	-	-	-	1	1
Horned lizard	2	-	-	-	2
Nonvenomous snakes	1	-	-	-	1
Snails	-	2	-	-	2
Total	333	35	1	12	381

Table 44. Fauna recovered from vicinity of Hearth 4, Rocky West

Square	Taxon	Element	Number
8N/19W	Cottontail	Scapula	1
8N/20W	Painted turtle	Carapace	1
8N/20W	Domestic chicken	Tibia	1
9N/21W	Medium mammal	Teeth	2
12N/20W	Small mammal	Scapula	1
12N/20W	Prairie dog	Scapula	1
12N/20W	Jackrabbit	Metatarsal	1
13N/21W	Quail-sized	Humerus	1
15N/20W	Small mammal	Long bones	2
16N/18W	Cottontail	Innominate	1
Total			12

Environmental Alterations

Environmental alterations affect faunal materials through exposure to sun, moisture, and temperature. The degree of weathering varies with the amount of exposure time and environmental conditions (Marshall 1989:19-20). Overexposure of bone leads to varying degrees of pitting, sun-bleaching, or exfoliation, which produces a mosaic, crackled appearance.

The number of environmentally altered bones is minimal in the assemblage. At LA 44565 a turtle carapace fragment and seven fragmented mammal bones exhibit pitting, five bones are sun bleached, and six bones are exfoliated. Four of the mammal bones from LA 116469 are pitted, and one is exfoliated.

Thermal Alterations

Approximately one-third of the assemblage demonstrates some degree of burning (Table 45). Lightly scorched bone is tan or brown in color. Heavily charred bone is created by excessive heat, and the bone becomes blackened. This category produced the largest amount of burnt bone, with 84 fragments at LA 44565, mostly consisting of rabbits and unidentifiable small mammal. The small-mammal bones are probably rabbit, because that was the most common bone of that size recovered from the site. With continuous high heat, carbonized bone becomes calcined (white) (Lyman 1994:384-385). Several small- and medium-mammal fragments and one jackrabbit bone were calcined.

A bone exposed to heat that has a portion of meat attached to it when the remainder of the bone is lacking flesh will produce a graded appearance. The bone will appear tannish brown to black. A small portion of the Roswell South assemblage was lightly graded. Heavily graded bone is blackened to calcined (white). Eight bones in the assemblage were exposed to a high temperature.

Animal Alterations

Animal alterations include gnawing, scatological, or puncture marks. Only one small-to-medium mammal bone was scatological. Scatological bones have passed through the digestive tract of an animal, and the stomach acids produce smooth edges and a thinned appearance to the bone (Fisher 1995:42).

With rodent gnawing, long parallel grooves are incised on the bone, and the dimensions will vary according to the size of the rodent (Fisher 1995:40). A cottontail vertebra exhibits rodent gnawing.

Processing by Humans

Processing entails bone breakage or butchering of a carcass for human consumption or utilitarian purposes. Bone can intentionally be broken to fit into a stewpot, for example. Environmental pressures such as temperature, water, and ice will also fragment bone. At times, it is difficult to distinguish between environmental effects and human processing.

Table 45. Thermal alteration, Rocky West

Common Name	Light or Scorched	Heavy or Black	Calcined	Graded Light/Heavy	Graded Black/Calcined
Small mammal	1	25	8	7	-
Small to medium mammal	-	6	-	12	-
Medium mammal	-	-	2	6	4
Medium to large mammal	1	5	-	3	2
Black-tailed prairie dog	-	-	-	-	-
Desert cottontail	1	27	-	6	-
Black-tailed jackrabbit	-	18	1	1	-
Sheep or goat	-	2	-	2	1
Domestic goat	-	-	-	-	-
Hawks and harriers	-	1	-	-	-
Quails, partridges, pheasants	-	-	-	-	-
Small perching birds	-	-	-	-	-
Domestic chicken	-	-	-	-	-
Turtles and tortoises	-	-	-	-	1
Painted turtle	-	-	-	-	-
Horned lizard	-	-	-	-	-
Nonvenomous snakes	-	-	-	-	-
Snails	-	-	-	-	-
Total	3	84	11	37	8

Only 4 of the 386 bones in the assemblage showed signs of processing. These four bones are historic and belong to a domestic goat, a sheep or goat, and a medium-to-large mammal, probably sheep or goat. An impact and spiral fracture, a portion cut off, and a chop mark, probably from a metal axe or hatchet, are the only indications of processing. With such minimal evidence it is difficult to establish any distinct pattern of butchering.

Summary

The high number of cottontail and jackrabbit remains in this small faunal assemblage could support the temporary camp site theory. They are a readily available food resource that could be easily captured.

There is also faunal evidence of historic animals: chicken, goat, and sheep or goat. These remains could be a by-product of a historic camp site.

Alternatively, LA 44565 could have been a historic trash scatter with a prehistoric site approximately 5 to 10 cm below the surface. The majority of the faunal remains came from the surface strip areas. But over time, because of rodent burrowing, environmental factors, and the trampling of humans or animals over surface soils, artifacts get churned into subsurface soils.

The Brantley Dam and Reservoir Project (Katz and Katz 1985:A135) near Carlsbad recovered cottontail, jackrabbit, other small mammals, birds, and historic creatures including cow, sheep, and goat.

A larger variety of fauna was retrieved from the Macho Dunes site, LA 29363 (Moga 2000), also near Carlsbad. Cottontail, jackrabbit, and woodrats were among the highest occurrences. Smaller numbers of turtle, mussel, and bird were also recorded. The only domesticate noted was one cow or bison molar from the upper 10 cm of fill, and it is not known if this element was historic or contemporary.

Subsistence at Roswell South and surrounding sites was extremely similar. At all these sites, the people focused on local native fauna. These sites are also multicomponent, and each has a historic phase.

FAUNA FROM LA 116471 (PUNTO DE LOS MUERTOS)

Nancy J. Akins

The excavation of Feature 1 at LA 116471 recovered an unusual assemblage of bone. For a fairly small number of species (at least 26), and given the sample size (n=8,052), much of the bone is burned (54.6 percent) and broken into small pieces (97.5 percent represent less than a quarter of the element).

Complicating the picture are the remains of twelve to thirteen humans, similarly fragmented and burned. As a result, small nondiagnostic pieces of human bone (mainly long bone and cranial fragments) make up some portion of this assemblage (in the large mammal category) and a few pieces of fauna (especially small pieces of turtle shell) may be included with the human assemblage (n=2,194).

Furthermore, extensive pothunting within Feature 1 removed any semblance of context and undoubtedly resulted in further breakage, as well as exposure and deterioration of unburned bone, and loss of an untold portion of the feature content.

Methods

In the lab, bone was cleaned by dry brushing. A good proportion of the assemblage was coated with a fine layer of cement-like clay or caliche that was removable only by scraping with a metal instrument. Several specimens were scraped during analysis to determine whether or not they were burned. Others had to be broken to determine whether or not they were burned.

Identifications were primarily made using comparative collections at OAS. Fish, lizard, and a few mammal bones were taken to the Museum of Southwest Biology, Divisions of Fishes, Herpetology, and Mammals, University of New Mexico, for identification. References to species found in the Carlsbad area (Bailey 1971; Degenhardt et al. 1996; Findley et al. 1975; Hubbard 1978; New Mexico Department of Game and Fish n.d.) were consulted, and species that are rare or reportedly absent from the area were double checked for accuracy of the identification. No attempt was made to differentiate between some closely related species of rodent. These are often species that burrow or were deposited after the main site occupation and are difficult to distinguish. All of the fauna, except that retrieved from flotation, were analyzed.

Each specimen (piece of bone) was computer coded for the following variables: field specimen or FS number, lot number (assigned to each line within an FS), count or number of specimens that fit the description, certainty (a notation that an identification is less than certain), articulation (whether bones were articulated, are from the same individual, or are pieces of the same bone), taxon, body part or element, side, part of the element represented, percent of the element represented, age of the animal, criteria for aging, the presence and degree of environmental alteration, presence and location of animal alteration, the color and location of thermal alteration, type and location of processing observed on the specimen, and whether the specimen was a tool, ornament, manufacturing debris, or pigment stained.

Taxonomic identifications are as specific as possible. Specimens that could not be identified to the species or family level were assigned to a range of indeterminate categories based on the size of the animal and whether it is mammal, bird, other, or could not be determined. Each specimen was counted only once, even when broken into a number of pieces by the archaeologist. If the break occurred prior to excavation, the pieces were counted separately and their union noted in the articulation variable.

Taxa Recovered

Most (86.5 percent) of the assemblage was identified only to the size of the animal (Table 46). The vast majority (78 percent) is from animals in the medium and large groups. Small mammals (12 percent) and mussels (5.0 percent) comprise small amounts, while birds (0.2 percent), turtles (1.0 percent), and fish (n=1 specimen) are hardly represented.

The use of even 1/8-inch screen can result in the loss of significant amounts of bone from small taxa. In one study of data from three rockshelter sites in Nevada, 64 percent of the small rodent, 54 percent of the squirrel, and 34 percent of the cottontail- to jackrabbit-sized bones were not recovered by 1/8-inch mesh (James 1997:386). While some of this type of loss undoubtedly affects the site sample, breakage, environmental factors, and the churning of soil by pothunters had a far greater effect.

Patterns of burning and preservation vary somewhat between the small mammals, especially rodents, and larger animals. This could suggest that many of the smaller forms were deposited more recently than the bulk of the collection and that unburned bone from the smaller taxa in the older deposits deteriorated over time and from exposure.

Unidentified Categories

Bone that could not be identified beyond the size of the animal was placed in the small-mammal or medium-

Table 46. Taxa recovered from Punto de los Muertos

Taxon	Common Name	Count/NISP	Percent	MNI
Small unknown	jackrabbit or smaler	4	<0.1%	-
Small mammal/medium to large bird	jackrabbit or smaller	19	0.2%	-
Small mammal	jackrabbit or smaller	586	7.3%	-
Small to medium mammal	coyote or smaller	138	1.7%	-
Medium mammal	beaver to coyote	6	0.1%	-
Medium to large mammal	coyote or larger	727	9.0%	-
Large mammal	wolf or larger	5485	68.1%	-
Very large mammal	larger than deer	1	<0.1%	-
Small squirrel	ground squirrels and chipmunks	6	0.1%	4
Cynomys ludovicianus	black-tailed prairie dog	13	0.2%	1+
Thomomys bottae	Botta's pocket gopher	1	<0.1%	1
cf. Geomys sp.	Plain's or desert pocket gopher	2	<0.1%	1
Pappogeomys castanops	yellow-faced pocket gopher	2	<0.1%	1
Dipodomys sp.	small kangaroo rat	3	<0.1%	2
Dipodomys spectabilis	banner-tailed kangaroo rat	5	0.1%	2
Castor canadensis	beaver	3	<0.1%	1
Cricetidae	cricetid rodents	2	<0.1%	1
Sigmodon hispidus	hispid cotton rat	5	0.1%	1
Neotoma sp.	woodrats	20	0.2%	3-5
Neotoma albigula	white-thoated woodrat	2	<0.1%	2
Small rodent	Cricetidae-size	5	0.1%	-
Medium to large rodent	*Neotoma*-size	37	0.5%	1
Sylvilagus audubonii	desert cottontail	148	1.8%	5-6
Lepus californicus	black-tailed jackrabbit	148	1.8%	6-7
Medium carnivore	badger to coyote size	3	<0.1%	-
Canis sp.	dog, coyote, or wolf	1	<0.1%	1
Artiodactyl	hoofed mammals	4	<0.1%	-
Medium artiodactyl	pronghorn to deer size	139	1.7%	1-2
Large artiodactyl	pronghorn or larger	2	<0.1%	1
Odocoileus sp.	deer	11	0.1%	1
Antilocapra americana	pronghorn	20	0.2%	1
Medium bird	quail to small duck size	4	<0.1%	-
Medium to large bird	quail or larger	4	<0.1%	-
Very large bird	turkey or larger	1	<0.1%	1
Colinus virginianus	bobwhite	2	<0.1%	1
Callipepla squamata	scaled quail	1	<0.1%	1
Callippla gambelii	Gambel quail	1	<0.1%	1
Testudinata	turtles and tortoises	62	<0.1%	-
Chrysemys picata	painted turtle	1	<0.1%	1
Trachemys or *Pseudomys*	slider or cooter	3	<0.1%	-
Trachemys scripta	pond slider	8	0.1%	1
Trionyx spineferus	spiny softshell	7	0.1%	1
Sauria	lizards	7	0.1%	1
Colubridae	nonvenomous snakes	2	<0.1%	1
Ictaluridae	catfish	1	<0.1%	1
Pelecypods	freshwater mussels	400	5.0%	-
Total		8052	100.0%	46-51

to-large bird, small-mammal, small-to-medium mammal, medium-mammal, medium-to-large mammal, large-mammal, and very large mammal categories. Table 46 identifies the body sizes included within each taxon. The medium-to-large and large-mammal categories are by far the largest, comprising 77.1 percent of the assemblage. As previously mentioned, these size groups include some bone that is human.

Ideally, the shape, a crest, or a foramen that is distinctively human or matching pieces to pieces that are distinctively human indicate the bone is human. Other "probably human" bones were identified on the basis of texture, and compact and cancellous tissue morphology. Undoubtedly, burning and extreme fragmentation prevented positive identification of some bone that is human.

Much of the information on the unidentified categories is summarized in Table 47. Long-bone fragments predominate in all taxa but are more numerous in the medium to large and large categories. This could reflect the preservation, where small pieces of flat bone were less likely to be preserved and recovered. When unburned, light, and heavy burning are compared, the small mammals have a distinctive pattern. Slightly more of the small-mammal category is recorded as lightly burned or scorched (28.0 percent), rather than heavily burned (24.4 percent). Less bone in every other indeterminate category is scorched, while the amount of heavily burned bone generally increases with body size; the medium-to-large and large-mammal groups have the most. As expected for unidentified categories, most of all groups are fragmentary, representing less than a quarter of the element.

Table 47. Selected variables for unidentified taxa, Punto de los Muertos

	Unknown	Small Mammal or Bird	Small Mammal	Small to Medium Mammal	Medium Mammal	Medium to Large Mammal	Large Mammal	Very Large Mammal
Number	4	19	586	138	6	727	5485	1
% of assemblage	0	0.2	7.3	1.7	0.1	9	68.1	0
% unidentified long bone	75	73.7	92.3	77.5	66.7	69.7	68.7	-
% unidentified flat bone	-	26.3	6.3	17.4	-	18.8	21.4	-
% unburned	25	10.5	47.6	29	50	22	29.1	100
% light burn/scorch	-	21.1	28	13	-	12.9	8	-
% heavy-calcine burn	75	68.4	24.4	58	50	65	62.9	-
% > 75% complete	-	-	-	-	-	0.1	0.6	-
% < 25% complete	100	100	99.7	93.3	100	99.6	99.4	100

Evidence of processing is rare. For the indeterminate small mammals, 14 have spiral breaks and one a snap break on long bones. One medium-to-large mammal specimen exhibits transverse cuts on a long bone, while two have impact breaks and one a spiral break. Large-mammal long bones have transverse (n=6) or oblique (n=1) cuts, impact breaks (n=5), and abrasion (n=1), and one is a bone flake resulting from an impact. The amount of burning, damage from pothunting, and erosion may have eliminated or obscured evidence of many types of processing. Better preservation in the smaller taxa seems to have preserved more evidence of processing and breakage.

Squirrels

At least two varieties of squirrels are represented, one small form and the black-tailed prairie dog. Findley et al. (1975:120-124) report only two small sciurids as inhabiting Eddy County along the Pecos River: *Spermophilus mexicanus* (Mexican ground squirrel) and *Spermophilus spilosoma* (the spotted ground squirrel). The Mexican ground squirrel lives in level grasslands associated with mesquite, cacti, or shrubs and has been found in the Pecos Valley. Spotted ground squirrels live in arid grasslands and deserts. Either species is possible in the site area.

Of the six small squirrel specimens, five are parts of humeri and one a radius. These are from two full-grown and two nearly full-grown animals. Two (one humerus fragment and the radius) are lightly burned or scorched. The rest have no signs of burning. A range of fragmentation is found: none fall in the smallest category (< 25 percent represented), but more than half (n=4) fall within the 25 to 50 percent category. The lack of heavy burning characteristic of this assemblage and relatively complete bones suggest that at least some of the small squirrel bones were deposited after the early occupation of the site. Three specimens from mature animals are from the same square, and all or almost all from squares with considerable rock, which may have enhanced preservation of these specimens.

Remains of the black-tailed prairie dog (*Cynomys ludovicianus*) are only slightly more common (n=13). The part distribution (seven cranial, two front limb, two

hind limb, and two phalanges) suggests no more than one animal, as all are mature and no exact part is duplicated. However, these are from eight different squares, mostly along the west side, and could represent a number of animals. The only burning found is a single instance of lightly scorched and calcined (7.7 percent). The phalanges are complete, and the other parts are represented by less than a quarter of the element. One fragment, an ulna, has both ends removed by diagonal cuts.

Black-tailed prairie dogs inhabit shortgrass plains. In the southern part of the state they become quite fat in winter and remain active through the winter (Findley et al. 1975:130-132). While the size and habits of this species, as well as evidence of its use as food in other archaeological assemblages, suggest it could have been used as a food animal, the small numbers may suggest less intense use than at many sites.

Rodents

At least ten species of rodent were identified in this assemblage. Only the woodrats occur with any frequency. Two pieces, a proximal tibia and a humerus from an immature animal, and three humerus fragments from mature rodents, could be identified only as small rodent. Medium to large rodent parts (n=37) are largely cranial (29.7 percent) or limb parts (43.2 percent). One of the small rodent bones is scorched or lightly burned, while 13 of the larger rodent bones are scorched and 3 are heavily burned. Most specimens are fragmentary. Four (80.0 percent) of the small rodent bones represent less than half of the elements, as do 31 (83.8 percent) of the medium to large rodents.

A single element is tentatively identified as Botta's pocket gopher (*Thomomys bottae*). While Findley et al. (1975:148) record no specific accounts of this species around Carlsbad, it is found in the southwest quadrant of Eddy County. The specimen is too small for the other pocket gophers inhabiting in the area and is slender for Botta's. But it is definitely a pocket gopher, and so was placed in this taxon. The element, much of a tibia from a young adult animal, is lightly scorched.

A larger pocket gopher (*Geomys* sp.), either the Plain's (*Geomys bursarius*) or desert (*Geomys arenarius*), is represented by a distinctive maxillary incisor and possibly by a mandibular symphysis fragment. Both pieces are scorched or lightly burned.

The yellow-faced pocket gopher (*Pappogeomys castanops*), only slightly more abundant (n=3 specimens), is represented by at least one young adult. Parts are from mandibles and a humerus. One piece is lightly burned or scorched and another heavily burned.

Neither the desert nor the Plain's pocket gopher have been reported for Eddy County. The Plain's pocket gopher is generally found to the north but is reported in El Paso and Hudspeth Counties in Texas. It prefers soft alluvial soils of arroyo bottoms and floodplains (New Mexico Department of Game and Fish species account 050268). The desert pocket gopher is found in Doña Ana and Luna Counties, where it prefers sandy or loamy soils (New Mexico Department of Game and Fish species account 050270). Yellow-faced pocket gophers are found in the Carlsbad area, where they prefer the deep friable soils of valleys (Findley et al. 1975:154).

A small kangaroo rat, Ord's and/or Merriam's (*Dipodomys ordii* or *Dipodomys merriami*), is represented by four specimens. Both species inhabit the Carlsbad area. Ord's is the most common desert rodent in New Mexico, occurring almost everywhere, but is partial to friable, especially sandy soils (Findley et al. 1975:174-175). Merriam's kangaroo rats are commonly associated with mesquite or other leguminous shrubs and may be excluded from the more friable soils when Ord's kangaroo rats inhabit the same area (Findley et al. 1975:183-184). Either or both could be represented by the specimens, three femur fragments and a partial tibia, all but one from the same provenience. All are comprised of less than half of the element, and two are lightly burned or scorched.

The larger kangaroo rat, banner-tailed or *Dipodomys spectabilis*, inhabits well-developed grasslands and heavier soils that can support a complex and deep burrow system (Findley et al. 1975:180). The five specimens here are fragmentary, and three are lightly burned. Femur and tibia fragments from the pothunters' backdirt and four squares at least 2 m apart could represent more than one rodent. At least two individuals are indicated by a young adult and an adult femur.

Although beavers (*Castor canadensis*) are no longer found in Eddy County, they once lived along most or all permanent streams (Findley et al. 1975:187) and were likely found in the Pecos River until eliminated by historic trapping. Beavers prefer flat terrain in fertile valleys near rivers, lakes, streams, or even seeps that have adequate flow for damming (Hill 1982:262). A nearly complete and unburned astragalus and two incisor fragments from a beaver are all that represents this species. A portion removed from the astragalus indicates that this species was utilized by the humans. All of the beaver specimens came from the pothunters' backdirt.

Cricetid rodents include the genera Reithrodontomys, Peromyscus, Onychomys, Sigmodon, and Neotoma. The western harvest mouse (*Reithrodontomys megalotis*) is found in or near the Carlsbad area, as are the canyon mouse (*Peromyscus crinitus*), the deer mouse (*Peromyscus maniculatus*), the white-footed mouse (*Peromyscus leucopus*), the brush

mouse (*Peromyscus boylii*), the northern grasshopper mouse (*Onychomys leucogaster*), the southern grasshopper mouse (*Onychomys torridus*), the hispid cotton rat (*Sigmodon hispidus*), the southern plains woodrat (*Neotoma micropus*), and the white-throated woodrat (*Neotoma albigula*) (Findley et al. 1975:196-242).

The southern woodrat is a grassland species that may live at the base of chollas or shrubs or in burrows along the sides of arroyos. Where it occurs with the white-throated woodrat, it becomes less common, and the white-throated woodrat occupies the rockier habitats (Findley et al. 1975:238-239).

In this assemblage, two mandibles are from a small cricetid. One is lightly scorched. Hispid cotton rat parts include cranial parts (maxillary and mandibular) and a humerus. The cranial parts are from the same square and probably the same rodent. The humerus is from over 2 m away. None are burned, and all but one comprise less than a quarter of the element.

Woodrats are more numerous, with 20 specimens from a minimum of three young adult and at least three mature individuals. At least four squares and the pothunters' backdirt contained woodrat specimens. Most are from the rocky squares along the north or west sides of the excavation, but one is from a far eastern square. A good number of the woodrat specimens are scorched or lightly burned (25.0 percent), and one is burned black (5.0 percent). Parts are cranial (15.0 percent), vertebrae (10.0 percent), humerus (30.0 percent), femur (35.0 percent), and tibia (10.0 percent). Most specimens comprise less than half of the element (65.0 percent), and two are complete. The white-throated rat parts are both maxillary pieces, indicating two mature rodents. Both are lightly scorched.

Rabbits

Cottontail rabbit bones equal those of jackrabbits in this assemblage. Both are relatively sparse (n=148, 1.8 percent each). Since only the dessert cottontail (*Sylvilagus audubonii*) and black-tailed jackrabbit (*Lepus californicus*) inhabit Eddy County (Findley et al. 1975:87-97), all rabbit specimens have been assigned to these two species.

Most specimens are from mature animals, but at least one immature and two young adult animals are represented. At least four mature cottontail rabbits are present, and two or three are consistently represented by a variety of body parts. The number is probably much higher, since virtually every bag contained cottontail remains. Crania (27.7 percent), vertebrae (4.7 percent), ribs (2.0 percent), scapula and front limbs (20.3 percent), and pelvis and hind limbs (45.3 percent) are all represented. Most cottontail specimens are unburned (60.8 percent), and light burns were recorded for 44 (29.7 percent), heavy for 7 (4.7 percent), calcined for 2 (1.4 percent), and graded light to heavy burns for 5 (3.4 percent). Most (82.4 percent) specimens represent less than half of the element, while only 21 are relatively complete (13.6 percent). A transverse cut on a mandible, oblique cuts on a tibia shaft, and a sliver cut from the shaft of a humerus are the only evidence of processing in this species.

At least one immature and one young adult jackrabbit are present, while five mature rabbits are suggested by parts of proximal ulnae. Body parts include pieces of crania (25.7 percent), vertebrae (2.7 percent), scapula and front limbs (25.0 percent), and innominates and hind limbs (46.6 percent). Many of the jackrabbit bones are unburned (60.8 percent). Scorches (24.3 percent), heavy burns (8.1 percent), calcined bone (2.0 percent), dry burns (1.4 percent), and graded burns (3.4 percent) were also noted. The majority of jackrabbit bones are fragmentary, represented by less than a quarter of the element (82.4 percent). Only seven are complete (4.7 percent), and one is nearly so (comprising more than 75 percent of the element). Potential processing consists of a spiral break on a radius, an impact break on a tibia, and an innominate with transverse cuts.

Carnivores

Few carnivore bones were identified. Two specimens, maxilla fragments from the same provenience and a proximal femur shaft fragment, are from a medium-sized carnivore. The canid part is the distal portion of a metatarsal. The carnivore specimens are all mature and could easily represent a single animal. None of the carnivore bones are burned.

Artiodactyls

The majority of the artiodactyl bone represents animals in the deer and pronghorn size range. Four pieces of tooth enamel were recorded simply as artiodactyl, and one long-bone fragment could be from a mule deer or something larger (the large artiodactyl specimen). A few specimens are small enough that white-tailed deer cannot be ruled out. A proximal ulna indicates the presence of a neonate artiodactyl that could not be identified to species.

Body parts for the medium artiodactyl (n=139) include pieces of crania (14.4 percent), vertebrae (15.8 percent), ribs (59.7 percent), a single piece of innominate, front limb (3.6 percent each), hind limb (2.9 percent), and feet (11.5 percent). Burning is common: only 27.3 percent of the specimens are unburned. Most are

heavily burned (44.6 percent), and a few are lightly burned or scorched (10.8 percent), graded (5.7 percent), or calcined (10.8 percent). Virtually all are very fragmentary (92.1 percent represent less than a quarter of the element) or fragmentary (7.9 percent comprise between 25 and 50 percent of the element).

Mule deer (*Odocoileus hemionus*) is the more likely species of deer in the Carlsbad area. However, white-tailed deer (*Odocoileus virginianus texanus*) is found in riparian communities and in the sandhills east of Roswell (Findley et al. 1975:328-332) and cannot be ruled out. The few specimens attributed to deer (n=11) are mostly teeth (n=7), plus a proximal radius fragment, a trapezoid-magnum, a navicularcuboid, and a first phalanx from at least one mature animal. Five are from the pothunters' backdirt, others are from squares along the north and west. One tooth fragment is burned.

Pronghorns (*Antilocapra americana*) inhabit open grasslands and were once abundant throughout the state (Findley et al. 1975:333). Pronghorn specimens are more frequent (n=20) than deer in this assemblage and have a greater array of parts. Again, none of the parts indicate more than one mature individual, although the distribution in at least nine squares suggests more. Parts are cranial (n=5), a distal humerus, metacarpal fragments (n=2), femur fragments (n=2), tibia fragments (n=3), and foot parts (n=7). Only one pronghorn specimen (a femur fragment) is burned (calcined) and all are very fragmentary (n=18) or fragmentary (n=1). A humerus and a metatarsal have impact fractures.

Birds

Few definite bird remains were recovered (n=13). Most could only be identified to the size of the bird, four from a medium bird, four from a medium to large bird, and one from a large bird the size of a turkey or large raptor. Elements include a partial scapula from a less than mature bird, a wing digit, and seven long bone fragments. Lightly scorched (n=2), heavily burned, and calcined (n=3) bird bones were found. All but the digit represent less than half of the element.

Only three species of birds could be identified, all small land birds. These include a coracoid and carpometacarpus from a bobwhite (*Colinus virginianis*) found in two widely separated squares. A sternum and a humerus are from quail. The former is more consistent with scaled quail (*Callipepla squamata*) and the latter with Gambel's quail (*Callipepla gambelii*). The humerus is lightly burned or scorched. All are in the middle range for completeness, the bobwhite in the 25 to 50 percent category, and the quail in the 50 to 75 percent category.

In the Carlsbad area, bobwhites live in native shinnery, mesquite, catclaw, and low-growing shrub thickets (Ligon 1961:94-96). Scaled quails are adapted to arid lands, and their distribution is coextensive with mesquite, blue chaparral, and cholla cactus. Gambel's quail favor brushy or timber-lined stream valleys and canyons, roosting in thick bushes and vines. Biologists give the original range of this species as the Rio Grande Valley south of Belen.

Turtles

At least three species of turtle were found. Many specimens could not be identified to genera or species (n=62 turtle, 3 slider or cooter), but painted turtle (n=1), softshell turtle (n=7), and pond slider (n=8) were identified. Except for one slider or cooter and nine unidentified turtle plastron fragments, pieces are from carapaces. Of those in the turtle taxon, most are small pieces not assigned a part of the carapace, five are nuchal fragments, three are neurals, three marginals, and one costal. The painted turtle portion is a pleural. Slider or cooter pieces are unidentified (n=2) or marginal, while the sliders are marginals (n=5) or unidentified. Softshell parts include a marginal, a pleural, and unidentified carapace pieces. One of the slider or cooter or slider specimens is scorched; the rest are unburned. Softshell pieces are largely unburned, and one is scorched. Turtle pieces are scorched (n=3), dry burned (n=1), heavily burned (n=23), calcined (n=17), or graded (n=10).

All are fragmentary, representing less than a quarter of the element. The unidentified turtle specimens are widespread in the site, occurring in 21 different squares throughout the feature and in the pothunters' backdirt. The cooter or slider is from three squares, two at the north edge of the excavations and one at the south edge. Slider parts are all from the same square, at the northwest corner of the excavation and adjacent to squares containing cooter or slider. Softshell remains were found in six separate squares in the center and along the west side of the excavation.

Painted turtles are found along the San Juan, Rio Grande, and Pecos Rivers. They prefer the slow-moving portions of permanent waters. They spend much of the day basking on banks or logs (Degenhardt et al. 1996:100-102). The western river cooter (*Pseudemys gorzugi*) is found in the lower Pecos River drainage, ranging as far north as Brantley Reservoir. A large river turtle, western cooters bask on the water's surface or on logs, quickly retreating underwater when approached. They are active during the day and rest underwater at night (Degenhardt et al. 1996:102-104). The slider (*Trachemys scripta*) is a medium to large turtle, also found in the lower Pecos River drainage. This species inhabits permanent wetlands with aquatic vegetation,

soft bottoms, and still or slow-moving water 1 to 2 m deep. Its habits are similar to those of the cooter. They disappear quickly when approached, are active during the day, and are inactive below the surface at night. They prefer to bask away from the shoreline (Degenhardt et al. 1996:109-110).

Spiny softshells (*Trionyx spiniferus*) are medium-sized turtles that are found in the lower Pecos River drainage living in almost all kinds of permanent water including rivers and permanent and temporary ponds near rivers. They need soft bottoms and spend little time on land. Extreme wariness explains why their presence is often unsuspected by humans. They bask on debris in the water, banks, or sandbars or bury themselves in the soft bottom of shallow pools and extend their necks to the surface to breath (Degenhardt et al. 1996:122-123).

Lizards

Seven pieces of what is probably the same whiptail lizard (*Cnemidophorus* sp.) are the remains of a rather recent addition to the site deposits. Parts include a piece of cranium, two vertebrae, an innominate, a femur, and a tibia. None are burned.

Several species of whiptail live around Carlsbad. The one found at LA 116471 is comparable to *Cnemidophorus tigris* (the western whiptail) in size. Other similarly sized whiptails that inhabit the area include *Cnemidophorus exsanguis* (Chihuahuan spotted whiptail), *Cnemidophorus grahamii* (checkered whiptail), and *Cnemidophorus gularis* (Texas spotted whiptail) (Degenhardt et al. 1996:209-231).

Snakes

Two nonvenomous snake vertebrae from adjacent squares were identified. These are mature bones, are complete, and are unburned, suggesting they too could be late additions to the site deposits. Many species of medium-sized snakes inhabit the area north of Carlsbad along the Pecos River.

Fish

Only one fish bone, a well-weathered and fragmentary penultimate vertebra from a large catfish (Ictaluridae), was recovered. However, one of the unidentified small animal bones could be from a fish based on texture. Given that the site overlooks the Pecos Valley, this seems unusual. The lack of fish bone could be attributed, at least in part, to poor preservation. Yet, while weathered, the piece found is in good condition. If it had been present and utilized in any amount, some fish bone should have been preserved by burning.

Several species of catfish live in the Pecos River. These include *Ictalarus furcatus* (blue catfish), *I. lupus* (headwater catfish), *I. punctalus* (channel catfish), and *Pylodictus olivaris* (flathead catfish). Some, including the channel catfish (up to 11 kg), blue catfish (reaching over 45 kg in the Mississippi River), and flathead (also reaching over 45 kg) grow to immense sizes (Koster 1957:73-78; Smith and Miller 1986:462).

Pelecypods

A number of small fragments of freshwater mussel were found (n=400). All are small fragments, and none have been identified to the species level. Three have been drilled for use as ornaments, and six have ground edges. Two are heavily burned.

Three species of pelecypods inhabit the Pecos River and may be present. *Cyrtonaias tampicoensis*, the Pecos pearly mussel, is restricted to the lowermost portions of the Pecos River (Metcalf 1982:50), where it lives in quiet or fast-running water of lakes, rivers, and small streams with mud, mud-sand, mud-gravel, and large pebble substrate (Murry 1985:A-25). *Popenaias popeii* is found in the Pecos River and some tributaries (Metcalf 1982:45). Little is known about its distribution, but it has been collected in mud-sand habitats (Murry 1985:A-25). *Lampsilis teres* prefers mud-sand or firm sand river bottoms (Murry 1985:A-25). All three species were recovered from archaeological assemblages associated with the construction of Brantley Dam (Murry 1985:A-25).

Environmental and Animal Alteration

Although the environmental and probably the animal alteration was occasionally obscured by a clay or caliche coating, environmental alteration was recorded for 77.2 percent of the assemblage (Table 48). Pitting, a uniform surface alteration that leaves the outer bone pitted or roughened, possibly from chemical processes in the soil, is the most commonly recorded environmental alteration (n=5,106, or 63.4 percent). The larger taxa and turtles have more of this type of alteration. Checking, or the cracks and exfoliation caused by exposure, was the second most frequent (n=587 or 7.3 percent), followed by root etching (n=414, or 5.1 percent). Small amounts are sun bleached (n=25, or 0.3 percent) or polished (n=61, or 0.9 percent).

Little animal alteration was noted, due in part to the condition of the bone. One piece each of small-mammal, large-mammal, and pronghorn bone have marks typical of carnivore gnawing, and one medium-mammal bone has a tooth puncture. Rodent gnawing was found on 47 pieces from a variety of taxa (small mammal

Table 48. Environmental alteration by taxon, Punto de los Muertos

Taxon	Pitted		Sun-bleached		Checked		Root-etched		Polished	
	No.	%	No.	%	No.	%	No.	%	No.	%
Small unknown					3	75.0%				
Small mammal/medium to large bird	6	31.6%							5	26.3%
Small mammal	357	60.9%	1	0.2%	16	2.7%	16	2.7%	6	1.0%
Small-medium mammal	89	64.5%			9	6.5%	5	3.6%	2	1.4%
Medium mammal	4	66.7%			1	16.7%	1	16.7%		
Medium to large mammal	440	60.5%	2	0.3%	80	11.0%	68	9.4%	13	1.8%
Large mammal	3920	71.5%	21	0.4%	448	8.2%	277	5.1%	41	0.7%
Very large mammal	1	100.0%								
Small squirrel	4	66.7%								
Prairie dog	5	38.5%							1	7.7%
Plain's or desert pocket gopher	1	50.0%								
Yellow-faced pocket gopher	1	33.3%								
Banner-tailed kangaroo rat	1	20.0%					1	20.0%		
Beaver	1	33.3%								
Hispid cotton rat	1	20.0%								
Woodrats	5	25.0%			1	5.0%	1	5.0%		
Medium-large rodent	5	13.5%								
Cottontail rabbit	67	45.3%			5	3.4%	9	6.1%		
Jackrabbit	60	40.5%	1	0.7%	13	8.8%	13	8.8%		
Medium carnivore	3	100.0%								
Canis sp.	1	100.0%								
Artiodactyl	1	25.0%								
Medium artiodactyl	69	49.6%			4	2.9%	6	4.3%	1	0.7%
Large artiodactyl	1	50.0%								
Deer	7	63.6%								
Pronghorn	9	45.0%			3	15.0%	1	5.0%		
Medium bird	2	50.0%					1	25.0%		
Medium-large bird	1	25.0%								
Quail	1	50.0%								
Turtle	24	38.7%			1	1.6%	15	24.2%	1	1.6%
Painted turtle	1	100.0%								
Slider or cooter	3	100.0%								
Pond slider	8	100.0%								
Softshell	5	71.4%			1	14.3%				
Snake	1	50.0%								
Fish	1	100.0%								
Assemblage total	5106	63.4%	25	0.3%	585	7.3%	414	5.1%	70	0.9%

[n=1], medium-to-large mammal [n=9], large mammal [n=23], cottontail [n=4], jackrabbit [n=1], medium artiodactyl [n=4], large artiodactyl [n=1], deer [n=1], and pronghorn [n=3]). Another 20 pieces have the rounding and dissolved look characteristic of having passed through a digestive system. All but three of these are from small animals that are likely to be eaten whole by carnivores or smashed and eaten by humans (small mammal/medium-to-large bird [n=1], small mammal [n=5], large mammal [n=3], prairie dog [n=1], woodrat [n=1], medium-to-large rodent [n=4], cottontail [n=2], and jackrabbit [n=3]).

Seasonality

The age distribution of animals found in an assemblage provides information on the seasons a site was occupied. Specimens are considered mature when they are from full-sized animals, the tissue is compact with no signs of porousness, or the epiphyses are completely fused. If a specimen is from a near to full-sized animal but retains some porousness or has an unfused epiphysis, it was recorded as a young adult. Specimens were considered immature when they range from about a third to two-thirds adult size or the bone had the porosity characteristic of young animals. Neonates are those that range from newborn to a third of adult size and have the porosity and shapes found in very young animals.

Overall, few immature animals are represented in the assemblage (Table 49). Only one neonate or newborn, a deer or pronghorn, was found. Pronghorn young are usually born in May (Bailey 1971:127), and deer in June (Mackie et al. 1982:867). A few cottontail and jackrabbit specimens are from individuals young enough to suggest summer through fall deposition because cottontail young are found from May through

Table 49. Taxon by age, Punto de los Muertos

Taxon	Fetal/Neonate		Immature (1/2 to 2/3 grown)		Young Adult (2/3 to full size)		Mature	
	No.	%	No.	%	No.	%	No.	%
Small mammal	-	-	3	0.5%	34	5.8%	549	93.7%
Small-medium mammal	-	-	-	-	5	3.6%	133	96.4%
Medium-large mammal	-	-	1	0.1%	22	3.0%	704	96.8%
Large mammal	-	-	5	0.1%	11	0.2%	5469	99.7%
Small squirrel	-	-	-	-	2	33.3%	4	66.7%
Botta's pocket gopher	-	-	-	-	1	100.0%	-	-
Yellow-faced pocket gopher	-	-	-	-	3	100.0%	-	-
Banner-tailed kangaroo rat	-	-	-	-	1	20.0%	4	80.0%
Cricetid rodent	-	-	1	50.0%	-	-	1	50.0%
Woodrat	-	-	-	-	9	45.0%	11	55.0%
Small rodent	-	-	2	40.0%	-	-	3	60.0%
Medium-large rodent	-	-	-	-	9	24.3%	28	75.7%
Cottontail rabbit	-	-	2	1.4%	13	8.8%	133	89.9%
Jackrabbit	-	-	3	2.0%	15	10.1%	130	87.8%
Medium artiodactyl	1	0.8%	-	-	2	1.4%	135	97.8%
Medium bird	-	-	-	-	1	25.0%	3	75.0%
Bobwhite	-	-	-	-	1	50.0%	1	50.0%
Lizard	-	-	-	-	6	85.7%	1	14.3%

October and jackrabbits from April through September (Bailey 1971:48, 50). Sliders hibernate from at least late October through March or April (Degenhardt et al. 1996:110).

The age distribution suggests at least a late spring/early summer use of the site. Abundant bone from mature animals could indicate a broader occupation range, but no specific evidence was found. The amount of bone and diversity of taxa certainly indicate a lengthy and/or repeated occupation of the site.

Burning

Burned and scorched bone was recorded by color, the location of the burn, and whether it exhibits fissures or exfoliation caused by heat. Light brown or scorched burns are generally superficial, while charring, smoking, or blackening occurs when the collagen is carbonized. Once all of the organic material is gone, the bone becomes white or calcined with a chalky consistency. Burning can occur before or after deposition and can burn while buried if the soil is dry and contains sufficient organic material. Color changes result when excessive heat modifies or damages the bone through high temperatures or long exposure and is generally not the result of cooking (Lyman 1994:384-385). In addition to the large amount of obviously burned bone, a portion of the assemblage was burned when it was dry or well after deposition. Burns recorded as dry were heavily burned or calcined on one side but not the other, or the surfaces were buff or light brown with a burned black core.

Burning varies most by the size of the animal involved (Table 50), ranging from none for the herps (lizard and snake) and fish to over 60 percent for the small-to-medium mammals, medium-to-large mammals, large mammals, medium artiodactyls, and turtles. The degree of burning also differs. As Figure 43 illustrates, the smaller animals have predominantly no burn or light burns, while the larger animals have most of the heavy, calcined, and dry burns. Burned human bone proportions are distinct from those found in any of these size groups. The unburned portion is the same as that for small mammal (53 percent), but there is little lightly burned bone (3 percent), and the heavy (28 percent) and calcined (9 percent) totals fall between the small and larger animal sizes. Dry burning proportions (7 percent) are essentially the same as for large mammals.

In the burned bone, fissuring and exfoliation was relatively rare (89.3 percent had neither) and less than for the human bone (77.4 percent). The amount of fissuring and exfoliation increases with the amount of burning and is most common in the graded heavy to calcined burns (Table 51). Taxa with the most are the larger body sizes (12.1 percent of the large-mammal bone is fissured or exfoliated compared to 1.7 percent of the small-mammal bone). Turtles also have a considerable amount (11.1 percent).

Reviewing the proportions of burned long bones (long tubular bones) and flat bones (crania, vertebrae,

Table 50. Burning by taxon, Punto de los Muertos

Taxon	Unburned		Light/Scorch		Dry Burn		Heavy/Black		Calcined		Light to Heavy/Calcined		Heavy to Calcined	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Unknown small	1	25.0%	-	-	-	-	-	-	3	75.0%	-	-	-	-
	2	10.5%	4	21.1%	-	-	13	68.4%	-	-	-	-	-	-
Small mammal/medium-large bird														
Small mammal	279	47.6%	164	28.0%	4	0.7%	108	18.4%	13	2.2%	18	3.1%	-	-
Small-medium mammal	40	29.0%	18	13.0%	3	2.2%	48	34.8%	23	16.7%	5	3.6%	1	0.7%
Medium mammal	3	50.0%	-	-	-	-	2	33.3%	1	6.7%	-	-	-	-
Medium-large mammal	160	22.0%	94	12.9%	6	0.8%	275	37.8%	142	19.5%	47	6.5%	3	0.4%
Large mammal	1594	29.1%	442	8.1%	365	6.7%	1889	34.4%	760	13.9%	380	6.9%	55	1.0%
Very large mammal	1	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Small squirrel	4	66.7%	2	33.3%	-	-	-	-	-	-	-	-	-	-
Prairie dog	11	84.6%	1	7.7%	-	-	-	-	1	7.7%	-	-	-	-
Botta's pocket gopher	-	-	1	100.0%	-	-	-	-	-	-	-	-	-	-
Plain's/desert pocket gopher	-	-	2	100.0%	-	-	-	-	-	-	-	-	-	-
Yellow-faced pocket gopher	1	33.3%	1	33.3%	-	-	1	33.3%	-	-	-	-	-	-
Small kangaroo rat	1	33.3%	2	66.7%	-	-	-	-	-	-	-	-	-	-
Banner-tailed kangaroo rat	2	40.0%	3	60.0%	-	-	-	-	-	-	-	-	-	-
Beaver	3	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Cricetid rodent	1	50.0%	1	50.0%	-	-	-	-	-	-	-	-	-	-
Hispid cotton rat	5	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Woodrat	8	40.0%	11	55.0%	-	-	1	5.0%	-	-	-	-	-	-
White-throated woodrat	-	-	2	100.0%	-	-	-	-	-	-	-	-	-	-
Small rodent	4	80.0%	1	20.0%	-	-	-	-	-	-	-	-	-	-
Medium-large rodent	21	56.8%	13	35.1%	-	-	3	8.1%	-	-	-	-	-	-
Cottontail rabbit	90	60.8%	44	29.7%	-	-	7	4.7%	2	1.4%	5	3.4%	-	-
Jackrabbit	90	60.8%	36	24.3%	2	1.4%	12	8.1%	3	2.0%	5	3.4%	-	-
Medium carnivore	3	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Canis sp.	1	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Artiodactyl	3	75.0%	1	25.0%	-	-	-	-	-	-	-	-	-	-
Medium artiodactyl	38	27.3%	15	10.8%	-	-	62	44.6%	15	10.8%	8	5.7%	1	0.7%
Large artiodactyl	2	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Deer	10	90.9%	-	-	-	-	1	9.1%	-	-	-	-	-	-
Pronghorn	19	95.0%	-	-	-	-	1	5.0%	-	-	-	-	-	-
Medium bird	3	75.0%	1	25.0%	-	-	-	-	-	-	-	-	-	-
Medium-large bird	-	-	1	25.0%	-	-	-	-	3	75.0%	-	-	-	-
Very large bird	-	-	-	-	-	-	1	100.0%	-	-	-	-	-	-
Bobwhite	2	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Quail	1	50.0%	1	50.0%	-	-	-	-	-	-	-	-	-	-
Turtle	8	12.9%	3	4.8%	1	1.6%	23	37.1%	17	27.4%	4	6.4%	-	-
Painted turtle	1	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Slider or cooter	2	66.7%	1	33.3%	-	-	-	-	-	-	-	-	-	-
Slider	8	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Softshell	6	85.7%	1	14.3%	-	-	-	-	-	-	-	-	-	-
Lizard	7	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Snakes	2	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Fish	1	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
Mussel	398	99.5%	-	-	-	-	2	0.5%	-	-	-	-	-	-
Total	2836	35.2%	866	10.8%	381	4.7%	2449	30.4%	983	12.2%	472	5.9%	66	0.8%

Table 51. Fissures and exfoliation by burn type, Punto de los Muertos

Burn Type	None		Shallow Exterior		Shallow Inferior		Shallow Both		Deep Exterior		Deep Interior		<50% Exfoliated		>50% Exfoliated	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Light	846	98.5%	3	0.3%	-	-	1	0.1%	-	-	-	-	9	1.0%	-	-
Light-heavy	401	88.1%	-	-	-	-	-	-	-	-	-	-	44	9.7%	10	2.2%
Dry	358	97.5%	-	-	-	-	-	-	-	-	-	-	9	2.5%	-	-
Heavy	2220	91.6%	1	>.1%	-	-	-	-	5	0.2%	-	-	179	7.4%	19	0.8%
Light-calcined	11	78.6%	-	-	-	-	-	-	-	-	-	-	3	21.4%	-	-
Heavy-calcined	34	51.5%	5	7.6%	-	-	1	1.5%	2	3.0%	1	1.5%	14	21.2%	9	13.6%
Calcined	740	75.4%	70	7.1%	5	0.5%	6	0.6%	33	3.4%	3	0.3%	88	9.0%	36	3.7%

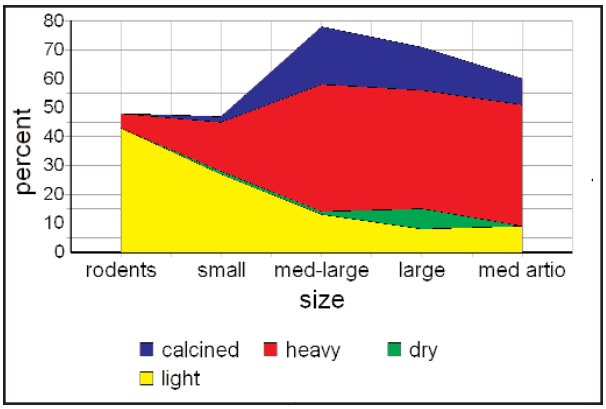


Figure 43. Burning by faunal body size, LA 116471 (Punto de los Muertos).

scapulae, innominates, carpals, and tarsals) for those unidentified taxa with larger sample sizes and considerable burning, shows some patterning (Table 52). In all but the large mammals and medium artiodactyls, the proportions are fairly equivalent while increasing with body size for the long bones (the extremely high proportions for medium artiodactyls come from the rib fragments, where 87 percent are burned) and decreasing for flat bones. This would seem to suggest that, at least for the larger body sizes, burning is not entirely random, and long bones are more likely to be burned. However, it is more likely that long bones (especially ribs) become more fragile when burned and break into more recognizable pieces than flat bones in the larger body sizes.

Table 52. Proportion of burned long bone and flat bone fragments for selected taxa, Punto de los Muertos

Taxon	% Burned Long Bone Fragments	% Burned Flat Bone Fragments
Small mammal	53%	47%
Small-medium mammal	72%	65%
Medium-large mammal	77%	80%
Large mammal	75%	58%
Medium artiodactyl	79%	39%

Few concrete conclusions can be reached about the burning. There is a lot of burning, and it differs between the body sizes. Some burning occurred after discard--at least 4.7 percent. It is possible that the larger body sizes with much burning represent the older deposits where burning has helped to preserve the bone, and that some bone may have been intentionally burned, perhaps as fuel. The smaller animals with little burning and mostly scorching could represent the later occupation associated with the ceramics or could have burned in situ.

Completeness

Much (97.5 percent) of the assemblage is very fragmentary (less than a quarter of the element is represented by the specimen) (Table 53). While extensive breakage can occur during marrow extraction or when rendering a carcass into pieces small enough to fit into cooking vessels, breakage also results from trampling, chewing by carnivores, and sediment weight and movement.

Again, there is some patterning associated with body size. Smaller animals have more complete or nearly complete specimens than larger animals. Some of this is because a portion of the rodents and the herps are likely postoccupational burrowers that are less likely to become broken. In addition, smaller-bodied animals require less breakage to render them into cookable or consumable units than larger animals.

Mechanical strength varies with the intensity of burning (Stiner et al. 1995:234). Thus, burning to a blackened or calcined state renders bone more susceptible to breakage, so burned bone should be in smaller pieces. In this assemblage as a whole this is the case (Table 54), with a statistically significant difference between bone that is largely complete and that which is fragmentary (X^2=103.6032, df=4, sig.= .000) at least at the rather gross level of monitoring employed here. Little bone was complete or nearly so (more than 75 percent present), but those found are burned less often than when bone was very fragmentary (less than 25 percent present).

Results are markedly different when broken down by body size (Table 55). More of the small-mammal, small-to-medium mammal, rodent, and rabbit group is more unburned when complete (78.6 percent compared to 25.0 percent for the large animal group), reflecting at least in part the postoccupational burrowers in the small animal group. In the most fragmented category, the small animals are burned only slightly less than the larger animal group (65.2 and 71.3 percent), suggesting that the size of the animal may have little to do with whether or not the burned bone is broken in small pieces. Lightly burned or scorched bone has a distinctive pattern. It occurs fairly commonly in all of the small animals regardless of fragment size groups, but there are none at all in the large animal group until the smallest fragment group. In addition, the amount of burned bone in the small-animal group increases as bone becomes more fragmentary, as would be expected when bone becomes more fragile from burning. However, it actually decreases in the large-animal group, suggesting that burning alone is not the cause of the fragmentary nature of this assemblage. Certainly, churning and trampling by pothunters and the archaeologists caused a great deal of

Table 53. Taxon by completeness, Punto de los Muertos

Taxon	Complete		>75% Complete		50-75% Complete		25-50% Complete		<25% Complete	
	No.	%	No.	%	No.	%	No.	%	No.	%
Unknown small	-	-	-	-	-	-	-	-	4	100.0%
Small mammal/medium-large bird	-	-	-	-	-	-	-	-	19	100.0%
Small mammal	-	-	-	-	2	0.3%	-	-	584	99.7%
Small-medium mammal	-	-	-	-	-	-	1	0.7%	137	99.3%
Medium mammal	-	-	-	-	-	-	-	-	6	100.0%
Medium-large mammal	-	-	1	0.1%	-	-	2	0.3%	724	99.6%
Large mammal	26	0.5%	4	0.1%	-	-	1	<0.1%	5454	99.4%
Very large mammal	-	-	-	-	-	-	-	-	1	100.0%
Small squirrel	1	16.7%	1	16.7%	-	-	4	66.7%	-	-
Prairie dog	2	15.4%	-	-	-	-	-	-	11	84.6%
Botta's pocket gopher	-	-	1	100.0%	-	-	-	-	-	-
Plain's/desert pocket gopher	-	-	-	-	-	-	-	-	2	100.0%
Yellow-faced pocket gopher	-	-	-	-	-	-	-	-	3	100.0%
Small kangaroo rat	-	-	-	-	-	-	3	100.0%	-	-
Banner-tailed kangaroo rat	-	-	-	-	-	-	5	100.0%	-	-
Beaver	-	-	1	33.3%	-	-	-	-	2	66.7%
Cricetid rodent	-	-	1	50.0%	-	-	1	50.0%	-	-
Hispid cotton rat	-	-	-	-	1	20.0%	-	-	4	80.0%
Woodrat	2	100.0%	-	-	5	25.0%	3	15.0%	10	50.0%
White-throated woodrat	-	-	-	-	-	-	2	100.0%	-	-
Small rodent	1	20.0%	-	-	-	-	2	40.0%	2	40.0%
Medium-large rodent	4	10.8%	-	-	2	5.4%	5	13.5%	26	70.3%
Cottontail rabbit	14	9.5%	6	4.1%	6	4.1%	33	22.3%	89	60.1%
Jackrabbit	7	4.7%	1	0.7%	2	1.4%	16	10.8%	122	82.4%
Medium carnivore	-	-	-	-	-	-	-	-	3	100.0%
Canis sp.	-	-	-	-	-	-	1	100.0%	-	-
Artiodactyl	-	-	-	-	-	-	-	-	4	100.0%
Medium artiodactyl	-	-	-	-	-	-	11	7.9%	128	92.1%
Large artiodactyl	-	-	-	-	-	-	-	-	2	100.0%
Deer	1	9.1%	-	-	-	-	1	9.1%	9	81.9%
Pronghorn	-	-	-	-	-	-	2	10.0%	18	90.0%
Medium bird	-	-	-	-	-	-	1	25.0%	3	75.0%
Medium-large bird	1	25.0%	-	-	-	-	-	-	3	75.0%
Very large bird	-	-	-	-	-	-	-	-	1	100.0%
Bobwhite	-	-	-	-	1	50.0%	1	50.0%	-	-
Quail	-	-	-	-	1	50.0%	-	-	1	50.0%
Turtles	-	-	-	-	-	-	-	-	62	100.0%
Painted turtle	-	-	-	-	-	-	-	-	1	100.0%
Slider or cooter	-	-	-	-	-	-	-	-	3	100.0%
Slider	-	-	-	-	-	-	-	-	8	100.0%
Softshell	-	-	-	-	-	-	-	-	7	100.0%
Lizard	6	85.7%	-	-	-	-	-	-	1	14.3%
Snakes	2	100.0%	-	-	-	-	-	-	-	-
Fish	-	-	-	-	-	-	-	-	1	100.0%
Mussel	-	-	-	-	-	-	-	-	400	100.0%
Total	67	0.8%	16	20.0%	20	20.0%	95	120.0%	7855	97.5%

Table 54. Burning by completeness for the entire assemblage, Punto de los Muertos

	>75% complete	25-75% complete	<25% complete
Unburned	49	54	2733
Light burn	8	38	820
Other burn	26	24	4301

Table 55. Proportion of burn type within completeness categories, Punto de los Muertos

Taxa	Burn Type	>75% complete	25-75% complete	<25% complete
Unknown small, small mammal, small mammal/large bird, small-medium mammal, medium mammal, rodents, rabbits, carnivores, and canids (n=1167)	% unburned	78.6	50.5	34.8
	% light/scorched	16.7	37.9	10.4
	% other burns	4.8	27	54.8
Medium-large mammal, large mammal, and artiodactyls (n=6381)	% unburned	25	23.5	28.6
	% light/scorched	0	0	8.7
	% other burns	75	76.5	62.6
Total assemblage (n=8053)	% unburned	59	46.5	34.8
	% light/scorched	9.6	32.8	10.4
	% other burns	31.3	20.7	54.8

breakage. Yet some activity at the site was probably responsible for a good portion of the burning and, therefore, the fragmentation.

Potential Butchering Marks

Given the amount of pitting and etching and the fragmentary nature of the bone, it is not surprising that few cuts and abrasions were found (Table 56). Cuts and portions removed indicate that at least some of the prairie dog, rabbit, beaver, medium-to-large mammal, large-mammal, and artiodactyl remains were left by humans. Evidence of smash breaks (impact breaks and bone flakes) are remarkably sparse given the fragmentation. This kind of damage should have remained evident if the breakage was due in large part to processing for marrow. Rendering bone for recovering grease requires smashing bones into small fragments then cooking the chips in water (Brink 1997:259-260). Only ten impacts and a single bone flake were found, again suggesting that some process other than carcass processing resulted in the condition of this assemblage.

Modification

Few modified specimens were found. Again, the amount of burning, breakage, and clay cover has probably obscured or destroyed some evidence of use. Table 57 lists the types of modification for each taxon by element. Ornaments (beads and tubes, and drilled shell discs) are some of the more common. Pigment stains found on the larger indeterminate groups could be on small pieces of human bone. Pigment was found on 15 pieces of human bone (about 0.2 percent). Many of the tool fragments are probably from the handles of tools.

Discussion

Viewed as a single unit, this assemblage is different from most reported for the area. Some of the dissimilar-

Table 56. Potential butchering marks by taxon and element, Punto de los Muertos

Taxon	Element	Transverse Cuts	Oblique Cuts	Impact Break	Spiral Break	Snap Break	Portion Cut Off	Abrasion	Percussion Pit	Bone Flake
Small mammal	long bone	-	-	-	14	1	-	-	-	-
Medium-large mammal	fragment	-	-	-	1	-	-	-	-	-
	long bone	1	-	2	1	-	-	-	-	-
Large mammal	long bone	6	1	5	-	-	-	1		1
Prairie dog	ulna	-	-	-	-	-	1	-	-	-
Beaver	astragalus	-	-	-	-	-	1	-	-	-
Cottontail rabbit	mandible	1	-	-	-	-	-	-	-	-
	humerus	-	-	-	1	-	-	-	-	-
	tibia	-	1	-	-	-	-	-	-	-
Jackrabbit	radius	-	-	-	1	-	-	-	-	-
	innominate	1	-	-	-	-	-	-	-	-
	tibia	-	-	1	-	-	-	-	-	-
Medium artiodactyl	rib	-	1	-	-	-	-	-	-	-
	humerus	-	-	-	-	-	-	-	1	-
Pronghorn	humerus	-	-	1	-	-	-	-	-	-
	metatarsal	-	-	1	-	-	-	-	-	-
Total		9	3	10	18	1	2	1	1	1

Table 57. Modified bone, Punto de los Muertos

Taxon	Element	Bead or Tube	Ornament	Manufacturing Debris	Tool Fragment	Ground Edge	Pigment-Stained
Small mammal	long bone	3	-	-	-	-	-
Small to medium mammal	long bone	3	-	-	-	-	-
Medium mammal	long bone	-	1	-	-	-	-
Large mammal	long bone	-	-	-	7	-	11
	flat bone	-	-	-	8	-	2
	rib	-	-	-	2	-	-
Medium artiodactyl	long bone	-	-	-	-	-	1
	metatarsal	-	-	1	1	-	-
	metapodial	-	-	-	-	-	1
Mussel	shell	-	3	-	-	6	-
Total		6	4	1	18	6	15

ity would undoubtedly disappear if the site could be broken into components and had some structure. The presence of even a few ceramics in the feature suggests a late occupation could have deposited a portion of the faunal remains. Late Prehistoric sites in the Carlsbad area generally produce faunal assemblages dominated by small mammals and mussels. Preservation is generally poor at most of these sites, resulting in small assemblages.

In the Brantley Reservoir area northwest of Carlsbad, the Champion site, consisting of a ring midden, a number of hearths, and scattered lithic and ceramic artifacts, had a small but varied faunal assemblage. In addition to an abundance of freshwater mussels, there were small numbers of jackrabbit, cottontail, squirrel, prairie dog, woodrat, turtle, and carnivore bones (Gallagher and Bearden 1980:119-120). Later excavations at a range of sites, including ring middens and stone enclosures, recovered freshwater mussel, cottontail, jackrabbit, woodrat, pocket gopher, deer, bird, and fish remains (Robertson 1985:A-19-20).

More recent excavations just east of Carlsbad again produced a small but diverse fauna, mostly small mammals. Squirrel, kangaroo rat, small mice, woodrats, porcupine, cottontail, jackrabbit, canids, badger, bison, bird, and turtle were all recovered from a highway project at LA 29363 (Moga 2000).

To the southeast, sites excavated in conjunction with WIPP produced little fauna. One lithic and ceramic artifact scatter (ENM 10418) contained cottontail, deer, bison, and freshwater mussel (*Lampsilis* sp.) (Lord and Clary 1985:183-188).

This Late Prehistoric pattern of small-mammal, turtle, and freshwater-mussel utilization could be represented in a portion of the LA 116471 assemblage and could help to explain the differences in burning and breakage between the small and large forms. The preponderance of larger animals, the large amount of burning and fragmentation, and the presence of significant amounts of human bone mixed with the fauna remain suggest a different adaptation or function. The general concept of Archaic adaptation is one of small-mammal utilization (e.g. Sebastian 1989:52), with exceptions. In Roney's (1985:72) excavations at Hooper Canyon Cave, almost 84 percent of the Archaic fauna was from large mammals and only 11 percent from small mammals, although the same was true for his ceramic level faunal assemblage.

The only vaguely similar report is from east of Carlsbad. Mera (1938:16) describes midden circles as resembling refuse heaps with small fragments of limestone, charcoal, and ash in an unstratified mass along with ceramics, burned and unburned bone, and freshwater mussels. In one specific circle with brown wares, he notes that a considerable quantity of bone was obtained but was in such fragmentary condition that only mule deer and pronghorn could be identified (Mera 1938:17). Human burials have been found in midden circles (Mera 1938:19), providing another similarity.

HUMAN BONE FROM LA 116471 (PUNTO DE LOS MUERTOS)

Nancy J. Akins

A large amount of human bone (n=2194) from a number of individuals was found mixed in with the fauna. Other than hand and foot elements and one vertebra, all are broken into small pieces, usually in the 1-5 cm range. Burning is common: 47.3 percent are burned, ranging from light burns to calcined. A fair amount (at least 16 percent) of the burns are on bone that was dry when burned. Red pigment adheres to a small number of the elements (n=30), often coating the entire bone and suggesting that some of the bones are from secondary or bundle burials. Calibrated AMS dates on human bone (n=3) range from as early as 775 to 5 B.C., while those on animal bone (n=2) date as early as 805 B.C. and as late as A.D. 450. These dates and the presence of ceramics suggest the site could have been used for human burial over many centuries, resulting in the presence of a variety of burial types and groups. Appendix 6 contains photographs of the human bones found in representative excavation units.

Methods

A detailed recording format was developed for the human bone. It contains many of the variables from the faunal coding system but is more detailed in describing the part of the element represented, the age of the individual, and the burning. Recorded variables include the FS number, a lot number, count, whether the element is from the same individual or the same bone as others in the bag, the element, the side, the part of the element represented, the portion of the part represented, how complete the element or part is (for major cranial bones only), the general age group of the individual, the specific age when possible, the criteria for aging, the sex or probable sex, environmental alteration, degree of environmental alteration, animal alteration, location of the animal alteration, burn color, burn location, crackling or exfoliation of burned bone, burn fracture morphology, potential processing and processing location, and pigment staining. In addition, measurements and other observations were recorded according to standard human protocol (Buikstra and Ubelaker 1994).

A fairly conservative approach was taken in determining whether bone was human. Many pieces had diagnostic shapes, cresting, muscle attachment, or foramina allowing for positive identifications. Other pieces (those coded long bone and flat bones) had attributes that when compared with the identified human and artiodactyls strongly suggested they are human. There remains, however, a number of small fragments that could be human but are just too small or lack diagnostic criteria, especially long bone shaft fragments, that were included in the faunal analysis. Conversely, there may be a few small pieces of turtle carapace that were recorded as human cranial case fragments. Small, burned pieces of human crania and turtle shell are remarkably similar.

Age was determined by comparing parts from immature individuals with those from aged individuals from the La Plata area in northwest New Mexico. These were aged by dental development and provide a relatively accurate assessment of age. The general age was recorded as fetus or newborn, infant (0.5 to 2 years), young child (2.5 to 5 years), middle child (5.5 to 10 years), older child (10.5 to 16 years), child age unknown, older child or small adult, young adult (17 to 25 years), middle adult (25 to 40 years), older adult (40+ years), or adult age unknown. If the age could be further refined from dental development, epiphysis closure, or size, this was recorded as a range under the specific age variable.

Sex was recorded as immature, female, male, probable female, probable male, or mature adult. Only one element is female. The few unquestionable male elements are either very large or have male characteristics such as a very blunt supraorbital margin or broad medial ridge on the pubis. Probable male and female designations are based on the size of the elements. The probable males are considerably larger and more rugose than a prehistoric male from Lincoln County. Similarly, the probable females are mature yet very gracile compared to this burial. Most elements fall between these two extremes and are considered adult, sex unknown.

Age and Sex

Most of the sample comes from adults of undetermined sex (Table 58). Although sparse, the aged pieces indicate that several children and adults were buried in Feature 1. These include two fetuses and at least one 3 to 6 year old, a 6 to 8 year old, two 8 to 10 year olds, and a 10 to 16 year old. A metacarpal and lateral portion of an occipital (from the pothunter's backdirt) are comparable in size to a full-term fetus or newborn from La Plata aged by dental development. The arch portion of a thoracic vertebra was considerably smaller than this La Plata individual and probably represents a preterm fetus. The vertebra was found several meters south of the pothunter's backdirt pile.

The young child elements, a portion of a maxilla, a hand phalanx, and a proximal femur shaft are similar in size to a 3 to 6 year old from La Plata. One is from the

Table 58. Age and sex distribution, Punto de los Muertos

Age or Gender	Count	Percent
Fetus or newborn	3	0.1%
Young child (2.5-5y)	3	0.1%
Middle child (5.5-10y)	31	1.4%
Older child (10.5-16y)	10	0.5%
Child, age unknown	21	1.0%
Young adult (17-25y)	5	0.2%
Middle adult (26-40y)	9	0.4%
Older adult (41+y)	3	0.1%
Adult, age unknown	1873	85.4%
Older child or adult	236	10.8%
Total	2194	100.0%
Immature	69	3.1%
Male	15	0.7%
Probable male	79	3.6%
Female	1	0.0%
Probable female	17	0.8%
Mature	2013	91.8%
Total	2194	100.0%

pothunter's backdirt, another from the grid adjacent to the backdirt, and the third from several meters to the east. These could be from the same or different individuals given the spatial distribution.

Middle child elements are the most numerous for the immature individuals and include at least two ages. While many of the parts could not be assigned a specific age, several are similar in size to a 3 to 6 year old from La Plata. These include a heavily burned cervical vertebra fragment, a thoracic vertebra fragment, the glenoid portion of a scapula, and a portion of an acetabulum. Since no parts are duplicated, these could represent a single child. All but one were found in the pothunter's backdirt, and the other is from a grid 2 m to the south.

Elements from individuals the size of a La Plata 8 to 10 year old are more numerous and indicate at least two are represented. Parts include a portion of a mandible, a tooth, most of the lowest thoracic vertebra, part of a lumbar vertebra, parts of two humeri from different individuals, an ulna shaft, and three hand and one foot phalanges. One of the hand phalanges is burned black. Six grids and the pothunter's backdirt contained parts of children in this age group. These form three spatial clusters, a singe grid to the north, three to the east, and two along the south, possibly indicating three children in this age group.

None of the elements assigned to the older child category (10.5 to 16 years) could be given a specific age. These elements include two pieces of mandible and a first metatarsal with an unfused proximal end. One of the mandible pieces is quite slender, suggesting a young female. The metatarsal is not yet full size, suggesting an older child rather than a young adult. Proximal metatarsals fuse between 18 and 20 years of age (Gray 1977:211). Two of the three bones from older children are from the pothunter's backdirt.

In the young adult group, at least one male and one female are present. These were generally aged between 17 and 24 years based on fusing or recently fused epiphysis (Buikstra and Ubelaker 1994:43; Gray 1977:131, 154). A male is suggested by a large distal radius and a proximal rib, and the female by a gracile and unfused medial clavicle. A second radius could not be sexed but could be from the female or another male, since it is the same side as the male radius. A distal ulna could come from either individual. Spatially, these occur in two groups, one to the west and one to the north.

Except for an atlas vertebra with minor degenerative lipping suggesting an individual in the middle age range, the parts assigned to this group are all portions of maxilla or mandibles with teeth or isolated teeth. Three pieces from the same mandible are probably from a male and represent a different individual than one of the other mandible fragments, indicating that at least two individuals fall within this age range. These come from only three squares and the pothunter's backdirt.

Parts suggesting older individuals include a heavily lipped axis vertebra and two heavily worn teeth. One tooth is large, suggesting a male. These are from two adjacent squares near the west edge and one on the east edge of the feature, suggesting two individuals are possible.

The age distribution data suggest that at least 12 individuals were buried in Feature 1. This means that a large amount of bone was from secondary and bundle burials and not brought to the site, was not recovered by the excavations, was removed by the pothunters, and/or deteriorated over time or when exposed by the pothunters. Tables 59 and 60 give the body part counts for the general age groups and for probable males and females. Although sparsely represented, several of the elements prone to rapid deterioration (vertebra, sternum, scapula, innominate, carpals, and tarsals) are relatively well represented.

General Indicators of Health

What little evidence there is suggests a healthy population. None of the cranial fragments exhibit evidence of porotic hyperostosis. Hypoplasia lines are present on three of the teeth (Table 61) and indicate some form of stress for at least two of the individuals. No caries were found, but some teeth have the heavy attrition characteristic of groups who use stone grinding tools.

Table 59. Elements by general age, Punto de los Muertos

General Age	Element	Count
Fetus-newborn	cranium	1
	thoracic vertebra	1
	metacarpal	1
Young child	cranium	1
	femur	1
	hand phalanx	1
Middle child	mandible	2
	cervical vertebra	3
	thoracic vertebra	2
	lumbar vertebra	1
	sternum	1
	rib	5
	scapula	3
	innominate	3
	humerus	4
	ulna	1
	carpal	1
	hand phalanx	4
	foot phalanx	1
Older child	mandible	2
	rib	7
	metatarsal	1
Older child/small adult	cranium	192
	mandible	3
	tooth	7
	atlas vertebra	2
	thoracic vertebra	3
	rib	7
	scapula	1
	humerus	1
	radius	2
	ulna	2
	metacarpal	7
	hand phalanx	6
	femur	1
	metatarsal	1
	foot phalanx	1
Child, age unknown	long bone end fragment	2
	flat bone	3
	cranium	15
	mandible	1
Young adult	rib	1
	clavicle	1
	radius	2
	ulna	1
Middle adult	cranium	2
	mandible	5
	tooth	1
	vertebra	1
Older adult	tooth	2
	atlas	1
Adult	long bone fragment	437
	flat bone fragment	304
	cranium	568
	mandible	19
	tooth	12
	vertebra	4
	atlas	7
	axis	4
	cervical vertebra	11
	thoracic vertebra	39
	lumbar vertebra	17
	sacrum	2
	sternum	1
	rib	83
	clavicle	3
	scapula	14
	innominate	13
	humerus	18
	radius	12
	ulna	11
	carpal	10
	metacarpal	17
	hand phalanx	65
	femur	46
	patella	4
	tibia	39
	fibula	64
	calcaneus	2
	talus	4
	tarsal	9
	metatarsal	17
	foot phalanx	12
	metatarsal or metacarpal	4

Table 60. Probable male and female elements, Punto de los Muertos

Gender	Element	Count
Male	long bone	5
	cranium	7
	mandible	7
	tooth	1
	atlas	2
	thoracic vertebra	2
	lumbar vertebra	3
	rib	4
	clavicle	1
	scapula	7
	innominate	1
	humerus	3
	radius	5
	ulna	3
	carpal	2
	metacarpal	3
	hand phalanx	6
	femur	9
	tibia	8
	fibula	7
	calcaneus	1
	talus	1
	tarsal	2
	metatarsal	2
	foot phalanx	2
Female	cranium	2
	mandible	1
	rib	1
	clavicle	2
	innominate	1
	metacarpal	5
	hand phalanx	2
	metatarsal	1
	calcaneus	1
	talus	1
	foot phalanx	1

Mobility

At least one of the males, probably two, are extremely large and robust for southwestern burials. The largest individual is about 25 percent larger than a La Plata male in some aspects. Few measurements were possible, and most of those are not commonly taken or reported. Table 62 gives these for the large individual compared with a male from Lincoln County, a large male from LA 3333 in the Galisteo Basin, and a male from the La Plata area. The Lincoln County burial is from a more or less sedentary group, probably dating between A.D. 1300 and 1400. That from the Galisteo Basin dates around A.D. 1200 but had a mobile lifestyle. The La Plata population consists of Pueblo II sedentary agriculturalists dating between A.D. 1000 and 1075.

One or both of the large males could be represented by the measured elements. Measurements from this site are larger to considerably larger in all dimensions. This is particularly true of the scapula, clavicle, and femur measurements, but evident in all. The measurements are also significantly larger than mean midshaft femur diameters for male burials from the Henderson site near Roswell at 32.3 and 25.7 mm (Rocek and Speth 1986:162).

This robusticity could have resulted from mobility or a somewhat different and larger-sized population.

Table 61. Teeth recovered from Punto de los Muertos (only those with observations)

Age Group	FS-Lot Number	Tooth	Hypoplasia	Wear	Comments
Young child	300-29	max deciduous canine	0		split
Middle child (8-10y)	351-1	max right incisor 1	0	0	6.27 × 6.43 × 9.8 mm
	387-1	mand incisor?	0?	0	crown fragment
Child age?	324-2	mand left incisor 1		0	crown fragment
Child/adult?	330-1	premolar?	1 at 1.77mm		crown fragment
	330-1	canine or premolar	0	0	crown fragment
	348-1	max incisor 1	0	0	crown fragment
	354-1	max left second molar	0	0	11.73 × 10.27 × 8.27 mm (5 cusps, + pattern)
Middle + adult	301-3	mand left first molar	0	7/7/9/9	11.06 × 11.11 × 4.36 mm
	317-1	mand right incisor 2	0	7	6.29 × 6.40 × 5.39 mm (pigment on crown)
	317-1	mand right canine	1 at 0.82mm	7	6.66 × 8.02 × 7.53 mm (pigment on crown)
	317-3	mand R second premolar	0	6	7.00 × 7.78 × 5.20 mm
	360-2	mand right incisor 1	0	6	5.33 × 4.92 × 6.98 mm
	360-3	max left first premolar	1 at 0.89mm	6	6.91 × 9.31 × 4.30 mm
	362-1	max right third molar?		7	7.85 × 9.00 × 4.59 mm
Older adult	324-5	max left first premolar	0	6	7.07 × 9.83 × 5.10 mm (pigment on crown)
	365-2	incisor?		8	worn to root, no enamel
Adult	300-32	molar	1 at base	6-9	crown fragment
	360-1	mand left incisor 2			fragment

Teeth not included in this table are root and crown fragments from unknown teeth.
Wear scoring system from Buikstra and Ubelaker (1994:52-53).
Measurements are mesiodistal diameter, buccolingual diameter, and crown height; 0=absent, blank=unknown.

Table 62. Comparative measurements of male burials (mm), Punto de los Muertos

Measurement	LA 116471	Chaves County	LA 3333 (B10)	La Plata (LA
Scapula glenoid: height	44.36	39.98	38.38	38.15
breadth	29.76	27.61	27.64	27.18
Femur: midshaft A-P	40.20*	25.57	29.53*	28.65
midshaft M-L	30.98*	24.29	25.80*	22.92
Clavicle: midshaft diameter	15.81*	9.42	9.94	11.29
Thumb phalanx 1: base diameter	16.2		15.52	15.48
Phalanx 1, digit 3 distal diameter	13.38		11.08	11.74
midshaft M-L diameter	10.99		8.3	9.56
Metacarpal 1 length	49.65		47.79	42.63
proximal M-L diameter	18.85		14.39	14.97
distal M-L diameter	15.1		14.98	14.94

* midshaft estimated

Smaller, more usual-sized individuals in the same burial population suggest that multiple groups and time periods are present, or that there was a good deal of sexual dimorphism between males and females in the group represented.

In general, external dimensions correlate with long-bone strength. Repetitive strain changes the amount and distribution of cortical bone (Bridges 1996:112). At least one study suggests that increased loading on bones around adolescence increases the surface, rather than inherited factors (Bridges 1996:115). Femoral shaft shape provides an indication of femur strength and mobility. Smaller, more circular indices (midshaft anteroposterior diameter ÷ midshaft mediolateral diameter) are associated with decreased mobility (Fig. 44). Modern hunter-gatherer males have high anteroposterior ratios (Bridges 1996:115). According to these principles, the large size and shape index (1.3) suggests considerable mobility beginning at an early age. Ratios for males from LA 3333 range from 0.95 to 1.43 with a

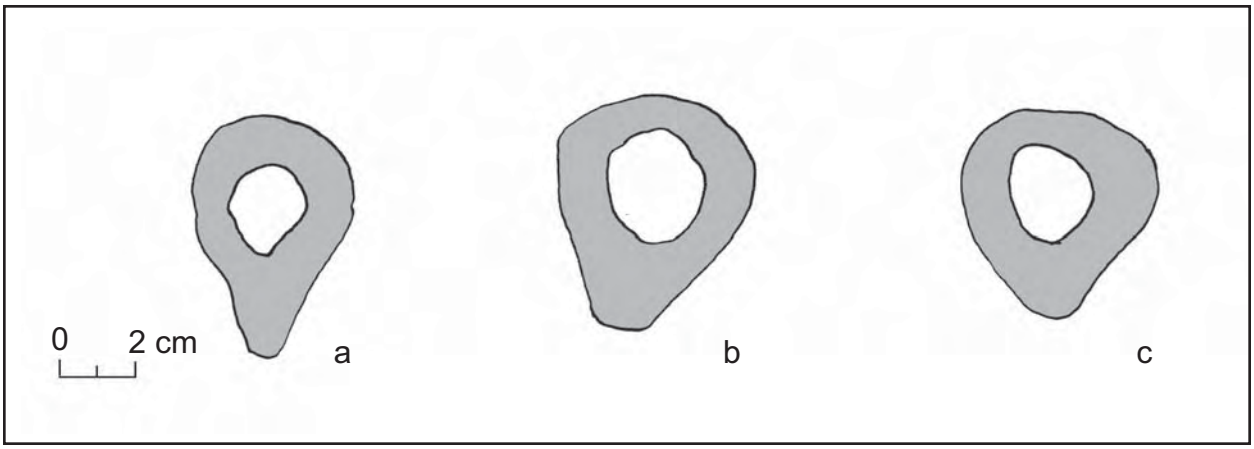


Figure 44. Comparison of (a) midshaft femur cross section, LA 116471 (Punto de los Muertos), with (b) preagricultural and (c) agricultural cross sections from Georgia.

mean of 1.16. For the La Plata males the range is from 0.80 to 1.14 with a mean of 1.00, or perfectly round (Akins 1996: Table 9).

Burning

Burning need not be related to culinary practices or cremation. Bone can be burned as fuel or as rubbish disposal or incidentally from a fire built over or near the bone. Assumptions that large proportions of burned bone in a site assemblage indicates systematic roasting are unwarranted (e.g., White 1992:157).

Experiments using wood fires and gas incinerators to burn dry, fleshed, and defleshed human bones found diagnostic differences in how they burned. Buikstra and Swegle (1989:256) found color was the best indicator of dry versus fresh bone. Table 63 summarizes their findings. They also note that it was impossible to incinerate a fleshed bone to a uniform smoked condition. Rather, parts became calcined before all became smoked. Dry bone could be blackened, but the color was superficial and often retained unburned areas, while other portions were calcined (Buikstra and Swegle 1989:252).

Bone can burn unintentionally after it is buried. One study demonstrated that modern deer bone buried 10 cm below a replicated prehistoric campfire became black in sand matrices and dark brown in clay matrices. Old bone (Archaic, dating about 5500 B.P.) was unaltered in sand but turned a pale brown in clay matrices. Low, long-duration direct burning resulted in uniform color and minimal distortion ,while short-duration, high-intensity burning produced multiple surface colors and moderate distortion (Bennett 1999:2-5). Others have found that calcination occurs only when a bone is directly exposed to fire. Buried bone would only burn to a carbonized state (Stiner et al. 1995:235).

With this background, the burning variables were refined to help determine the timing of the burns and whether cremation could account for some of the burned bone. Burn color was noted as unburned, light or scorched burns, light to heavy burns on the same surface, dry burns (light surfaces with black interiors), heavy or smoked, light brown to black to calcined, black to calcined, or calcined. Burn location was recorded as even over the entire specimen, discontinuous over the entire specimen, proximal, distal, shaft, ends or edges, interior only, exterior only, black on the interior and brown on the exterior, brown on the interior and black

Table 63. Differences in burning between fleshed, defleshed, and dry bone, Punto de los Muertos

	Fleshed	Defleshed	Dry
Color	white, blue, gray	white, blue, gray	tan to brown surface, gray to white underneath
Cortical exfoliation	less common	more common	absent
Longitudinal shaft fissures	deep and long	deep and long	shallow and long
Transverse splitting	deep and more common	deep and less common	shallow and infrequent
Shallow crackling on articular surfaces	present	present	absent
Curved cracks	present but rare	present but rare	absent

on the exterior, or on opposite sides. Crackling or exfoliation was noted as absent; shallow exterior, interior, or both; deep exterior, interior, or both; exfoliated over less than half of the surface; or exfoliated over more than half of the surface. Finally, the burn fracture was characterized as absent (no fracture), indeterminate (when the cause of the fracture was uncertain), or combinations of smooth and/or jagged for breaks that were longitudinal, transverse, diagonal, curved, irregular, and combinations of these.

Burn Characteristics

Slightly more of the human bone sample is unburned (52.6 percent) than burned (47.4 percent). The most common burns are heavy or black (21.9 percent) or combinations of heavy and light to calcined (12.9 percent). Lightly burned or scorched bone (2.8 percent) and calcined bone (6.9 percent) are rare, while dry burns are second only to heavy burns (7.3 percent) in proportion. As for location (Table 64), light burns are most often even over the entire bone. Graded burns, whether light to heavy or light to calcined, generally cover the entire bone in an even or discontinuous manner, while those graded black to calcined tend to be even or on opposite sides of the bone. Dry burns are generally black on the interior and brown on the exterior, brown on the exteriors and black at the core (coded as even entire specimen), or have one side unburned. A few (n=3) appear partially burned because the surface color is graded. Heavy burns are almost all even over the entire bone, as are calcined burns.

Most burned bones have neither crackling nor exfoliation (77.4 percent). Shallow crackling was found on a few with varying degrees of burn (Table 65). Deep cracks or checks were observed on only graded to calcined and calcined bone. Exfoliation or destruction of the outer surface by the heat is more common and found with all degrees of burns.

Recording of burn fractures produced few patterns, probably because of the difficulty in distinguishing those resulting from the burn from other types of breaks. In general, combinations of smooth and jagged breaks (n=457) are more common than just smooth (n=149) or just jagged (n=151) breaks. Similarly, break forms are most often a combination of longitudinal, transverse, and diagonal (n=362), followed by irregular (n=135). Other combinations--longitudinal, transverse, and irregular (n=77), and longitudinal, transverse, and curved (n=127)--are more common than simple transverse (n=30), longitudinal (n=11), diagonal (n=11), or curved (n=4).

Age and Sex

Overall, more adult bones are burned than those from children (Fig. 45), and the large child/small adult group has the largest proportion (79.7 percent). The adult/child and burned/unburned (adult = 834 burned, 1,056 unburned; child = 51 unburned, 17 burned) dichotomy is statistically significant (X^2 =9.7724, df=1, sig. = .0018). Only 25.0 percent of the children's bones are burned, compared to 44.1 percent of those from adults. Table 66 lists the elements and burning for each age group, and Table 67 the same for the probable male and female elements. Proportionately, more female elements (77.7 percent) than male elements (25.5 percent) are burned. Virtually all body parts were burned, especially crania and hand elements.

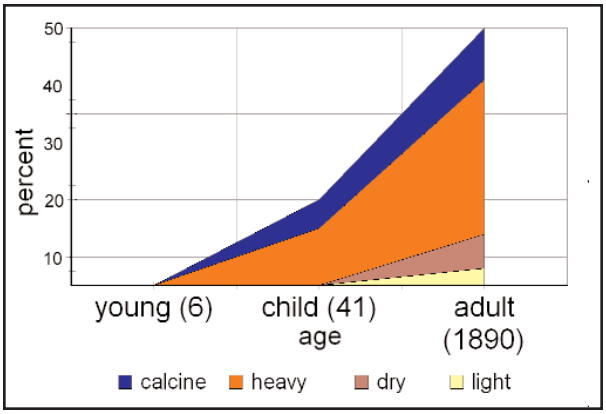


Figure 45. Burning of human bone by age, LA 116471 (Punto de los Muertos).

Spatial Distribution

Greater densities of bone were recovered from the west side of the feature, while greater densities of burned bone came from a strip at the center (41N and 42N). The distributions are sufficiently different that sample size alone cannot account for any spatial patterning in the burned human bone. Density information is compared with that of the faunal assemblage in a later section.

Discussion

Characteristics of cremated bone depend on the firing temperature, treatment before deposition, and conditions in the burial area. Color ranges from chalky white to gray, blue-gray, gray-brown, and black. Shattering and distortion make it difficult to identify individual fragments among the burned remains. Compact bone and tooth crowns normally crack and break into pieces, while tooth roots often survive. Cancellous bone shrinks

Table 64. Burn color and location, Punto de los Muertos

Burn Color	Even		Graded Same Surface		End or Edge		Interior		Exterior		Interior Black Exterior Brown		Interior Brown Exterior Black		Opposite Sides	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Lighty or scorched	57	91.9%	-	-	2	3.2%	1	1.6%	-	-	2	3.2%	-	-	-	-
Light to heavy	57	46.3%	34	27.6%	6	4.9%	4	3.3%	13	10.6%	3	2.4%	2	1.6%	4	3.3%
Dry burn	51	31.7%	3	1.9%	-	-	1	0.6%	-	-	88	54.7%	18	11.2%	-	-
Heavy (black or sooted)	475	98.8%	-	-	3	0.6%	-	-	2	0.4%	1	0.2%	-	-	-	-
Brown-black-calcined	-	-	7	77.8%	-	-	1	11.1%	-	-	-	-	-	-	1	11.1%
Black to calcined	24	47.1%	3	5.9%	1	2.0%	1	2.0%	3	5.9%	1	2.0%	-	-	18	35.3%
Calcined	148	97.4%	-	-	-	-	4	2.6%	-	-	-	-	-	-	-	-
Total	812	78.2%	47	4.5%	12	1.2%	12	1.2%	18	1.7%	95	9.1%	20	1.9%	23	2.2%

Table 65. Crackling and exfoliation by burn color, Punto de los Muertos

Burn Color	None		Crackled or Checked												Exfoliated			
			Shallow Exterior		Shallow Interior		Shallow Both		Deep Exterior		Deep Interior		Deep Both		<50% of Surface		>50% of Surface	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Light to heavy	58	93.5%	-	-	-	-	-	-	-	-	-	-	-	-	4	6.5%	-	-
Light to heavy	99	80.5%	-	-	1	0.8%	-	-	-	-	-	-	-	-	21	17.1%	2	1.6%
Dry burn	134	83.2%	-	-	-	-	-	-	-	-	-	-	-	-	23	14.3%	4	2.5%
Heavy (black)	397	82.5%	3	0.6%	1	0.2%	-	-	-	-	-	-	-	-	75	15.6%	5	1.0%
Brown-black-calcined	8	88.9%	-	-	-	-	-	-	-	-	-	-	-	-	1	11.1%	-	-
Black-calcined	25	49.0%	3	5.9%	1	2.0%	1	2.0%	1	2.0%	1	2.0%	-	-	17	33.3%	2	3.9%
Calcined	83	54.6%	21	13.8%	1	0.6%	4	2.6%	9	5.9%	2	1.7%	3	2.0%	24	15.8%	5	3.3%
Total	804	77.4%	27	2.6%	4	0.4%	5	0.5%	10	1.0%	3	0.3%	3	0.3%	165	15.9%	18	1.7%

Table 66. Burning by age and element, Punto de los Muertos

Age	Element	Unburned	Light Burn	Light-Heavy	Dry Burn	Heavy Burn	Brown to Calcined	Black to Calcined	Calcined
Fetus/newborn	cranium	1	-	-	-	-	-	-	-
	thoracic vertebra	1	-	-	-	-	-	-	-
	metacarpal	1	-	-	-	-	-	-	-
Young child	cranium	1	-	-	-	-	-	-	-
	hand phalanx	1	-	-	-	-	-	-	-
	femur	1	-	-	-	-	-	-	-
Middle child	mandible	2	-	-	-	-	-	-	-
	cervical vertebra	1	-	-	-	2	-	-	-
	thoracic vertebra	2	-	-	-	-	-	-	-
	lumbar vertebra	1	-	-	-	-	-	-	-
	sternum	1	-	-	-	-	-	-	-
	rib	5	-	-	-	-	-	-	-
	scapula	3	-	-	-	-	-	-	-
	innominate	3	-	-	-	-	-	-	-
	humerus	4	-	-	-	-	-	-	-
	ulna	1	-	-	-	-	-	-	-
	carpal	1	-	-	-	-	-	-	-
	hand phalanx	2	-	-	-	1	-	-	1
	foot phalanx	1	-	-	-	-	-	-	-
Older child	mandible	1	-	-	-	1	-	-	-
	rib	6	-	-	-	-	-	-	1
	metatarsal	1	-	-	-	-	-	-	-
Child	long bone	1	-	-	-	1	-	-	-
	flat bone	3	-	-	-	-	-	-	-
	cranium	5	1	2	1	5	-	-	1
	mandible	1	-	-	-	-	-	-	-
Child/adult	cranium	33	4	19	38	71	2	13	12
	mandible	1	-	-	-	-	-	-	2
	tooth	2	-	-	-	4	-	-	1
	cervical vertebra	-	-	1	-	-	-	1	-
	thoracic vertebra	2	-	-	-	1	-	-	-
	rib	3	-	-	-	1	-	-	3
	scapula	-	-	-	1	-	-	-	-
	humerus	-	1	-	-	-	-	-	-
	radius	2	-	-	-	-	-	-	-
	ulna	1	-	1	-	-	-	-	-
	metacarpal	3	1	1	-	1	-	-	1
	hand phalanx	-	2	-	1	3	-	-	-
	femur	1	-	-	-	-	-	-	-
	metatarsal	-	-	-	-	1	-	-	-
	foot phalanx	-	-	-	-	1	-	-	-
Young adult	rib	1	-	-	-	-	-	-	-
	clavicle	-	-	-	-	1	-	-	-
	radius	2	-	-	-	-	-	-	-
	ulna	1	-	-	-	-	-	-	-
Middle adult	cranium	2	-	-	-	-	-	-	-
	mandible	5	-	-	-	-	-	-	-
	tooth	1	-	-	-	-	-	-	-
	vertebra	-	-	-	1	-	-	-	-
Older adult	tooth	2	-	-	-	-	-	-	-
	cervical vertebra	-	-	-	-	-	-	-	1
Adult	long bone	286	8	8	6	86	-	4	39
	flat bone	286	-	-	-	9	-	-	9
	cranial	187	26	57	103	144	6	15	30
	mandible	6	2	2	-	4	-	3	2
	teeth	8	-	-	-	1	-	1	2
	vertebra	4	-	-	-	-	-	-	-
	cervical vertebra	14	-	1	-	6	-	1	1
	thoracic vertebra	25	1	1	-	9	-	-	3
	lumbar vertebra	11	-	1	-	2	-	1	2
	sacrum	1	-	-	-	-	-	-	1
	sternum	1	-	-	-	-	-	-	-
	rib	45	3	5	1	20	-	2	7
	clavicle	1	-	-	-	-	-	-	2
	scapula	8	-	2	-	2	-	1	1
	innominate	7	1	-	1	4	-	-	-
	humerus	8	-	1	-	8	-	-	1
	radius	6	-	1	-	4	1	-	-
	ulna	6	-	1	-	2	-	-	2
	carpal	7	-	-	-	2	-	-	1
	metacarpal	6	3	1	1	3	-	-	2
	hand phalanx	35	1	6	3	13	-	2	5
	femur	28	-	2	-	12	-	1	3
	patella	2	1	-	-	1	-	-	-
	tibia	8	3	4	3	10	-	4	7
	fibula	16	3	5	-	33	-	1	6
	talus	2	-	-	-	2	-	-	-
	calcaneus	1	-	-	-	1	-	-	-
	tarsals	7	-	-	1	-	-	1	-
	metatarsals	8	1	-	-	5	-	1	2
	foot phalanges	7	-	1	-	3	-	-	-
	carpal or tarsal	1	-	-	-	-	-	-	-
	metacarpal or metatarsal	3	-	-	-	-	-	-	1

Table 67. Burning by element for probable males and females, Punto de los Muertos

Gender	Element	Unburned	Light Burn	Light-Heavy	Dry Burn	Heavy Burn	Brown to Calcined	Black to Calcined	Calcined
Female	cranium	-	-	-	2	-	-	-	-
	mandible	-	-	-	-	1	-	-	-
	ribs	-	-	-	-	-	-	1	-
	clavicle	-	-	-	-	1	-	1	-
	innominate	-	-	-	-	1	-	-	-
	metacarpal	1	1	-	-	1	-	1	-
	hand phalanx	-	-	-	-	1	-	1	-
	talus	1	-	-	-	-	-	-	-
	metatarsal	-	-	-	-	-	-	1	-
	calcaneus	1	-	-	-	-	-	-	-
	foot phalanx	1	-	-	-	-	-	-	-
Male	long bone fragment	3	-	-	2	-	-	-	-
	cranium	4	-	1	2	3	-	-	-
	mandible	4	-	-	-	2	1	-	-
	tooth	1	-	-	-	-	-	-	-
	cervical	-	-	-	-	-	-	-	-
	vertebra	2	-	-	-	-	-	-	-
	thoracic	-	-	-	-	-	-	-	-
	vertebra	2	-	-	-	-	-	-	-
	lumbar vertebra	2	-	-	-	1	-	-	-
	rib	4	-	-	-	-	-	-	-
	clavicle	1	-	-	-	-	-	-	-
	scapula	5	-	-	-	-	1	1	-
	innominate	1	-	-	-	-	-	-	-
	humerus	2	-	-	-	1	-	-	-
	radius	4	-	-	-	1	-	-	-
	ulna	2	-	-	-	-	-	1	-
	carpal	1	-	-	-	-	-	1	-
	metacarpal	2	-	-	-	1	-	-	-
	hand phalanx	6	-	-	-	-	-	-	-
	femur	8	-	1		1	-	-	-
	tibia	3	-	-	1	3	-	1	-
	fibula	7	-	-	-	-	-	-	-
	talus	1	-	-	-	-	-	-	-
	calcaneus	-	-	-	-	1	-	-	-
	tarsal	2	-	-	-	-	-	-	-
	metatarsal	1	-	-	-	1	-	-	-
	foot phalanx	2	-	-	-	-	-	-	-

slightly but retains its shape. Fissures are often concentric and less frequent than in compact bone. Cracks in compact bone generally follow the trajectories of the bone (Gejvall 1970:469-471; McKinley 1994:339).

As a whole, the burned bone from LA 116471 does not fit this description or that of most of the cremated bone recovered from the Southwest. Cremations from four sites in the Point of Pines, Arizona, area are described as calcined bones reduced to small fragments. Color was mostly light gray to blue gray with deep checking, diagonal and transverse fracturing, and warping. A few were only smoked. Parts most likely to survive the burning were the thick parts of the cranium, the body and condyles of the mandible, distal end of the humerus, the calcaneus, the talus, and the patella. Long bones were reduced to badly distorted shaft fragments and eroded lumps of cancellous bone (Merbes 1967:501). An earlier site in the same area, the Cienaga Creek site, produced cremations that varied from a few scraps to a double handful of bone. It was finely broken, and individual pieces seldom reached 3 cm in size. The color was gray to white, and the larger pieces displayed thermal cracks (Haury 1957:13). Hohokam cremations at Snaketown were completely incinerated, with deep checking, diagonal transverse fractures, and warping. A few were only smoked, and no unburned bone was found (Birkby 1976:381).

Little of the burned bone from LA 116471 displays the shrinking and warping characteristic of cremation. Calcined bone and bone where the burn grades into calcined is definitely in the minority (9.7 percent of the assemblage). Yet the calcined bone often displays the deep cracks and exfoliation found in cremations. Given the amount of breakage and small size of most fragments, cremation should not be ruled out. Cremation may not completely burn all bone so that a range of burn

intensity can be found, especially in areas where fuelwood availability could influence the degree of burning that took place. Although rare, dry-bone cremation is also possible.

A variety of crematory methods were practiced during the Archaic. A Late Archaic site in the southeastern United States had one pit feature that contained primary (unburned) burials, primary cremations, and secondary cremations. Another area consisted of a crematory fire containing bone, not all of which was burned, as well as a pile of unburned disarticulated bone that may have been assembled for burning but never burned, and burned bone on top of these (Mires 1991:122-123). Closer to southeastern New Mexico, partially burned burials have been found in conjunction with inhumation, bundle burials, and cremations in sinkhole sites dating to the Archaic in Central Texas (Bement 1994:126).

Looking in detail at the implications of the burning at LA 116471, several types of mortuary treatment are indicated. Dry burns, identified either by color, the shallowness of the burn, or a location such as interior only or burned on the interior but not or less so on the exterior, accounts for 7.3 percent of the sample (15.5 percent of the burned bone). These burns represent activities that took place after the bone had dried or after it was deposited. If calcined burns require exposure to live coals, a minimum of 9.7 percent (or 20.4 percent of the burned bone) were exposed to burning in an open fire. Of these, 152 no longer had flesh because they are completely calcined, while 60 may have been fleshed since only portions are calcined. Undoubtedly, a variety of funerary practices are represented by the human bone. The mobile hunters and gatherers who frequented the area may well have deposited parts of those who died elsewhere in Feature 1.

Fragmentation

Like the faunal bone, most of the human bone is highly fragmented. Complete bones are extremely rare (1.5 percent), and all but one of these are small, compact, hand and foot bones. Greater proportions of children's bones are complete--13.2 percent as compared to 0.2 percent of the adult bones (Fig. 46). The proportion of bone falling in the smallest category (less than 25 percent of the element) is larger for adults (96.1 percent) than children (63.2 percent). This does not necessarily indicate that children were treated differently, since in both groups, it is the small, compact, hand and foot bones that survived breakage.

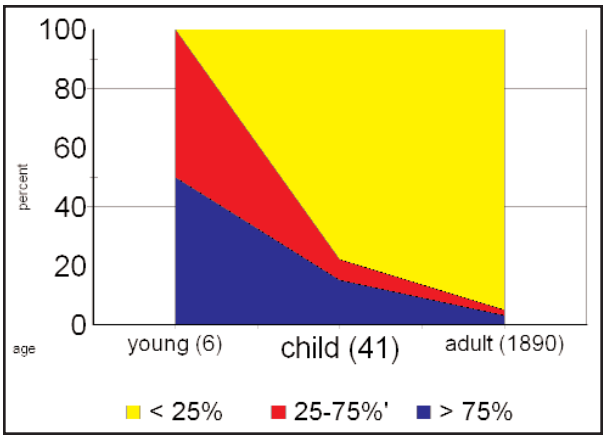


Figure 46. Completeness of human bone by age, LA 116471 (Punto de los Muertos).

No damage could be positively attributed to carnivores, but then not all carnivore-disturbed bone has clear identifying marks (Akins 1995; Kent 1981:370). Five pieces have rodent gnawing, but rodent gnawing rarely leads to fragmentation.

The age of the bone, pothunting, and excavation activities account for some of the breakage. Yet burning is a major factor. Burned bone is more friable and takes little agitation or pressure for its size to be reduced (Stiner et al. 1995:29). As a result, simple reuse of the site area over many centuries would break burned bone into small fragments.

In this assemblage, the proportion of burned bone increases as the portion of the element represented by a bone decreases. Complete bones are less likely to be burned (25.0 percent are burned) than fragmentary bones (47.7 percent are burned) (Table 68), perhaps con-

Table 68. Burning by completeness, Punto de los Muertos

Burn Color	Complete		>75%		50-75%		25-50%		<25%		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Unburned	24	75.0%	12	50.0%	12	48.0%	14	50.0%	1093	52.4%	1155	52.6%
Light or scorched	-	-	1	4.2%	3	12.0%	2	7.1%	56	2.7%	62	2.8%
Light to heavy	-	-	3	12.5%	-	-	4	14.3%	116	5.6%	123	5.6%
Dry burn	2	6.3%	1	4.2%	-	-	1	3.6%	157	7.5%	161	7.3%
Heavy (black or sooted)	5	15.6%	6	25.0%	7	28.0%	3	10.7%	460	22.1%	481	21.9%
Brown-black-calcined	-	-	-	-	-	-	-	-	9	0.4%	9	0.4%
Black to calcined	-	-	-	-	1	4.0%	-	-	50	2.4%	51	2.3%
Calcined	1	3.1%	1	4.2%	2	8.0%	4	14.3%	144	6.9%	152	6.9%
Total	32	100.0%	24	100.0%	25	100.0%	28	100.0%	2085	100.0%	2194	100.0%

firming that activities have increased the amount of fragmented bone, especially burned bone. When counts are broken down into three fragmentation groups (>75, 25 to 75, and <25 percent) and three burn groups (unburned, light burns, and other burns), the difference is statistically significant (X^2=11.7230, df=4, sig.=0.0195), again suggesting there is a relationship between burning and small fragment size for the human bone from this site.

Limited efforts to match bone fragments met with little success, probably because so much of the bone was not recovered, the fragmentary nature of what was recovered, and the difficulty of comparing that many small bone fragments. Those found were never more than 2 m away from pieces of the same bone.

Potential Alteration

Five bones display marks or breaks that could be interpreted as purposeful human alteration (Table 69). These include two breaks that can occur on green bone, one on the very large scapula and the other on the shaft of a fibula. I have observed and documented breaks like that found on the fibula as fresh breaks on dry bone. Peels, or the mechanisms that cause peels, likewise occur on bone that is not green (Akins 1995).

Table 69. Marks and breaks, Punto de los Muertos

FS-Lot	Element	Portion	Mark or Break	Location
301-31	atlas vertebra	anterior	peel	arch
359-4	femur	proximal shaft fragment	oblique cuts	shaft
359-5	femur	shaft fragment	transverse cuts	shaft
363-1	scapula	glenoid	diagonal break	acromonium
363-11	fibula	shaft fragment	spiral break	shaft

The linear marks are on femur shafts. Those on the left femur consist of about 11 short (3-5 mm) U-shaped transverse marks on the medial aspect of the shaft. At least three of the marks are double and reminiscent of gnawing by a small rodent. All are eroded so the edges are not smooth and sharp like cuts. On the posterior of this piece, just lateral of the linea aspera, are a series of small diagonal and transverse scratches. These are within a depressed area so they are probably not cuts. Parallel to the linea aspera is a singe vertical mark consisting of a clear mark with a smaller one at its edge. The right femur shaft has recent damage in the same general area, interrupting a thorough coating of red pigment. There are also two diagonal marks about 5 mm long and broadly V-shaped, possibly cuts. All of these, especially those on the pigment stained femur, could have resulted from mortuary practices, taphonomic processes, or carnivore gnawing. None are classic unambiguous cuts with barbs or shoulder effects (e.g. White 1992:146).

Even if they were cut marks, skinning and disarticulation can be ruled out by the location of the marks. Disarticulation marks are found on the edges or articular surfaces of long bones, while skinning cuts are found around the shafts of the lower legs and phalanges. Filleting marks are generally parallel to the long axis of the bone (Lyman 1994:298). Series of fine, short cut marks on skeletons from secondary burials have been considered the result of defleshing where repeated strokes were necessary to clean the bone (Olsen and Shipman 1994:380). However, when defleshing occurs, marks are generally found on a variety of elements (e.g., Olsen and Shipman 1994:380; and Raemsch 1993:238), making this explanation questionable for this site.

Pigment Stains

Several bones have traces of hematite (Table 70) ranging from small areas that could result from settling on the bone to almost completely coated intentional staining. One of the bones with pigment is also heavily burned. When found, the pigment is almost always associated with adult elements (n=28); the rest (n=2) are from the older child/small adult group. As many as seven are from males; the rest are undetermined. Cranial parts (n=9) and femur fragments (n=7) most frequently have stains. The metacarpal and some femur shafts are thoroughly coated, while the teeth generally have but small areas of pigment. Pigment-stained bones were found in 10 separate grids, mostly in the southwest quadrant. Pigment staining does not merely depend on sample size, since the two grids with the largest counts have no pigment.

Table 70. Pigment-stained elements, Punto de los Muertos

Element	Count	Percent
Long bone	1	3.3%
Flat bone	2	6.7%
Crania	5	16.7%
Mandible	3	10.0%
Teeth	1	3.3%
Vertebra	3	10.0%
Rib	3	10.0%
Radius	1	3.3%
Metacarpal	1	3.3%
Hand phalanx	3	10.0%
Femur	7	23.3%
Total	30	100.0%

Discussion

LA 116471 as an Example of Cannibalism

Some would look at the presence of burning and the few potential cut marks and suspicious breaks in this assemblage and infer that the deposits result from cannibalistic activities. Turner has narrowed the scope of inquiry to "five cost-effective and definitive criteria[:] cut marks, burning, breakage, anvil or hammerstone abrasions, and many missing vertebrae." To this he now adds pot polish (Turner 1992:9). Accordingly, he would probably argue that the LA 11741 assemblage meets all of these criteria regardless of the context. Yet, as has been pointed out by others, violence and mutilation, mortuary ritual involving ritual dismemberment, secondary burial, cremation, and ceremonial reduction, carnivore scavenging, and taphonomy also produce similar characteristics (e.g., Akins 1995; Bahn 1992; Bullock 1991; Darling 1998). The mere presence of these criteria in sites with varied and complex stratigraphic contexts should never be taken as "proof" that cannibalism took place.

White takes a more cautious but also flawed approach with an assemblage from Mancos, Colorado. He sees the issue as one of consumption and its recognition, so that "when archaeologists find *faunal* remains whose context, element representation, and damage patterns are in accordance with exploitation of nutritional benefit, the faunal remains may be interpreted to represent evidence of human consumption. When *human* remains are found in similar contexts, with similar patterns of exploitation, they are best interpreted as evidence of conspecific consumption, or cannibalism" (emphasis added; White 1992:339). Thus, in his view, emphasis should be placed on comparative analysis of human and faunal remains, and when damage patterns resulting from the preparation and removal of tissue are consistent between the two, an inference of cannibalism is warranted (White 1992:339).

Some find this approach convincing (e.g., Villa 1992:1420). Others maintain he skews his analysis in favor of cannibalism by only comparing the Mancos assemblage with butchered animals and by assuming that all butchering on fauna is for consumptive purposes (Bahn 1992:40; Darling 1998:2). As Bahn (1992:40) points out, "Since the ways in which one can cut, break or burn bones do not vary markedly, it is hardly surprising that despite anatomical differences between food animals and people there are considerable similarities." The same is true of burning patterns, especially when they are unlikely to result from cooking.

Regardless, neither set of criteria provides convincing evidence when applied to the LA 116471 assemblage. In the LA 116471 assemblage, definite cut marks are rare, if not absent, as is intentional breakage. Percussion scars are absent, although the minute striae that accompany them would probably be obscured by environmental alteration. Burning, when found, is largely confined to types that cannot be attributed to culinary processing (completely smoked or calcined and dry burns). While vertebrae may be missing, so are a lot of other parts. A total of 97 vertebral fragments were found, compared to 112 hand bones and 47 foot bones. Cranial fragments comprise a good proportion (47.0 percent) of the assemblage, with scant counts for all other elements.

In many respects the human bone resembles the faunal assemblage (n=8052). Cuts are rare in the faunal bone (n=12), with only three on larger animals. Breaks that could indicate processing are more common (n=29) but still rare and are more often found on small mammals (n=19). One percussion scar and an abrasion that could result from impacts were observed on a large animal and an artiodactyl bone. Burning is similar, mostly sooted or calcined for the larger animals. Vertebra are similarly rare, comprising 0.4 percent of the faunal assemblage. Neither the LA 116471 human nor the faunal assemblage fits White's (1992:339-340) rather strenuous requirement that the damage patterns warrant an inference that bone tissue was manipulated to obtain nutrition. Much of the damage and apparent similarities are taphonomic rather than the result of intentional human actions.

Density plots of bone and burned bone not attributed to the pothunter's backdirt (Figs. 47-51) show that numbers of human bone, unburned human bone, faunal bone, and burned faunal bone are greatest in the southwest quadrant of the excavated area. Broken down into

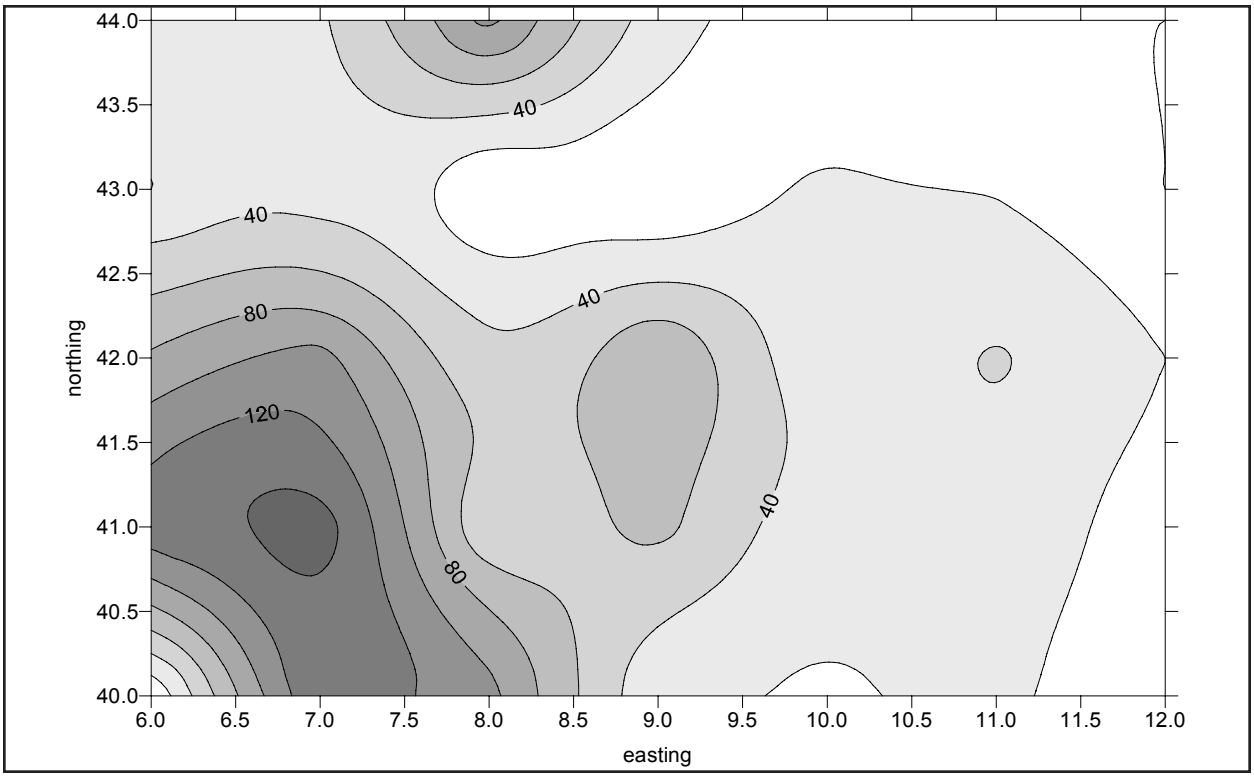


Figure 47. Distribution of all human bone by percentage, LA 116471 (Punto de los Muertos).

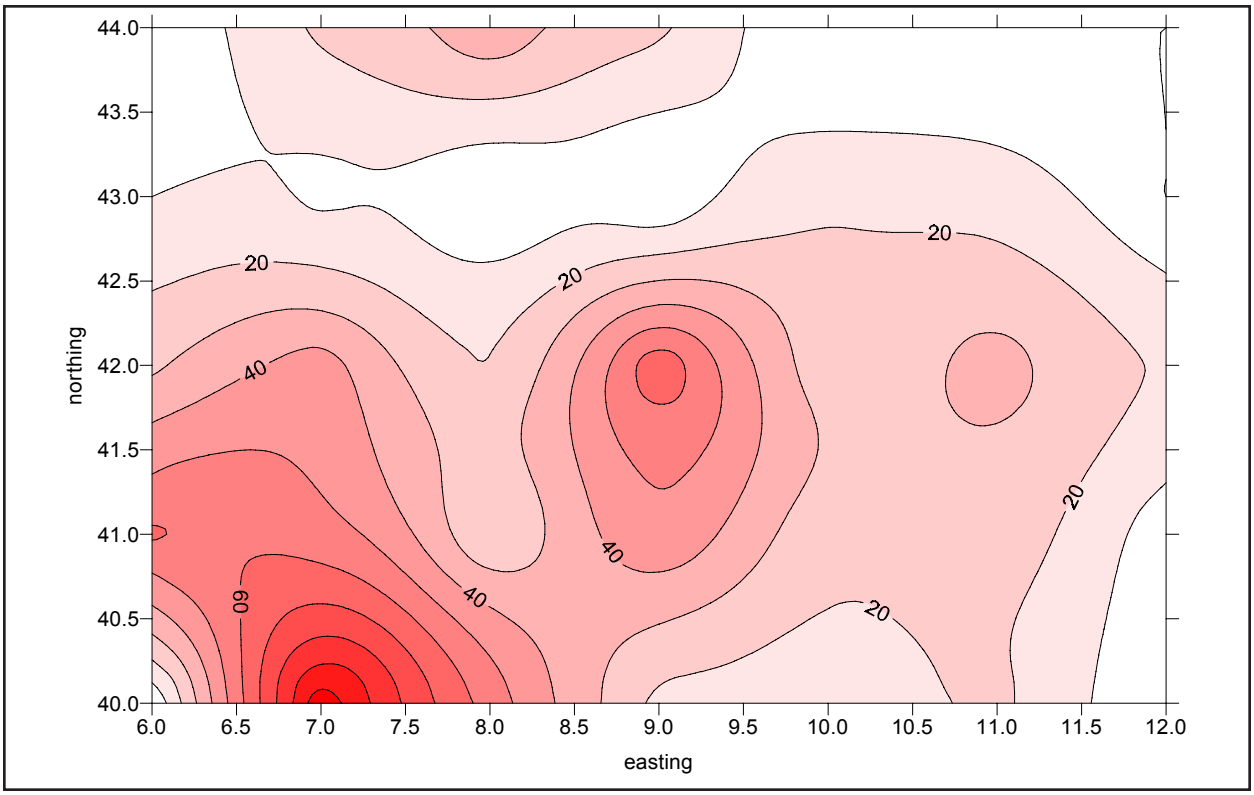


Figure 48. Distribution of burned human bone by percentage, LA 116471 (Punto de los Muertos).

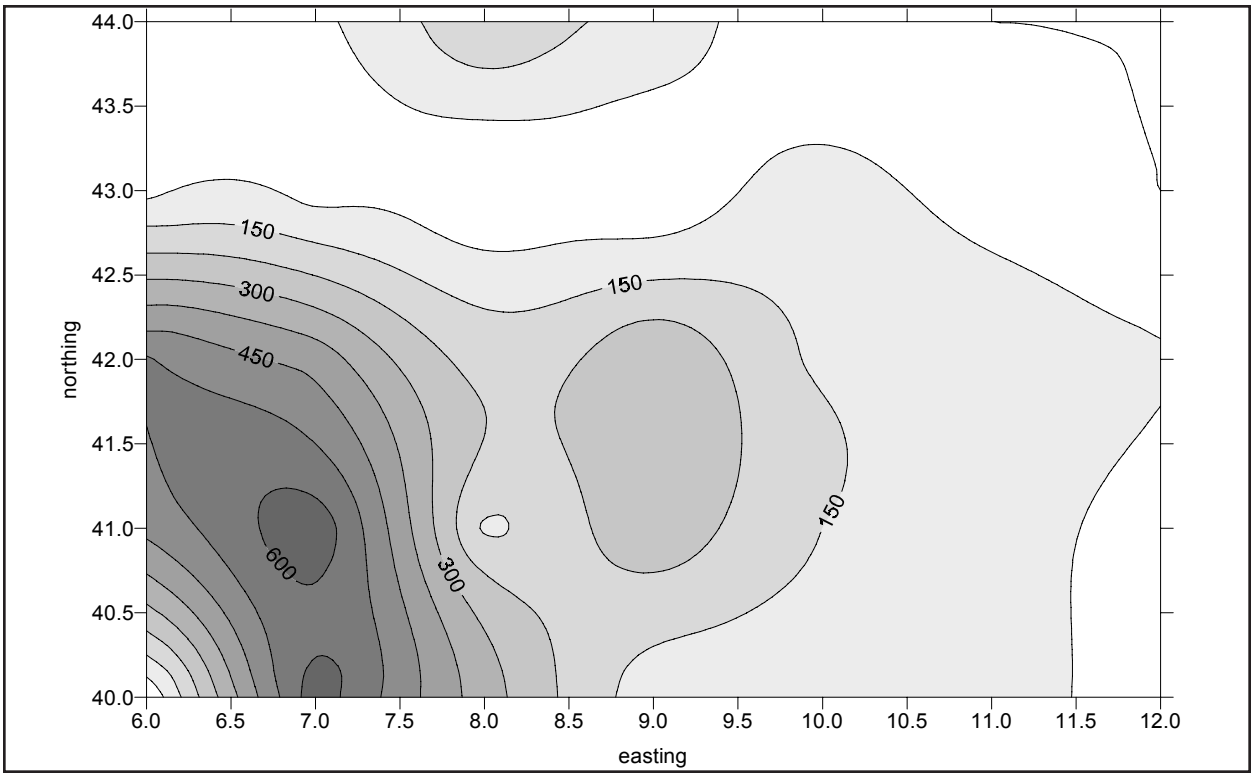


Figure 49. Distribution of all fauna by percentage, LA 116471 (Punto de los Muertos).

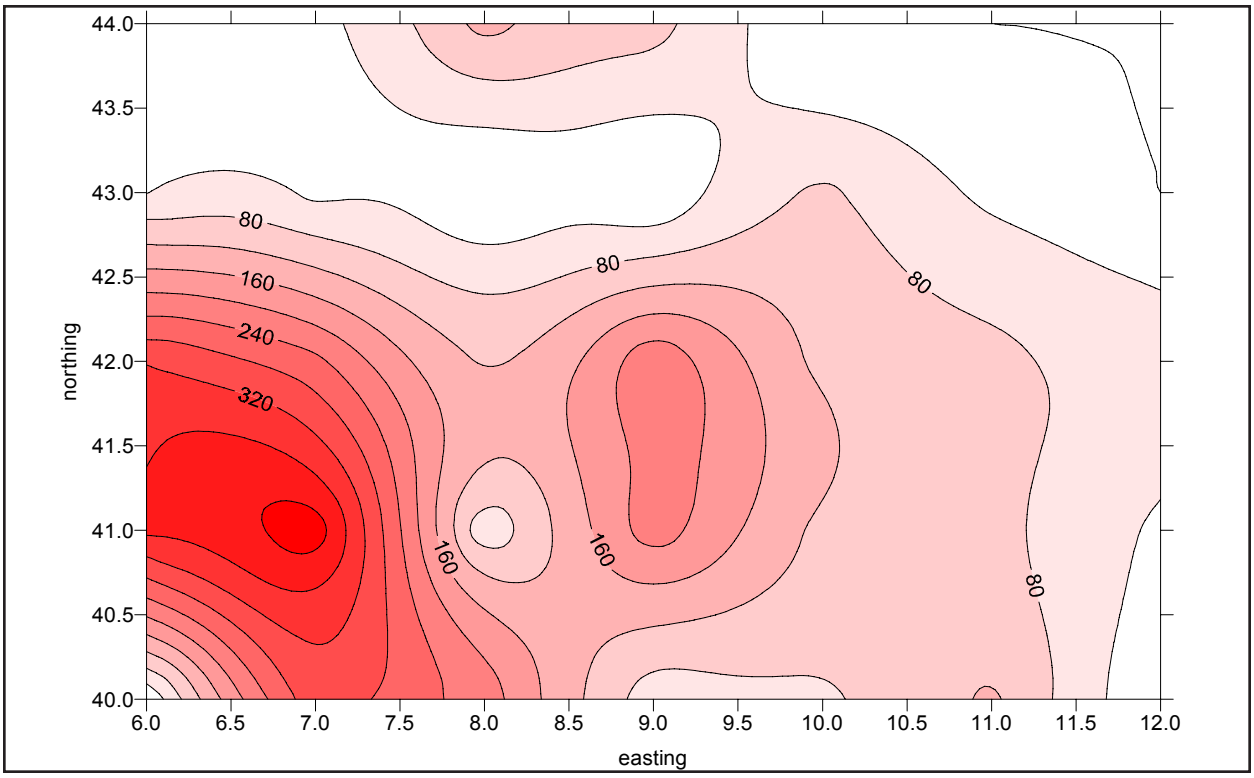


Figure 50. Distribution of burned fauna by percentage, LA 116471 (Punto de los Muertos).

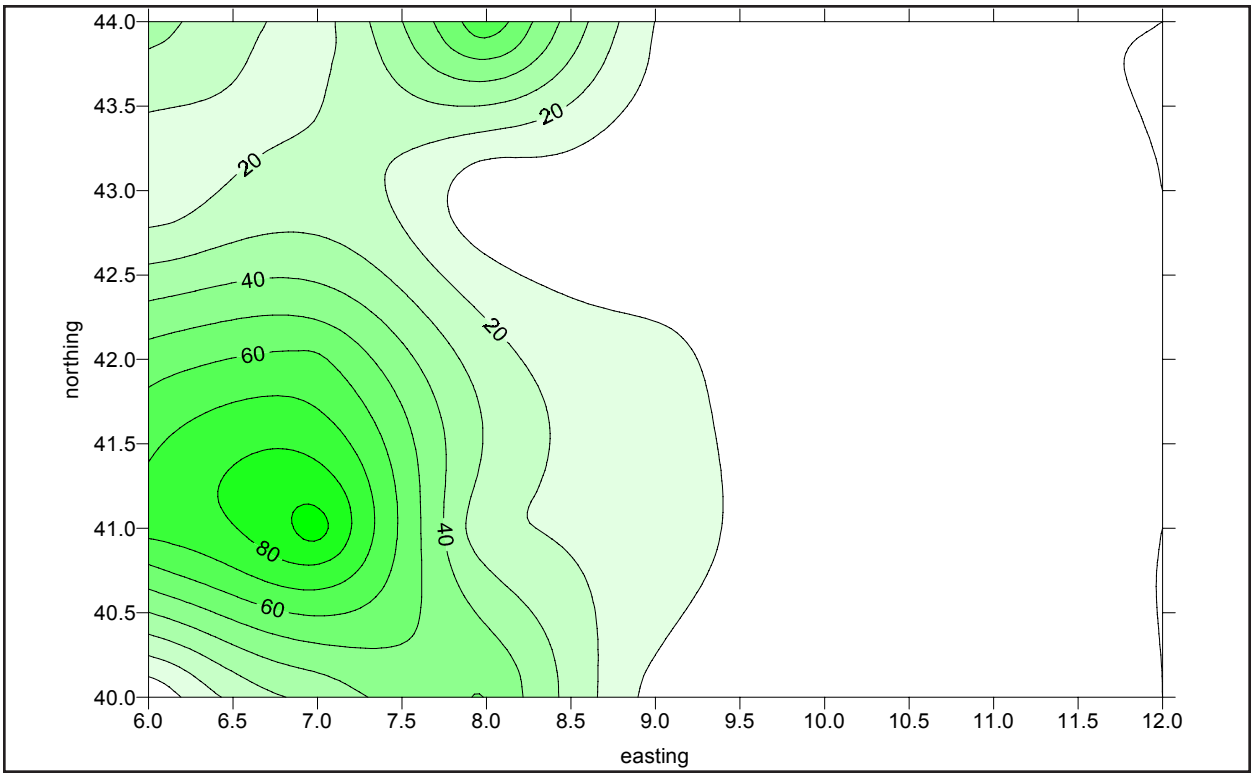


Figure 51. Distribution of unburned human bone by percentage, LA 116471 (Punto de los Muertos).

heavy and calcined burning, the human bone has a concentration to the east that is not found in the faunal bone (Figs. 52-58). These dense spots could indicate distinct episodes of burning or cremation deposits. Unburned human and faunal bone is concentrated along the west edge, suggesting better preservation of bone in this area. Dry burns have yet another distribution and are quite different for the human and faunal bone. This implies something other than a strictly random or an essentially equivalent distribution and suggests that some spatial relationships remain within the structure. Besides potential mortuary activity, other factors such as better preservation from deeper burial, less disturbance, or other factors are undoubtedly involved.

LA 116471 as a Mortuary Assemblage

Few burials from the Carlsbad area have been studied. In her summary of Southern Jornada and non-Jornada burials, Stodder (1989:302-303) found reference to only 49 from Eddy County and another 10 from Otero County to the west. Many of these were excavated by Mera (1938) in caves in the Guadalupe Mountains west of Carlsbad. In addition to primary inhumations found in association with habitation cave sites or, more commonly, in caves dedicated to burial, Mera (1938:40-41) reports a site he called Cremation Cave. Inside the cave were small pieces of calcined bone along with twine and fragments of coiled basketry.

Toulouse considered the Cremation Cave remains found by Mera and those found at Burnet Cave, South Three Forks Canyon, and Williams Cave to be bag or basket cremations, in which cremations were placed in bags or baskets at sites where ceramics do not occur. At that time, this type of cremation was found only in the Guadalupe Mountains (Toulouse 1944:68-71).

Since then, Haury has recovered similar cremations at an Archaic site near Cienaga Creek on the San Carlos Reservation in Arizona. Cremations were mostly (40 of 47) individual cremations placed in one large pit, but three were also scattered individual pits. While most appeared to be individual cremations placed in small pits, one pit in a waterlogged environment preserved two baskets, which probably held the cremation. Haury noted similar bag or basket cremations in the Guadalupe Mountains and in Texas near the mouth of the Pecos River (Haury 1957:11-12). Sinkhole sites in central Texas contain combinations of burial, cremation, partially burned burials, and bundle burials dating from at least 5840 B.P. (Bement 1994:126).

These observations establish that a widespread Archaic pattern included not only primary inhumations but also cremations and bundle burials. Several sites have indications that the remains were removed from

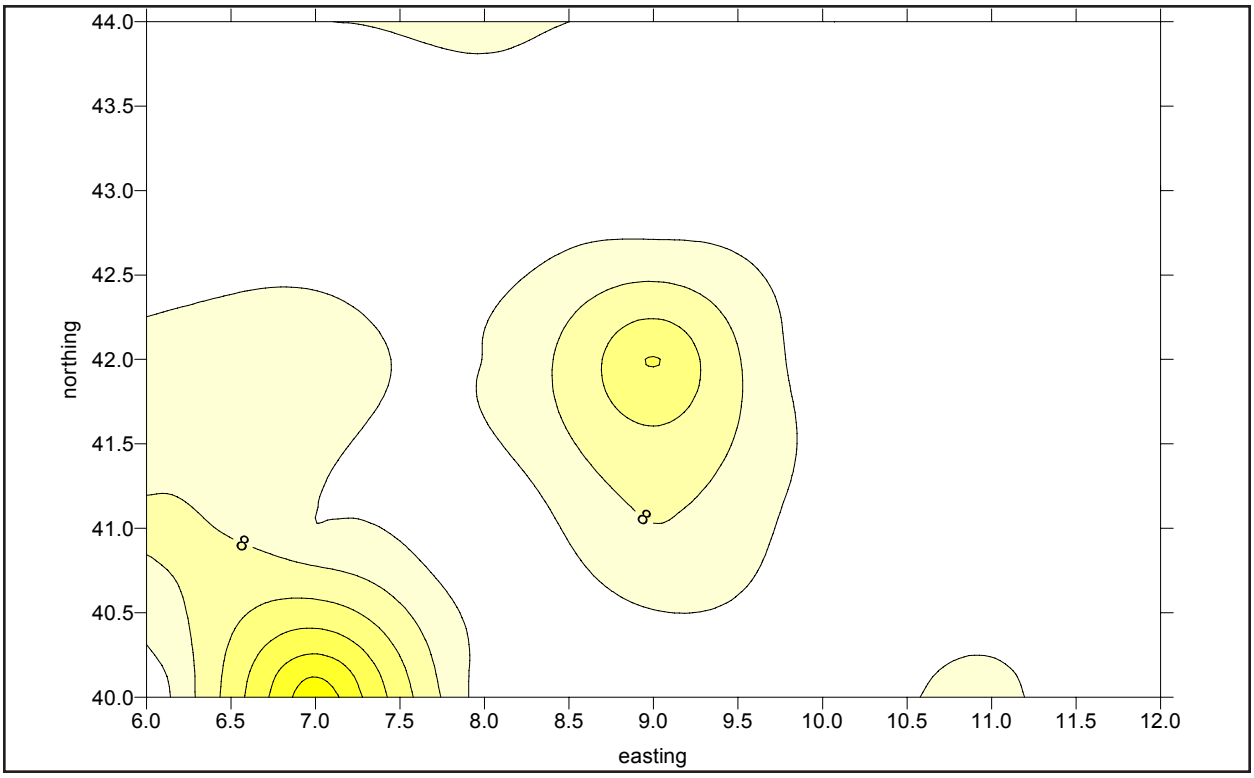


Figure 52. Distribution of dry burned human bone by percentage, LA 116471 (Punto de los Muertos).

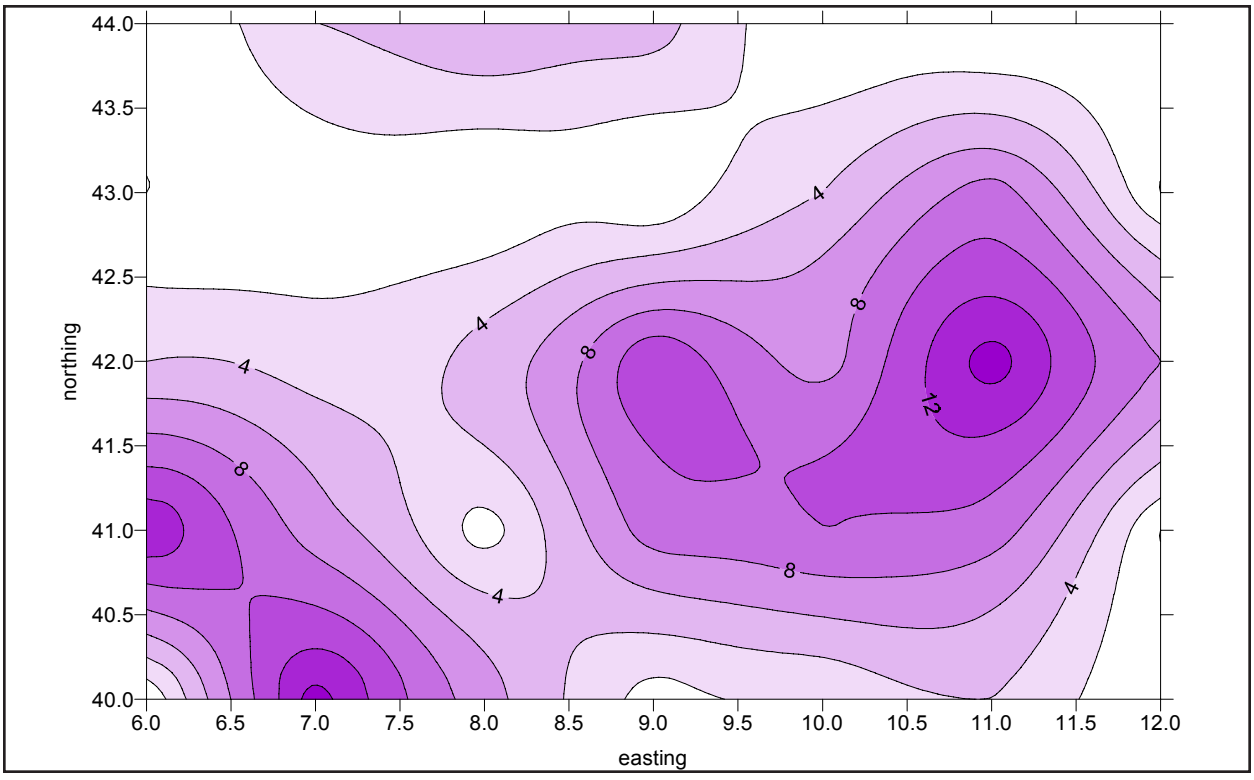


Figure 53. Distribution of calcined human bone by percentage, LA 116471 (Punto de los Muertos).

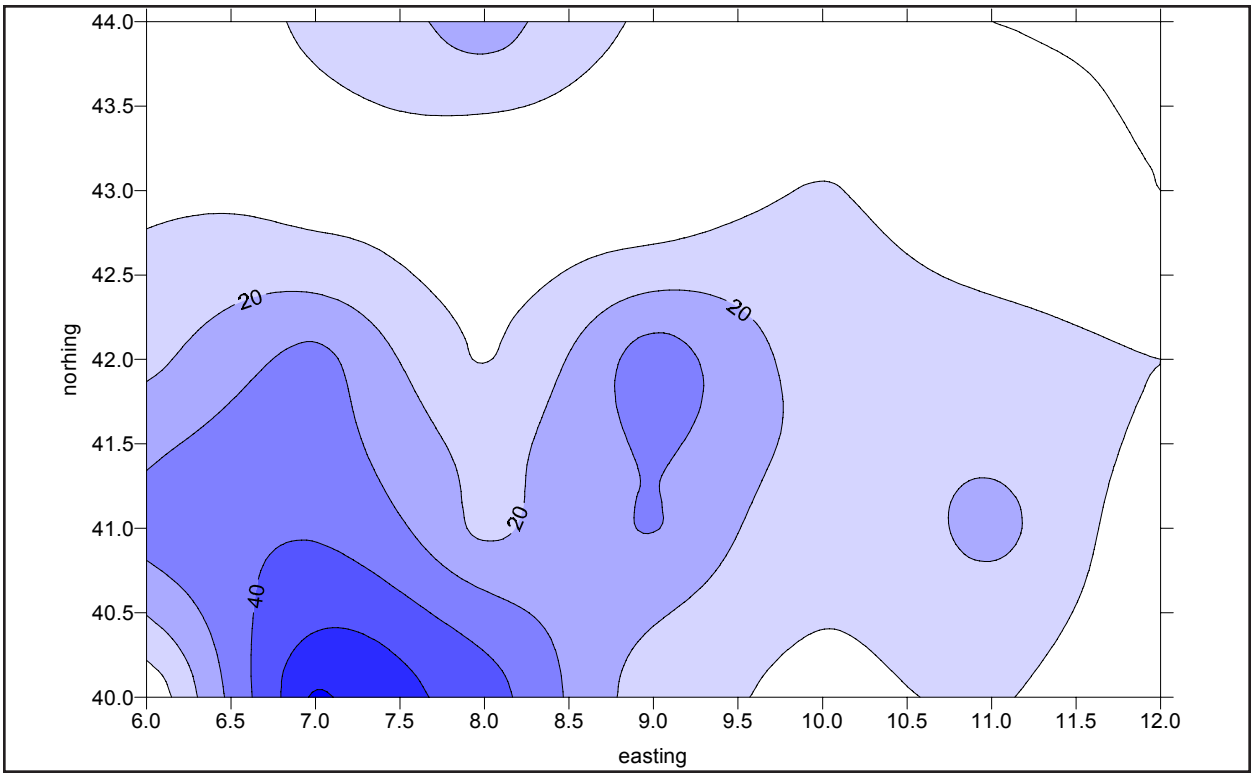


Figure 54. Distribution of human bone with heavy burns by percentage, LA 116471 (Punto de los Muertos).

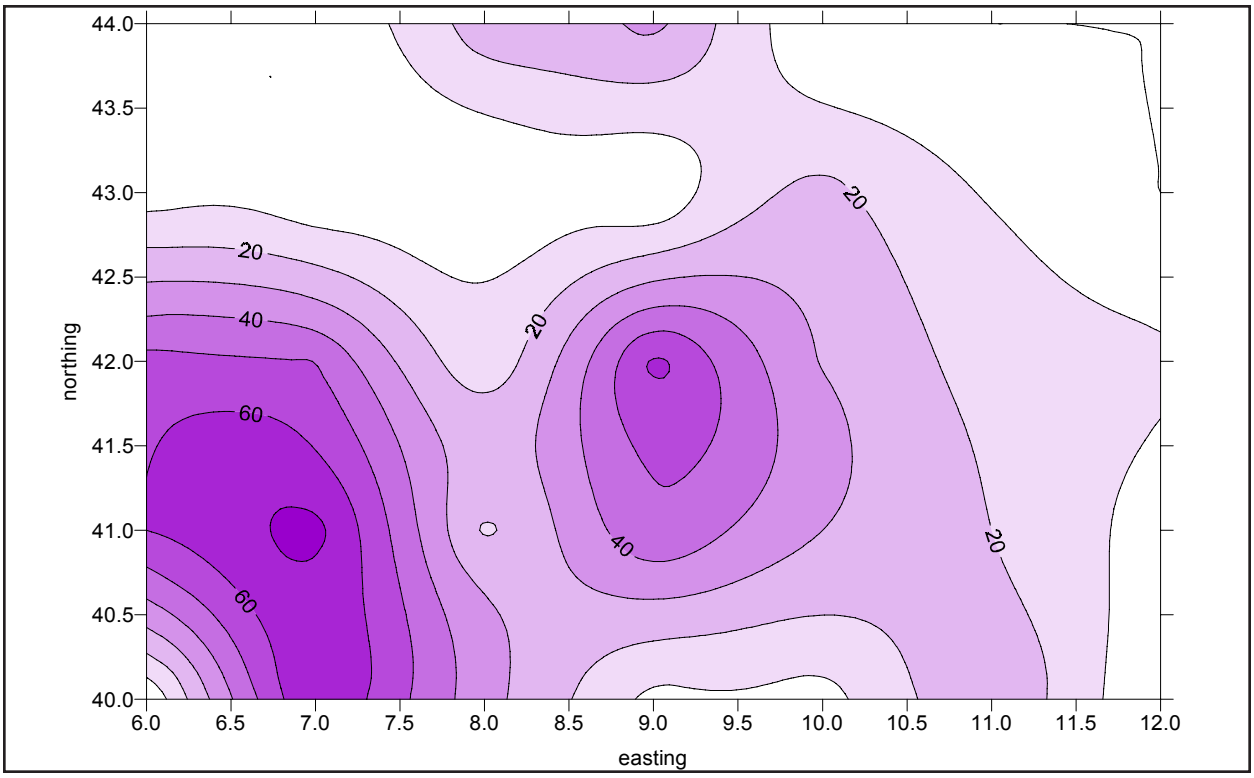


Figure 55. Distribution of calcined faunal bone by percentage, LA 116471 (Punto de los Muertos).

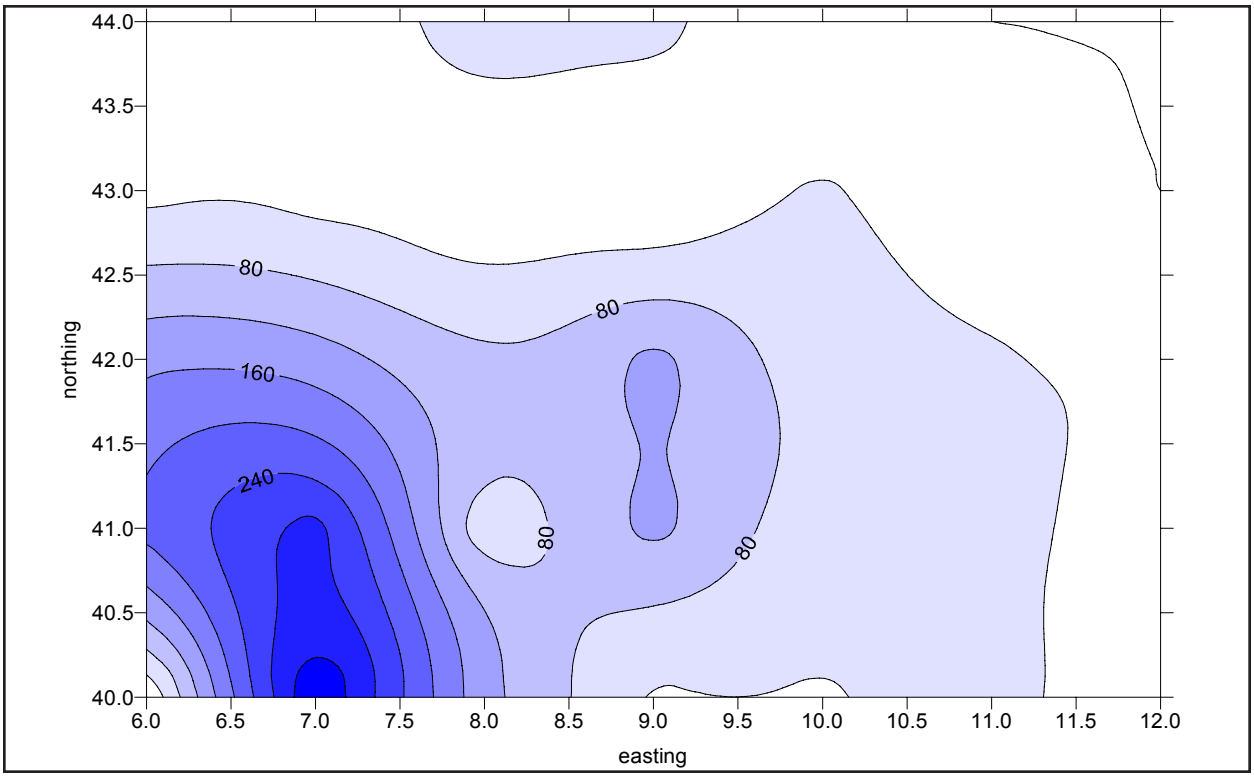


Figure 56. Distribution of faunal bone with heavy burns by percentage, LA 116471 (Punto de los Muertos).

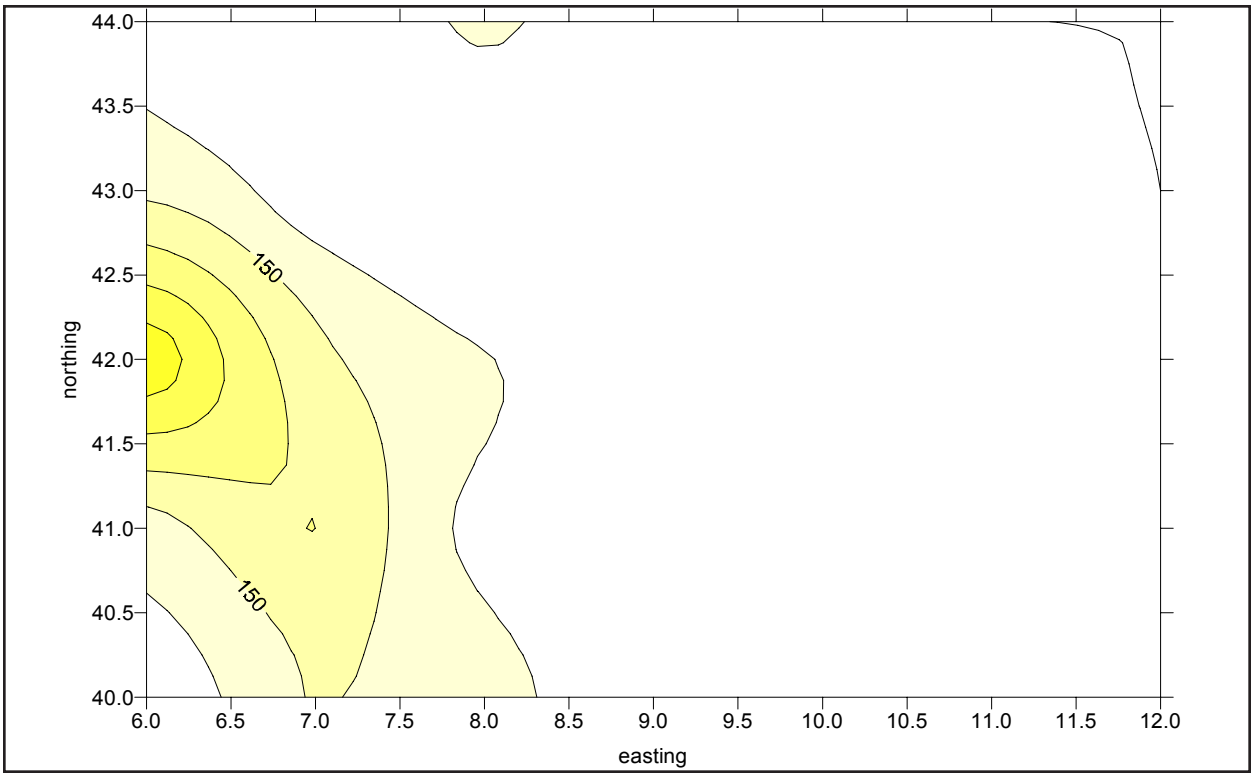


Figure 57. Distribution of unburned fauna by percentage, LA 116471 (Punto de los Muertos).

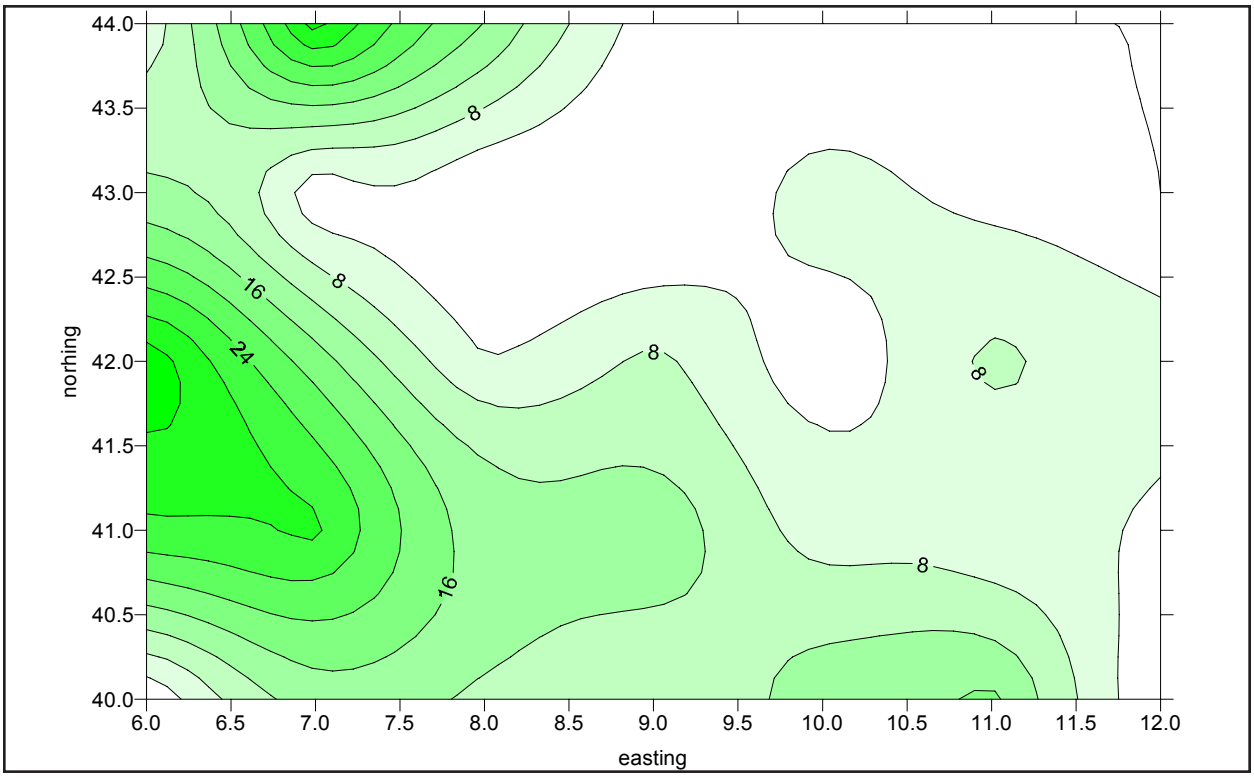


Figure 58. Distribution of dry-burned fauna by percentage, LA 116471 (Punto de los Muertos).

the site of death and of the cremation and placed in certain areas. The presence of what are essentially cemeteries for groups considered highly mobile hunter-gatherers demonstrates an attachment to a place that was routinely returned to and either a degree of restricted mobility or a sense of territoriality (Charles 1995:79).

Feature 2, a group of human bone collected from the base of a grid along the south edge, was comprised of cranial fragments (n=4) from a mature individual, femur shaft portions from two males, and a radius from a male, all unburned. One of the femur fragments matched pieces from the same grid and from two grids to the north. All three of the long bones and one cranial fragment have pigment staining. The remains in this feature suggest intentional mortuary placement of at least parts of two males, possibly as bundle burials. This and at least some of the heavily burned and calcined bone indicate at least two types of burial are represented.

What sets this site apart from the other reported sites is the accumulation of faunal bone and smaller quantities of lithic and other cultural material in the same deposits as human bone. Haury (1957:9, 24) found a few pieces of animal bone in the cremations from the Cienaga Creek site, as well as projectile points and other lithic artifacts, pipes, goundstone, and pigment. The pit containing most of the cremations was preceramic, dating about 2,500 years old. None of the hearths found at this site were associated with the cremations. Cremation Cave was at the top of a steep talus slope and had not been used for habitation (Mera 1938:41). Another cave, called Burial Cave, was used only for inhumation (Mera 1938:39-40). A site near Guadalupe Point, excavated by a Carlsbad resident, had a cremation in close proximity to primary burials. Another held pieces of basketry, scattered cremation bone, and parts of an unburned infant (Mera 1938:42-43), apparently without evidence of habitation. These accounts clearly indicate that a variety of mortuary practices is not unusual in the area.

Some of the artifacts, especially the ornaments, found at LA 116471 were probably burial offerings left with the cremations and inhumations. Others could indicate nothing more than long and repeated use of this particular area that included burning of rubbish. With no indications that Feature 1 was strictly a midden area, it is the presence of faunal bone, similar in the proportion, amounts, and types of burning found in the human remains, that sets this site apart from the Archaic cemetery sites described above.

ADDRESSING THE DATA RECOVERY QUESTIONS

The following discussions refer in part to data contained in Table 71.

Problem Domain 1: Settlement and Site Types

LA 116467, Site 7 (North Area)

One hearth, three small cache or storage pits, and a refuse concentration constitute the features uncovered at Site 7.

The hearth is a small, nonrock basin. Its size suggests functions limited to providing warmth for the site occupants and perhaps limited cooking.

The pits, with their small capacities (21.0 to 33.5 l., or 5.5 to 8.8 gals.), are of the type we believe to have served as caches for articles, rather than to store food. If they were used for foodstuffs, the quantities stored would have been correspondingly small and not sufficient for overwintering.

The large number of pottery sherds and number of vessels they represent raise the possibility that Site 7 originally had structures and may have been a farming location. The structures, if present, were removed during an earlier episode of highway construction. Excavations for the current project involved only the western edge of the site.

Site 7, situated on a very small, ephemeral drainage, is well away from the larger streams (Rio Hondo, Pecos River, etc.), where known farming villages are clustered in the Roswell region. Ordinarily, one would not expect the small drainage to be favorable for cultivation simply because it is so far from known permanent water. However, it is clear from the extant weather records for the Roswell area that, at times in the historic past and presumably in the prehistoric past as well, there were periods during which the average annual precipitation was as high as 500 mm (20 inches; Wiseman 2001). Wet periods such as these would have permitted dry-land cultivation at Site 7.

In summary, the part of Site 7 excavated during this project possessed an extramural hearth and three small extramural storage pits. These suggest a short-term occupation that could have been associated with a hunting-gathering economy. However, the artifact assemblage provides clues for a more intensive use of the location, perhaps one that even involved structures and perhaps farming.

LA 116468, El Follon (North Area)

El Follon is no longer considered a valid site and is not discussed further here.

LA 116469, Site 9 (North Area)

Excavations at Site 9 produced five hearths of two types: burned-rock hearths and nonrock basin hearths.

The two burned-rock features, Hearths 1 and 4, 0.5 m or less in diameter, consist of single layers of stone with associated lightly organically stained fill in shallow depressions. Otherwise, both are very similar to Hearth 4 at Rocky West. Because of the small size of Hearths 1 and 4, we suspect that they functioned mainly as sources of heat for personal comfort and/or to cook food. In a cooking function, they probably served mainly for roasting small quantities of food. No charred plant materials other than fuel-wood fragments and no animal remains were recovered from either hearth.

The three nonrock basin hearths include two sizes: small (30 cm diameter, Hearths 3 and 5) and large (60 cm diameter, Hearth 2). All were filled with lightly to moderately stained fill but lacked rocks. Because of the small size of the hearths and their contents, we suspect that they functioned mainly to cook food and perhaps secondarily as sources of heat for personal comfort. Three burned fragments of bone indicate Hearth 2 may have been used to cook a small mammal. Hearths 3 and 5 lacked burned animal bone, and none of the hearths produced charred plant remains other than fuel-wood fragments.

Like Site 7, Site 9 is situated on a very small, unnamed drainage. Also as at Site 7, this drainage might be farmable under conditions of higher than average rainfall. Is it possible that Site 9 was a farming site and had structures? Were structures and other kinds of facilities present? What does the artifact assemblage tell us?

Although we excavated 206 sq m of Site 9, we failed to locate structures or features other than the hearths. Structures and features such as storage pits are not necessary for the identification of a site as a farm, but their presence supports an interpretation of farming because it implies a commitment to the locale.

In summary, the situation of Site 9 along a small drainage and an assessment of the modern precipitation records for the Roswell region indicate that farming was possible there during wetter-than-average periods. However, the absence of features other than hearths suggests that all occupations were temporary camps and probably did not involve farming.

Table 71. Site characteristics, Roswell South (X = present/represented)

Site	LA 116467	LA 116469	LA 44565	LA 116467	LA 116470
Period of Occupation	Late Prehistoric	Archaic, Late Prehistoric	Archaic, Historic	Archaic, Late Prehistoric	Late Prehistoric (?)
Occupation Type	Farm (?)	Camp, Camp	Camp, Plant Processing	Cemetery (?), Plant Processing	Plant Processing
Site Features					
Hearths:					
nonrock	1	3	1-2	-	-
rock	-	2	1	-	-
Baking facility	-	-	2	-	-
Cache pits	3	-	-	-	-
Mortars	-	-	-	3	12+
Rock feature (burial mound?)	-	-	-	1	-
Hunting Equipment Manufacture/Maintenance					
Projectile points:					
dart	1	-	1	7	-
arrow	-	1	-	1	-
Bifaces	1	-	4	30	1
Plant-Food Processing					
Manos	1	-	-	-	-
Pottery Vessels					
Total MNV	33	10	-	7-8	-
Total sherds	295	15	-	14	-
Water transport/storage	X	-	-	X	-
Cooking	X	-	-	X	-
Dry-goods storage	X	X	-	X	-
Food service	X	-	-	X	-
General Tasks/Other Equipment Manufacture/Maintenance					
End scrapers	-	-	2	3	-
Backed knife	-	-	-	1	-
Flake tools	20	4	5	39	-
Awls	-	-	-	10	-
Reamers	-	-	-	1	-
Unifaces	-	-	-	2	-
Grinding slab	-	1	-	-	-
Personal Adornment/Decoration					
Beads	-	-	-	82	-
Pendants	-	-	-	2	-
Incised bone	-	-	-	2	-
Sherd:lithic debris ratio	1:1	1:14	-	1:244	-
Chipped Stone Manufacture Debris					
Cores	21	9	50	31	-
Core-reduction flakes	245	168	430	2541	1
Biface-thinning flakes	-	2	8	109	-
Miscellaneous flakes	5	6	20	210	-
Shatter	43	31	121	531	-
Imported Items and Materials					
Lithic artifacts:	-	-	-	-	-
Edwards chert	-	-	7	11	-
Possible Edwards chert	-	-	4	7	-
Alibates	-	-	-	1	-
Possible Alibates	-	-	-	1	-
Possible Tecovas chert	-	-	-	1	-
Obsidian	-	-	2	3	-
Pottery:	-	-	-	-	-
Mimbres Black-on-white	1	-	-	-	-

Table 71 (continued)

Site	LA 116467	LA 116469	LA 44565	LA 116467	LA 116470
Period of Occupation	Late Prehistoric	Archaic, Late Prehistoric	Archaic, Historic	Archaic, Late Prehistoric	Late Prehistoric (?)
Occupation Type	Farm (?)	Camp, Camp	Camp, Plant Processing	Cemetery (?), Plant Processing	Plant Processing
UV Responses of Local Gray Cherts					
Percent none	75	88	99	95	-
Percent low	22	11	1	4	-
Percent medium/bright	3	1	-	1	-
Faunal Remains					
Small mammal	-	X	X	X	-
Small-medium mammal	-	-	X	X	-
Medium mammal	-	-	X	X	-
Medium-large mammal	-	-	X	X	-
Very large mammal	-	-	-	X	-
Small squirrel	-	-	-	X	-
Prairie dog	-	-	-	X	-
Pocket gopher	-	-	-	X	-
Kangaroo rat	-	-	-	X	-
Beaver	-	-	-	X	-
Deer mouse	-	-	-	X	-
Cotton rat	-	-	-	X	-
Woodrat	-	-	-	X	-
Cottontail	-	-	X	X	-
Jackrabbit	-	X	X	X	-
Canids	-	-	-	X	-
Mule deer	-	-	-	X	-
Pronghorn	-	-	-	X	-
Hawks/harriers	-	-	X	-	-
Medium bird	-	-	-	X	-
Very large bird	-	-	-	X	-
Water birds	-	-	-	X	-
Bobwhite	-	-	-	X	-
Quail	-	-	-	X	-
Quail, etc.	-	-	X	-	-
Small birds	-	-	X	-	-
Turtles	-	-	X	X	-
Slider/cooter	-	-	-	X	-
Pond slider	-	-	-	X	-
Spiny softshell	-	-	-	X	-
Painted turtle	-	-	X	-	-
Whiptail lizard	-	-	-	X	-
Horned lizard	-	-	X	-	-
Snake	-	-	X	X	-
Snail	-	-	X	-	-
Plant Remains					
Food: none	-	-	-	-	-
Fiber: cotton	-	-	X	-	-
Fuel:					
juniper	-	-	X	-	-
unknown conifer	-	-	X	X	-
maple	-	-	X	-	-
saltbush/greasewood	X	X	-	X	-
Mexican crucillo	-	-	X		-
mesquite	-	-	X	X	-
rose family	-	-	X	-	-
nonconifer	X	X	X	X	-
monocot	-	-	X	-	-
walnut	-	-	X	-	-
indeterminate	-	-	X	-	-
squawberry	-	-	X	-	-
unknown	-	-	-	X	-

LA 44565, Rocky West (South Area)

Several features were uncovered at Rocky West-: three burned-rock "hearths," one small nonrock basin hearth, and a possible nonrock basin hearth. At least two different functions are inferred for these features.

The three burned-rock features are all concentrations of burned rocks that lie mostly in a single layer of rocks) on the aboriginal ground surface. Hearths 2 and 3 have diameters of 1.5 to 2 m, and each contains 100+ rock fragments.

The rocks in Hearth 2 appear to comprise two groups relating to its function. The north group appears to have constituted a second or upper layer of rocks that originally overlay the lower or south group during use. In this scenario, the two layers of rocks formed a type of baking oven that functioned by enclosing the foods to be baked between two layers of heated rocks. Once the foods were baked, the upper layer of rocks was scraped to one side to remove the cooked foods. If this reconstruction is correct, the diameter of the facility during operation was about 1 m. Its operation would have been a variation of the baking facility described in Black et al. (1997: Fig. 15).

Hearth 3 appears to differ from Hearth 2 in one important way. Unlike Hearth 2, the configuration of its rocks suggests a single, coherent whole. Perhaps this was also a baking facility but one that operated precisely like that described in Black et al. (1997). That is, to create a baking function, Hearth 2 could have been constructed with the foods arranged on top of a single layer of heated rocks. This in turn would have been domed over with grass, then earth, to preserve moisture and bake the foods. Apparently this was one way that Chiricahua Apaches baked small numbers of agave hearts (Black et al. 1997:65).

Hearth 4, with a diameter of 1 m and three dozen rocks, is small compared to Hearths 2 and 3. It may have been an even smaller version of the Hearth 3 construct, or it may have been a simple hearth for roasting game and/or warmth on cold nights.

One of the interesting aspects of Hearth 4 is the presence of three large, flat rocks about 2 m to the northeast, east, and southeast. These rocks are equidistant from each other and from the hearth, suggesting a formal relationship. Perhaps they were individual place markers for the people who used the hearth. None of the rocks display use or other modification, yet their placement relative to one another and to the hearth surely is more than fortuitous.

The north hearth in the Feature 1 area is a simple, nonrock basin filled with charcoal-stained earth. Evidence of food preparation in the form of animal bones and edible plant parts was absent in the fill. This suggests, by no means conclusively, that the north hearth was used primarily as a heat source.

The possible hearth in the south part of Feature 1 also lacked burned rocks. Unlike the north hearth, it contained a number of small-mammal, rabbit, and goat-bone fragments and charred cotton seeds. If this was a hearth, it was evidently used for cooking meals and as a heat source for warmth.

In summary, the portion of the Rocky West site excavated during this project was used mainly for the preparation of various plant and animal foods and/or as a heat source. The absence of features such as structures and storage facilities indicates that the occupations were short-term and probably not more than a few days in duration.

LA 44583, Rocky East (South Area)

The excavated part of this site was too small and produced too little material to address these research questions. However, it should be kept in mind that this site is probably an extension of the Rocky West site and the type of occupation represented there.

LA 116470, La Tertulia de las Molineras (South Area)

La Tertulia de las Molineras is characterized by at least two groups of mortars and a sparse scatter of knapping debris. The absence of other types of features, refuse deposits, and an artifact assemblage indicative of other types of activities shows that this was a specialized grinding location. It is likely that the people who used the mortars lived at a habitation site in the vicinity, perhaps the large site immediately to the east on the valley floor beside the Pecos River.

We postulate that the grouping of the mortars is an expression of social units, probably by outright band ownership or by usufruct. Grouping as a result of restrictions imposed by the availability of bedrock surfaces suitable for mortars does not appear to be likely. This seems particularly true because the bedrock between the two mortar groups appears to be of the same quality and accessibility as that containing the mortars.

LA 116471, Punto de los Muertos (South Area)

Punto de los Muertos is characterized by five features: a rock feature (Feature 1) of unknown original configuration, a group of three bedrock mortars, at least one probable human burial (Feature 2), the burned and fragmented remains of 11 or 12 other humans, and an artifact scatter that defines the total site area.

At the time of this project, Feature 1 was a heavily

vandalized mound with the center dug out. Its outside measurements were 7 by 7 m, and its height above the surrounding ground surface was about 0.5 m. It was composed of rocks of various sizes and shapes, some burned, but many unburned.

We cannot be certain whether the rocks of the rock feature originally formed an annular ring or a single, domed mound. But Feature 1 may have been a dome-shaped burial mound similar to the burial mounds of the Abilene region of west-central Texas.

This is not an altogether satisfactory interpretation for several reasons, chiefly the presence of a large amount of domestic refuse and an unusually large amount of burned human bone. The human bone may represent partial cremation or other types of burning events. However, both the human bones and the animal bones are about equally represented among the various burn categories, suggesting that all shared a common fragmentation and burn history.

The dark organic staining, artifactual content, and fill depth of the rock feature are characteristic of relatively intense human occupations. Although they were not counted, pieces of burned rock or fire-cracked rocks were also noted in the fill. Again, due to thorough mixing of the deposit, we can determine nothing about the internal relationships of the various components of this fill prior to the vandalism.

Bedrock mortars in general are discussed in some detail for both La Tertulia de las Molineras and Punto de los Muertos in Wiseman (2000b).

The surface artifact scatter included several pottery sherds, the presence of which indicates a second, later occupation of the site. We assume that both occupations contributed lithic manufacture debris to the overall surface assemblage, but we have no way of segregating these materials by component.

Feature 2 represents the only locus within the rock feature where we believe we can demonstrate the former existence of a human burial. This does not mean that other burials were lacking within Feature 1. The vandalism prior to our involvement at the site so thoroughly disturbed the rock feature that we could not identify other specific burial loci, if in fact others had been present. Feature 2 has been radiocarbon dated to about 400 B.C.

In summary, two occupations are represented at Punto de los Muertos. The earlier one dates to the Late Archaic and is represented by what we assume was a low rock feature that may have been a burial mound for 12 or 13 humans. The fill of this feature contained large quantities of cultural refuse--processed animal bones, lithic knapping debris, some artifacts, and some burned rocks--that are difficult to explain.

The source or sources of these materials are unknown, but they may not have been generated at the site. We have no direct evidence of intensive occupation on the hillock, unless the rock feature, with this concentration of refuse, represents a refuse dump per se. Is a specialized, concentrated refuse dump likely to be found in a hunter-gatherer camp? Probably not, but we cannot say with certainty.

Another possibility is that the fill was hauled up the hill from the large site lying on the valley bottom immediately east of Punto de los Muertos, perhaps to cover the buried human remains in Feature 1. The natural soil on the slopes of the hill is very thin and would have been difficult to gather for this purpose.

The second occupation belongs to the Late Prehistoric period and is most clearly represented by the pottery recovered from the ground surface outside the rock feature. We suspect, but cannot demonstrate, that the three bedrock mortars situated in a rock ledge at the south end of the site may also belong to this period.

Problem Domain 2: Artifact Assemblages

LA 116467, Site 7 (North Area)

The artifact assemblage includes evidence of hunting (projectile point), plant-food processing (mano), general camp tasks (flake tools), general tool production (flake tools), and hunting equipment manufacture and maintenance (knapping debris).

The most surprising aspect, though, is the relatively large number of potsherds. The 295 sherds recovered from Site 7 represent at least 33 different vessels, perhaps more. Vessel types and functions include water storage, cooking, dry-foodstuff storage, and food service. These vessel types clearly indicate a more intensive involvement in food preparation and consumption than one normally expects on small sites in southeastern New Mexico. This is especially true if the site was inhabited by hunter-gatherers (which may or may not apply in this case).

Another aspect of the artifact assemblage deviates from the expected. The ratio of chipped stone manufacture debris to pottery sherds is 1:1. This ratio is unusually equitable for a site that was, at the outset, assumed to be a hunter-gatherer site. The ratio is closer to that of farming villages where the sherds often outnumber pieces of chipping debris.

In the Southwest, studies have shown that as reliance on cultigens increased, the intensity of pottery usage, as measured by quantities of potsherds relative to pieces of knapping debris, increased as well. Over time, the number and/or weight of potsherds increases and supersedes the number/weight of lithic chipping debris, often by a wide margin. For example, the ratios of

sherds to lithics in the lightly agricultural, pithouse period sites in the Highland Mogollon of west-central New Mexico average about 1:1, or basically the same as at Site 7. In the succeeding pueblo period, with its heavier reliance on cultigens, the ratios often approach 10 sherds for every flake (Wilson 1999).

The presumed local gray cherts from Site 7 are distinctive in that only 75 percent gave no response to ultraviolet light stimulation. Flakes that gave warm (22 percent) and medium (3 percent) responses together comprise 25 percent of the total. These results clearly group Site 7 with the small cluster of farming sites situated along the lower Rio Hondo southwest of Roswell: the Fox Place (Wiseman 2002) and Rocky Arroyo Village (Wiseman 1985 and n.d.).

Site 7 also is similar in this regard to the Bob Crosby Draw site northeast of Roswell and east of the Pecos River. However, since Bob Crosby Draw produced an unusually large number of Edwards and possible Edwards flakes, the similarities end here, for all of the Site 7 gray cherts appear to be from local sources.

In summary, the artifact assemblage from Site 7 represents a moderately diverse set of activities. The pottery assemblage is both large and diverse in the types of activities it represents. These facts, plus the potsherd-to-lithic ratio, suggest that Site 7 was more than a mere camp and that its inhabitants may have been farming. The UV light responses of the local gray cherts are more similar to those from two sites along the Rio Hondo, 20 km northwest of Site 7. This suggests that the inhabitants of all three sites collected their gray cherts from the same general area , possibly among the limestone hills immediately west or southwest of the Hondo sites.

LA 116468, El Follon (North Area)

El Follon is no longer considered a valid site and is not discussed further here.

LA 116469, Site 9 (North Area)

The artifact assemblage from Site 9 is quite small (N=233 items) and limited. Activities include hunting-equipment manufacture and/or repair (projectile point), some sort of grinding activity (but probably not food preparation), general camp activities (flake tools), dry-goods transport and/or storage (brown ware pottery jars), and general chipped stone manufacture (knapping debris).

The 15 potsherds and 216 pieces of lithic knapping debris give a sherd-to-lithic ratio of 1:14. A ratio heavily favoring lithic items is usually believed to indicate that the site was a hunter-gatherer site rather than a farming site. However, the 15 sherds from Site 9 represent as many as 10 different vessels. Since all but one of the sherds are undiagnostic body fragments, we have virtually no insight into vessel form diversity and therefore little insight into the functional diversity of the assemblage. The one rim is from a Jornada Brown jar.

An additional complicating factor is that Site 9 was occupied on at least two different occasions. Although the earlier occupation has been labeled Transitional Archaic (sixth or seventh century A.D.), some of the pottery could still belong to that occupation.

The presumed local gray cherts from Site 9 are distinctive in that 88 percent gave no response to ultraviolet light stimulation. Flakes that gave warm and medium responses together comprise 12 percent of the total. These results group Site 9 with the majority of sites examined thus far and set the site apart from the small cluster of farming sites situated along the lower Rio Hondo southwest of Roswell and from the Bob Crosby Draw site.

In summary, most of the artifactual evidence suggests that the two (or more) occupations at Site 9 were short term and that the types of activities that took place were limited in number and scope. The presence of sherds from about 10 different pottery vessels appears to be contradictory and raises the possibility that at least one of the occupations involved farming. However, we cannot resolve this quandary at the present time.

For the time being, we assume that Site 9 was used primarily, if not solely, for camping. We have no way of knowing how long each camping episode lasted. However, given the lack of heavy charcoal staining in the fills and the absence of reddening of the sediments surrounding the hearths, we suspect that each episode was on the order of one or at most a few nights each.

LA 44565, Rocky West (South Area)

The variety of the artifacts and therefore the kinds of activities that took place at the site are very limited. Activities include hunting equipment manufacture/repair (projectile point, bifaces), hide/pelt preparation (end scrapers), general camp tasks (flake tools), and general chipped stone manufacture (knapping debris). It is interesting to note that most of the biface-thinning activities occurred in the vicinity of Hearth 4.

The end scrapers are not the classic Plains form of implement usually believed to be associated with and even indicative of bison hunting. The Rocky West specimens could have been used for scraping pelts of smaller species, including some of those represented in the faunal assemblage from Rocky West.

The presumed local gray cherts are quite distinctive in that 99 percent gave no response to ultraviolet light

stimulation. Flakes that gave warm and medium responses together comprise only 1 percent of the total. These results clearly group Rocky West with the majority of sites examined thus far and set the site apart from Site 7 and the small cluster of farming sites along the lower Rio Hondo southwest of Roswell. Rocky West also differs greatly in this regard from the Bob Crosby Draw site northeast of Roswell and east of the Pecos River. Bob Crosby Draw produced an unusually large number of Edwards and possible Edwards flakes for the region.

In summary, the Rocky West artifact assemblage is heavily weighted toward the manufacture and maintenance of hunting equipment. Some hide/pelt preparation is indicated by end scrapers, and the few flake tools may have been used for these or other activities.

LA 44583, Rocky East (South Area)

The excavated part of Rocky East was too small and produced too little material to address these research questions. Only a few pieces of chipped lithic manufacture debris were recovered. However, it should be kept in mind that the prehistoric component is probably an extension of the Rocky West site and the type of occupation represented there.

LA 116470, La Tertulia de las Molineras (South Area)

Because our investigations were limited to the part of Tertulia de las Molineras lying within the existing right-of-way, the artifact collection consists of only two items. One is a fragment of a thick biface, and the other is a flake. Both of these items, which probably represent hunting paraphernalia manufacture and/or repair, were recovered from the fill of the one mortar we excavated. Thus, they presumably postdate the use of this particular mortar. We currently have no way of knowing how these items relate to the rest of the features at the site.

LA 116471, Punto de los Muertos (South Area)

Activities represented by the artifacts are varied: hunting equipment manufacture/repair projectile points, bifaces); hide-article manufacture and/or basketry/matting manufacture (awls); pelt/hide preparation (scrapers); various cutting tasks (knives); general camp tasks (flake tools); water transport/storage, dry-goods transport/storage, and food service (pottery jars and bowls); plant-food preparation (mortars); personal adornment (beads and pendants); and chipped stone manufacture (knapping debris).

None of the nonceramic items were recovered from an unequivocal Late Prehistoric (pottery period) context. Nor can we state unequivocally that all of the items other than the Archaic projectile points belonged to the Archaic, even if recovered from the depths of the rock feature. Thus, we cannot be certain which activities were performed during each period of occupation.

That being the case, it is interesting to note that the variety of artifacts, the number and variety of animal bone fragments, and the dark color of the fill within the rock feature suggest that the activities represented at Punto de los Muertos were varied, and that they reflect one or more intensive occupations. That is, we believe them to be more characteristic of base camps than specialized-activity or procurement sites.

An alternative but less satisfying explanation is that the fill and its contents may have come from a nearby site. In this scenario, the fill may have been brought up to the rock feature to provide dirt for human burials. This proposition is based on the idea that the rock feature represents a burial mound and that suitable quantities of fill were lacking on the hill slopes surrounding Punto de los Muertos.

Since the end scrapers in the Punto de los Muertos assemblage are *not* the classic Late Prehistoric Plains form, we do not believe that these particular items indicate that the Punto de los Muertos inhabitants engaged in intensive bison hunting. This view is buttressed by the absence of identifiable bison bone and bones of unequivocal bison size in the Punto de los Muertos assemblage.

The ornaments are another matter of special interest. A few of them, especially the fragmentary olivella beads, are burned. Thus, these specimens could have been components of a general trash situation. However, at Pueblo de las Humanas (Gran Quivira) in central New Mexico, olivellas were commonly found with cremations (Hayes et al. 1981).

The majority of the ornaments--guitar-shaped, cut-shell beads; discoidal beads; and tubular beads--were not burned. Furthermore, the guitar-shaped beads are a shape I have not previously seen. Of three major collections from large sites on or near the Plains/Southwest frontier (i.e., Pecos Pueblo, Pueblo de las Humanas, and Arroyo Hondo Pueblo), only Arroyo Hondo Pueblo near Santa Fe produced a guitar-shaped ornament (Venn 1984: Fig. 41, bottom row left).

Furthermore, a literature search of several major references on the Southwest and Texas failed to turn up more examples of this bead type: Jernigan (1978) on the Southwest; DiPeso et al. (1974) on Casas Grandes; and *Bulletin of the Texas Archeological Society*, vols. 1-70, on Texas.

Given the fact that none of the Punto de los Muertos beads were burned, it appears likely that they constituted a single necklace. Although we can in no way prove

it, we suspect that the necklace had originally accompanied the Feature 2 burial.

If the majority of the beads, especially the unburned beads of all types, were associated with the Feature 2 burial, then their distribution in the fill of the rock feature is an index to the degree of disturbance of the deposits. Beads were recovered from 24 of the 29 excavated squares. Some of those squares were among the ones excavated in the pothunters' backdirt pile situated on the northwest side of the feature, which strongly suggests that the plunderers were not screening the fill, although it does not guarantee that they did not recover some of the beads while moving the fill.

The presumed local gray cherts in the knapping debris are fairly distinctive in that 95 percent gave no response to stimulation by ultraviolet light. Flakes that gave warm and medium responses together comprise only 5 percent of the total. These results clearly group Punto de los Muertos with the majority of sites examined thus far for the Pecos Valley of New Mexico and set the site apart from the small cluster of farming sites situated along the lower Rio Hondo southwest of Roswell. Punto de los Muertos also differs greatly in this regard from the Bob Crosby Draw site northeast of Roswell and east of the Pecos River. Bob Crosby Draw produced an unusually large number of Edwards and possible Edwards flakes for the region.

In summary, the artifact assemblage of Punto de los Muertos, if in fact it was generated on the site, indicates that a fairly wide range of activities took place there during the two occupations of the hill. However, the mixed nature of the deposits in the rock feature, from which most of the artifacts were recovered, obscures the relationships and associations. Thus, the activities they represent cannot be assigned to one or the other of the occupations. To complicate matters further, it is also possible that the rock feature was an Archaic period cemetery and that the fill (with all the animal bones and artifacts) was carried up the hill from the site below to cover the burials.

Problem Domain 3: Subsistence

LA 116467, Site 7 (North Area)

No subsistence remains were recovered from Site 7. However, earlier in this section we inferred from the large quantities of pottery that one activity at the site may have been farming. The drainage on which Site 7 is situated is quite small and did not, as far as we can determine, contain a dependable water supply on a perennial basis. If a spring or seep was present at one time, evidence of it is now gone.

But one possibility does exist that may have permitted farming in the vicinity of the site during certain periods. In a study of precipitation records for Roswell (Wiseman 2001), annual precipitation from1878 to 1930 was averaged in five-year increments. The results clearly show that Roswell experienced periods of high precipitation compared to today. Three of the ten five-year periods exceeded 16 inches of precipitation, as follows: 1881 through 1885, 457 mm (18 inches); 1886 through 1890, 508 mm (20 inches); and 1896 through 1900, 432 mm (17 inches). These figures are quite high compared to 279-330 mm (11-13 inches) for 1878 through 1960. Thus, it should have been possible to dry-farm in the Roswell region during certain periods, particularly if the soil had been covered with a good grass-sod prior to the onset of the wet periods. A continuous grass-sod traps and retains moisture effectively, making it an excellent medium for growing crops. That, coupled with the moisture from a series of wetter-than-average years, could make dry-farming a success, even in a small drainage such as that at Site 7. This appears to be exactly what happened for awhile at Blackdom, an early twentieth-century community of farms in the vicinity of Site 7.

The 295 potsherds represent a minimum of 33 vessels and embody several types of vessels and functions: cooking, dry-goods storage, water transport/storage, and food service. Given the comparatively large number of vessels and the presumption that great care was probably taken to avoid breakage, it appears certain that food and water handling (preparation, service, storage) were major activities at Site 7.

The fragment of a one-hand mano indicates that plant-food processing was performed at the site. We cannot determine whether the plants ground with this implement were domesticated or wild. If the plant food included a domesticate such as corn, then the small size of the mano suggests that corn was an adjunct, rather than a staple or major constituent in the diet (Hard et al. 1996; but see Adams 1999). Otherwise, the mano was probably used to process wild-plant seeds.

Judging by the projectile point fragment, the inhabitants of Site 7 also hunted while at the site.

In summary, no plant or animal remains were recovered during our excavations with which to document the subsistence foods of the inhabitants of Site 7. However, the artifact evidence suggests that the occupants hunted game and gathered wild-plant products and/or engaged in cultivation.

LA 116468, El Follon (North Area)

El Follon is no longer considered a valid site and is not discussed further here.

LA 116469, Site 9 (North Area)

Remains that can be confidently attributed to subsistence activities at Site 9 are rare. No charred plant remains other than fuel materials were recovered from the hearths.

Animal remains in the form of three charred fragments of small-mammal bones were recovered from only one feature, Hearth 2. These rodent-size remains indicate that the people who built and used this large, nonrock basin hearth had one or more rabbits or smaller animals for a meal.

The one projectile point fragment, probably of an arrow tip, indicates the capacity for hunting. Presumably, the bow and arrow would have been used on larger game such as antelope, deer, or bison. The point fragment was recovered from near nonrock Hearth 5.

In summary, subsistence data are almost totally lacking from Site 9. The only actual remains recovered are from small mammals (rabbits or smaller). Some of the occupants may also have been hunting larger animals with the bow and arrow. No subsistence species of plants were recovered.

LA 44565, Rocky West (South Area)

Virtually all of the faunal and floral subsistence remains recovered from Rocky West came from the organic stain and possible south hearth in the Feature 1 area. Unfortunately, only some of these remains can be directly assigned to one or the other of the two general periods of occupation at the site. The goat/sheep bones, domestic chicken, and radiocarbon-dated wild walnut shell clearly belong to the historic period. Since the chicken tibia is not burned, it probably represents an isolated twentieth-century drop and may not directly relate to the site occupation or the rest of the remains.

The charred cotton seeds probably also belong to the historic period because they are cultigens. Their presence in the site is enigmatic because, as far as we know, cotton was not grown in southeastern New Mexico until the twentieth century. We are currently at a loss to explain them, unless the seeds were being used as food and had been obtained from cotton-growing Native Americans along the Rio Grande. The only other occupation or occupations at the site took place during the prehorticultural Archaic period.

We suspect, but cannot conclusively demonstrate, that many of the charred, nondomesticated faunal remains are aboriginal in derivation. These include cottontail, jackrabbit, hawk/harrier, turtle-tortoise, small mammal, small-to-medium mammal, medium mammal, and medium-to-large mammal. Since these remains came from within or very near the possible south hearth, they may belong to the Archaic period. The confounding point, however, is that the sheep/goat remains also came from the same general location.

If we look only at the burned bones assigned to general size categories, we find that 50 percent (N=41) are small mammals, 22 percent (N=18) are small-to-medium mammals, 15 percent (N=12) are medium mammals, and 13 percent (N=11) are medium-to-large mammals. Thus, at least 87 percent of these remains belong to small and medium mammals.

Among the rest of the bones, no animals larger than a domestic goat or sheep were recognized among those materials identifiable to the level of genus, family, or species. This suggests that the medium-to-large mammal bone fragments belong to a medium mammal, perhaps sheep/goat.

As discussed earlier, the thermal features designated as Hearths 2 and 3 may have been used to bake (as opposed to roast) foods of unknown composition. That is, baked foods are covered (actually surrounded) with hot rocks. In contrast, roasted foods are cooked by placing them over hot rocks, leaving the upper surfaces of the foods open to the air; roasted foods must be turned over or rotated to achieve thorough cooking. Both plant and animal foods could have been cooked in these facilities. However, no subsistence remains were recovered from direct association with either feature.

The one dart point tip indicates that the Archaic site occupants engaged in hunting. However, none of the bones identifiable to the level of species, family, or genus are of a size normally hunted with the atlatl and dart. Thus, the Archaic occupants of Rocky West probably outfitted their weaponry but subsisted primarily, if not solely, on plants and/or small animals during their stay at the site.

In summary, direct evidence of subsistence practices in the form of burned animal and floral materials were recovered from only one feature at Rocky West. These remains belong to both the Late Archaic and the historic periods as indicated by radiocarbon dates and the species represented. Unfortunately, only the historic species, that is, sheep/goat remains, can be confidently assigned to period. The identifiable wild species include cottontail, jackrabbit, hawk/harrier, and turtle/tortoise. Of the charred bone fragments not identifiable to species, genus, or family, 87 percent are small, small-to-medium, and medium mammal in size. We believe, but cannot demonstrate, that these remains are Archaic in age. The only subsistence plant remains (if, in fact, they were used as food) recovered from Rocky West are the cotton seeds.

LA 44583, Rocky East (South Area)

The excavated part of this site was too small and produced too little material to address these research questions. However, it should be kept in mind that this site is probably an extension of the Rocky West site and the type of occupation represented there.

LA 116470, La Tertulia de las Molineras (South Area)

No plant or animal remains attributable to the subsistence of the occupants of Tertulia de las Molineras were recovered in the minimal work conducted at this site.

The matter of what was being ground in the mortars is problematic. During the planning for this project, we contemplated trying to recover residues from the bottoms and lower sides of the mortars that might be reveal subsistence information. This was to be attempted by chiseling out and collecting fragments of the grinding surface. We were discouraged from doing this during the excavation of Mortar 1 and those at nearby Punto de los Muertos because of mortar depths, horizontal cracks that dropped the bottoms of the mortars to even greater depths, and massive root systems that filled the mortars and the cracks. The difficulty of dislodging and retrieving rock fragments of suitable size from the lower walls and bottoms, plus the potential for contamination by the roots, were strong deterrents.

This situation left us with only one recourse, to peruse the archaeological and ethnographical literature. The effort resulted in a paper entitled "Some Thoughts about Bedrock Mortars and Subsistence Group Size in the Northern Trans-Pecos" (Wiseman 2000b). Mortars and pestles were used by a large number of prehistoric and historic groups throughout North America to prepare food for consumption. In the dryer regions of the Southwest (Texas, New Mexico, Arizona, and California), plants processed in this fashion include mesquite beans, prickly pear cactus, carpetweed seeds, and oak acorns. There are undoubtedly others. Some or perhaps all of these species could have been ground in the Tertulia de las Molineras mortars, but we believe for topographic reasons that mesquite is the most likely candidate.

LA 116471, Punto de los Muertos (South Area)

The deposits excavated from the rock feature at this site produced large numbers of animal bones but no plant remains attributable to subsistence.

The faunal assemblage is large by southeastern New Mexico standards. Twenty-seven species are represented, but more importantly, the medium and large mammals are better represented than one would expect. These include canine (dog, coyote, or wolf), deer, pronghorn, and a large number of fragments that belong to these and/or animals of similar size. Smaller species include prairie dog, gopher (three species), kangaroo rat (two species), beaver, cotton rat, wood rat, cottontail, jackrabbit, birds (medium, medium-to-large, and very large), bobwhite, quail (two species), turtle (four species), lizard, nonvenomous snake, catfish, and freshwater mussel.

Although our faunal specialist, Nancy Akins, does not agree, I consider all of these species to be possible food items for the reasons discussed in Wiseman (2002). Blakeslee (1999) provides in-depth discussion of some of the same points but also discusses several additional points that are currently in vogue among Central Plains archaeologists. He ultimately makes the case for the implementation of a garden hunting strategy by Central Plains Villagers during the first two centuries of the second millennium A.D.

Wiseman's position is based on the ethnographic literature on hunter-gatherers and subsistence farmers in general, all of which indicate that very few sources of protein were ignored on a day-to-day basis by most peoples around the world. I believe that we should assume until proven otherwise that humans used virtually every species that they could capture or find.

In support of this position, it should be noted that most archaeological faunal assemblages possess several features in common. One of these is that few bones of any given species display actual evidence of use by humans. That is, evidence of butchering or cooking is to be found on some of the elements but not on all of them. It seems that the number of bones displaying such evidence--compared to all of the bones for a particular species--usually constitute only 5 to 20 percent of the assemblage. Most bones in most assemblages do not display direct evidence of use by humans, even those species that were certainly used for food (e.g., deer and pronghorn).

What does this imply for species x when only a few elements of that species are present? If none of those elements show evidence of human use, does that mean the species was not used by the occupants of the site? In this context, I firmly believe that the absence of burning, butchering marks, etc. cannot be considered as compelling evidence that the animal was not consumed by humans.

This methodological "sticky wicket" and other kinds of biases have clearly delimited and probably severely biased our perceptions of prehistoric lifeways and our interpretations of archaeological remains. Accordingly, about the only criterion that I accept as a priori evidence that a given archaeological bone can be

ruled out as a prehistoric food item is one that is obviously fresh (i.e., greasy). To some extent, comparisons among the various taxa with regard to degrees of burning by body size can provide perspective on this question, as Akins shows (this report). The reader is invited to consider the full argument of this position as discussed in Wiseman (2002).

In summary, the faunal remains from Punto de los Muertos indicate that as many as 27 species of animals may have been taken by the site occupants. Most if not all of these were probably used for food. Among the 27, if we go strictly on numbers, jackrabbit, cottontail, woodrat, kangaroo rats, small squirrels, gophers, turtles, perhaps pronghorn and/or deer, and perhaps freshwater mussel were the most frequently used animals.

The remaining categories are represented by few elements each--beaver, cotton rat, canid (dog, coyote, and/or wolf), very large bird (turkey or larger), bobwhite, quail, catfish, and perhaps snakes and lizards. While the individual species in this last group may not have been particularly important in and of themselves, the specific timing of their entry into the human diet could have been crucial to health if they occurred during periods of low protein intake. As a group and in the context of year-round health, their contribution should have been closer to par with the larger-bodied species.

No subsistence plant-food remains were recovered from Punto de los Muertos. However, the bedrock mortars indicate that plant foods were processed and perhaps consumed at the site.

Problem Domain 4: Exchange and Mobility

LA 116467, Site 7 (North Area)

The only material recovered from Site 7 that is known to have originated outside of southeastern New Mexico is one Mimbres Style III Black-on-white sherd. The bowl of which this sherd was a part would have been made in southwestern New Mexico no closer to Site 7 than the Rio Grande Valley. Its mode of transmission to Site 7 is unknown. However, Mimbres pottery has been documented in a number of southeastern New Mexico sites, including some in the Roswell area (Parry and Speth 1984).

No exotic lithic materials (obsidian, Edwards chert, Alibates, etc.) or Plains artifacts were recovered from Site 7.

LA 116468, El Follon (North Area)

El Follon is no longer considered a valid site and is not discussed further here.

LA 116469, Site 9 (North Area)

No lithic materials (obsidian, Edwards, Alibates, etc.), pottery, or artifacts attributable to other regions were recovered from Site 7.

LA 44565, Rocky West (South Area)

The lithic materials represented in the chipped stone assemblage include a relatively large number of exotic or imported materials. Seven flakes are Edwards chert from central or west-central Texas, four flakes may be Edwards chert, and two flakes are obsidian, probably from north-central New Mexico. Together, these items represent 2.1 percent of the total debitage assemblage. This figure (2.1 percent) is generally high compared to the percentages of lithic trade materials often found in southeastern New Mexico sites (cf. Wiseman 2002).

Although these materials come from 100+ km away and in opposite directions, this situation is not unusual in southeastern New Mexico sites. The Rocky West occupants may have participated in the same general trade network(s) as many/most other prehistoric and early historic peoples who lived in this part of the state. Or they could have acquired both materials directly from the sources for themselves. Juan Sabeata, an early historic Jumano trader, ranged over the entire area of what we now call the state of Texas (Kelley 1955), an east-west distance of at least 1,125 km (700 miles).

Most of the Edwards and possible Edwards items were recovered from the area south of Feature 1 and east of Hearths 2 and 3. Thus, they could belong to either or both of the Archaic or the historic occupations of the site. The obsidian was recovered from the vicinity of Hearth 4, which we believe on the basis of feature type to be Archaic in age.

In summary, an unusually large (yet still small overall) percentage of intrusive and possible intrusive lithic materials was recovered from Rocky West. Eleven of the 13 total items are Edwards and possible Edwards chert from west-central Texas. The two exceptions are obsidian, possibly from the Jemez Mountains of north-central New Mexico. Only the obsidian can be confidently attributed to the Archaic period occupation. The Edwards and possible Edwards may date to the Archaic or the historic or both. We have no way of determining at present whether the Rocky West inhabitants collected these materials themselves or acquired them through intermediary peoples. Direct acquisition from the actual sources seems unlikely but is not totally out of the question.

LA 44583, Rocky East (South Area)

No materials originating outside the region were recovered from Rocky East. However, it should be kept in mind that this site may be an extension of the Rocky West site and the type of occupation represented there.

LA 116470, La Tertulia de las Molineras (South Area)

No materials originating outside the region were recovered from Tertulia de las Molineras. It should be kept in mind that only a very small part of the site and very few artifacts (two lithic items) were recovered. Also, Tertulia de las Molineras was a specialized-activity site where we would not expect to find exotic materials. Any such items would be more likely found back at the main camp, in this instance, perhaps the large site immediately east of Tertulia de las Molineras.

LA 116471, Punto de los Muertos (South Area)

Twenty-four pieces of exotic lithic material were recovered from the surface of the site and the fill of the rock feature at Punto de los Muertos. Together, these items represent 0.7 percent of the debitage assemblage, a somewhat low rate for southeastern New Mexico sites.

Eighteen of these items are Edwards or possible Edwards chert from west-central Texas east of Punto de los Muertos or possibly the Stockton Plateau of Trans-Pecos Texas south of Punto de los Muertos. These areas are 160 to 320 km (100 to 200 miles) to the south and east of Punto de los Muertos.

Three items representing sources in the Texas Panhandle or perhaps adjacent parts of northeastern New Mexico are one piece of Alibates, one piece of possible Alibates, and one piece of possible Tecovas. The known sources of these materials and their look-alikes are 240 to 480 km (150 to 300 miles) north and northeast of Punto de los Muertos.

The last three items are clear black obsidian. Although these materials have not been sourced, they may be from either the Jemez Mountains of north-central New Mexico or the Rio Grande gravels in the Las Cruces/El Paso region. These sources are 240 km (150 miles) west-southwest and 450 km (275 miles) northwest, respectively, from Punto de los Muertos. The obsidian in the Rio Grande gravels were transported by the river from the Jemez Mountains and Grants Ridge sources (Miller 1999).

In summary, imported lithic materials recovered from Punto de los Muertos represent far-flung sources in virtually all directions from the site. Although the overall quantity of these materials is relatively low (0.7 percent of total debitage assemblage), it nevertheless indicates socioeconomic ties and/or direct access to the resources of a very wide territory. This situation is not unusual for sites in southeastern New Mexico.

Problem Domain 5: Dating the Occupations

LA 116467, Site 7 (North Area)

Two methods can be used to date the occupation(s) of Site 7: radiometric and ceramic.

The two calibrated radiocarbon determinations for the Hearth and Pit 3 are A.D. 1455 and A.D. 1420, respectively (Fig. 59; Appendix 2). Whether one averages these dates or accepts them at face value, they suggest an early to mid-fifteenth-century occupation.

The pottery assemblage of eight types together provides a general dating estimate for the site (Table 72). By taking the earliest end date for the earliest pottery types (South Pecos Brown at A.D. 1200; Brody's Mimbres at A.D. 1250+?) and the earliest beginning date for the latest pottery type (Corona Corrugated at A.D. 1225 as a proxy for Jornada Corrugated), we derive the short range of A.D. 1200-1225. The Site 7 occupation could have occurred during this period. However, the range is short and not very believable, particularly since the types on which it is based are among the most poorly dated of the group.

A somewhat early date for the assemblage as a whole is believable, given the strong representation of red-slipped brown sherds (7 percent of total sherds, 32 percent of MNVs), the possible San Francisco Red sherd, and the Mimbres Style III Black-on-white sherd. And then too, Jelinek believes that South Pecos Brown dates relatively early (rather than late) on seriational grounds. All of this is supported by the rather weak presence of Three Rivers Red-on-terracotta and the absence of Lincoln Black-on-red and the Rio Grande glazes.

Chupadero Black-on-white, with dates of A.D. 1100/1150/1175 to 1450/1500/1545, covers the entire time range under consideration and therefore is less definitive than other types. And the El Paso Polychrome is represented by some sherds that are thin enough to date to the late A.D. 1200s or 1300s. However, the absence of rims precludes further evaluation beyond the possibility that a later date is indicated.

In short, nothing in the pottery assemblage unequivocally indicates a late A.D. 1200s, 1300s, or 1400s date.

In summary, the dating evidence for Site 7 is contradictory. The two radiocarbon dates are mutually supporting and indicate an early to mid A.D. 1400s date for the hearth and the one pit. The pottery, especially the Mimbres Black-on-white, suggests a pre-A.D. 1300 starting date. The pottery does not strongly support the

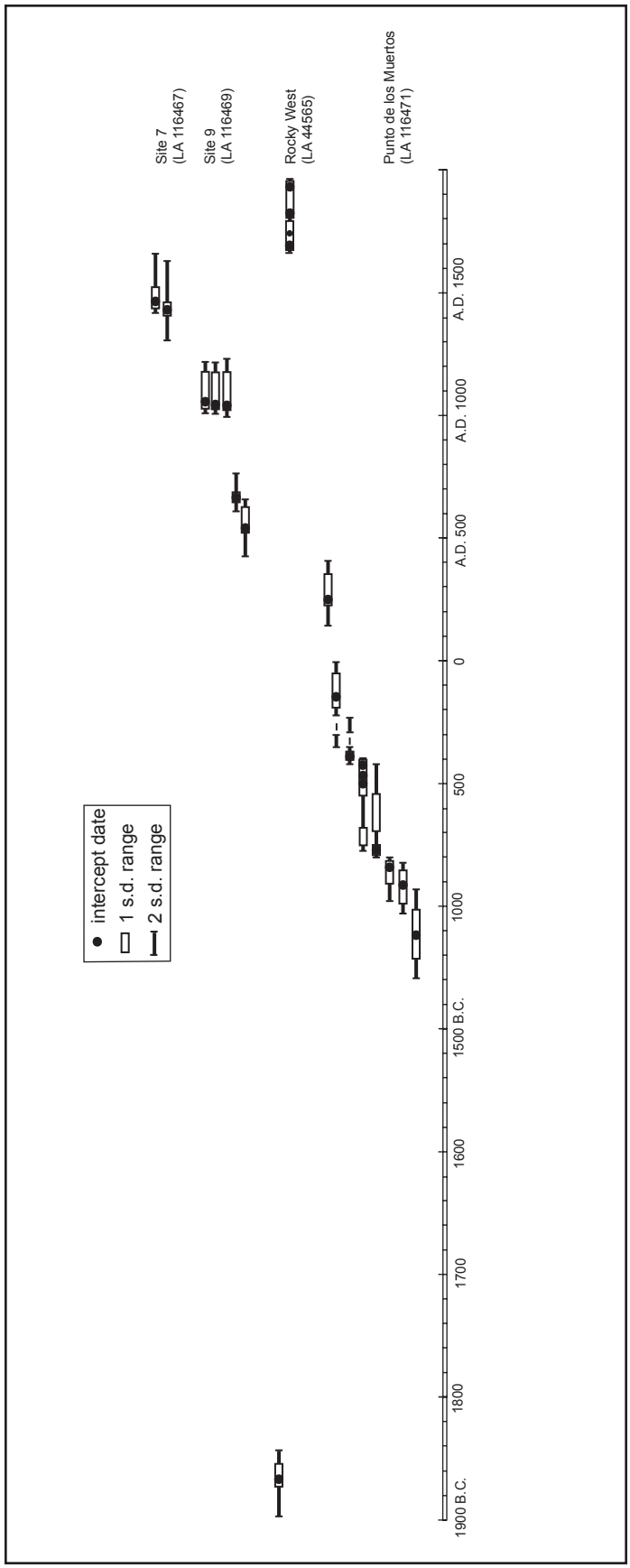


Figure 59. Radiocarbon dates for the Roswell South sites.

Table 72. Dates of pottery types from Roswell South sites

Pottery Type	Date A.D.	Reference
Mimbres Black-on-white (Style 3)	1000-1150	Anyon et al. 1981
	1000-1250+?	Brody 1977, p. 66; see also Nelson 1999
Crosby Black-on-gray	1000-1300	Jelinek 1967
Chupadero Black-on-white	1100- ?	Wiseman 1982
	1150- ?	Breternitz 1966
	?-1450/1500	Snow n.d.
	1175-1545	Hayes et al. 1981
El Paso Polychrome	1100-1400	Whalen 1981
Three Rivers Red-on-terracotta	1150-1300/1350	Breternitz 1966
Jornada Brown	450-1350	Wiseman 1996a Kelley 1984
South Pecos Brown	?-1200	Jelinek 1967
McKenzie Brown	1100-1300	Jelinek 1967
Corona Corrugated	1225-1460	Hayes et al. 1981

radiocarbon dates, though this is based on the absence of types that we expect to see for such a late date. It is, of course, possible that two occupations are represented, but this does not seem likely considering the relatively small size of the site and its placement in what we suppose to be a marginal location for horticulture.

LA 116468, El Follon (North Area)

El Follon is no longer considered a valid site and is not discussed further here.

LA 116469, Site 9 (North Area)

Three methods can be used to date the occupation of Site 9: radiometric, ceramic, and projectile point.

The five calibrated radiocarbon determinations (Fig. 59; Appendix 2) from Features 1, 2, 3, 4, and 5 fall into two groups. The earlier group, consisting of the two rock hearths (Features 1 and 4), has two dates of A.D. 560 (bifurcated 1 s.d. range of A.D. 465-475 and 515-620; Beta-118883) and A.D. 660 (1 s.d. range of A.D. 640-680; Beta-118886), respectively. These dates do not overlap at the level of one standard deviation, suggesting that they could indicate two different occupations. They do, however, overlap at the level of two standard deviations, meaning that they are statistically one and the same and therefore could represent a single occupation.

The three calibrated radiocarbon determinations from the nonrock hearths (Features 2, 3, and 5) are A.D. 1035 (1 s.d. range of A.D. 1020-1165; Beta-118884), A.D. 1035 (1 s.d. range of 1015-1170; Beta-118885), and A.D. 1040 (1 s.d. range of A.D. 1020-1170; Beta-118887), respectively. These results strongly suggest contemporaneity of the three hearths.

The pottery assemblage provides a general dating estimate for the site (Table 72). The three dated pottery types--Jornada Brown, South Pecos Brown, and McKenzie Brown--are not well dated as pottery-type dating goes, but we do have general estimates that are useful to a degree.

Jornada Brown was the primary utility ware of the Glencoe phase peoples of the Sierra Blanca country west of Roswell. That phase and the production of Jornada Brown are believed to have ended some time in the fourteenth century A.D. The beginning dates for both the phase and the pottery type are more problematic. At the current time, it appears that the production of Jornada Brown may have started in the fifth or early sixth century A.D. This date is predicated on the absence of Jornada Brown at the Sunset Archaic site, a substantial base-camp site situated along the middle Rio Hondo (Wiseman 1996a). Thus, for now, the manufacture dates for Jornada Brown are estimated at A.D. 450/500 to 1350/1400.

South Pecos Brown is dated by associated pottery types and assemblage seriation. Jelinek (1967) suggests dates of pre-A.D. 900 to post-A.D. 1300, with the period of greatest abundance A.D. 900-1100. He believes the type to have been made primarily south of his Middle Pecos region, meaning in the vicinity of Roswell. However, judging by the most common tempering constituent, gray feldspar derived from Sierra Blanca gray syenite, most South Pecos was probably made in the Sierra Blanca region 65 km or more west of Roswell.

McKenzie Brown is also dated by Jelinek (1967) on the basis of associated pottery types and seriation. His suggested dates are A.D. 1100 to 1300, with the period of greatest abundance A.D. 1200-1300. Elsewhere, I have ventured the opinion that at least some sherds typeable as McKenzie Brown may actually have belonged to the Plains tradition and were made somewhere on the Southern Plains, perhaps in eastern New Mexico. This suggestion is based on the paste, which is usually black and is tempered with abundant quartz. However, the radiocarbon date from the same hearth (number 2) brings the suggested late date for McKenzie into question.

A fragment of an arrow point or arrow point preform indicates a Late Prehistoric date. The mid-blade fragment does not reveal whether the style was corner- or side-notched. It was recovered from the vicinity of Hearth 5, which also dates to the Late Prehistoric period.

In summary, the radiocarbon dates, pottery, and arrow point/preform indicate at least two different occupations of Site 9. The radiocarbon dates clearly indicate one or possibly two Terminal Archaic occupations in the sixth and/or seventh centuries A.D. Both are associated

with burned-rock hearths. The radiocarbon dates also indicate at least one Late Prehistoric occupation about the mid-eleventh century A.D. This occupation is associated with simple basin hearths that lack burned rock. The pottery could be associated with the Terminal Archaic or the Late Prehistoric occupation or both. However, we suspect that it was associated with the Late Prehistoric period. The one sherd of McKenzie Brown came from the fill of Late Prehistoric Hearth 2. The one arrow point/preform supports a Late Prehistoric (pottery) period occupation.

LA 44565, Rocky West (South Area)

Radiocarbon results indicate that the archaeological remains investigated at Rocky West represent at least two periods of occupation (Fig. 59; Appendix 2). The earlier occupation, and the one that probably resulted in most or all of the lithic knapping debris at the site, dates to about 1730 B.C. This period equates with the Middle Archaic Avalon phase (3000-1000 B.C.) of the Brantley sequence (Katz and Katz 1985a). Unfortunately, this date is not directly associated with any feature other than the stain of Feature 1 and the possible south hearth located there.

We did not obtain dates from the two small, on-surface baking facilities (Features 2 and 3) or the smaller burned-rock hearth (Feature 4). However, we have evidence from other sites in the area that suggests rock facilities such as these probably date to the Archaic period or possibly to the early Late Prehistoric period. Similar features have been dated at Site 9 (this report) and at LA 8053 and 38264E of the Seven Rivers Project, a few kilometers north of Rocky West. The five calibrated dates from those features range from 1135 B.C. to A.D. 1155. It is therefore possible that Features 2, 3, and 4 at LA 44565 belong to the same occupation as the 1730 B.C. date from Feature 1, or possibly to other Archaic period occupations, or conceivably to a Late Prehistoric period occupation. However, the absence of pottery at Rocky West makes a pottery period occupation unlikely.

The later occupation at Rocky West is historic. Unfortunately, the one sample produced four intercept dates--A.D. 1690, 1735, 1815, and 1925--all about equally good candidates for the true date of the carbonized walnut shell from which the date was obtained. The sheep bone in the Feature 1 deposit essentially confirms a historic date for the deposit.

In summary, radiocarbon evidence indicates that Rocky West was occupied on at least two occasions, one dating to about 1730 B.C. (Middle Archaic or Avalon phase) and the other to the historic period, about A.D. 1690, 1735, 1815, or 1925. The three burned-rock thermal features (numbers 2, 3, and 4) could not be dated directly because of the absence of charcoal. However, on the basis of similar features that have been radiocarbon dated at nearby sites, it is likely that the Rocky West features date to the Archaic period.

LA 44583, Rocky East (South Area)

No radiocarbon dates or diagnostic artifacts were recovered from the limited work accomplished at this site. We suspect, but cannot confirm, that LA 44583 and LA 44565 were one site that became two sites as a consequence of the construction of U.S. 285.

LA 116470, La Tertulia de las Molineras (South Area)

No datable materials were recovered from Tertulia de las Molineras. This is not unusual, for mortar sites are plagued with difficulties in defining cultural and temporal associations.

Archaeologists tend to treat the cultural and temporal aspects of mortar sites in one of three ways: (1) mortars found *within* other types of sites are presumed to belong to the occupations of those sites (such as at SM-108; Katz and Katz 1985a); (2) mortars found *near* other types of sites may be attributed to the occupations of those sites (again at SM-108; Katz and Katz 1985a); and (3) when mortar sites are found in isolated areas (well away from known sites), archaeologists generally desist from suggesting cultural and temporal associations (Gallagher and Bearden 1980), especially since, as is usually the case, diagnostic artifacts are absent.

These assumptions relate directly to the fact that the mortars can only be dated by their situations and associations. It would be much better to date them directly by some inherent feature such as organic substances adhering to the lower grinding surfaces or, better yet, absorbed into the rock matrices of those surfaces. That is, substances derived from materials ground in the mortars undoubtedly have worked their way into the rock matrix. They should be extractable by microchemical techniques, identifiable as to plant or animal of origin, and datable.

The absence of diagnostic artifacts at Tertulia de las Molineras precludes dating the mortars at this time. The survey archaeologist (Marshall 1997) reported finding a dozen or so flakes on the surface of this site, and two lithic items were recovered from the one mortar we excavated. None of these artifacts are diagnostic, and they cannot help date the site. However, it is entirely possible that Tertulia de las Molineras was a grinding station for the large site on the floor of the Pecos Valley 100 m or so to the east.

LA 116471, Punto de los Muertos (South Area)

The occupations at Punto de los Muertos can be estimated through radiometric determinations and diagnostic artifacts.

Beta-Analytic, Inc. provided eight carbon dates from the rock feature, Feature 1 (Table 73; Appendix 2). These dates represent three undisturbed contexts (one wood charcoal sample and one human bone from bottom contact and a second wood charcoal sample from fill within 10 cm of the bottom) and five disturbed contexts (one wood charcoal sample obtained from two different squares, two pieces of human bone, and two pieces of animal bone).

ing radiocarbon dates, then perhaps only two separate uses of the rock feature are represented--one long one lasting for about 1,300 years and stretching from about 1300 B.C. to the time of Christ, and a shorter occupation lasting from about A.D. 135 to 405.

If one is less conservative in interpreting radiocarbon dates, then at least four separate uses of the rock feature might be postulated as follows: (1) initial construction and use of the rock mound for unknown purposes between about 1300 and 800 B.C.; (2) deposition of both burned human bone and burned animal bone between about 800 and 350 B.C.; (3) more deposition of burned human bone between about 200 B.C. and the time of Christ; and (4) more deposition of burned ani-

Table 73. Radiocarbon dates, Punto de los Muertos

Beta-Analytic No.	Provenience	Sample	Context	Calibrated Intercept Date	Calibrated Date Range (1 s.d.)
118888	Sq. 41N/2W fill	mesquite charcoal	disturbed fill	845 B.C.	910 to 820 B.C.
118889	Sq. 43N/3W within 10 cm of bottom	unknown nonconifer charcoal	undisturbed	915 B.C.	990 to 855 B.C.
118890	Sq. 41N/3E, bottom contact	mesquite charcoal	undisturbed	1120 B.C.	1215 to 1015 B.C.
137609	NW backdirt	human bone	disturbed fill	155 B.C.	190 to 55 B.C.
137610	Sq. 42N/0 fill	animal bone	disturbed fill	A.D. 255	A.D. 230 to 350
137611	Feature 2; Feature 1 bottom contact	human bone	undisturbed	390 B.C.	405 to 375 B.C.
137612	reburied bones	animal bone	disturbed fill	500 B.C. 465 B.C. 425 B.C.	755 to 680 B.C. 550 to 405 B.C.
137613	reburied bones	human bone	disturbed fill	770 B.C.	790 to 750 B.C. 695 to 540 B.C.

The dates of the animal and human bone were required to ascertain the temporal relationship of these species to one another as well as relative to the presumed dates of the rock feature (i.e., the wood charcoal samples from bottom and near-bottom contexts). These determinations are critical to the discussions elsewhere in this report regarding the nature of the deposits and remains (intentional burials? cannibalism?) and the function of the Rock Mound in general.

Two aspects of these eight radiocarbon dates are important to note. First, the two dates that should be the earliest--that from bottom contact in the rock feature and the one from undisturbed context within 10 cm of the bottom--are in fact the earliest. And, they are stratigraphically consistent, with the bottom contact date being earlier.

Second, the eight dates as a group define a span of 1700 years based on two-standard-deviation values--stretching from 1300 B.C. to A.D. 400. The use of the rock feature (Feature 1) obviously took place over a long period of time and definitely does not represent a single episode of occupation.

If one takes the conservative approach to interpret-

mal bone between about A.D. 135 and 405. Given the fact that so few pieces of bone were dated, this punctuated scenario is more suspect than usual in spite of the fact that it is more consonant with the lives of hunter-gatherers, who probably visited and used this location on an intermittent basis.

Seven dart points and one arrow point were recovered from LA 116471. The dart points have straight or slightly expanding stems and appear stylistically to belong to the McMillan and/or Brantley phases (Late Archaic, 1000 B.C.-A.D. 1, and Terminal Archaic, A.D. 1-750, respectively; Katz and Katz 1985a). The four specimens with intact bases have neck widths of 12, 11.5, 11.5, and 9.5 mm, all within the Katz's range of 9 to 14 mm for the Brantley phase.

Only the complete dart point, which can be typed as a Williams point in the Texas sequence (Turner and Hester 1993), had good context (undisturbed fill within 10 cm of bottom of the rock feature). It also was associated with a charcoal sample that yielded a date of 1120 B.C. (Beta-118890). The point style and radiocarbon date are mutually consistent with a Middle to Late Archaic (2500-300 B.C.) association in the Texas

sequence (Turner and Hester 1993). However, the neck width of 11.5 mm suggests a younger date and an association with the Terminal Archaic Brantley phase (A.D. 1-750) of the Brantley sequence (Katz and Katz 1985a). These results are in general agreement with the radiocarbon evidence, although they are not particularly satisfying with respect to the Katz's method for estimating projectile point dates from neck width measurements.

However one prefers it, the Archaic period use of the rock feature in terms of the Brantley sequence began at the end of the Middle Archaic Avalon phase (3000-1000 B.C.) and ended during the first half of the Terminal Archaic Brantley phase (A.D. 1-750) (Katz and Katz 1985a).

The arrow point or arrow point preform fragment indicates a Late Prehistoric or post-A.D. 750 occupation. This conclusion is supported by the presence of pottery.

The four pottery types represented at this site have all been dated at other sites in New Mexico. Chupadero Black-on-white is dated A.D. 1175-1545 by Hayes et al. (1981), though Wiseman (1982) suggests that a beginning date of A.D. 1100 may be more accurate. Hayes et al. (1981) also date Corona Corrugated as A.D. 1200/25 to 1460. Lincoln Black-on-red is not well dated, but A.D. 1300 to 1400 (Breternitz 1966) is probably close to being correct.

Jornada Brown is definitely the longest-lived of the group, but its dating is also the most problematic, especially the beginning date. I am currently using the dates of A.D. 450/500 to 1350 for the type. These dates are based on the absence of Jornada Brown at the late-dating Sunset Archaic site in the eastern foothills of the Sierra Blanca (Wiseman 1996a) and the fact that the type was the primary utility ware in Glencoe phase sites in the Sierra Blanca. Kelley (1984) believes that all Glencoe phase sites were abandoned by about A.D. 1350.

Since Lincoln Black-on-red is the shortest-lived pottery type represented at LA 116471 (assuming that the single sherd is Lincoln and not a badly fired Three Rivers Red-on-terracotta), we suggest on the basis of the pottery evidence that a late occupation at LA 116471 took place during the fourteenth century. This corresponds with the middle Late Prehistoric Oriental phase (A.D. 1150-1450) of Katz and Katz (1985a).

In summary, the archaeological evidence clearly indicates that LA 116471 experienced at least three or more periods of use. The earlier one was long, probably episodic, and lasted from about 1300 B.C. to the time of Christ; it equates with the end of the Middle Archaic Avalon phase (3000-1000 B.C.) through the end of the Late Archaic McMillan phase (1000 B.C.-A.D. 1) in the Brantley sequence (Katz and Katz 1985a). Most of the remains recovered from the site, especially those from the fill of the rock feature, probably belong to this occupation(s). The second use of the site took place during the first half of the Brantley phase (A.D. 1-750), or about A.D. 135 to 400. The latest occupation was also shorter, occurred during the fourteenth century A.D., and probably involved the use of the bedrock mortars.

Problem Domain 6: Assessing Cultural Affiliation

LA 116467, Site 7 (North Area)

Site 7 is clearly a prehistoric site that dates some time in the thirteenth, fourteenth, and/or perhaps fifteenth centuries A.D. The small section left for us to excavate provides only a glimpse of the site content in terms of features and artifact assemblage.

However, two lines of evidence suggest that the occupants may have been farmers rather than hunter-gatherers. The first, as discussed earlier, is the size of the pottery assemblage and its proportion of the overall artifact assemblage relative to the lithic manufacture debris. An equal or high ratio of potsherds to pieces of knapping debris seems to be characteristic of farming assemblages.

The other line of evidence, also discussed earlier, is the composition of the lithic debitage assemblage. Specifically, the ultraviolet light signature of the local gray cherts is similar to sites like the Fox Place and Rocky Arroyo Village and stands apart from the other project sites. The Fox Place and Rocky Arroyo Village, which are located along the Rio Hondo several kilometers northwest of Site 7, appear on the basis of preliminary data to be situated near a source of San Andres gray cherts that provide this distinctive signature.

Thus, we suspect that the inhabitants of Site 7 acquired their gray cherts and their pots from the same area or source. On the basis of this admittedly minimal evidence, we postulate that the Site 7 people were farmers who came from the vicinity of the Rio Hondo where it enters the Pecos Valley southwest of Roswell. Whether these people were Jornada-Mogollones, like the people of Rocky Arroyo Village, or hunter-gatherers heavily influenced by the Jornada-Mogollones, like the people of the Fox Place, we cannot say.

Hickerson (1994) postulates that the prehistoric, as well as the very early historic, peoples inhabiting southeastern New Mexico were Jumanos. We embrace the widest possible interpretation of her suggestion, including the possibility that both farmers and hunter-gatherers living along the juncture of the Southern Plains and the Southwest shared the same or similar ethnicity. We provisionally accept this notion, and our application of it, as useful working hypotheses to guide further exca-

vation and study. This thesis is discussed in more detail in Wiseman (2002).

In summary, the current evidence weakly supports the notion that the occupants of Site 7 were farmers from the vicinity of where the Rio Hondo enters the Pecos Valley who may have been the ancestors of the Jumanos, a shadowy early historic group that disappeared as an ethnic entity about A.D. 1700.

LA 116468, El Follon (North Area)

El Follon is no longer considered a valid site and is not discussed further here.

LA 116469, Site 9 (North Area)

The preponderance of evidence indicates that the inhabitants of Site 9 during both occupations were hunting and gathering at the time that they were at the site. However, because of the large number of vessels represented by the sherds recovered from the site and the location of the site next to potentially arable land, we cannot be certain whether the people were full-time hunter-gatherers or farmers on a hunting and/or gathering trip. Thus, the people of both occupations could have been Jornada-Mogollon horticulturists from the mountains to the west, or they could have been "nomads" of the region. Either way, they may have been early-day Jumanos, as Hickerson (1994) suggests.

LA 44565, Rocky West (South Area)

As we have seen, Rocky West was occupied during at least two periods, the middle (ca. 1730 B.C.) of the Middle Archaic (Avalon phase, 3000 to 1000 B.C.) and the historic period, in this case around A.D. 1670, 1735, 1815, or 1925.

We currently have no way of knowing the ethnic identity of the Avalon phase people. Taxonomically speaking, this phase and the Brantley sequence of which it is a part belongs to the Trans-Pecos archaeological culture area of West Texas, the Chihuahuan Desert.

The historic occupation can be culturally/ethnically pinned down a little better. Since we have no way of knowing which of the four radiocarbon intercept dates is the correct one, we will outline the most likely ethnic group or groups represented for each intercept date. The 1670 date could have been Jumano or Apache. We believe Apache is more likely because the best known, perhaps most widely ranging Jumano was the trader Juan Sabeata (Kelley 1955). Sabeata was a major figure in pan-Texas/northern Mexico trade in the 1670s. According to a traveling companion of Sabeata, Apaches were a serious menace to travelers crossing the Southern Plains as early as 1683 (Kelley 1955). They were also showing up in what is now northern Chihuahua in the 1690s (Griffen 1998). We therefore suspect that Apaches, probably groups now encompassed by the Mescaleros and/or Lipans, were probably in control of the Guadalupe Mountains and Seven Rivers region by 1650 (see also Schroeder 1973; and Hickerson 2003).

The 1735 date and especially the 1815 date are probably Apache for the reasons just stated. The Mescaleros controlled the mountainous areas of southeastern New Mexico until the mid 1800s.

At first thought, the 1925 date would most likely mean either an Hispanic or an Anglo-American affiliation. However, the north hearth (provenience of the dated walnut shell) is a Native American style thermal feature, making an Hispanic or Anglo-American origin unlikely. This supposition is based on the radiocarbon dating of small, nonrock basin hearths and the perhaps fallacious notion that persons of European ancestry tend to build much larger camp fires, usually on the surface of the ground. The question then becomes: Is the 1925 intercept date erroneous, or was the north hearth created by an off-reservation Mescalero? Neither possibility can be eliminated on the basis of present evidence.

In summary, the date of the Archaic component at Rocky West is, on the basis of present knowledge, too early to permit useful speculation about ethnicity of the inhabitants. In contrast, the historic occupants almost certainly were Apaches. However, Jumanos, Hispanics, and Anglo-Americans cannot be totally ruled out simply because of the uncertainties surrounding the radiocarbon assay and the multiple intercept dates derived from the calibration routine. These results cannot be reconciled, for the dated material is so close to modern times that it challenges the limits of the radiocarbon technique (R. Hatfield, pers. comm. 1999).

LA 44583, Rocky East (South Area)

The part of this site that was excavated on this project was too small and produced too little material to address these research questions. However, it should be kept in mind that this site is probably an extension of the Rocky West site and the type of occupation represented there.

LA 116470, La Tertulia de las Molineras (South Area)

Lacking a means of dating the occupation of Tertulia de las Molineras, we can only guess what ethnic group or groups used the site and the region. The possibilities for this site and for Punto de los Muertos are discussed below.

LA 116471, Punto de los Muertos (South Area)

Three or more periods of occupation are indicated by the dates obtained for this site. The earliest one dates from the end of the Middle Archaic Avalon phase to the end of the Late Archaic McMillan phase (i.e., ca. 1300 B.C. to ca. A.D. 1). A brief second use of the site took place in the first half of the Terminal Archaic Brantley phase (i.e., ca. A.D. 1 to ca. 400). Other than these dates and material culture, we have no real way of suggesting an ethnic affiliation because of the long interval between these periods and the Late Prehistoric period occupation.

The third occupation of Punto de los Muertos took place during the fourteenth century A.D. Hickerson (1994) suggests the Native American population of southeastern New Mexico might have been the Jumanos, a group of people who became known for widespread trading and hunting throughout the region in the late A.D. 1600s (Kelley 1955). They disappeared as an identifiable ethnic group around A.D. 1700, evidently because of reduced numbers, the eviction of their Spanish allies during the Pueblo Revolt of 1680, and the need to ally themselves with stronger groups to avoid extinction.

Given the fact that, archaeologically and biotically, the Guadalupe Mountains belong to the Trans-Pecos region of West Texas, other ethnic groups must also be mentioned as the possible Late Prehistoric inhabitants of our south project sites. Some of the more likely candidates are the Jediondos, Sumas, Cibolos, and Cholomes. All four groups are listed as having inhabited the poorly known Trans-Pecos country east of El Paso and northeast of La Junta de los Rios (Presidio, Texas) in early contact times (Griffen 1998; Bolton 1930:316). The Sumas and the Cibolos are generally believed to have been linguistically and culturally related to the Jumanos (Hickerson 1994). The Chinarras, who were noted in the same general region in the eighteenth century (Griffen 1979:40), are a more remote possibility as occupants of the project sites.

From the standpoint of material culture, Beckes and Adovasio (1980) have noted strong similarities in prehistoric basketry techniques among dwellers in the Big Bend country of the Trans-Pecos, the Lower Pecos region of southwest Texas, and the Hueco district of south-central New Mexico and adjacent Texas. While Beckes and Adovasio do not explicitly include the Guadalupe Mountains within the Hueco district, they do mention that the Guadalupes are on the eastern edge of their study area.

Problem Domain 7: Examining a Cultural Boundary Zone

Only four sites--Site 7 (LA 116467), Site 9 (LA 116469), Rocky West (LA 44565), and Punto de los Muertos (LA 116471)--produced enough information to address this question. Insufficient information was derived from the limited work at both Rocky East (LA 44583) and La Tertulia de las Molineras (LA 116471). El Follon (LA 116468) is not convincing as an authentic prehistoric manifestation.

Of the four sites, three have Archaic components (Site 9, Rocky West, Punto de los Muertos), all four have Late Prehistoric components, and only Rocky West has a historic, Native American component. Thus, the historic period is eliminated from further consideration here.

Archaic Period

A brief review of the Archaic components at the three sites reveals that the manifestations at all three are minimal, and diagnostic artifact types are too few in number to permit comparison. Additionally, the Archaic component at Punto de los Muertos is unique, removing this site from further comparison among the project sites.

This leaves us with only two Archaic components at two sites, Site 9 in the north and Rocky West in the south. Both have burned-rock thermal features. Those at Site 9 are so small that it is a virtual certainty that they were used for roasting food and/or warming the site occupants, as opposed to preparing larger quantities of food by baking.

By way of contrast, two of the four thermal features at Rocky West are larger and may have been small baking facilities. The third thermal feature, Hearth 4, is small like those at Site 9 and may have been used for roasting food and/or warming the site occupants.

The fourth thermal feature at Rocky West, the possible nonrock hearth in the Feature 1 area, provided an Archaic date, but its construction (absence of burned rock) and associated Middle/Late Archaic radiocarbon date make it enigmatic. Current evidence suggests that nonrock hearths appear to date mostly, if not solely, to the Late Prehistoric (pottery) period, making the association of the Archaic date with the possible south hearth questionable. Plus, it is by no means certain that this feature was actually a hearth rather than an "artifact" of rodent burrowing.

The only other criterion we can use to assess degree of similarity/dissimilarity between the Archaic components at Site 9 and Rocky West is the composition of the local gray chert assemblages (i.e., the ultraviolet light

study). Although the UV light responses given by both assemblages do differ, both fall within the same range as most of the other sites studied thus far. That is, the percentages of pieces giving medium to bright responses to UV light stimulation are so low as to be negligible. Thus, the assemblages of the Archaic components at both Site 9 and Rocky West are essentially one in the same in this regard.

Late Prehistoric Period

A brief review of the Late Prehistoric components at three project sites reveals that the manifestations at all three are minimal. Two of the sites, Sites 7 and 9, are in the north, and the third, Punto de los Muertos, is in the south. Diagnostic artifacts other than pottery are too few in number to permit comparison on this basis. However, as with the Archaic components, we do have some information useful for evaluating this particular problem domain.

Site 7 is believed to have been a small habitation site associated with farming, though structures or cultigens were not found. The site is situated on a small drainage possessing a small patch of alluvium suitable for dry farming during periods of greater than average precipitation. The numbers of pottery sherds and pieces of knapping debris are nearly equal. The local gray cherts embody a UV light signature very similar to those of Rocky Arroyo Village and the Fox Place, on the outskirts of Roswell. We envision that the occupants of Site 7 moved from the vicinity of those two sites to take advantage of the alluvial patch for farming.

Site 9 also produced pottery. However, the pottery-to-lithic-debitage ratio is much lower and is more like that expected at hunter-gatherer sites. The UV light signature of the local gray cherts shows a paucity of pieces emitting a moderate to bright response, placing the assemblage with the main site group and distinguishing it from the Site 7 assemblage. From the standpoint of situation, Site 9, like Site 7, is on a small, ephemeral drainage within the Sacramento Plain. This drainage has sufficient alluvium that it could have been dry-farmed during wet periods. The radiocarbon dates are earlier than the period of farming florescence in the Roswell area, and no cultigens were recovered from the fills of the three nonrock, pottery period hearths excavated at this site. Since hearths were the only features found, we suggest that Site 9 was used only for camping.

Punto de los Muertos produced several pottery sherds that indicate a Late Prehistoric occupation of the hillock. That occupation evidently was ephemeral, perhaps associated with the mortars, but lacked substantive structures and evidence of farming. The dearth of artifacts attributable to the Late Prehistoric period and the overall similarity of this component to other pottery period components in the Guadalupe Mountains/Brantley region are in general agreement with the notion that the occupants were probably hunter-gatherers adapted to the Chihuahuan Desert scrublands.

Summary

We have minimal data from the Archaic components at Site 9 and Rocky West by which to compare their similarity or dissimilarity. In the final analysis, we cannot define differences between the two sites that are not related to function. We see no differences that might be attributable to cultural differences. If anything, these two sites could be used to argue for cultural similarity across this section of New Mexico at this period in time.

We are only slightly better off with the Late Prehistoric or pottery period occupations. Site 7 may have been a farming location, but Site 9 probably served only as a camping spot. Perhaps the most useful piece of information is the suggestion of farming along the tiny drainages on the Sacramento Plain and well away from the Pecos River and its larger tributaries. The occupants of Site 7, the possible farm site, also appear to have been connected with the large sites near Roswell, but those at Site 9 evidently were less so connected.

It should also be noted in this context that the Site 7 occupation was basically coeval with the last occupations/uses of both the Fox Place and the Henderson site at Roswell. It was also considerably later than the terminal occupations of Jelinek's Middle Pecos sites along the Pecos River north of Roswell. The Late Prehistoric occupation at Punto de los Muertos appears to have been a hunter-gather occupation typical of the northern Trans-Pecos region of West Texas.

In final summation, the Roswell-South project sites did not permit us to clearly demarcate a prehistoric cultural/social boundary between the Roswell area and the Carlsbad area. This is not particularly surprising, given the facts that we have so few sites to work with, the contents of those sites are minimal, and the distances involved are great.

More to the point, the idea that we might be able to identify social boundaries on a project such as this one is optimistic, given the complexity and scale of the phenomenon. For instance, using ceramic data collected specifically for the purpose of looking at territoriality among dozens of sites and hundreds of square kilometers in South Africa, Sampson (1988) found that defining such boundaries was difficult, though not impossible, at least in some senses.

Perhaps even more importantly, the results of a number of other studies (see Stark 1998 and various papers therein, especially those by Goodby [1968] and

Hegmon [1968]) indicate that many archaeologists' conceptions of social boundaries are seriously simplistic. Social boundaries can be and often are defined in a number of ways by most nonstate groups and sometimes by individuals within those groups.

Furthermore, ethnographers and archaeologists alike have had considerable difficulty in defining material culture correlates that *might* be useful in this pursuit; certainly, no attributes, specific types of artifacts, styles, or technologies appear to have universal utility to that end. Because of these and myriad other problems, the definition of ethnic groups may not be successful much of the time, though many of the contributors to the Stark volume seem unwilling to abandon the idea.

This seems also to be true for southeastern New Mexico. For instance, the currently (but poorly) known distributions of two styles of projectile points keep the embers of hope alive. Livermore (and Livermore-like) points and Maljamar points are major constituents in some assemblages but are only occasional adjuncts in others. Better known to the world at large, it is a matter of fact that farmers were juxtaposed with hunter-gatherers in the region during both the Late Prehistoric and early historic periods. Surely these facts are relating useful information about specific groups. As always seems to be the case, we only need more data and improved perspectives for interpreting that information. Suffice to say, inquiry into the dynamics of human territoriality in southeastern New Mexico is wide open for future researchers.

IMPLICATIONS OF THE ROSWELL SOUTH PROJECT

Several aspects of the Roswell South data have important implications for future research.

Dating

The dates from Site 7 (LA 116467) document occupation of the Roswell region in the fifteenth century A.D. This period is at the late end of, or conceivably postdates, the known occupations of the large farming villages the Roswell area (i.e., Rocky Arroyo village, the Fox Place, the Henderson site, Bloom Mound). It also postdates the time (about A.D. 1250 or 1300) when Jelinek (1967) postulates abandonment of the Middle Pecos farming sites in favor of a bison-hunting existence.

We have now documented through excavation the use of the broad Sacramento Plain and its tiny drainages, perhaps for farming as well as for camping places during travel. The dates, along with those from the Garnsey Bison Kill site (Speth 1983), the Garza hearth at the Garnsey Spring Campsite (Parry and Speth 1984), the late hearth at Corn Camp (Wiseman 1996b), and the north hearth in Feature 1 at Rocky West (this report) document the poorly known period of occupation of the Pecos Valley following the cessation of the Late Prehistoric farming villages and the early historic Spanish period.

The period represented by these dates presumably was characterized by a hunting-gathering lifeway, perhaps one focused on bison hunting, as Jelinek (1967) suggests. Site 7 also presents the possibility that limited farming, or perhaps gardening, was also part of that subsistence system. We believe that the historic peoples represented by these "late-dating" sites were Jumanos (Hickerson 1994) for the pre-1600 dates, the Jumanos or Apaches (Lipans? Mescaleros?) for the 1600-1700 dates, and the Apaches for the post-1700 dates.

Nonrock Hearths

Three projects that I have undertaken in the Roswell/Carlsbad region (Roswell South, Seven Rivers, and Dunahoo Hills [Corn Camp]) have produced certain types of thermal features that have temporal significance. Of particular importance at this juncture is the nonrock basin hearth or the basin hearth with six or fewer burned rocks in the fill.

With only two exceptions out of a total of 17 examples (including three from the Garnsey Spring Campsite [Parry and Speth 1984]), these simple hearths produce radiocarbon dates from the late A.D. 800s to the early 1900s. Their primary, if not sole, association with the Late Prehistoric and historic periods is clear. The two exceptions are suspected of having problems with contamination and/or errors made in the archaeological laboratory.

The sizes of nonrock hearths range from 25 to 55 cm across and up to 10 cm deep. The presence of these hearths is best detected by broad-scale, shallow shovel stripping that in some cases needs to be only a few centimeters deep. Needless to say, they can be easily missed since they rarely show on the surface.

Rock Feature, Punto de los Muertos

The rock feature (Feature 1) at Punto de los Muertos (LA 116471) appears to have been a fascinating and important aspect of this site and the prehistory of the Trans-Pecos region of Texas in general. The presence of thousands of animal and human bones in a single small feature raises many questions that cannot be answered with the Feature 1 data simply because vandals got to the site first.

Was the rock feature a specialized burial mound for humans, as suggested by the analysis offered here? Or do the remains represent something much more sinister, like cannibalism? Certainly, some scholars would look at the condition of the human materials and readily suggest this to be the case (e.g., Turner and Turner 1999). The dating of the three fragments of human bone clearly indicate that, if so, the consumption of humans probably took place on more than one occasion.

The quantities and condition of the animal remains in the rock feature fill add another factor to the equation and make the rock feature remains stand apart from other examples recently interpreted as evidence of cannibalism. These animal bones need to be explained before I will be totally convinced that cannibalism is or is not the appropriate explanation in this instance (Bahn 1992). However, once again, the vandalism to the rock feature prior to our involvement precludes resolving the problem in this particular instance.

Assuming that the rock feature is not the only example of its kind in the region, it is imperative that others be located, carefully excavated, and fully analyzed to answer these questions. Akins provides a list of additional observations on both the human and the animal remains that should be employed if these materials are again found together in such quantities. Only then can we hope to round out our perspective on the prehistory of the region.

REFERENCES CITED

Adams, Jenny L.
1999 Refocusing the Role of Food-Grinding Tools as Correlates for Subsistence Strategies in the U.S. Southwest. *American Antiquity* 64(3):475-498.

Akins, Nancy J.
1995 Prehistoric Violence along the La Plata River in New Mexico. Paper presented at the 60th Annual Meeting of the Society for American Archaeology in Minneapolis.

1996 LA 3333 Human Bone. Manuscript.

in prep.
Salt Creek: Data Recovery at Seven Prehistoric Sites along U.S. 285 in Chaves and De Baca Counties, New Mexico. Archaeology Notes 298. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Anyon, Roger, Patricia A. Gilman, and Steven A. LeBlanc
1981 A Reevaluation of the Mimbres-Mogollon Archaeological Sequence. *The Kiva* 46:209-225.

Applegarth, Susan R.
1976 Prehistoric Utilization of the Environment of the Guadalupe Mountains. Ph.D. diss., Department of Anthropology, University of Wisconsin at Madison.

Austin, Robert J.
1986 The Experimental Reproduction and Archaeological Occurrence of Biface Notching Flakes. *Lithic Technology* 15(3):96-100.

Bahn, Paul
1992 Ancestral Cannibalism Gives Us Food for Thought: Review of Prehistoric Cannibalism at Mancos, 5MTUMR-22346. *New Scientist* 134(1816):40-41.

Bailey, Vernon
1913 *Life and Crop Zones of New Mexico*. Biological Survey Report No. 35. U. S. Department of Agriculture, Washington, D. C.

1971 *Mammals of the Southwestern United States, with Special Reference to New Mexico*. Reprint. Dover Publications, New York.

Beckes, Michael R., and James M. Adovasio
1980 Perspectives on the Origins and Affinities of Mogollon on the Eastern Periphery. In *Mogollon Archaeology: Proceedings of the 1980 Mogollon Conference*, edited by Patrick H. Beckett, pp. 201-209. Acoma Books, Ramona, California.

Bement, Leland C.
1994 *Hunter-Gatherer Mortuary Practices during the Central Texas Archaic*. University of Texas Press, Austin.

Bennett, Joanne L.
1999 Thermal Alteration of Buried Bone. *Journal of Archaeological Science* 26:1-8.

Birkby, Walter H.
1976 Cremated Human Remains. In *The Hohokam: Desert Farmers and Craftsmen*, by Emil W. Haury, pp. 380-384. University of Arizona Press, Tucson.

Black, Stephen L., L. W. Ellis, D. G. Creel, and G. T. Goode
1997 *Hot Rock Cooking on the Greater Edwards Plateau: Four Burned Rock Midden Sites in West Central Texas*. Studies in Archeology 22. 2 vols. Texas Archeological Research Laboratory, University of Texas at Austin.

Blakeslee, Donald J.
1999 Waconda Lake: Prehistoric Swidden-Foragers in the Central Plains. *Central Plains Archeology* 7(1).

Bohrer, Vorsila, and Karen Adams
1977 *Ethnobotanical Techniques and Approaches at the Salmon Ruin, New Mexico*. Eastern New Mexico University Contributions in Anthropology 8(1). Portales.

Bolton, Herbert Eugene
1930 *Spanish Exploration in the Southwest, 1542-1706*. Charles Scribner's Sons, New York.

Bossneck, J.
1970 Osteological Differences between Sheep and Goats. In *Science in Archaeology: A Survey of Progress and Research*, 2nd ed., edited by Don Brothwell and Eric Higgs, pp. 331-358. Praeger, New York.

Boyd, Douglas K.
1996 Evidence for Intersocietal Warfare during the

Terminal Archaic and Late Prehistoric I Periods in the Texas Panhandle-Plains and Western Oklahoma. Paper presented at the 54th Annual Plains Anthropological Conference, October 30-November 2, Iowa City, Iowa.

1997 *Caprock Canyonlands Archeology: A Synthesis of the Late Prehistory and History of Lake Alan Henry and the Texas Panhandle-Plains*. Reports of Investigations No. 110. 2 vols. Prewitt and Associates, Austin.

Breternitz, David A.
1966 *An Appraisal of Tree-Ring Dated Pottery in the Southwest*. Anthropological Papers of the University of Arizona No. 10. Tucson.

Bridges, Patricia S.
1996 Skeletal Biology and Behavior in Ancient Humans. *Evolutionary Anthropology* 112-120.

Brink, J. W.
1997 Fat Content in Leg Bones of Bison, and Applications to Archaeology. *Journal of Archaeological Science* 1997:259-274.

Brody, J. J.
1977 *Mimbres Painted Pottery*. Maxwell Museum of Anthropology and University of New Mexico Press, Albuquerque.

Brown, David E.
1994 *Biotic Communities: Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City.

Buikstra, Jane E., and Mark Swegle
1989 Bone Modification due to Burning: Experimental Evidence. In *Bone Modification*, edited by R. Bonnichsen and M. Sorg, pp. 247-258. University of Maine, Orono.

Buikstra, Jane E., and Douglas H. Ubelaker
1994 *Standards for Data Collection from Human Skeletal Remains*. Arkansas Archeological Survey Research Series No. 44. Fayetteville.

Bullock, Peter Y.
1991 A Reappraisal of Anasazi Cannibalism. *The Kiva* 57(1):5-16.

1999 *Red Lake Tank: Excavation of Four Sites East of Roswell, New Mexico*. Archaeology Notes 250. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Burgess, Tony L.
1977 A Reconstruction of the Vegetation of Brantley Reservoir Area prior to Anglo-American Settlement. Paper presented in the symposium "Holocene Environments and Human Adaptation on the Pecos River, New Mexico" at the annual meeting of the Society for American Archaeology, New Orleans, May 1977.

Bussey, Stanley D., Richard Kelly, and Judith A. Southward
1976 *LA 4821, Three Rivers, Otero County, New Mexico: A Project of Excavation, Stabilization, and Interpretation of a Prehistoric Village*. Cultural Resources Management Division Report No. 69. New Mexico State University, Las Cruces.

Carlson, Alvar Ward
1969 New Mexico's Sheep Industry, 1850-1900: Its Role in the History of the Territory. *New Mexico Historical Review* 44 (1):26.

Chapman, Joseph A., J. Gregory Hockman, and William R. Edwards
1982 Cottontails. In *Wild Mammals of North America: Biology, Management, and Economics*, pp.83-123, by Joseph A. Chapman and George A Feldhamer. Johns Hopkins University Press, Baltimore.

Charles, Douglas K.
1995 Diachronic Regional Social Dynamics: Mortuary Sites in the Illinois Valley/American Bottom Region. In *Regional Approaches to Mortuary Analysis*, edited by Lane Anderson Beck, pp. 77-99. Plenum Press, New York.

Collins, Michael B., and Thomas R. Hester
1968 A Wooden Mortar and Pestle from Val Verde County, Texas. *Bulletin of the Texas Archeological Society* 39:1-8.

Corley, John A.
1965 A Proposed Eastern Extension of the Jornada Branch of the Mogollon. *Bulletin of the Lea County Archaeological Society* 1:30-36. Hobbs.

Covey, Cyclone (trans. and ed.)
1997 *Cabeza de Vaca's Adventures in the Unknown Interior of America*. University of New Mexico Press, Albuquerque.

Dane, Carle H., and George O. Bachman
1965 *Geologic Map of New Mexico*. U.S. Geological Survey, Washington, D.C.

Darling, J. Andrew
1998 Mass Inhumation and the Execution of Witches in the American Southwest. *American Anthropologist* 100(3):1-21.

Degenhardt, William G., Charles W. Painter, and Andrew H. Price
1996 *Amphibians and Reptiles of New Mexico*. University of New Mexico Press, Albuquerque.

Dick-Peddie, William A.
1993 *New Mexico Vegetation, Past, Present, and Future*. University of New Mexico Press, Albuquerque.

DiPeso, Charles C.
1974 *Ceramics and Shell*. Vol. 6 of *Casas Grandes, a Fallen Trading Center of the Gran Chichimeca*. Amerind Foundation, Dragoon, Arizona.

Etchieson, G. Meeks
1983 *Archaeological Survey of Additional Portions of the Brantley Project Area, Eddy County, New Mexico*. Bureau of Reclamation, Southwest Region, Amarillo, Texas.

Farwell, Robin E., Yvonne R. Oakes, and Regge N. Wiseman
1992 *Investigations into the Prehistory and History of the Upper Rio Bonito, Lincoln County, New Mexico*. Laboratory of Anthropology Notes 297. Museum of New Mexico, Santa Fe.

Ferdon, Edwin N.
1946 *An Archaeological Excavation of Hermit's Cave, New Mexico*. School of American Research Monograph No. 10. Santa Fe.

Findley, James S., Arthur H. Harris, Don E. Wilson, and Clyde Jones
1975 *Mammals of New Mexico*. University of New Mexico Press, Albuquerque.

Fisher, John W.
1995 Bone Surface Modification in Zooarchaeology. *Journal of Archaeological Method and Theory* 2(1):7-68.

Fletcher, Henry T.
1931 Some Types of Archaeological Sites in Trans-Pecos Texas. *Bulletin of the Texas Archeological and Paleontological Society* 3:7-17.

Forrester, Robert E., Jr.
1951 *A Series of Eighteen Indian Skeletons Excavated in Shackelford County, Texas*. Bulletin of the Texas Archeological and Paleontological Society 22:132-143.

1991 Pestles for Boat-Shaped Mortars in Texas. *Bulletin of the Texas Archaeological Society* 60:191-207.

Gabin, Vickie L., and Lee E. Lesperance
1977 *New Mexico Climatological Data: Precipitation, Temperature, Evaporation, and Wind: Monthly and Annual Means, 1850-1975*. W. K. Summers and Associates, Socorro, New Mexico.

Gallagher, Joseph G., and Susan Bearden
1980 *Evaluation of Cultural Resources at Brantley Reservoir, Eddy County, New Mexico*. Research Report 120. Archaeology Research Program, Southern Methodist University, Dallas.

Gejvall, Nils-Gustaf
1970 Cremations. In *Science in Archaeology: A Survey of Progress and Research*, edited by Don Brothwell and Eric Higgs, pp. 468-479. Praeger Publishers, New York.

Goodby, Robert G.
1998 Technological Patterning and Social Responsibilities: Ceramic Variability in Southern New England, A.D. 1000-1675. In *The Archaeology of Social Boundaries*, edited by Miriam T. Stark, pp. 161-182. Smithsonian Institution Press, Washington, D.C.

Gray, Henry
1977 *Anatomy, Descriptive and Surgical*. Bounty Books, New York.

Griffen, William B.
1979 *Indian Assimilation in the Franciscan Area of Nueva Vizcaya*. Anthropological Papers of the University of Arizona No. 33. Tucson.

1998 *Apaches at War and Peace: The Janos Presidio, 1750-1858*. Reprint. University of Oklahoma Press, Norman. Originally published 1988.

Hannaford, Charles A.
1981 *The Roswell Sites: Archaeological Survey and*

Testing of 24 Sites along U.S. 70 in Chaves and Lincoln Counties, New Mexico. Laboratory of Anthropology Notes 275. Museum of New Mexico, Santa Fe.

Hard, Robert J., Raymond P. Mauldin, and Garry R. Raymond
1996 Mano Size, Stable Carbon Isotope Ratios, and Macrobotanical Remains as Multiple Lines of Evidence of Maize Dependance in the American Southwest. *Journal of Archaeological Method and Theory* 3:253-318.

Hargrave, Lyndon L.
1972 *Comparative Osteology of the Chicken and American Grouse*. Prescott College Press, Prescott.

Haury, Emil W.
1957 An Alluvial Site on the San Carlos Indian Reservation, Arizona. *American Antiquity* 23(1):2-27.

Hayes, Alden C., Jon Nathan Young, and A. H. Warren
1981 *Excavation of Mound 7, Gran Quivira National Monument, New Mexico*. National Park Service Publications in Archeology No. 16. Washington, D.C.

Hegmon, Michelle
1998 Technology, Style, and Social Practices: Archaeological Approaches. In *The Archaeology of Social Boundaries*, edited by Miriam T. Stark, pp. 264-279. Smithsonian Institution Press, Washington, D.C.

Henderson, Mark
1976 *An Archaeological Inventory of Brantley Reservoir, New Mexico.* Archaeology Research Program Contributions in Anthropology No. 18. Department of Anthropology, Southern Methodist University, Dallas.

Hickerson, Nancy Parrott
1994 *The Jumanos, Hunters and Traders of the South Plains*. University of Texas Press, Austin.

2003 The War for the South Plains, 1500-1700. In *The Coronado Expedition from the Distance of 460 Years*, edited by Richard Flint and Shirley Cushing Flint, pp. 187-202. University of New Mexico Press, Albuquerque.

Hill, Edward P.
1982 Beaver. In *Wild Mammals of North America: Biology, Management, and Economics*, edited by Joseph A. Chapman and George A. Feldhamer, pp. 256-281. Johns Hopkins University Press, Baltimore.

Howard, Edgar B.
1930 Archaeological Research in the Guadalupe Mountains. *Museum Journal* 21:188-213. University of Pennsylvania.

1932 Caves along the Slopes of the Guadalupe Mountains. *Bulletin of the Texas Archaeological and Paleontological Society* 4:7-19.

1935 Evidence of Early Man in North America. *Museum Journal* 24(2-3):53-171. University of Pennsylvania.

Hubbard, John P.
1978 *Revised Check-List of the Birds of New Mexico*. New Mexico Ornithological Society Publication No. 6. Albuquerque.

Huckell, Lisa W.
1993 Plant Remains from the Pinaleño Cotton Cache, Arizona. *The Kiva* 59(2):147-203.

James, Steven R.
1997 Methodological Issues concerning Screen Size Recovery Rates and Their Effects on Archaeofaunal Interpretations. *Journal of Archaeological Science* 24:385-397.

Jelinek, Arthur J.
1967 *A Prehistoric Sequence in the Middle Pecos Valley, New Mexico*. Anthropological Papers of the Museum of Anthropology No. 31. University of Michigan, Ann Arbor.

Jernigan, E. Wesley
1978 *Jewelry of the Prehistoric Southwest.* School of American Research Press and University of New Mexico Press.

Jones, Volney H.
1936 A Summary of Data on Aboriginal Cotton of the Southwest. In *Symposium on Prehistoric Agriculture*. University of New Mexico Bulletin, Anthropology Series 1(5):51-64.

Judd, Neil M.
1954 *The Material Culture of Pueblo Bonito*.

Smithsonian Miscellaneous Collections 124. Smithsonian Institution, Washington, D.C.

Katz, Paul
1978 *An Inventory and Analysis of Archaeological Sites in the High Country of Guadalupe Mountains National Park, Texas*. Archaeological Survey Report No. 36. Center for Archaeological Research, University of Texas at Austin.

Katz, Susana R., and Paul Katz
1985a *The Prehistory of the Carlsbad Basin, Southeastern New Mexico: Technical Report of Prehistoric Archaeological Investigations in the Brantley Project Locality*. Bureau of Reclamation, Southwest Regional Office, Amarillo, Texas.

1985b *The History of the Carlsbad Basin, Southeastern New Mexico: Technical Report of Historic Archaeological Investigations in the Brantley Project Locality*. Bureau of Reclamation, Southwest Regional Office, Amarillo, Texas.

Kelley, J. Charles
1955 Juan Sabeata and Diffusion in Aboriginal Texas. *American Anthropologist* 57(5):981-995.

Kelley, Jane H.
1984 *The Archaeology of the Sierra Blanca Region of Southeastern New Mexico*. Anthropological Papers of the Museum of Anthropology No. 74. University of Michigan, Ann Arbor.

Kemrer, Meade F.
1998 *Data Recovery at Site LA 103523: A Complex Domestic Area in Eddy County, New Mexico*. HSR Report No. 9516 (revised). Human Systems Research, Tularosa, New Mexico.

Kemrer, Meade F., and Timothy M. Kearns
1984 *An Archaeological Research Design Project for the Abo Oil and Gas Field, Southeastern New Mexico*. Report submitted to the Roswell District Office of the Bureau of Land Management by Chambers Consultants and Planners, Albuquerque.

Kent, Kate Peck
1983 *Prehistoric Textiles of the Southwest*. School of American Research, Santa Fe, and University of New Mexico Press, Albuquerque.

Kent, Susan
1981 The Dog: An Archaeologist's Best Friend or Worst Enemy: The Spatial Distribution of Faunal Remains. *Journal of Field Archaeology* 8:367-372.

Kidder, Alfred V.
1932 *The Artifacts of Pecos*. Papers of the Phillips Academy Southwestern Expedition 6. Andover, Massachusetts.

Koster, William J.
1957 *Guide to the Fishes of New Mexico*. University of New Mexico Press, Albuquerque.

Kuchler, A. W.
1964 *Potential Natural Vegetation of the Conterminous United States*. Map and manual. American Geographical Society Special Publication No. 36. New York.

Lehmer, Donald J.
1948 *The Jornada Branch of the Mogollon.* Social Science Bulletin No. 17. University of Arizona, Tucson.

Leslie, Robert A.
1979 The Eastern Jornada Mogollon, Extreme Southeastern New Mexico. In *Jornada Mogollon Archaeology: Proceedings of the First Jornada Conference*, edited by P. H. Beckett and R. N. Wiseman, pp. 179-199. Cultural Resource Management Division, New Mexico State University; and the Historic Preservation Bureau, Department of Finance and Administration, Las Cruces and Santa Fe.

Ligon, J. Stokley
1961 *New Mexico Birds, and Where to Find Them*. University of New Mexico Press, Albuquerque.

Lord, Kenneth J., and Karen H. Clary
1985 Biological Studies. In *Archaeological Investigations of Three Sites within the WIPP Core Area, Eddy County, New Mexico*, edited by Kenneth J. Lord and William E. Reynolds, pp. 167-188. Chambers Consultants and Planners, Albuquerque.

Lord, Kenneth J., and William E. Reynolds
1985 *Archaeological Investigations of Three Sites within the WIPP Core Area, Eddy County, New Mexico*. Report submitted by Chambers Consultants and Planners to the U.S. Army

Corps of Engineers, Albuquerque District Office.

Lyman, R. Lee
1994 *Vertebrate Taphonomy*. Cambridge University Press, New York.

Mackie, Richard J., Kenneth L. Hamlin, and David F. Pac
1982 Mule Deer. In *Wild Mammals of North America: Biology, Management, and Economics*, edited by Joseph A. Chapman and George A. Feldhamer, pp. 862-877. Johns Hopkins University Press, Baltimore.

Maker, H. J., H. E. Dregne, V. G. Link, and J. U. Anderson
1974 *Soils of New Mexico*. Agricultural Experiment Station Research Report 285. New Mexico State University, Las Cruces.

Mallouf, Robert J.
1985 A Synthesis of Eastern Trans-Pecos Prehistory. Master's thesis, Department of Anthropology, University of Texas at Austin.

Marshall, Larry G.
1989 Bone Modification and "The Laws of Burial." In *Bone Modification*, edited by Robson Bonnichsen and Marcella H. Sorg, pp. 7-24. Center for the Study of the First Americans, Institute for Quaternary Studies, University of Maine, Orona.

Marshall, Michael P.
1997 *A Cultural Resources Survey for the Proposed Roswell to Carlsbad U. S. 285 Highway Improvement Project, Chaves and Eddy Counties, New Mexico*. Cibola Research Report No. 174. Cibola Research Consultants. Prepared for Taschek Environmental Consulting, Albuquerque.

Maxwell, Timothy D.
1986 *Archaeological Test Excavations at the Townsend Site (LA 34150), Chaves County, New Mexico*. Laboratory of Anthropology Notes 344. Museum of New Mexico, Santa Fe.

McKinley, Jacqueline I.
1994 Bone Fragment Size in British Cremation Burials and Its Implications for Pyre Technology and Ritual. *Journal of Archaeological Science* 21:339-342.

Mera, H. P.
1938 *Reconnaissance and Excavation in Southeastern New Mexico*. Memoirs of the American Anthropological Association. Reprinted by Kraus Reprint, New York, 1969.

1943 *An Outline of Ceramic Developments in Southern and Southeastern New Mexico*. Technical Series Bulletin No. 11. Laboratory of Anthropology, Santa Fe.

Merbes, Charles F.
1967 Cremated Human Remains from Point of Pines, Arizona: A New Approach. *American Antiquity* 32(4):498-506.

Metcalf, Artie L.
1982 Fossil Unionacean Bivalves from Three Tributaries of the Rio Grande. In *Proceedings of the Symposium on Recent Benthological Investigations in Texas and Adjacent States*, edited by J. R. Davis, pp. 43-59. Aquatic Sciences Section, Texas Academy of Science, Austin.

Miller, Myles, III
1999 Paper presented at the 11th Jornada-Mogollon Conference, Las Cruces, New Mexico.

Mires, Ann Marie Wagner
1991 Sifting the Ashes: Reconstruction of a Complex Archaic Mortuary Program in Louisiana. In *What Mean These Bones? Studies in Southeastern Bioarchaeology*, edited by Mary Lucas Powell, Patricia S. Bridges, and Ann Marie Wagner Mires, pp. 114-130. University of Alabama Press, Tuscaloosa.

Moga, Susan M.
2000 Macho Dunes Fauna. In *Prehistoric Burned Brush Structures and a Quarry Site along the Carlsbad Relief Route, Eddy County, New Mexico*, by Dorothy A. Zamora, pp. 119-123. Archaeology Notes 203. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Morrow, James G.
1936 A Prehistoric Cremated Burial of the Abilene Region. *Bulletin of the Texas Archeological and Paleontological Society* 8:17-24.

Morton, John
1988 Commentary on "Some Major Problems in the Social Anthropology of Hunter-Gatherers," by

Alain Testart. *Current Anthropology* 21(1):1-31.

Murry, Harold D.
1985 Appendix 3: Analysis of Molluskan Materials from the Brantley Project Area, Eddy County, New Mexico. In *The Prehistory of the Carlsbad Basin, Southeastern New Mexico*, by Susana R. Katz and Paul Katz, pp. A-24-26. Incarnate World College, San Antonio.

Nelson, Margaret C.
1999 *Mimbres during the Twelfth Century: Abandonment, Continuity, and Reorganization*. University of Arizona Press, Tucson.

New Mexico Department of Game and Fish
n.d. Biota Information System of New Mexico (http://www.gmfsh.state.nm.us).

Oakes, Yvonne R.
1982 *Prehistoric Gathering Sites near Hackberry Lake, Eddy County, New Mexico*. Laboratory of Anthropology Notes 305. Museum of New Mexico, Santa Fe.

1985 *An Assessment of Gathering Sites near Hackberry Lake, Eddy County, New Mexico*. Laboratory of Anthropology Notes 415. Museum of New Mexico, Santa Fe.

Odum, Eugene P.
1971 *Fundamentals of Ecology*. 3rd ed. W. B. Saunders, Philadelphia.

Olsen, Sandra L., and Pat Shipman
1994 Cutmarks and Perimortem Treatment of Skeletal Remains on the Northern Plains. In *Skeletal Biology in the Great Plains: Migration, Warfare, Health, and Subsistence*, edited by Douglas W. Owsley and Richard L. Jantz, pp. 377-387. Smithsonian Institution Press, Washington, D.C.

Parry, William J., and John D. Speth
1984 *The Garnsey Spring Campsite: Late Prehistoric Occupation in Southeastern New Mexico*. Museum of Anthropology Technical Reports No. 15. Museum of Anthropology, University of Michigan, Ann Arbor.

Phillips, David A., Jr., Philip A. Bandy, and Karen Scholz
1981 *Intensive Survey of Two Rivers Dam and Reservoir Project, Chaves County, New Mexico*. Report of Investigations No. 60. New World Research, Tucson.

Raemsch, Carol A.
1993 Mechanical Procedures Involved in Bone Dismemberment and Defleshing in Prehistoric Michigan. *Midcontinental Journal of Archaeology* 18(2):217-244.

Ray, Cyrus N.
1931 Recent Archeological Researches in the Abilene Section. *Bulletin of the Texas Archeological and Paleontological Society* 3:76-89.

1932 Archeological Research in Central West Texas. *Bulletin of the Texas Archeological and Paleontological Society* 4:63-70.

1933 Multiple Burials in Stone Cist Mounds of the Abilene Region. *Bulletin of the Texas Archeological and Paleontological Society* 5:14-24.

1936 Some Unusual Cremated Burials Found near Colorado, Texas. *Bulletin of the Texas Archeological and Paleontological Society* 8:9-16.

1937 More Evidence concerning Abilene Man. *Bulletin of the Texas Archeological and Paleontological Society* 9:193-217.

1939 Some Unusual Abilene Region Burials. *Bulletin of the Texas Archeological and Paleontological Society* 11:226-250.

1946 Two Buried Multiple Stone Cist Structures. *Bulletin of the Texas Archeological and Paleontological Society* 17:18-27.

Riches, Susan M.
1970 Archaeological Survey of the Eastern Guadalupe Mountains, New Mexico. Master's thesis, Department of Anthropology, University of Wisconsin, Madison.

Robertson, Paul B.
1985 Appendix 2: Analysis of Vertebrate Materials from the Brantley Project Area, Eddy County, New Mexico. In *The Prehistory of the Carlsbad Basin, Southeastern New Mexico*, by Susana R. Katz and Paul Katz, pp. A-19-23. Incarnate World College, San Antonio.

Rocek, Thomas R., and John D. Speth
1986 *The Henderson Site Burials: Glimpses of a Late Prehistoric Population in the Pecos Valley.* Museum of Anthropology Technical Reports No. 18. University of Michigan, Ann Arbor.

Roney, John R.
1995 Prehistory of the Guadalupe Mountains. *The Artifact* 33(1):1-99.

Sampson, C. Garth
1988 *Style Boundaries among Mobile Hunter-Gatherers.* Smithsonian Institution Press, Washington, D.C.

Schermer, Scott C. (editor)
1980 *Report on the Mitigation of Archaeological Sites in the Proposed Haystack Mountain ORV Area*. Agency for Conservation Archaeology, Eastern New Mexico University, Portales.

Schlanger, Sarah H.
1990 Artifact Assemblage Composition and Site Occupation Duration. In *Perspectives on Southwestern Prehistory*, edited by Paul E. Minnis and Charles L. Redman, pp. 103-121. Westview Press, Boulder.

Schroeder, Albert H.
1973 The Mescalero Apaches. In *Technical Manual, 1973 Survey of the Tularosa Basin: The Research Design*, by Human Systems Research, pp. 124-144. Tularosa, New Mexico.

Schroeder, Albert H., and Dan S. Matson
1965 *A Colony on the Move: Gaspar Castano de Sosa's Journal, 1590-1591*. School of American Research, Santa Fe.

Scurlock, Dan
1998 A Poor Man's Cow: The Goat in New Mexico and the Southwest. *New Mexico Historical Review* 73(1):7-24.

Sebastian, Lynne
1989 The Archaic Period. In *Living on the Land: 11,000 Years of Human Adaptation in Southeastern New Mexico*, by Lynne Sebastian and Signa Larralde, pp. 41-57. New Mexico Bureau of Land Management, Cultural Resources Series No. 6.

Sebastian, Lynne, and Signa Larralde
1989 *Living on the Land: 11,000 Years of Human Adaptation in Southeastern New Mexico*. Cultural Resources Series No. 6. New Mexico State Office, Bureau of Land Management, Santa Fe.

Shinkle, James D.
1966 *Reminiscences of Roswell Pioneers*. Hall-Poorebaugh Press, Roswell.

Smith, Michael Leonard, and Robert Rush Miller
1986 The Evolution of the Rio Grande Basin as Inferred from Its Fish Fauna. In *The Zoogeography of North American Freshwater Fishes*, edited by Charles H. Hocutt and E. O. Wiley, pp. 457-485. John Wiley & Sons.

Snow, David H.
n.d. *A Preliminary Ceramic Analysis, LA 120, Gran Quivira, 1985: The Glazes and Black-on-White Wares*. Report submitted to Katherine A. Spielmann, Arizona State University, Tempe.

Speth, John D.
1983 *Bison Kills and Bone Counts: Decision Making by Ancient Hunters.* University of Chicago Press.

Staley, David P.
1996 *Mescalero Plains Archaeology*. Vols. 1 and 2. TRC Mariah Associates, Albuquerque.

Stark, Miriam T.
1998 *The Archaeology of Social Boundaries*. Smithsonian Institution Press, Washington, D.C.

Steele, D. Gentry
1987 Utilization of Marine Mollusks by Inhabitants of the Texas Coast. *Bulletin of the Texas Archeological Society* 58:215-248.

Stiner, Mary C., Steven L. Kuhn, Stephen Weiner, and Ofer Bar-Yosef
1995 Differential Burning, Recrystallization, and Fragmentation of Archaeological Bone. *Journal of Archaeological Science* 22:223-237.

Stodder, Ann Lucy Wiener
1989 Appendix B: Bioarcheological Resources of New Mexico. In *Human Adaptations and Cultural Change in the Greater Southwest*, by Alan H. Simmons, Ann Lucy Wiener Stodder, Douglas D. Dykeman, and Patricia Hicks, pp. 300-317. Arkansas Archeological Survey Research Series No. 32. Fayetteville.

Stuart, David E., and Rory P. Gauthier
1981 *Prehistoric New Mexico: Background for Survey*. Historic Preservation Bureau, Department of Finance and Administration, Santa Fe.

Tichy, Marjorie Ferguson
1939 The Archaeology of Puaray. *El Palacio* 46:145-63.

Toulouse, Joseph H., Jr.
1944 Cremation among the Indians of New Mexico. *American Antiquity* 10(1):65-74.

Tuan, Yi-Fu, C. E. Everard, J. G. Widdison, and I. Bennett
1973 *Climate of New Mexico*. Revised edition. New Mexico State Planning Office, Santa Fe.

Turner, Christy G., II
1992 Anasazi Cannibalism: Review of Prehistoric Cannibalism at Mancos 5MTUMR-2346. *Review of Archaeology* 13(2):7-13.

Turner, Ellen Sue, and Thomas R. Hester
1993 *A Field Guide to Stone Artifacts of Texas Indians*. 2nd ed. Texas Monthly Field Guide Series. Gulf Publishing, Houston.

Turner, Christy G., II, and Jacqueline A. Turner
1999 *Man Corn: Cannibalism, and Violence in the Prehistoric American Southwest*. University of Utah Press, Salt Lake City.

Turpin, Solveig (compiler)
1988 Seminole Sink: Excavation of a Vertical Shaft Tomb, Val Verde County, Texas. *Plains Anthropologist* 33-122, pt. 2 (Memoir 22).

U.S. Department of Commerce, Weather Bureau
1965 *Climatic Summary of the United States Supplement for 1951 through 1960: New Mexico*. Climatography of the United States No. 86-25. Washington, D.C.

Venn, Tamsin
1984 Shell Artifacts from Arroyo Hondo Pueblo. In *The Faunal Remains from Arroyo Hondo Pueblo, New Mexico*, by Richard W. Lang and Arthur H. Harris, pp. 227-253. School of American Research Press, Santa Fe.

Vierra, Bradley J.
1989 *A Sixteenth-Century Spanish Campsite in the Tiguex Province*. Laboratory of Anthropology Notes 475. Museum of New Mexico, Santa Fe.

Villa, Paola
1992 Light on Dark Matters: Review of Prehistoric Cannibalism at Mancos 5MTUMR-2346. *Science* 257:1420-1421.

Wallace, Henry
1983 The Mortars, Petroglyphs, and Trincheras on Rillito Peak. *The Kiva* 48(3).

Whalen, Michael E.
1981 Origin and Evolution of Ceramics in Western Texas. *Bulletin of the Texas Archaeological Society* 52:215-229.

White, Tim D.
1992 *Prehistoric Cannibalism at Mancos 5MTUMR-2346*. Princeton University Press, Princeton.

Wilson, C. Dean
1999 Ceramic Studies. In *Archaeology of the Mogollon Highlands: Settlement Systems and Their Adaptations*, by Yvonne R. Oakes and Dorothy A. Zamora. Archaeology Notes 232. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Wiseman, Regge N.
1971 The Neff Site: A Ceramic Period Lithic Manufacturing Site on the Rio Felix, Southeastern New Mexico. *The Artifact* 9(1):1-25.

1975 Sitio Creston (LA 4939): A Stone Enclosure Site near Las Vegas, New Mexico. *Plains Anthropologist* 20-69:81-104.

1981 Further Investigations at the King Ranch Site, Chaves County, New Mexico. In *Archaeological Essays in Honor of Mark Wimberly*, edited by Michael S. Foster. The Artifact 19(3-4):169-198.

1982 The Intervening Years: New Information of Chupadero Black-on-White and Corona Corrugated. *Pottery Southwest* 9(4):9-17.

1985 Bison, Fish, and Sedentary Occupation: Startling

Data from Rocky Arroyo (LA 25277), Chaves County, New Mexico. In *Views of the Jornada Mogollon*, edited by Colleen M. Beck, pp. 30-32. Eastern New Mexico University Contributions in Anthropology 12. Portales.

1988 The Continuing Saga of the King Ranch Site (LA 26764): Update and Summary of Findings. In *Fourth Jornada Mogollon Conference (Oct. 1985), Collected Papers*, edited by Meliha S. Duran and Karl W. Laumbach, pp. 223-254. Human Systems Research, Tularosa, New Mexico.

1991 *The Fox Place and Roswell Country Prehistory: A Preliminary Report*. Paper presented at the 7th Jornada Conference, October 1991, in El Paso, Texas, and Ciudad Juarez, Chihuahua, Mexico.

1992 Conclusions: The Crockett Canyon and Filingen Sites. In *Investigations into the Prehistory and History of the Upper Rio Bonito, Lincoln County, New Mexico*, by R. E. Farwell, Y. R. Oakes, and R. N. Wiseman, pp. 171-172. Laboratory of Anthropology Notes 297. Museum of New Mexico, Santa Fe.

1996a *The Land in Between: Archaic and Formative Occupations along the Upper Rio Hondo of Southeastern New Mexico*. Archaeology Notes 125. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

1996b *Corn Camp and La Cresta: Small Dune Sites and Their Bearing on the Prehistory of Southeastern New Mexico*. Archaeology Notes 152. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

1997 *U.S. 285 Roswell-South Project: Data Recovery Plan for Nine Prehistoric and Historic Sites between Roswell and Carlsbad, Chaves and Eddy Counties, New Mexico*. Archaeology Notes 225. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2000a *Bob Crosby Draw and River Camp: Contemplating Prehistoric Social Boundaries in Southeastern New Mexico*. Archaeology Notes 235. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2000b Some Thoughts about Bedrock Mortars and Subsistence Group Size in the Northern Trans-Pecos. *Journal of Big Bend Studies* 12:13-36. Center for Big Bend Studies, Sul Ross State University, Alpine, Texas.

2001 *Glimpses of Late Frontier Life in New Mexico's Southern Pecos Valley: Archaeology and History at Blackdom and Seven Rivers*. Archaeology Notes 233. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2002 *The Fox Place (LA 68188): A Late Prehistoric Hunter-Gatherer Pithouse Village near Roswell, New Mexico*. Archaeology Notes 234. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2003 Punto de los Muertos (LA 116471): A Possible Late Archaic Cemetery in the Northern Trans-Pecos of Southeastern New Mexico. *Journal of Big Bend Studies* 15:1-26. Center for Big Bend Studies, Sul Ross State University, Alpine, Texas.

in prep.
Prehistory of the Berrendo River System in the Southern Plains of New Mexico. Archaeology Notes 236. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

n.d. Rocky Arroyo Village. Manuscript in the possession of the author.

Wiseman, R. N., M. Y. El-Najjar, J. S. Bruder, M. Heller, and R. I. Ford
1976 *Multi-Disciplinary Investigations at the Smokey Bear Ruin (LA 2112), Lincoln County, New Mexico*. COAS Publishing and Research Monograph No. 4. Las Cruces, New Mexico.

Wiseman, R. N., N. Williamson, J. E. Spivey, and G. A. Martinez
2001 *Glimpses of Late Frontier Life in New Mexico's Southern Pecos Valley: Archaeology and History at Blackdom and Seven Rivers*. Archaeology Notes 233. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Zamora, Dorothy A.
2000 *Prehistoric Brush Structures and a Quarry Site along the Carlsbad Relief Route, Eddy County, New Mexico*. Archaeology Notes 203, Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

APPENDIX 1: POLICY ON COLLECTION, DISPLAY, AND REPATRIATION OF CULTURALLY SENSITIVE MATERIALS, MUSEUM OF NEW MEXICO

Rule No. 11 Adopted: 01/17/91

Office of Cultural Affairs
Museum Division
(Museum of New Mexico)
P.O. Box 2087, 113 Lincoln Ave.
Santa Fe, New Mexico 87504

I. INTRODUCTION

The policy of the Museum of New Mexico is to collect, care for, and interpret materials in a manner that respects the diversity of human cultures and religions.

Culturally sensitive materials include material culture as well as the broader ethical issues which surround their use, care, and interpretation by the Museum. The Museum's responsibility and obligation are to recognize and respond to ethical concerns.

II. DEFINITIONS

A. "Culturally sensitive materials" are objects or materials whose treatment or use is a matter of profound concern to living peoples; they may include, but are not limited to:

1. "Human remains and their associated funerary objects" shall mean objects that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later;

2. "Sacred objects" shall mean specific items which are needed by traditional religious leaders for the practice of an ongoing religion by present-day adherents;

3. Photographs, art works, and other depictions of human remains or religious objects, and sacred or religious events; and

4. Museum records, including notes, books, drawings, and photographic and other images relating to such culturally sensitive materials, objects, and remains.

B. "Concerned party" is a museum-recognized representative of a tribe, community, or an organization linked to culturally sensitive materials by ties of culture, descent, and/or geography. In the case of a federally recognized Indian tribe, the representative shall by tribally authorized.

C. "Repatriation" is the return of culturally sensitive materials to concerned parties. Repatriation is a collaborative process that empowers people and removes the stigma of cultural paternalism which hinders museums in their attempts to interpret people and cultures with respect, dignity, and accuracy. Repatriation is a partnership created through dialogue based upon cooperation and mutual trust between the Museum and the concerned party.

D. The Museum of New Mexico's Committee on Sensitive Materials is the committee, appointed by the Director of the Museum of New Mexico, that shall serve as the Museum of New Mexico's advisory body on issues relating to the care and treatment of sensitive materials.

III. IDENTIFICATION OF CONCERNED PARTIES

A. The Museum shall initiate action to identify potentially concerned parties who may have an interest in culturally sensitive material in the Museum's collections.

B. The Museum encourages concerned parties to identify themselves and shall seek out those individuals or groups whom the Museum believes to be concerned parties.

C. The Museum's sensitive materials committee shall review all disputed individual claims of concerned-party status in consultation with the tribe, community, or organization which the individual(s) claim to represent.

The Museum's sensitive materials committee shall assist, when necessary, in designating concerned parties who have an interest in culturally sensitive materials contained in the collections of the Museum of New Mexico.

D. The Museum shall provide an inventory of pertinent culturally sensitive materials to recognized concerned parties.

E. The Museum shall work with concerned parties to determine the appropriate use and care of and procedures for culturally sensitive materials which best balance the needs of all parties involved.

IV. IDENTIFICATION AND TREATMENT OF CULTURALLY SENSITIVE MATERIALS

A. Within five years of the date of adoption of this policy, each Museum unit shall survey to the extent possible (in consultation with concerned parties, if appropriate) its collections to determine items or material which may be culturally sensitive materials. The Museum unit shall submit to the Director of the Museum of New Mexico an inventory of all potentially culturally sensitive materials. The inventory shall include to the extent possible the object's name, date, and type of accession, catalogue number, and cultural identification. Within six months of submission of its inventory to the Director of the Museum of New Mexico, each Museum unit shall then develop and submit a plan to establish a dialogue with concerned parties to determine appropriate treatment of culturally sensitive items or materials held by the unit.

B. As part of its treatment plans for culturally sensitive materials, the Museum reserves the right to restrict access to, or use of, those materials to the general public. The Museum staff shall allow identified concerned parties access to culturally sensitive materials.

C. Conservation treatment shall not be performed on identified culturally sensitive materials without consulting concerned parties.

D. The Museum shall not place human remains on exhibition. The Museum may continue to retain culturally sensitive materials. If culturally sensitive materials, other than human remains, are exhibited, then a good-faith effort to obtain the advice and counsel of the proper concerned party shall be made.

E. All human skeletal remains held by the Museum shall be treated as human remains and are de facto sensitive materials. The Museum shall discourage the further collection of human remains; however, it will accept human remains as part of its mandated responsibilities as the State Archaeological Repository. At its own initiation or at the request of a concerned party, the Museum may accept human remains to retrieve them from the private sector and furthermore may accept human remains with the explicit purpose of returning them to a concerned party.

IV. REPATRIATION OF CULTURALLY SENSITIVE MATERIALS

A. On a case-by-case basis, the Museum shall seek guidance from recognized concerned parties regarding the identification, proper care, and possible disposition of culturally sensitive materials.

B. Negotiations concerning culturally sensitive materials shall be conducted with professional discretion. Collaboration and openness with concerned parties are the goals of these dialogues, not publicity. If concerned parties desire publicity, then it will be carried out in collaboration with them.

C. The Museum shall have the final responsibility of making a determination of culturally sensitive materials subject to the appeal process as outlined under Section VII A.

D. The Museum of New Mexico accepts repatriation as one of several appropriate actions for culturally sensitive materials only if such a course of action results from consultation with designated concerned parties as described in Section III of this policy.

E. The Museum may accept or hold culturally sensitive materials for inclusion in its permanent collection.

F. The Museum may temporarily accept culturally sensitive materials to assist efforts to repatriate them to the proper concerned party.

G. To initiate repatriation of culturally sensitive materials, the Museum of New Mexico's current deaccession policy shall be followed. The curator working with the concerned party shall complete all preparations for deaccession through the Museum Collections Committee and Director before negotiations begin.

H. Repatriation negotiations may also result in, but are not limited to, the retention of objects with no restrictions on use, care, and/or exhibition; the retention of objects with restriction on use, care, and/or exhibition; the lending of objects whether permanently or temporarily for use to a community; and the holding in trust of culturally sensitive materials for the concerned party.

I. When repatriation of culturally sensitive materials occurs, the Museum reserves the right to retain associated Museum records but shall consider each request for such records on an individual basis.

VI. ONGOING RECOVERY OR ACCEPTANCE OF ARCHAEOLOGICAL MATERIALS

A. In providing sponsored archaeological research or repository functions, the Museum shall work with agencies that regulate the inventory, scientific study, collec-

tion, curation, and/or disposition of archaeological materials to ensure, to the extent possible under the law, that these mandated functions are provided in a manner that respects the religious and cultural beliefs of concerned parties.

B. When entering into agreements for the acceptance of, or continued care for, archaeological repository collections, the Museum may issue such stipulations as are necessary to ensure that the collection, treatment, and disposition of the collections include adequate consultation with concerned parties and are otherwise consistent with this Policy.

C. In addition to the mandated treatment of research sites and remains and in those actions where treatment is not mandated, defined, or regulated by laws, regulations, or permit stipulations, the Museum shall use the following independent guidelines in recovering or accepting archaeological materials:

1. Prior to undertaking any archaeological studies at sites with an apparent relationship to concerned parties, the Museum shall ensure that proper consultation with the concerned parties has taken place.

2. When so requested by concerned parties, the Museum shall include an observer, chosen by the concerned party, in the crew of an archaeological study.

3. The Museum shall not remove human remains and their associated funerary objects or materials from their original context nor conduct any destructive studies on such remains, objects, and materials except as part of procedures determined to be appropriate through consultation with concerned parties, if any.

4. The Museum reserves the right to restrict general public viewing of in situ human remains and associated funerary objects or items of a sacred nature and further shall not allow the public to take or prepare images or records of such objects, materials, or items, except as part of procedures determined to be appropriate through consultation with concerned parties. Photographic and other images of human remains shall be created and used for scientific records only.

5. The Museum reserves the absolute right to limit or deny access to archaeological remains being excavated, analyzed, or curated if access to these remains would violate religious practices.

APPENDIX 2: RADIOCARBON RESULTS

BETA

BETA ANALYTIC INC.

DR. M.A. TAMERS and MR. D.G. HOOD

UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell — Auth. July 8, 1998

Museum of New Mexico — July 27, 1998

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-118878	3430 +/- 50 BP	-24.7 o/oo	3430 +/- 50 BP

SAMPLE #: 647-44565-1
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

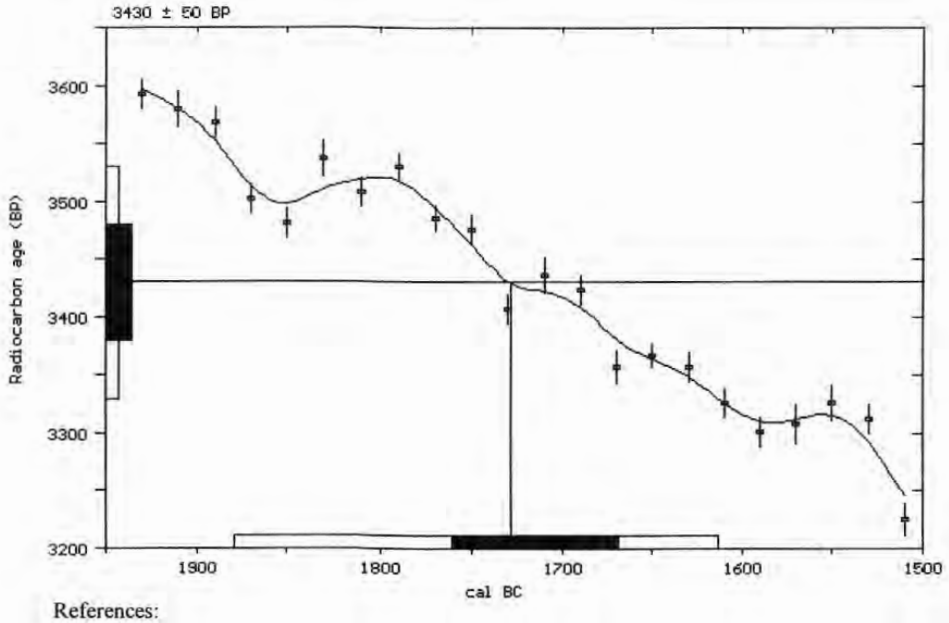
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.7:lab mult.=1)

Laboratory Number:	Beta-118878
Conventional radiocarbon age:	**3430 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1880 to 1615**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1730
1 sigma calibrated results: (68% probability)	cal BC 1760 to 1670



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

BETA ANALYTIC INC.

DR. M.A. TAMERS and MR. D.G. HOOD

UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Mr. Timothy D. Maxwell

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-118879	101.1 +/- 0.7 % modern	-25.0* o/oo	101.1 +/- 0.7 % modern

SAMPLE #: 647-44565-2
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid
COMMENT: the small sample was given extended counting time
COMMENT: reported result indicates an age of post 0 BP and has been reported as a % of the modern reference standard

Beta-118880	120 +/- 60 BP	-23.5 o/oo	140 +/- 60 BP

SAMPLE #: 647-44565-3
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Beta-118881	420 +/- 70 BP	-25.0* o/oo	420 +/- 70* BP

SAMPLE #: 647-116467-1
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Beta-118882	520 +/- 80 BP	-25.0* o/oo	520 +/- 80* BP

SAMPLE #: 647-116467-2
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Beta-118883	1300 +/- 60 BP	-11.7 o/oo	1520 +/- 60 BP

SAMPLE #: 647-116469-1
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

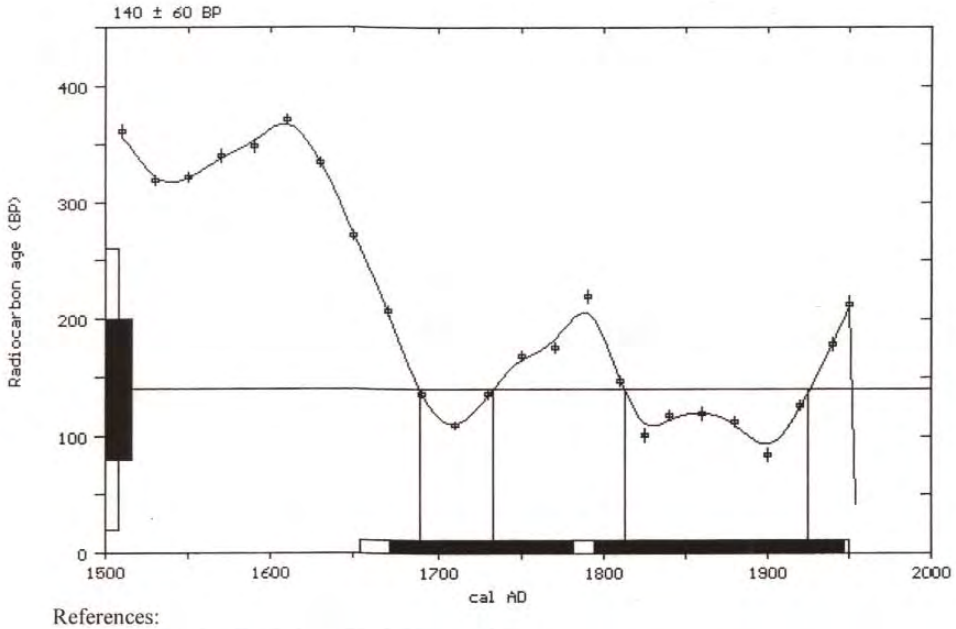
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-23.5:lab mult.=1)

Laboratory Number:	Beta-118880
Conventional radiocarbon age:	**140 ± 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1655 to 1950**

Intercept data:

Intercepts of radiocarbon age with calibration curve:	cal AD 1690 and cal AD 1735 and cal AD 1815 and cal AD 1925
1 sigma calibrated results: (68% probability)	cal AD 1670 to 1780 and cal AD 1795 to 1945



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

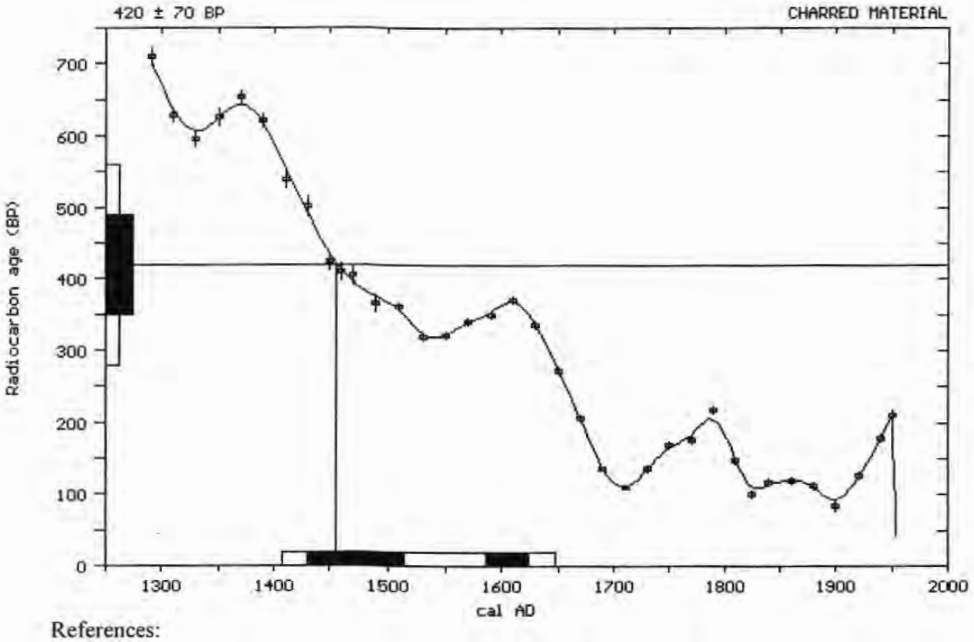
(Variables:estimated C13/C12=-25:lab mult.=1)

Laboratory Number:	Beta-118881
Conventional radiocarbon age*:	**420 ± 70 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1410 to 1650**

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1455
1 sigma calibrated results: (68% probability)	cal AD 1430 to 1515 and cal AD 1585 to 1625



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

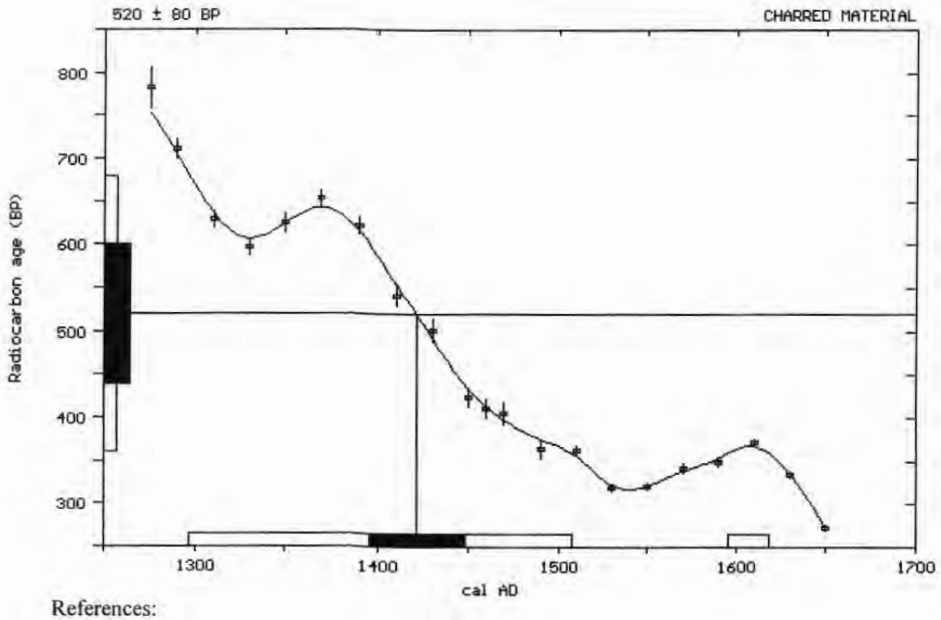
(Variables:estimated C13/C12=-25:lab mult.=1)

Laboratory Number:	Beta-118882
Conventional radiocarbon age*:	**520 ± 80 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1295 to 1505 and cal AD 1595 to 1620**

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1420
1 sigma calibrated results: (68% probability)	cal AD 1395 to 1450



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

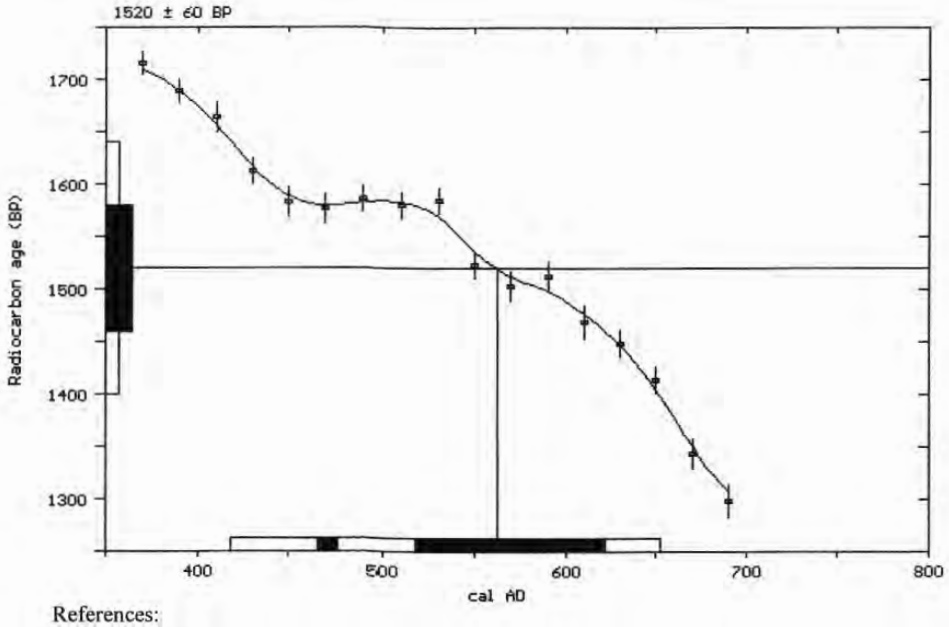
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-11.7:lab mult.=1)

Laboratory Number:	Beta-118883
Conventional radiocarbon age:	**1520 ± 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 420 to 650**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 560
1 sigma calibrated results: (68% probability)	cal AD 465 to 475 and cal AD 515 to 620



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-118884	740 +/- 50 BP	-11.8 o/oo	960 +/- 50 BP

SAMPLE #: 647-116469-2
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Beta-118886	1140 +/- 50 BP	-10.8 o/oo	1380 +/- 50 BP

SAMPLE #: 647-116469-4
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Beta-118887	730 +/- 50 BP	-11.3 o/oo	950 +/- 50 BP

SAMPLE #: 647-116469-5
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

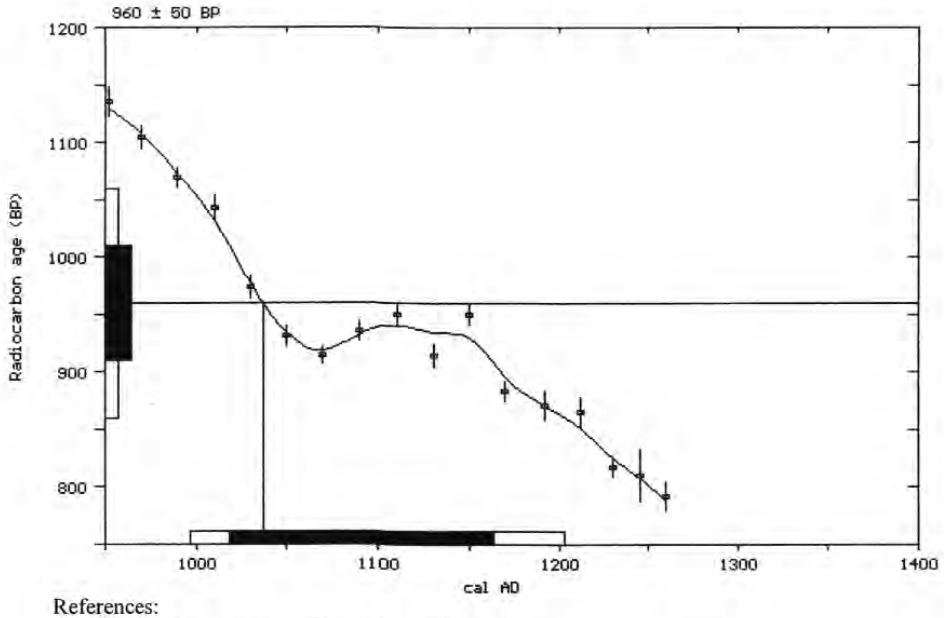
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-11.8:lab mult.=1)

Laboratory Number:	Beta-118884
Conventional radiocarbon age:	**960 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 995 to 1205**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1035
1 sigma calibrated results: (68% probability)	cal AD 1020 to 1165



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

1985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

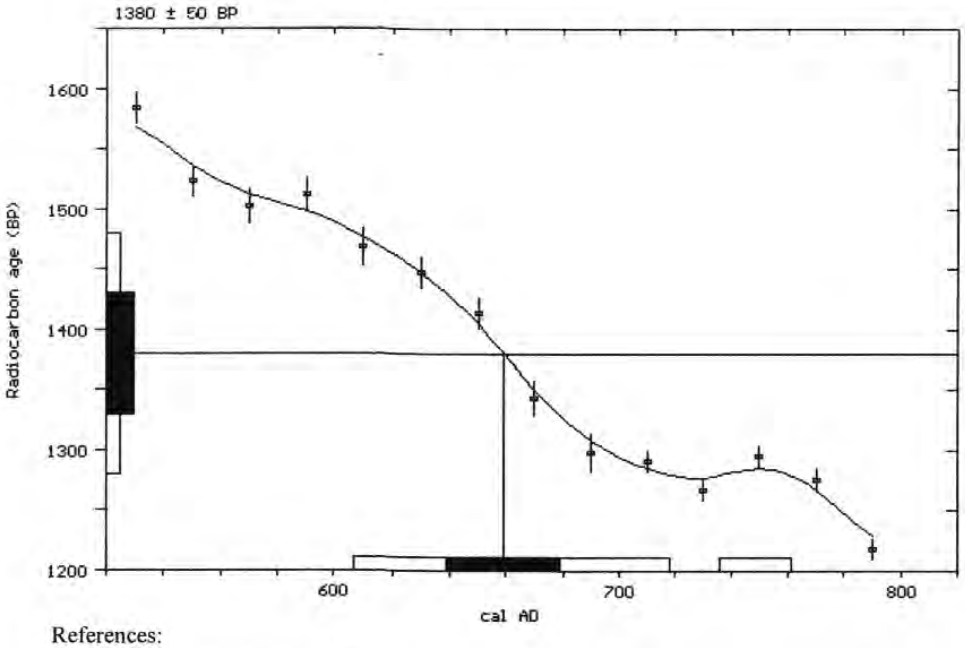
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-10.8:lab mult.=1)

Laboratory Number:	Beta-118886
Conventional radiocarbon age:	**1380 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 605 to 720 and cal AD 735 to 760**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 660
1 sigma calibrated results: (68% probability)	cal AD 640 to 680



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

1985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

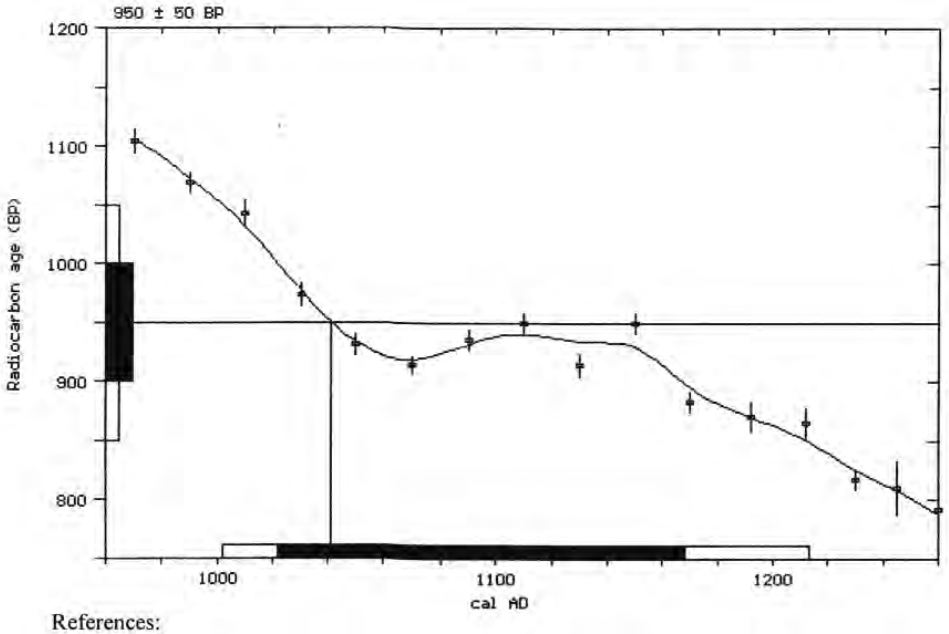
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-11.3:lab mult.=1)

Laboratory Number:	Beta-118887
Conventional radiocarbon age:	**950 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1000 to 1215**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1040
1 sigma calibrated results: (68% probability)	cal AD 1020 to 1170



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Mr. Timothy D. Maxwell

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-118885	740 +/- 60 BP	-11.5 o/oo	960 +/- 60 BP
SAMPLE #: 647-116469-3 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-118888	2710 +/- 50 BP	-24.2 o/oo	2730 +/- 50 BP
SAMPLE #: 647-116471-1 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-118889	2800 +/- 50 BP	-25.6 o/oo	2790 +/- 50 BP
SAMPLE #: 647-116471-2 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-118890	2930 +/- 60 BP	-24.6 o/oo	2930 +/- 60 BP
SAMPLE #: 647-116471-3 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

NOTE: Eight additional samples from this set are being analyzed by AMS and will be reported separately.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

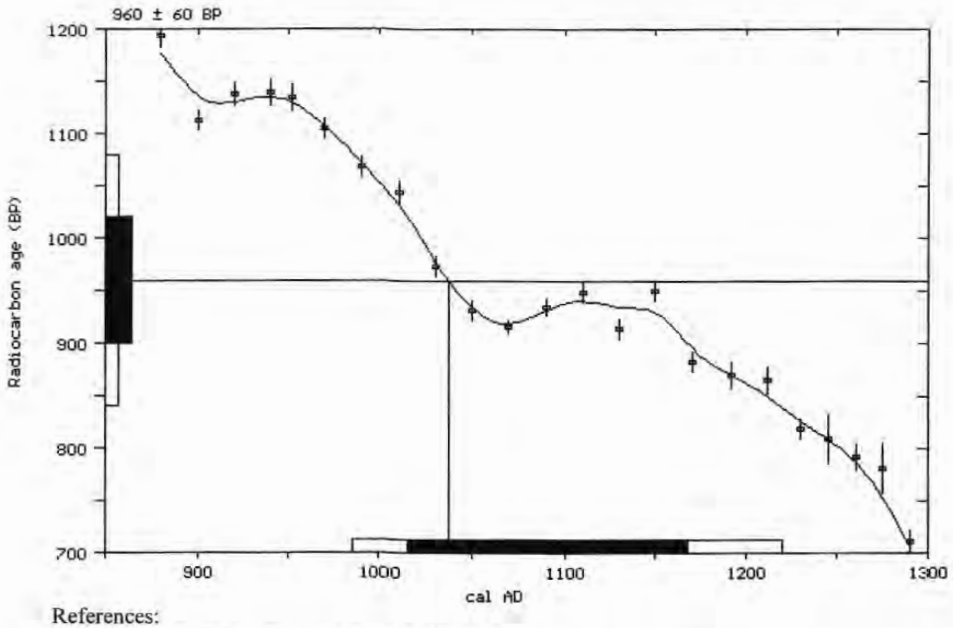
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-11.5:lab mult.=1)

Laboratory Number:	Beta-118885
Conventional radiocarbon age:	**960 ± 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 985 to 1220**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1035
1 sigma calibrated results: (68% probability)	cal AD 1015 to 1170



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

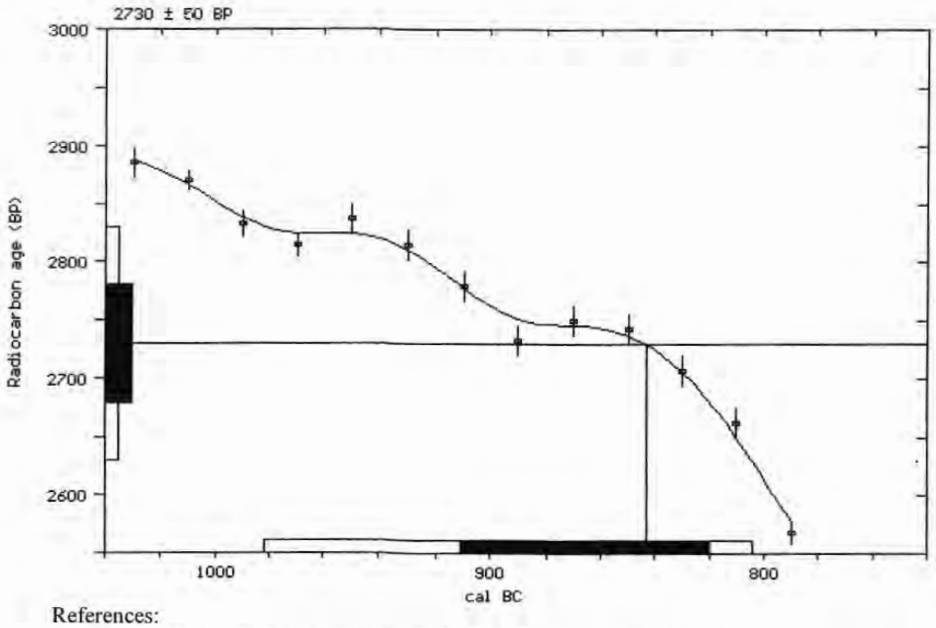
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.2:lab mult.=1)

Laboratory Number:	Beta-118888
Conventional radiocarbon age:	**2730 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 980 to 805**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 845
1 sigma calibrated results: (68% probability)	cal BC 910 to 820



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

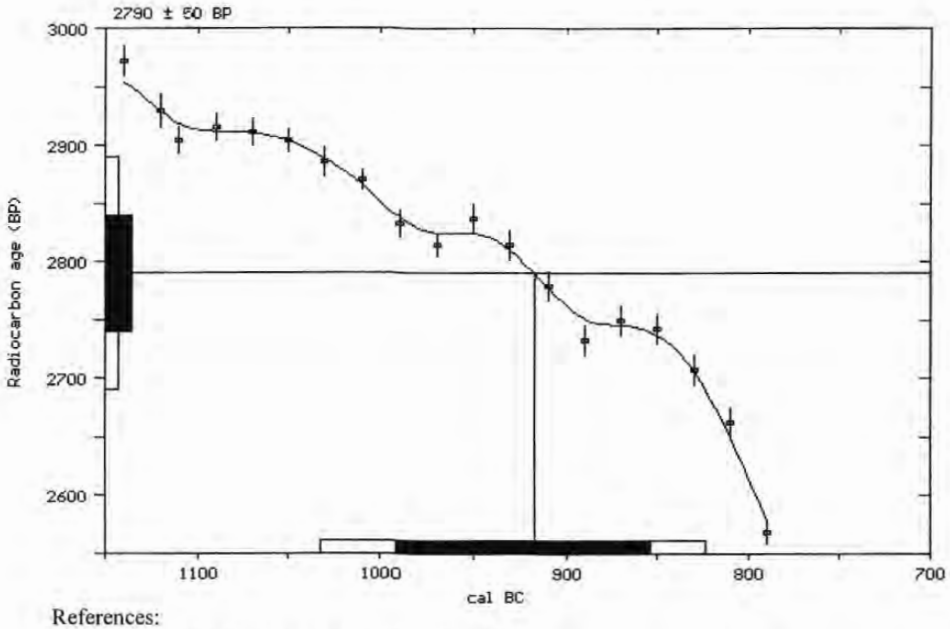
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-25.6:lab mult.=1)

Laboratory Number:	Beta-118889
Conventional radiocarbon age:	**2790 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1030 to 825**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 915
1 sigma calibrated results: (68% probability)	cal BC 990 to 855



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

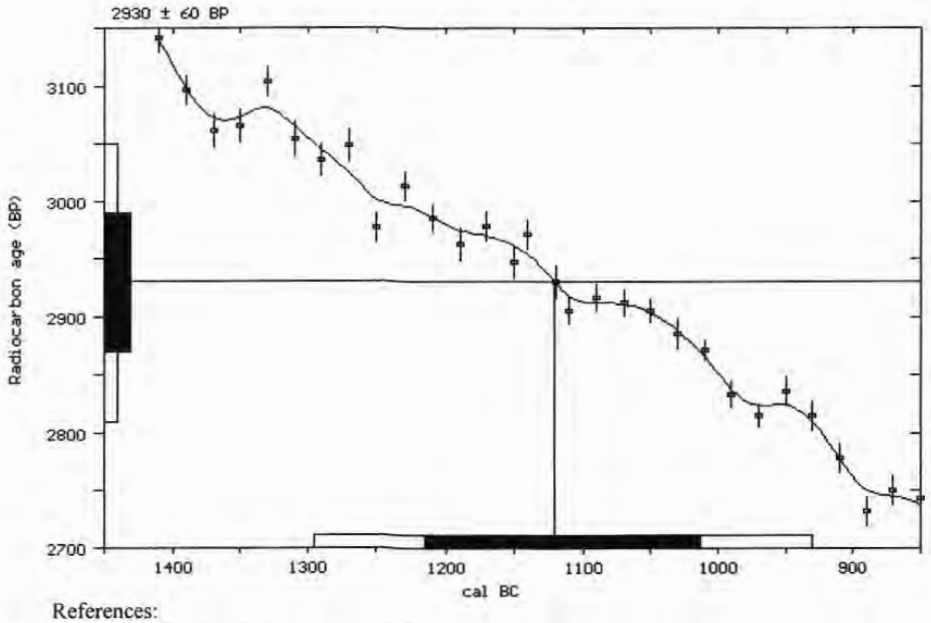
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.6:lab mult.=1)

Laboratory Number:	Beta-118890
Conventional radiocarbon age:	**2930 ± 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1295 to 930**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1120
1 sigma calibrated results: (68% probability)	cal BC 1215 to 1015



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@radiocarbon.com

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell — Report Date: January 25, 2000

Museum of New Mexico — Material Received: December 14, 1999

Sample Data	Measured Radiocarbon Age	$^{13}C / ^{12}C$ Ratio	Conventional Radiocarbon Age (*)
Beta-137609	1940 +/- 50 BP	-14.5 o/oo	2110 +/- 50 BP
SAMPLE #: LA116471-300 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(organic material): acid washes			
Beta-137610	1540 +/- 50 BP	-11.7 o/oo	1760 +/- 50 BP
SAMPLE #: LA116471-312 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(bone collagen): collagen extraction with alkali			
Beta-137611	2100 +/- 50 BP	-11.3 o/oo	2320 +/- 50 BP
SAMPLE #: LA116471-359 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(bone collagen): collagen extraction with alkali			
Beta-137612	2290 +/- 50 BP	-16.4 o/oo	2430 +/- 50 BP
SAMPLE #: LA116471-363A ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(bone collagen): collagen extraction with alkali			
Beta-137613	2270 +/- 50 BP	-10.0 o/oo	2520 +/- 50 BP
SAMPLE #: LA116471-363B ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(bone collagen): collagen extraction with alkali			

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-14.5:lab. mult=1)

Laboratory number: **Beta-137609**

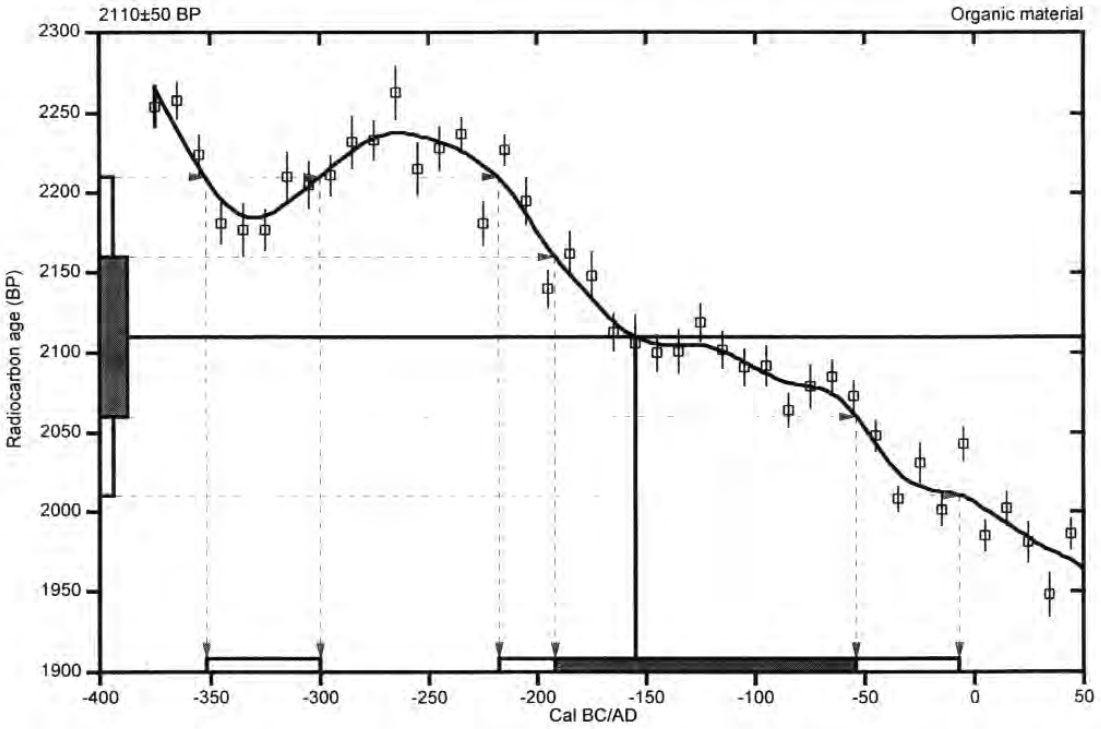
Conventional radiocarbon age: **2110±50 BP**

2 Sigma calibrated results: (95% probability) **Cal BC 350 to 300 (Cal BP 2300 to 2250) and Cal BC 220 to 5 (Cal BP 2170 to 1955)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 155 (Cal BP 2105)

1 Sigma calibrated result: (68% probability) Cal BC 190 to 55 (Cal BP 2140 to 2005)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-mail: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.7:lab. mult=1)

Laboratory number: **Beta-137610**

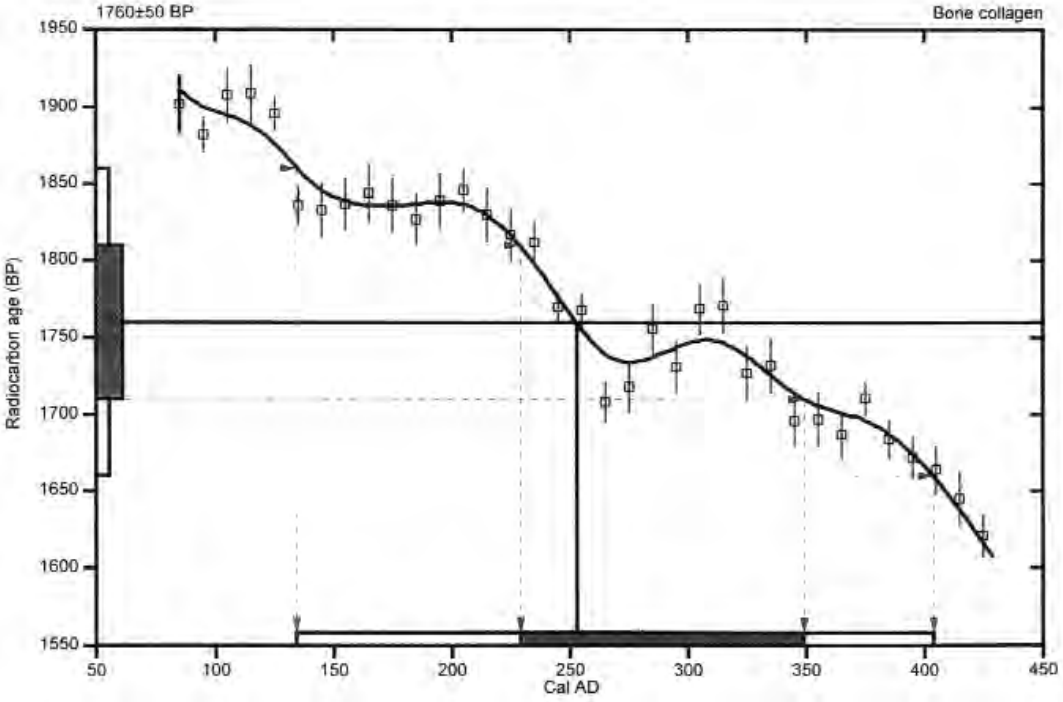
Conventional radiocarbon age: **1760±50 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 135 to 405 (Cal BP 1815 to 1545)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 255 (Cal BP 1695)

1 Sigma calibrated result: (68% probability) Cal AD 230 to 350 (Cal BP 1720 to 1600)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-mail: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.3:lab. mult=1)

Laboratory number: **Beta-137611**

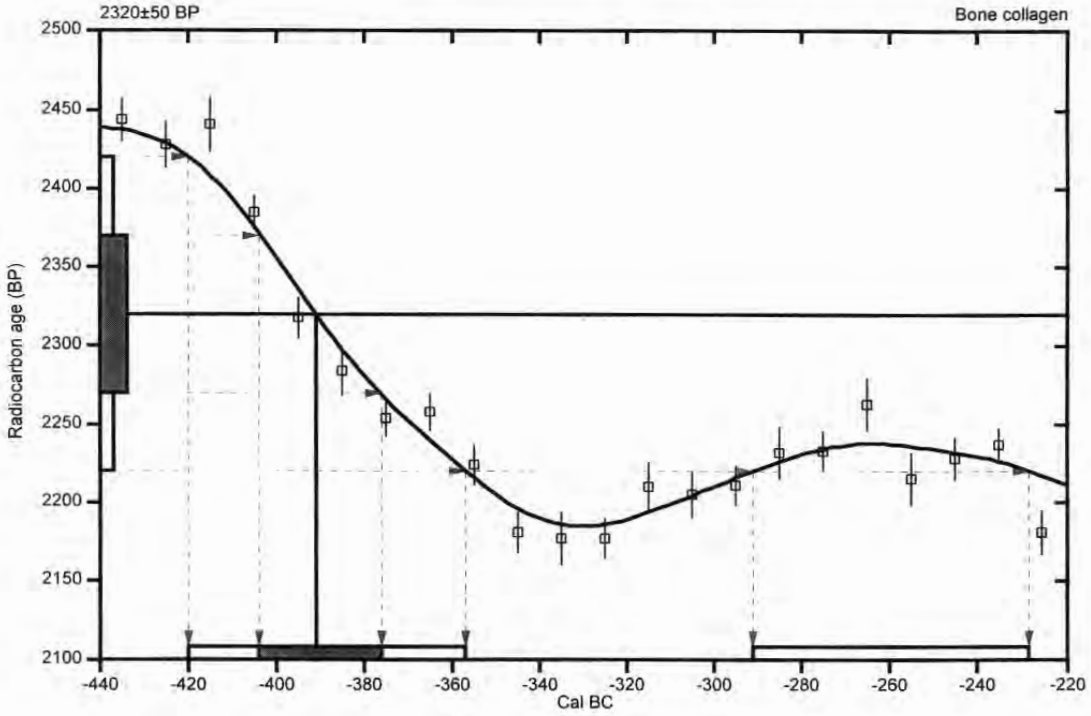
Conventional radiocarbon age: **2320±50 BP**

2 Sigma calibrated results: (95% probability) **Cal BC 420 to 355 (Cal BP 2370 to 2305) and Cal BC 290 to 230 (Cal BP 2240 to 2180)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 390 (Cal BP 2340)

1 Sigma calibrated result: (68% probability) Cal BC 405 to 375 (Cal BP 2355 to 2325)



References:

Database used
INTCAL98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-mail: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-16.4:lab. mult=1)

Laboratory number: **Beta-137612**

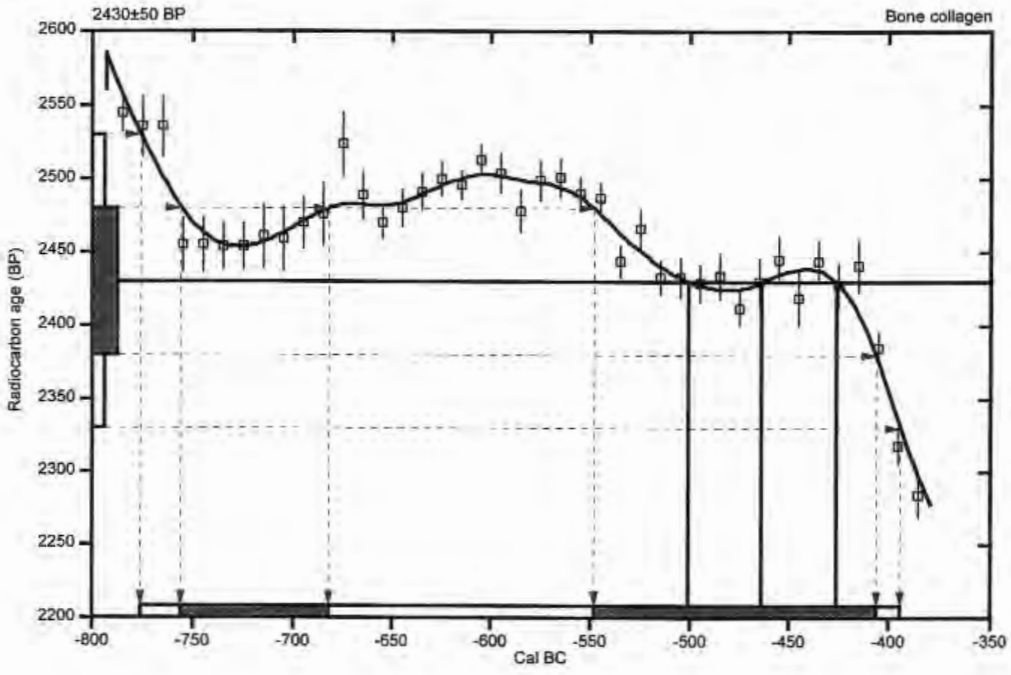
Conventional radiocarbon age: **2430±50 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 775 to 395 (Cal BP 2725 to 2345)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal BC 500 (Cal BP 2450) and Cal BC 465 (Cal BP 2415) and Cal BC 425 (Cal BP 2375)

1 Sigma calibrated results: (68% probability) Cal BC 755 to 680 (Cal BP 2705 to 2630) and Cal BC 550 to 405 (Cal BP 2500 to 2355)



References:

Database used
INTCAL98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-mail: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-10:lab. mult=1)

Laboratory number: **Beta-137613**

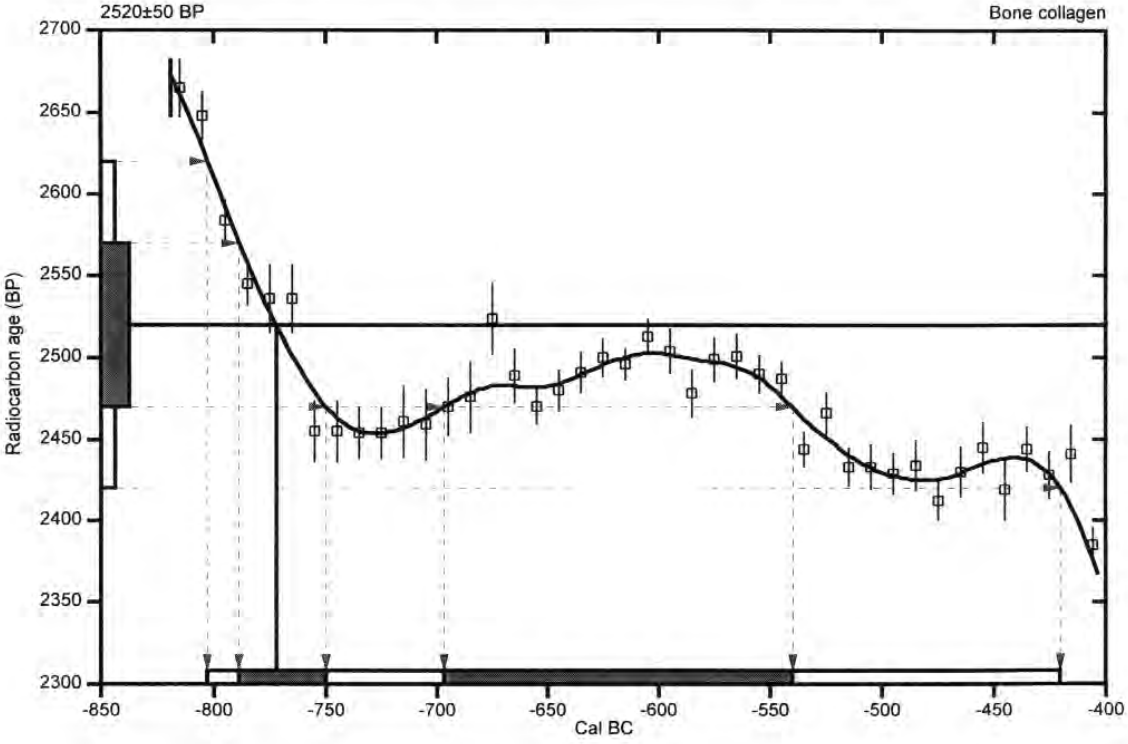
Conventional radiocarbon age: **2520±50 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 805 to 420 (Cal BP 2755 to 2370)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 770 (Cal BP 2720)

1 Sigma calibrated results: (68% probability) Cal BC 790 to 750 (Cal BP 2740 to 2700) and Cal BC 695 to 540 (Cal BP 2645 to 2490)



References:

Database used
INTCAL98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-mail: beta@radiocarbon.com

BETA ANALYTIC INC.

RADIOCARBON DATING SERVICES

Dr. MURRY A. TAMERS
Mr. DARDEN G. HOOD
Directors

RONALD E. HATFIELD
Laboratory Manager

CHRISTOPHER PATRICK
TERESA A. ZILKO-MILLER
Associate Managers

ANALYTICAL PROCEDURES AND FINAL REPORT

FINAL REPORT

This package includes the final date report, this statement outlining our analytical procedures, a glossary of pretreatment terms, calendar calibration information, billing documents (containing balance/credit information and the number of samples submitted within the yearly discount period), and peripheral items to use with future submittals. The final report includes the individual analysis method, the delivery basis, the material type and the individual pretreatments applied. Please recall any correspondences or communications we may have had regarding sample integrity, size, special considerations or conversions from one analytical technique to another (e.g. radiometric to AMS). The final report has also been sent by fax or e-mail, where available.

PRETREATMENT

Results were obtained on the portion of suitable carbon remaining after any necessary chemical and mechanical pretreatments of the submitted material. Pretreatments were applied, where necessary, to isolate ^{14}C which may best represent the time event of interest. Individual pretreatments are listed on the report next to each result and are defined in the enclosed glossary. When interpreting the results, it is important to consider the pretreatments. Some samples cannot be fully pretreated making their ^{14}C ages more subjective than samples which can be fully pretreated. Some materials receive no pretreatments. Please read the pretreatment glossary.

ANALYSIS

Materials measured by the radiometric technique were analyzed by synthesizing sample carbon to benzene (92% C), measuring for ^{14}C content in a scintillation spectrometer, and then calculating for radiocarbon age. If the Extended Counting Service was used, the ^{14}C content was measured for a greatly extended period of time. AMS results were derived from reduction of sample carbon to graphite (100 %C), along with standards and backgrounds. The graphite was then sent for ^{14}C measurement in an accelerator-mass-spectrometer located at one of six collaborating facilities; Lawrence Livermore National Laboratory (LLNL) in California, Eidgenössische Technische Hochschule University (ETH) in Zürich, Oxford University in England, The New Zealand Institute of Nuclear and Geological Sciences (GNS), Groningen University in The Netherlands, or The University of Kiel in Germany.

THE RADIOCARBON AGE AND CALENDAR CALIBRATION

The "Conventional C14 Age (*)" is the result after applying C13/C12 corrections to the measured age and is the most appropriate radiocarbon age (the "*" is discussed at the bottom of the final report). Applicable calendar calibrations are included for organic materials and fresh water carbonates between 0 and 10,000 BP and for marine carbonates between 0 and 8,300 BP. If certain calibrations are not included with this report, the results were either too young, too old, or inappropriate for calibration.

4985 S.W. 74 COURT, MIAMI, FL 33155 U.S.A.
TELEPHONE: 305-667-5167 / FAX: 305-663-0964 / INTERNET: betaradiocarbon.com
WEB SITE: http://www.radiocarbon.com

PRETREATMENT GLOSSARY

Pretreatment of submitted materials is required to eliminate secondary carbon components. These components, if not eliminated, could result in a radiocarbon date which is too young or too old. Pretreatment does not ensure that the radiocarbon date will represent the time event of interest. This is determined by the sample integrity. The old wood effect, burned intrusive roots, bioturbation, secondary deposition, secondary biogenic activity incorporating recent carbon (bacteria) and the analysis of multiple components of differing age are just some examples of potential problems. The pretreatment philosophy is to reduce the sample to a single component, where possible, to minimize the added subjectivity associated with these types of problems.

"acid/alkali/acid"

The sample was first gently crushed/dispersed in deionized water. It was then given hot HCl acid washes to eliminate carbonates and alkali washes (NaOH) to remove secondary organic acids. The alkali washes were followed by a final acid rinse to neutralize the solution prior to drying. Chemical concentrations, temperatures, exposure times, and number of repetitions, were applied accordingly with the uniqueness of the sample. Each chemical solution was neutralized prior to application of the next. During these serial rinses, mechanical contaminants such as associated sediments and rootlets were eliminated. This type of pretreatment is considered a "full pretreatment". On occasion the report will list the pretreatment as "acid/alkali/acid - insolubles" to specify which fraction of the sample was analyzed. This is done on occasion with sediments (See "acid/alkali/acid - solubles"

Typically applied to: charcoal, wood, some peats, some sediments, textiles

"acid/alkali/acid - solubles"

On occasion the alkali soluble fraction will be analyzed. This is a special case where soil conditions imply that the soluble fraction will provide a more accurate date. It is also used on some occasions to verify the present/absence or degree of contamination present from secondary organic acids. The sample was first pretreated with acid to remove any carbonates and to weaken organic bonds. After the alkali washes (as discussed above) are used, the solution containing the alkali soluble fraction is isolated/filtered and combined with acid. The soluble fraction which precipitates is rinsed and dried prior to combustion.

"acid washes"

Surface area was increased as much a possible. Solid chunks were crushed, fibrous materials were shredded, and sediments were dispersed. Acid (HCl) was applied repeatedly to ensure the absence of carbonates. Chemical concentrations, temperatures, exposure times, and number of repetitions, were applied accordingly with the uniqueness of each sample. The sample, for a number of reasons, could not be subjected to alkali washes to ensure the absence of secondary organic acids. The most common reaso is that the primary carbon is soluble in the alkali. Dating results reflect the total organic content of the analyzed material. Their accuracy depends on the researcher's ability to subjectively eliminate potential contaminants based on contextual facts.

Typically applied to: organic sediments, some peats, small wood or charcoal, special cases

"collagen extraction"

The material was first tested for friability ("softness"). Very soft bone material is an indication of the potential absence of the collagen fraction (basal bone protein acting as a "reinforcing agent" within the crystalline apatite structure). It was then washed in de-ionized water and gently crushed. Dilute, cold HC acid was repeatedly applied and replenished until the mineral fraction (bone apatite) was eliminated. The collagen was then dissected and inspected for rootlets. Any rootlets present were also removed when replenishing the acid solutions. Where possible, usually dependant on the amount of collagen available, alkali (NaOH) was also applied to ensure the absence of secondary organic acids.

Typically applied to: bones

"acid etch"

The calcareous material was first washed in de-ionized water, removing associated organic sediments and debris (where present). The material was then crushed/dispersed and repeatedly subjected to HCl etches to eliminate secondary carbonate components. In the case of thick shells, the surfaces were physically abraded prior to etching down to a hard, primary core remained. In the case of porous carbonate nodules and caliche, very long exposure times were applied to allow infiltration of the acid. Acid exposure times, concentrations, and number of repetitions, were applied accordingly with the uniqueness of the sample.

Typically applied to: shells, caliche, calcareous nodules

"neutralized"

Carbonates precipitated from ground water are usually submitted in an alkaline condition (ammonium hydroxide or sodium hydroxide solution). Typically this solution is neutralized in the original sample container, using deionized water. If larger volume dilution was required, the precipitate and solution were transferred to a sealed separatory flask and rinsed to neutrality. Exposure to atmosphere was minimal.

Typically applied to: Strontium carbonate, Barium carbonate
(i.e. precipitated ground water samples)

"none"

No laboratory pretreatments were applied. Special requests and pre-laboratory pretreatment usually accounts for this.

"acid/alkali/acid/cellulose extraction"

Following full acid/alkali/acid pretreatments, the sample is rinsed in NaClO2 under very controlled conditions (Ph = 3, temperature = 70 degrees C). This eliminates all components except wood cellulose. It is useful for woods which are either very old or highly contaminated.

Applied to: wood

"carbonate precipitation"

Dissolved carbon dioxide and carbonate species are precipitated from submitted water by complexing them as amonium carbonate. Strontium chloride is added to the ammonium carbonate solution and strontium carbonate is precipitated for the analysis. The result is representative of the dissolved inorganic carbon within the water. Results are reported as "water DIC".

Applied to: water

BETA ANALYTIC INC.
RADIOCARBON DATING LABORATORY
CALIBRATED C-14 DATING RESULTS

Calibrations of radiocarbon age determinations are applied to convert BP results to calendar years. The short term difference between the two is caused by fluctuations in the heliomagnetic modulation of the galactic cosmic radiation and, recently, large scale burning of fossil fuels and nuclear devices testing. Geomagnetic variations are the probable cause of longer term differences.

The parameters used for the corrections have been obtained through precise analyses of hundreds of samples taken from known-age tree rings of oak, sequoia, and fir up to 7,200 BP. The parameters for older samples, up to 22,000 BP, as well as for all marine samples, have been inferred from other evidence. Calibrations are presently provided for terrestrial samples to about 10,000 BP and marine samples to about 8,300 BP.

The Pretoria Calibration Procedure program has been chosen for these dendrocalibrations. It uses splines through the tree-ring data as calibration curves, which eliminates a large part of the statistical scatter of the actual data points. The spline calibration allows adjustment of the average curve by a quantified closeness-of-fit parameter to the measured data points. On the following calibration curves, the solid bars represent one sigma statistics (68% probability) and the hollow bars represent two sigma statistics (95% probability). Marine carbonate samples that have been corrected for δ 13/12C, have also been corrected for both global and local geographic reservoir effects (as published in Radiocarbon, Volume 35, Number 1, 1993) prior to the calibration. Marine carbonates that have not been corrected for δ 13/12C, have been adjusted by an assumed value of 0 ‰ in addition to the reservoir corrections. Reservoir corrections for fresh water carbonates are usually unknown and are generally not accounted for in those calibrations. In the absence of measured δ 13/12C ratios, a typical value of -5 ‰ was assumed for freshwater carbonates. There are separate calibration data for the Northern and Southern Hemisphere. Variables used in each calibration are listed below the title of each calibration page.

(Caveat: the calibrations assume that the material dated was living for exactly ten or twenty years (e.g. a collection of 10 or 20 individual tree rings taken from the outer portion of a tree that was cut down to produce the sample in the feature dated). For other materials, the maximum and minimum calibrated age ranges given by the computer program are uncertain. The possibility of an "old wood effect" must also be considered, as well as the potential inclusion of some younger material in the total sample. Since the vast majority of samples dated probably will not fulfill the ten/twenty-year-criterium and, in addition, an old wood effect or young carbon inclusion might not be excludable, these dendrocalibration results should be used only for illustrative purposes. In the case of carbonates, reservoir correction is theoretical and the local variations are real, highly variable and dependant on provenience. The age ranges and, especially, the intercept ages generated by the program must be considered as approximations.)

EXPLANATION OF THE BETA ANALYTIC DENDRO-CALIBRATION PRINTOUT

CALIBRATION OF RADICARBON AGE TO CALENDAR YEARS

Variables used in the calculation of age calibration → **(Variables: C13/C12= :Delta-R= :Glob res= :lab. multi=1)**

Laboratory Number: Beta-12345

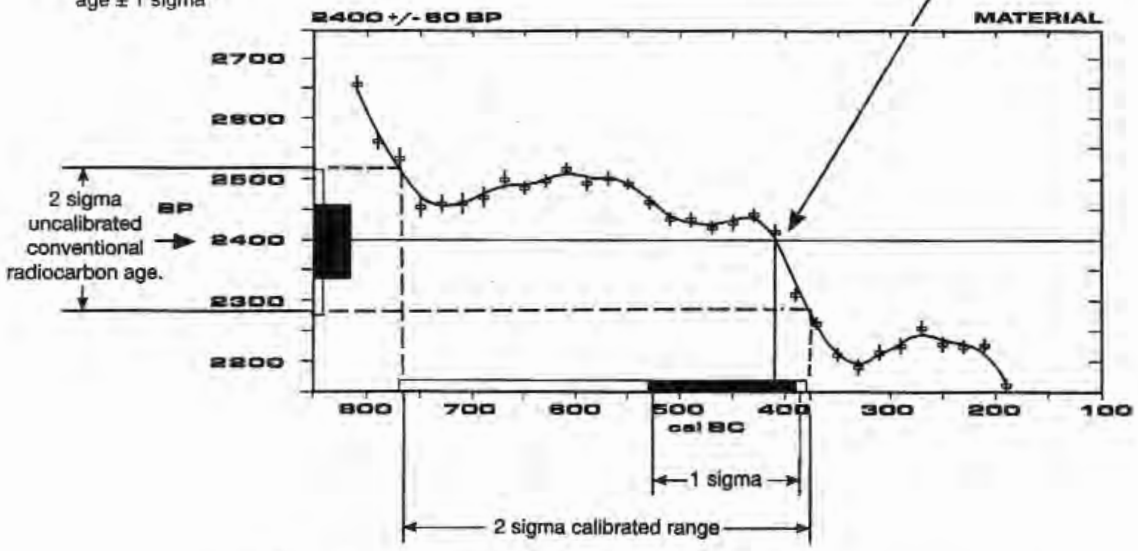
Conventional radiocarbon age: **2400 +/- 60 BP** ← The uncalibrated conventional radiocarbon age (± 1 sigma)

The recommended calibration age range to be used for interpretation → **Calibrated result: (2 sigma, 95% probability)** **cal BC 770 to 380**

Intercept data:

Intercept of conventional radiocarbon age with calibration curve: cal BC 410 ← The intercept between the conventional radiocarbon age and the calibrated calendar time scale curve.

The calibration result of the conventional radiocarbon age ± 1 sigma → 1 sigma calibrated result: (68% probability) cal BC 530 to 390



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J.C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(I), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A.S. and Vogel, J.C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R.S. and Devine, J.M., 1993, Radiocarbon 35(I)

Beta Analytic, Inc., 4985 S.W. 74th Court, Miami, Florida 33155

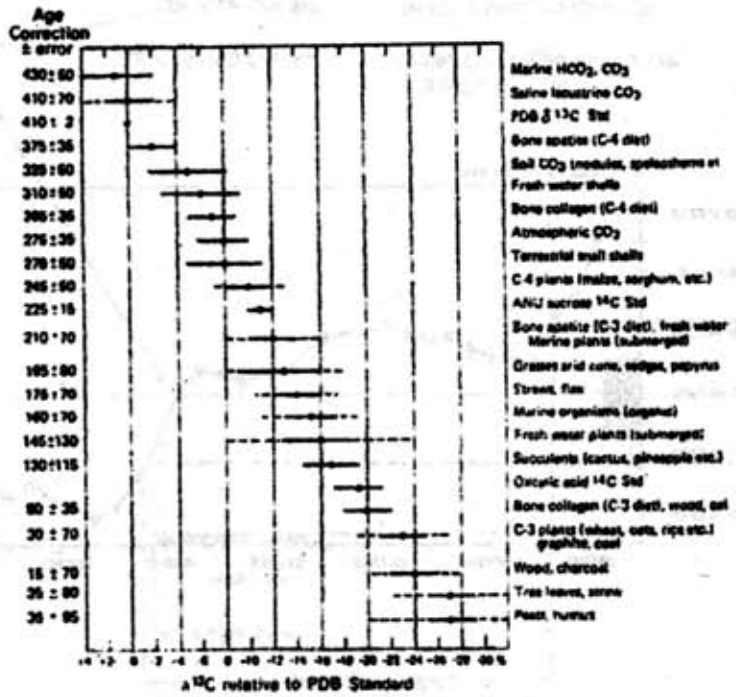
Reporting results (recommended):

1. List the conventional radiocarbon age with its associated 1 sigma standard deviation in a table and designate it as such.
2. Discussion of ages in the text should focus on the 2 sigma calibrated range.

Derivation of a radiometric or accelerator dendro-calibrated (CALENDAR) date requires use of a CONVENTIONAL radiocarbon date (Stuiver and Polach)[1]. The conventional date is a basic radiocarbon date that has been normalized to the modern standard through the use of C13/C12 ratios* (analyzed or estimated). The statistical error (+/-) on an analyzed C13/C12 value is quite small and does not contribute significantly to the combined error on the date. However, use of an estimated C13/C12 ratio for an unknown sample may incur a very large combined error term. This is clearly illustrated in the figure below (Gupta & Polach; modified by J. Head)[2] where the possible range of C13/C12 values for a particular material type may be so large as to preclude any practical application or correction.

In cases where analyzed C13/C12 values are not available, we have provided (for illustration) dendro-calibrations assuming a mean "chart" value, but without an estimated error term.

Where a sample carbon reservoir different from the modern oxalic acid/wood modern standard (e.g. shell) is involved, a further correction must be employed; the necessary variables are displayed on the calibration sheet.



[1]Stuiver, M. and Polach, H.A., 1977. Discussion: Reporting of 14-C data, Radiocarbon, 19, 355-363.

[2]Gupta S.K. and Polach H.A., 1985. Radiocarbon dating practices at ANU Handbook,p.114, Radiocarbon Laboratory, Research School of Pacific Studies, ANU, Canberra.

*Radiocarbon is incorporated into various materials by different pathways and this introduces differing degrees of isotopic fractionation. The C13/C12 ratio of any material is the millesimal difference of the sample to the carbonate PDB standard and is directly related to the C14/C12 ratio. The degree of sample C-14 enrichment or depletion then is normalized to that of the modern standard.

APPENDIX 3: POTTERY ASSEMBLAGE DATA FOR SOUTHEASTERN NEW MEXICO SITES

The collections used in the cumulative tables include survey and excavated materials (Tables A1 and A2). The proveniences of the excavated collections are all from structure fills; some of the structures are quite large and deep. Fill collections, rather than floor assemblages, were used because floor assemblages are usually quite small and are notorious for having skewed representations of types.

The chance that fill collections represent long time spans is good in many instances. Such might be the case where pottery types like Mimbres Black-on-white, Lincoln Black-on-red, and Rio Grande Glaze A Red occur in the same assemblage. The manufacture periods of these type (Mimbres versus Lincoln and Rio Grande Glaze) did not overlap. They should not occur together except as heirloom pieces (Mimbres) or in deposits of slow accumulation. The structures and collections selected met one primary criterion--large assemblage size.

Table A1. Pottery assemblage data for southeastern New Mexico sites (percentages)

Site/Provenience	Brown Wares	Chupadero Black-on-white	El Paso Polychrome	Lincoln Black-on-red	Three Rivers Red-on-Terracotta	San Andres Red-on-Terracotta	Roswell Brown	Other Three Rivers Ware	Corona Corrugated	Mimbres Style III Black-on-white	Rio Grande Glaze	Other	Number
LA 116467	70%	6%	10%	-	<1%	<1%	7%	4%	1%	<1%	-	1%	295
Lower Rio Hondo													
The Fox Place	35%	39%	6%	<1%	5%	-	-	7%	5%	-	<1%	2%	29,248
Rocky Arroyo (2)	-	45%	27%	3%	8%	<1%	-	8%	8%	-	-	<1%	912
Bloom Mound (F)	8%	7%	56%	7%	1%	-	-	13%	6%	-	1%	1%	891
Southern Middle Pecos													
Site P-7	61%	37%	<1%	-	<1%	1%	-	?	<1%	-	-	<1%	1540
Site P-8	48%	49%	-	-	<1%	2%	-	?		-	-	<1%	1375
Garnsey Spring	73%	16%	-	<1%	1%	1%	1%	2%	<1%	1%	-	5%	899
Capitan Mountains													
Smokey Bear (4)	24%	36%	6%	1%	3%	<1%	<1%	3%	23%	-	<1%	3%	1719
Baca Site	12%	11%	6%	4%	1%	-	<1%	4%	61%	-	<1%	<1%	869
Salas (test pit)	14%	27%	6%	7%	1%	-	-	9%	35%	-	-	1%	195
Upper Rio Bonito													
Crockett Canyon A	78%	6%	4%	-	8%	2%	1%	?	11%	1%	-	1%	377
Crockett Canyon AA	53%	13%	4%	-	26%	3%	1%	?	-	1%	-	-	756
Crockett Canyon CC	66%	12%	4%	-	14%	3%	-	?	-	<1%	-	1%	456
Upper Rio Ruidoso													
Bonnell House 9	47%	8%	14%	2%	1%	<1%	3%	7%	14%	<1%	1%	2%	606
Bonnell House 12	75%	7%	6%	1%	1%	<1%	2%	3%	2%	<1%	-	2%	346
Bonnell House 13	52%	11%	23%	<1%	1%	<1%	2%	5%	1%	<1%	-	4%	650

? No data; unpainted body sherds presumably subsumed under type name.

Table A2. Site/provenience data for southeastern New Mexico sites

Lower Rio Hondo:		
The Fox Place, entire excavated assemblage	mid to late 1200s and 1300s	Wiseman 2002
Rocky Arroyo, Feature 2 fill	late 1200s	Wiseman n.d.
Bloom Mound, Structure F fill	Lincoln phase, late 1200s, 1300s	Kelley 1984
Southern Middle Pecos:		
Site P-7 surface	Roswell phase, 1250-1300	Jelinek 1967
Site P-8 surface	Roswell phase, 1250-1300	Jelinek 1967
Garnsey Spring, pottery components	multicomponent, 1100s to early 1300s	Parry & Speth 1984 (new estimate by Wiseman)
Capitan Mountains:		
Smokey Bear (Block Lookout), Fea. 4	Lincoln phase, late 1200s, 1300s	Wiseman et al. 1976
Baca site (LA 12156), Feature 1	Lincoln phase, late 1200s, 1300s	Wiseman 1975
Salas site (LA 588), test in Borrow Pit	Lincoln phase, late 1200s, 1300s	Wiseman 1975
Upper Rio Bonito:		
Crockett Canyon, Houses A, AA, CC	middle Glencoe	Farwell et al. 1992
Upper Rio Ruidoso:		
Bonnell site, Houses 9, 12, 13	late Glencoe	Kelley 1984

APPENDIX 4: DEFINITIONS OF CHIPPED STONE DEBITAGE TERMS

Material Types

Gray Cherts

A variety of gray cherts suitable for knapping are available in southeastern New Mexico. The raw-material units are commonly found as concretions or nodules up to 10 or 15 cm long, eroding out of San Andres limestone in the hill country west of the Pecos Valley (Hannaford 1981; Phillips et al. 1981).

Colors include off-white, various shades of gray and brownish-gray, and black. The gray and brownish-gray shades are the most common. Individual pieces frequently possess two or more shades or colors. The transitions from one shade to the other may be gradual or they may be abrupt, as in striping or mottling. Occasional pieces of off-white and gray (or light gray and dark gray) striped material, sometimes referred to as "fingerprint" or "zebra" chert, were noted in the collections. I have seen these materials among those found eroding out of the San Andres limestone. Ten sorting varieties were tabulated during the analysis, though all were pooled for presentation here.

Variable percentages of knapping debris show the effects of heat treatment. Gray cherts showing different degrees of orange coloration indicate intentional heating, probably to improve the knapping quality of the pieces. These pieces also have a good luster equal to or better than that normally seen in untreated (e.g., strictly gray) examples.

The knapping quality of the local gray cherts varies from grainy (transitional to a siltite) to fine, cryptocrystalline. Perhaps the greatest problems to knappers are the small unit sizes, internal fractures, and textural irregularities common to a large percentage of the nodules.

Other Cherts

This catchall category includes varieties of cherts that probably belong to the local gray category as well as some that evidently derive from other sources. The former group includes grainy cherts or silicious siltstones which embody many of the colors and color combinations of the local gray cherts described above. The grainy structure of these cherts requires greater physical strength to knap. These materials comprise the majority of the "other chert" category.

A few cherts of radically different colors which do not derive from the same sources as the gray cherts include dark red and black jasper, white and brown chalcedonic chert, tan chert, medium brown chert, dark brown chert, and medium brown chert with black speckles. All of these cherts have a fine, cryptocrystalline structure which enhances their knapping quality. However, I suspect that the raw material units for these materials are generally small (i.e., 10 cm or less in maximum dimensions), and some are obviously riddled with internal fractures and other flaws that make knapping difficult. The Pecos River terrace gravels are the suspected source area for all of this last group of cherts. However, a local collector once told me that the Cedar Hills area, 10 to 15 km north of the project area, is a possible source of tan chert.

Chalcedonies

These slightly to highly translucent, cryptocrystalline materials include eight sorting varieties with gray and brownish-gray colors. The colors of most pieces are the same as the local gray cherts, including a "fingerprint" variant. It seems likely that these materials originated from San Andres limestone.

Two varieties of chalcedony which probably do not derive from the local San Andres are clearish white with traces of brown and red, and light gray with profuse red. The Pecos River gravels are the suspected source of these uncommon materials.

Quartzites, Fine Quartzites, and Siltites

Siltites, or silicified siltstones and shales, are a common component of some parts of the San Andres formation. Not surprisingly, flakes of this material are frequently found in the cultural assemblages as well. Grain sizes include true siltstones and mudstones. Both light gray and light brown colors are represented. However, the frequent occurrence of light brown examples among the debitage in the sites also suggests some of the specimens may have been heat treated in an attempt to make them more knappable. Clearly, a specially designed study will be necessary before the matter is resolved.

Both fine- and coarse-grained quartzites in several colors were recorded. The fine light gray and light brown quartzites are probably related to the siltite described above and therefore are probably of local origin. Flakes of a fine white quartzite are probably burned examples of these materials. Varieties of quartzites that are not immediately available in the vicinity of the sites include a true off-white variety, brown and gray, a fine medium brown and dark gray (not the same as the previous brown and gray variety), dark gray-green, orange-red to orange (burned?), and dark purple. The Pecos River gravels may be the source of some or all of these

materials.

Other Materials

The miscellaneous category includes a wide variety of local and exotic stones. The local ones are light gray, medium gray, and medium brown sandstones; medium gray and medium brown limestones; white to clear-white massive quartz; and a black siltite (silicified shale). Black siltite may have originated in the Sacramento, Sierra Blanca, or Jicarilla Mountains to the west, where it is common in prehistoric sites. Quarries of black siltite and silicified shale have been documented in the southern Jicarilla Mountains (Kelley 1984:253). Flakes of dark gray to black igneous rock may also come from the same mountains.

Several lithic materials are easily recognized as deriving from distant sources. All examples are few in number: Alibates material (both the orange-red and the purple varieties), Tecovas or Quitaque chert (?), and clear obsidian. The source of the obsidian is currently uncertain; similar material is documented in Las Cruces area Rio Grande gravels in south-central New Mexico and on the eastern side of the Jemez Mountains of north-central New Mexico. A local resident recently reported that obsidian was found by a relative near the top of one of the eastern peaks in the Capitan Mountains; however, this report has not been verified.

Core Types

The terms for the types of cores are mostly self-explanatory, but two of them--two-platforms-adjacent and two-platforms-parallel--require a few remarks. In the remarks below, the word "face" refers to the surface from which flakes actually detach. Thus, the hammer strikes the platform, and the flake removes from the core face.

Two-Platforms-Adjacent Cores

The striking platforms of two-platforms-adjacent cores share a common edge and form an angle between them. That angle is usually about 90 degrees, but it may also be as much as 140 or 150 degrees.

Two-Platforms-Parallel Cores

The striking platforms of two-platforms-parallel cores do not share a common edge. The platforms are roughly parallel to one another because the opposing flat sides of a cobble or pebble are used as the platforms. However, the degree of parallelness can vary widely. Flakes struck from the two platforms may be removed from different faces or from the same faces of the core.

Flake Types

Biface Notching Flakes

These distinctive, small flakes have the U-shaped platforms characteristic of flakes removed during the notching of bifaces for hafting (Austin 1986).

Biface-thinning Flakes

Flakes classified as biface-thinning flakes are probably mostly flakes produced by pressure and baton techniques. These flakes tend to be thin, are strongly curved (and frequently twisted) along the length axis, and have decidedly acute platform/ventral surface angles. These flakes also frequently have one or more flake scars on the dorsal surface at the distal end which were removed from the opposite direction.

Core-reduction Flakes

Core-reduction flakes comprise the majority of any chipped stone debitage assemblage. Flakes removed in order to trim the core (after initial decortication), shape the core, and obtain flakes suitable for making formal artifacts, and flakes which fail to meet the requirements for making formal artifacts are included in this category.

Decortication Flakes and Platform-preparation Flakes

Decortication flakes and platform-preparation flakes are very similar in some respects. Both have large amounts of cortex on the dorsal surface. The primary difference is one of thickness: decortication flakes are relatively thick, and platform preparation flakes are very thin. While the distinction between *thick* and *thin* is subjective and therefore of questionable value, it seems to define a difference in attitude. The thicker or decortication flakes suggest an absence of concern for conserving material. The thinner or platform preparation flakes suggest just the opposite: remove cortex to prepare a good striking surface, but do not remove any more material than is absolutely necessary.

Hammerstone Flakes

Hammerstone flakes were removed from hammerstones during pounding. They have one or more ridges or high points on the dorsal surfaces which were heavily blunted from hard pounding. Although it is not necessarily the case, most hammerstone flakes are believed

to be unintentional.

Platform Edge Rejuvenation Flakes

Platform edge rejuvenation flakes were removed from cores in order to overcome a series of step fractures and other failures which were preventing successful flake detachment. Two general approaches were used. One was to strike the corrective flake from further back on the platform but in the same direction that regular flake removal was being done. The other approach was to strike the rejuvenation flake from one side of the platform edge. Either way, the resulting flake has a distinctive triangular cross section with a smooth surface below one side of the apex and multiple step fracture scars on the other. The apex on the rejuvenation flake removed from further back on the platform is perpendicular to the long axis of the flake. That of the flake removed from the side of the core is parallel to the long axis (i.e., forms a prominent spine down the dorsal surface).

Platform Types

Most of the terms for the platforms are generally self-explanatory, but a few remarks are appropriate.

Multiple-flake-scar Platforms

Multiple-flake-scar (MFS) platforms differ from faceted platforms in several important ways. MFS platforms simply have two or more scars of previously removed flakes on them. While the flake scars may have been the result of core-platform preparation (i.e., removal of cortex to improve flake production), the procedure was to remove the cortex from the platform of the core in an expedient manner and without any intention other than to remove that cortex. To this end, the decortication flakes may and often were removed from any convenient direction on the core. Thus, reduction flakes from these cores can have flake scars which obviously emanated from more than one direction.

A faceted platform, as the term is used by Old World lithic technologists, involves more than simple decortication. A series of small flakes was sequentially removed from the same edge of the core, resulting in parallel flake scars and flake scar ridges. Moreover, the flake removal is done in such a way that a convex platform, rather than a flat one, is created. This convex surface permitted easier isolation of an aiming point for flake detachment and therefore greater control over the final product. My experience with southwestern lithic assemblages, particularly those from the pottery periods, is that true faceted platforms are rarely found. However, the fact that they do exist indicates that this sophisticated technique was known to prehistoric knappers even though it was not widely used.

Pseudo-dihedral Platforms

The term *pseudo-dihedral* is modified from the Old World concept of dihedral platforms. This method of core platform preparation involved the removal of two series of flakes, one down each side of the core. The distal ends of one row of flakes intersected those of the other row, resulting in a single tentlike ridge down the center of the core platform. This ridge was then used as an aiming point for regular flake detachment. This ridge permitted easier isolation of an aiming point for flake detachment and therefore greater control over the final product. Flakes produced from dihedral cores display two flake scars ending in a central peak on their platforms. Ideally, ripples and other landmarks show that the two flakes were removed from opposite directions, terminating in the peak.

In southwestern assemblages, true dihedral platforms are rare, but prehistoric knappers employed a similar (or "pseudo") approach. They frequently aimed their hammers at ridges between adjacent flake scars, or at edges between flake scars and cortex, or at the edge of a core platform. Such aiming points had the same effect as the dihedral ridge--limiting the place where the blow could land, thereby creating greater control over the size and shape of the new flake. The resulting flake platforms have a peak between two flake scars or between a flake scar and cortex.

Modified-feathered Termination

Only one distal termination type, the modified-feathered, needs explanation. This type of termination occurred when the flake was so thick that a portion of the opposite side of the core was carried away with the flake, resulting in a blunt distal edge.

Shatter

Shatter is any piece of material derived from the knapping process which cannot be classified as a core or flake. In general, shatter results from uncontrolled breakage of the core, usually because of naturally occurring internal fractures or other inconsistencies in the material.

Pieces of Material

Pieces of material are chunks of knappable material brought into the site by the occupants. However, for

reasons unknown, they were not knapped or otherwise intentionally fractured.

Use-Wear on Debitage

The unifacial and bifacial types of edge-wear are found on several kinds of edge configurations which might reflect function; these configurations, as seen from either the dorsal or the ventral surfaces of the flakes, are straight, convex, concave, sinuous, irregular, and projections. The distinction between use-wear on concave edges and notches can be somewhat arbitrary in some instances. For the most part, notches have small diameters and configurations that set them apart from the remainder of the edges on which they are located.

Two basic types of use-wear are represented: marginal unifacial wear and marginal bifacial wear. Very conservative criteria were used in deciding whether edge damage is attributable to use-wear. Generally speaking, a number of contiguous scars had to be present for a given manifestation to be designated use-wear. In a number of instances, the flake scars were sufficiently long and regular that they may have been the product of minute intentional retouch.

APPENDIX 5. ARTIFACT DATA, LA 116471 (PUNTO DE LOS MUERTOS)

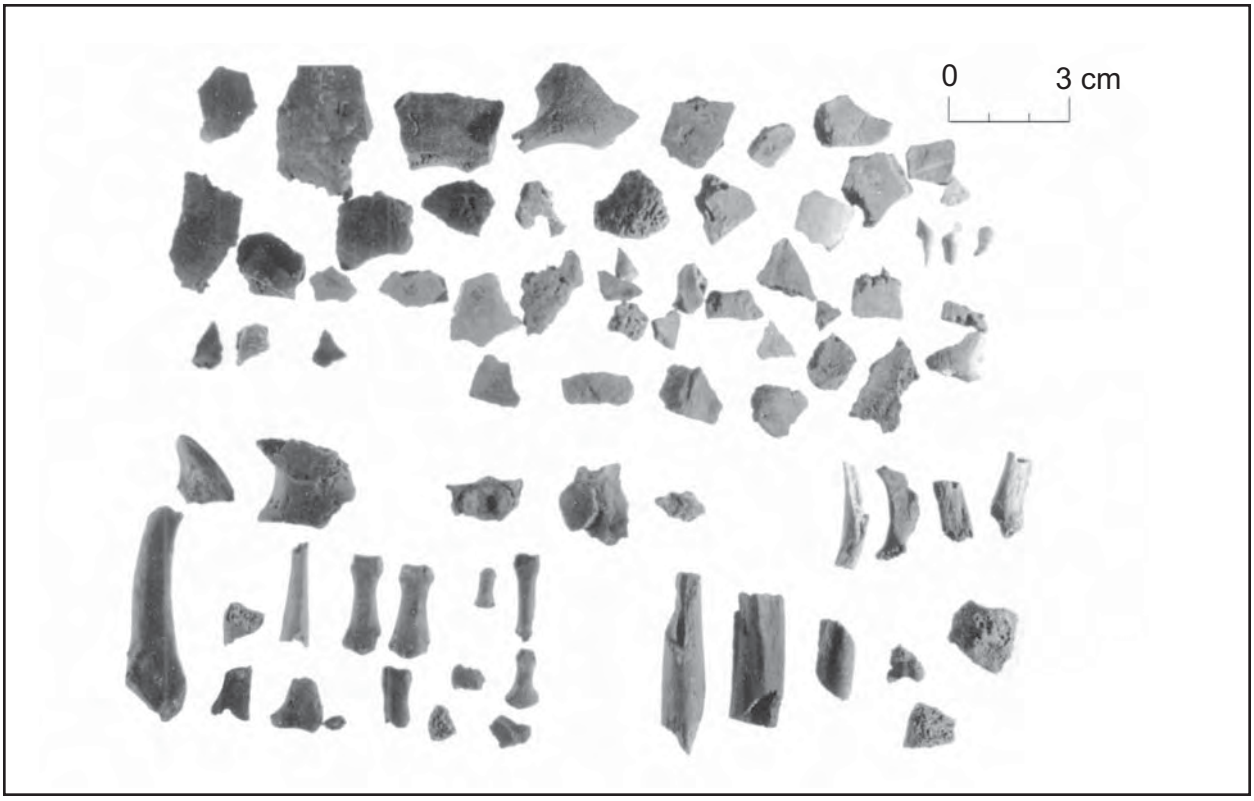
FS Number	Provenience	Type	Material	Dimensions (mm)			Description	UV Light Response
				Length	Width	Thickness		
Artifacts Other than Bifaces:								
93	surface	dart	chert, medium-dark gray	14+	17+	4+	base fragment; heat treated; neck width 11.5 mm	none
302	fill	dart	chert, medium gray, fossiliferous	19+	18+	5+	base fragment; neck width 9.5 mm	weak
310a	fill	dart	chert, medium brown-gray	9+	19+	5+	base of stem?; possibly heat treated	mottled
315b	fill	dart	chert, light gray, fossiliferous	17+	15+	5+	tip fragment	none
318	fill	dart	chert, dark gray with white mottles	22+	15+	5+	tip fragment	mottled
353	0-20 cm above bottom	dart	chert, medium-dark gray	13+	15+	5+	base fragment; neck width 12 mm	weak
358	0-10 cm above bottom	dart	Alibates look-alike	51	24	6	complete; tip reworked; weighs 6.2 g; associated with C-14 date; neck width 11.5 mm	weak
388	fill	dart	chert, pink and yellow	7+	10+	3+	mid-blade fragment	mottled
326	surface	backed knife	limestone, cherty with red streaks and mottles	57	28	7.5	complete; leaf-shaped with one lateral edge steeply retouched ("beveled"); weighs 10.2 g	weak
90	surface	end scraper	chert, medium brown-gray and pink	20.5	20.5	4	complete; on a bifacial thinning flake or blade fragment; heat treated; neck width 2.2 mm	none
390	0-10 cm above bottom	end scraper	chert, poor quality; off-white and dark gray with voids	35	24	9	complete; square projection along one edge that shows no use-wear; weighs 6.7 g	weak
315a	fill	end scraper	chert, light brown and medium gray with rectangular voids	20	19	7	complete; weighs 3.2 g	none
341	fill	awl	rib splinter	19+	7+	4+	tip fragment with blunt point; two flat surfaces with ground edges	
343a	fill	awl	metapoidal splinter	26+	7+	4+	tip fragment (point missing)	
343b	fill	awl	long-bone splinter	34+	6+	4+	tip fragment (point missing); calcined	
312	fill	reamer	Chupadero Black-on-white sherd	25	20	5.5	one corner used as a reamer (use-wear); no other modification to sherd	
304	fill	miscellaneous incised bone	rib (?) fragment	22+	7+	4+	small edge fragment of medium mammal bone; incised lines on both faces; burned	
364	fill	miscellaneous incised bone	rib (?) fragment	19+	5+	4+	similar in all respects to FS 304	
305a	fill	uniface	quartzite, purple	60	41	20	complete; large, thick, triangular flake with steeply retouched lateral edges	
66	surface	uniface?	siltite, gray-brown	30+	34+	8+	large, thin biface fragment with fine, steep unifacial edge retouch along one edge; recycled	
Bifaces:								
38	surface	small	siltite, medium gray with tan patina	10+	18+	4+	outrepassé break	
67	surface	small	siltite, black and medium red	14+	20+	7+	base snapped during manufacture	
95	surface	small	chert, medium gray with dark brown mottles	13+	16+	6+	mid-section fragment	
193	surface	arrow point preform?	chert, light purple gray	15+	14+	3+	basal half with both corners missing	none
202	surface	roughout	chert, medium gray	47	19	11	complete; weighs 10.2 g	weak (dark red)
300	fill	indeterminate size	chert, medium gray and red	8+	9+	3+	tip fragment; not Alibates	weak
305b	fill	indeterminate size	chert, pink and gray	17+	6+	6	fits FS 367a; heat treated	mottled*
308a	fill	small	chert, black	17+	20+	7+	medial fragment from near tip	none
308b	fill	indeterminate size	chert, black	7+	13+	4+	medial fragment; probably heat treated (pink tinge)	weak
310b	fill	indeterminate size	chert, medium gray, fossiliferous	9+	11+	5+	wedge-shaped edge fragment	mottled
310c	fill	indeterminate size	chert, medium gray	8+	6+	3+	wedge-shaped edge fragment	mottled

FS Number	Provenience	Type	Material	Dimensions (mm)			Description	UV Light Response
				Length	Width	Thickness		
329	fill	indeterminate size	chert, fingerprint	27+	12+	4	lateral (?) fragment; fingerprint pattern very subtle	
330a	fill	large	siltite, dark red with white blotches and fine black specks	23+	12+	6+	fits FS 379a; corner fragment	
330b	fill	indeterminate size	chert, dark gray with subtle black mottles	13+	11+	5+	corner basal fragment	mottled
334	fill	small	chert, medium brown-gray	16+	24+	6+	basal fragment	weak
335	fill	small	chert, medium gray	12+	16+	5+	basal fragment	weak
342	fill	large	chert, medium-dark gray	11+	27+	6+	medial fragment	mottled
364	fill	small	chert, off-white to light gray with brown mottles	16+	15+	5+	tip fragment; roughout?	weak
365	fill	large	siltite, dark red with white blotches and fine black specks	10+	15+	3+	tip fragment (same artifact as FS 330a and 379a but does not fit either one	
366	fill	large	chert, dark gray-black	20+	25+	7+	medial fragment	weak to mottled
367a	fill	indeterminate size	chert, light gray	19+	12+	6+	fits FS 305b; lateral edge fragment; heat treated	weak to mottled
367b	fill	indeterminate size	chert, light gray with medium brown specks	15+	20+	6+	fragment of very large item; probably heat treated	weak
368	fill	small	obsidian, smoky black	11+	14+	5+	basal fragment; not Polvadera obsidian	
371	fill	large	chert, medium-dark gray-brown	26+	20+	8+	corner fragment	weak
377	fill	large	chert, medium gray-brown and dark gray	31+	15+	12+	lateral edge fragment	weak
379a	fill	large	siltite, dark red with white blotches and fine black specks	42+	26+	9+	fits 330a; medial fragment	
379b	fill	indeterminate size	chert, dark brown with blotchy patina	22+	15+	5+	tip fragment of bifacially modified flake	bright
382	fill	large	siltite, dark brown (liver colored)	43+	51+	11+	basal fragment; dorsal surface fully flaked; ventral surface edge-trimmed	
385a	fill	indeterminate size	chert, medium and dark gray	25+	23+	6+	tip (?) fragment	weak to mottled
385b	fill	indeterminate size	chert, medium-dark gray with fine black specks	15+	10+	5+	lateral edge fragment	none

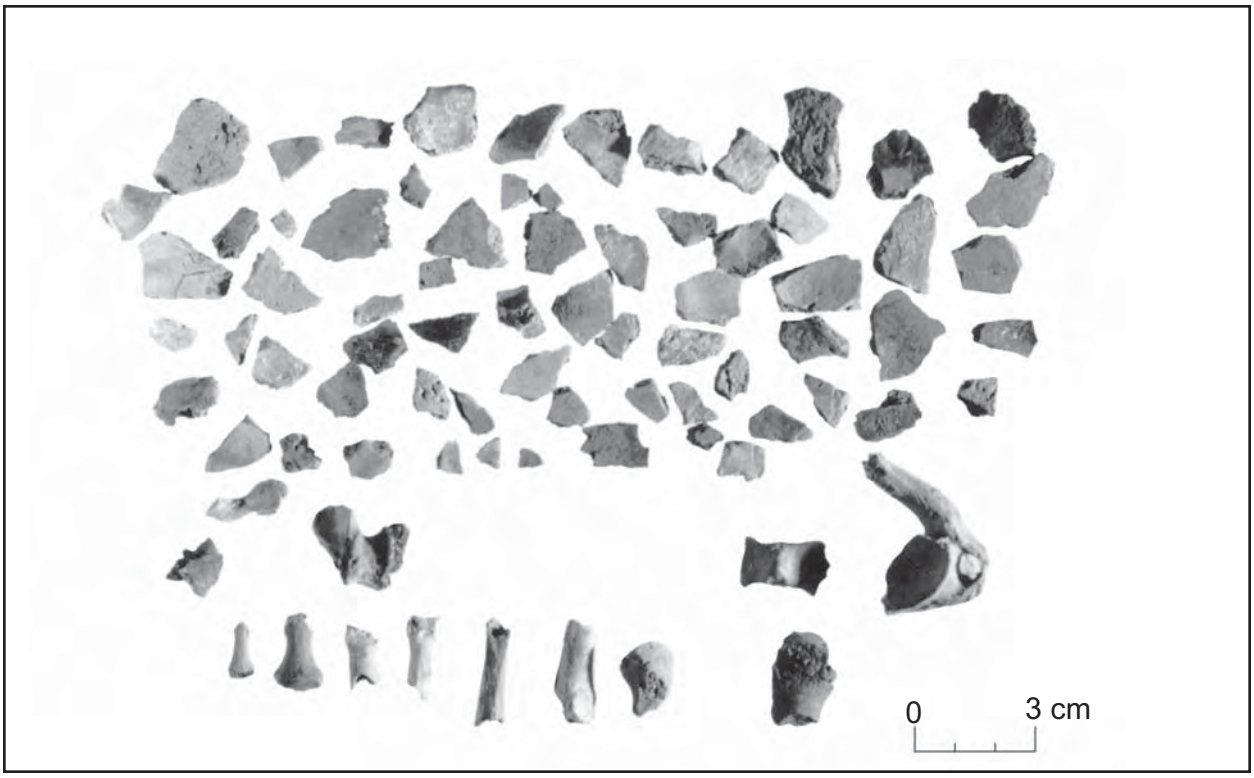
+ incomplete dimension
* probably not Edwards chert

APPENDIX 6: HUMAN REMAINS FROM REPRESENTATIVE PROVENIENCES, LA 116471 (PUNTO DE LOS MUERTOS)

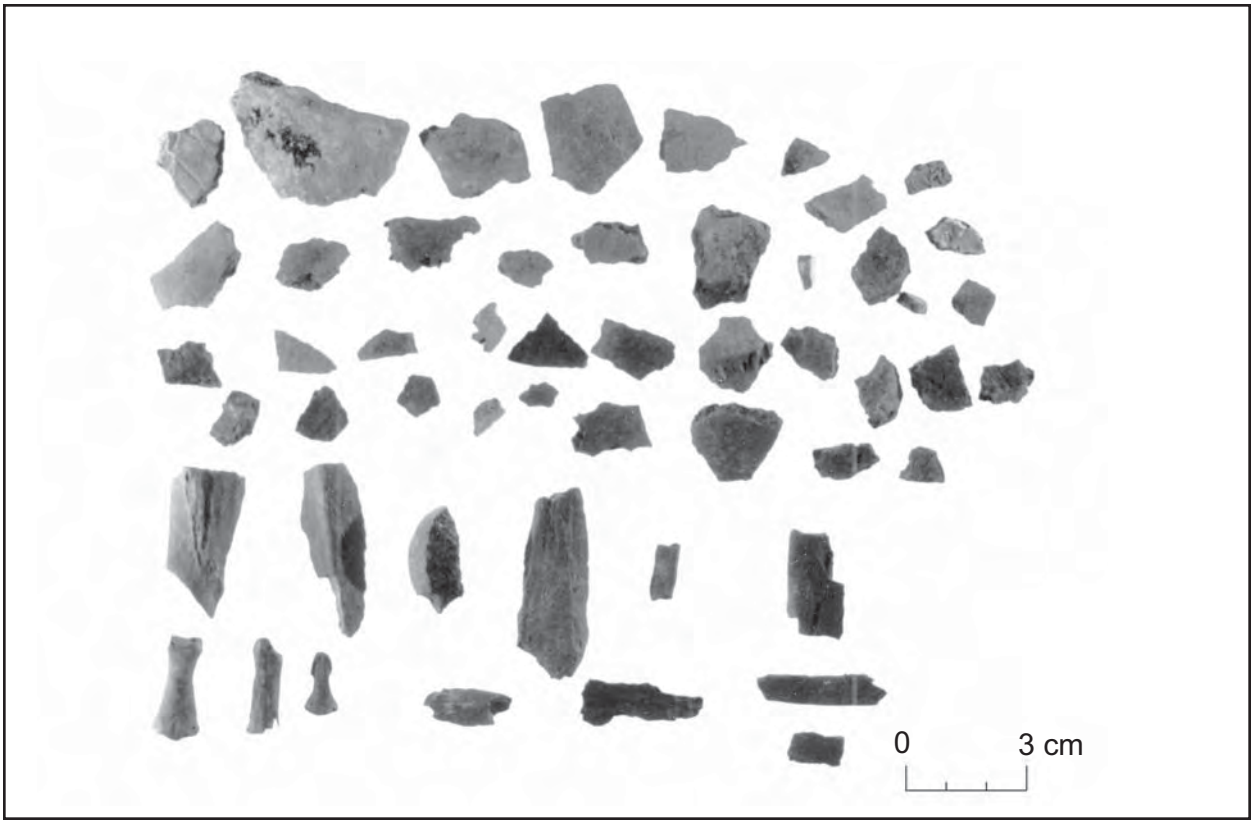
FS 360, 41N 3W upper fill.



FS 330, 41N 2W.



FS 335, 40N 2W.



FS 319, 41N 0E.

FS 359, Feature 2.

FS 319, 42N 1W.