BOB CROSBY DRAW AND RIVER CAMP:
CONTEMPLATING PREHISTORIC SOCIAL BOUNDARIES IN SOUTHEASTERN NEW MEXICO

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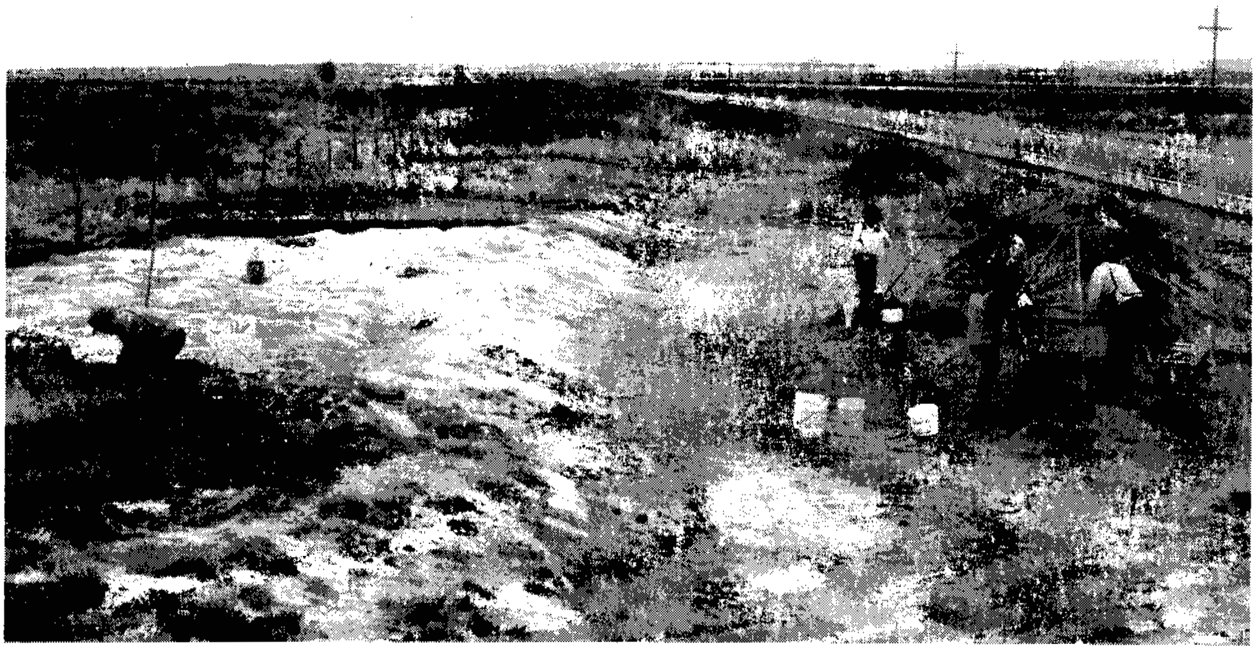

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ADMINISTRATIVE SUMMARY

In late 1993, the New Mexico State Highway and Transportation Department (NMSHTD) requested that the Office of Archaeological Studies (OAS), Museum of New Mexico, conduct data recovery operations at two prehistoric sites along U.S. 70, north of Roswell, New Mexico. The work was part of NMSHTD Project BR-070-7(15)348, a bridge replacement and highway-widening project. LA 75163 and LA 103931 are on NMSHTD right-of-way and lands to be acquired from private sources. The parts of LA 75163 excavated for the bridge project all lie within the existing right-of-way. Data recovery operations were conducted in the spring of 1994.

At LA 75163, the Bob Crosby Draw site, an area measuring 8 by 50 m and occurring entirely within the existing highway right-of-way south of the pavement and west of the bridge was excavated to geologic gypsum. Two groups of hearths, a prehistoric pit, a possible emergency pit structure, and artifact patterns among the midden deposits inform on several aspects of prehistoric lifeways during the late prehistoric pottery period.

At LA 103931, the River Camp site, near the Pecos River west of LA 75163, 128 sq m were excavated to hardpan. Only lithic and pottery artifacts were recovered. No hearths, pits, structures, or other features were found.

Given the similarities between the pottery assemblages, it seems likely that both sites were used by the same group or groups of people between A.D. 1225 and 1350 or 1400. Since we found no evidence of extended or even overnight use of LA 103931, we suspect that this site was a day-use congregation point for nearby people, perhaps from LA 75163, possibly for trading with peoples from west of the river.

The New Mexico State Highway and Transportation Department provided funding for this project.

NMSHTD Project BR-070-7(15)348, CN 1688
MNM Project 41.557 (Bob Crosby Draw)
State of New Mexico (CPRC) Archaeological Excavation Permit SE-95

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INTRODUCTION

In late 1993 the New Mexico State Highway and Transportation Department (NMSHTD) requested that the Office of Archaeological Studies recover data from LA 75163 and LA 103931 for a bridge replacement project over the Pecos River and for several smaller drainages to the east along U.S. 70, northeast of Roswell, Chaves County (Fig. 1 and Appendix 1). A data recovery plan (Wiseman 1993) was prepared and approved for beginning work in the spring of 1994. The NMSHTD provided funding for this project.

The fieldwork was accomplished between March 28 and May 6, 1994, by OAS staff members Regge N. Wiseman, Peter Y. Bullock, Byron Hamilton, and Robert Sparks, with the assistance of Robert Herrera, Manuel L. "Larry" Lopez, Nieves J. "Jesse" Najar, Jorge Sotelo, and Juan Carlos Zavala-Guzman. Paul Ontiveros was night watchman.

The Bob Crosby Draw site (LA 75163, also known as the Funny Fence site) was first recorded, tested, and subjected to limited data recovery by Human Systems Research in relation to the excavation for an underground fiber optics line (HSR Project 9001; Sechrist and Laumbach 1991). The River Camp site (LA 103931) was first recorded during planning for the current highway project.

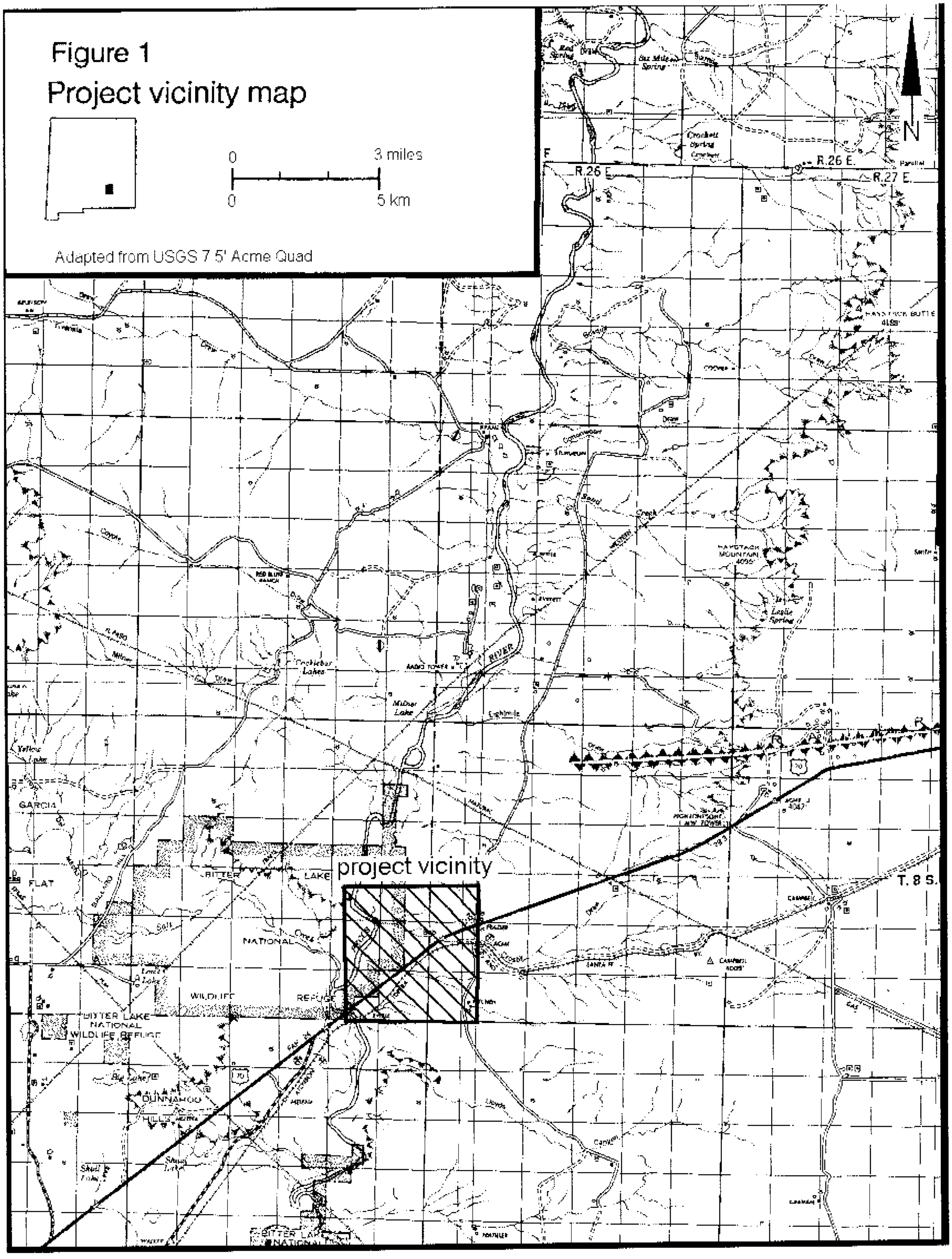
Figure 1
Project vicinity map
0
3 miles
0
5 km
Adapted from USGS 7.5' Acme Quad
N
R.26 E.
R.27 E.
T. 8 S.
project vicinity
BITTER
LAKE
NATIONAL
WILDLIFE
REFUGE
BITTER LAKE
NATIONAL
WILDLIFE REFUGE
DUNNAHOO
HILLS
GARCIA
FLAT
HAYSTACK
MOUNTAIN
RIVER

NATURAL ENVIRONMENT

The project area lies at the western edge of the Great Plains physiographic province (Fenneman 1931). In the vicinity of the project sites, the terrain slopes rather gently upward from the Pecos River on the west to the top of the Mescalero Pediment on the east. This traverse crosses the Lakewood, Orchard Park, and Blackdom terraces before topping out on the Mescalero Pediment. The terraces and the edge of the pediment are denoted by slight undulations. Short distances to the north and south of the traverse, however, the terraces and pediment form steep escarpments. To the south, the edge of the Mescalero Pediment forms a steep-sided escarpment known locally as Comanche Hill. This escarpment delimits the eastern edge of the Pecos Valley in this sector.

The Bob Crosby Draw site is situated at the edge of and part way down the western slope of the Mescalero Pediment (Figs. 2 and 3). The site abuts the south edge of Bob Crosby Draw. Surface deposits consist of a thin mantle of sand. In places, mesquite-covered dunes range in height from .5 to 2 m above the surrounding ground surface. Elevation at the east (highest) end of the site is 1113 m above mean sea level.

LA 103931 is on the Lakewood Terrace, 300 m east of the channel of the Pecos River. The site surface, which slopes very gently downward from east to west, is covered with a thin mantle of sand but no dunes. Site elevation is 1077 m above mean sea level.

The surface geology of the project area consists of the undivided strata of the Artesia Group (Permian) (Dane and Bachman 1965). Gypsum of the Seven Rivers formation (Artesia Group) outcrops in Bob Crosby Draw at LA 75163.

Soils in the vicinity of the Bob Crosby Draw site belong to the Reeves-Holloman-Gypsumland Association (Maker et al. 1971). Reeves soils are the best in this association for agriculture, but their limitations are severe enough that their overall arable potential is generally low. Reeves soils are characterized as "moderately deep, light colored calcareous loams underlain by gypsiferous earth or rock [at depths] of 20 to 40 inches. They are moderately to strongly saline in localized areas where drainage is restricted. In this unit, the Reeves soils typically occupy gently sloping plains or the slightly depressed or swale areas" (Maker et al. 1971:15).

The prehistoric occupants of the Bob Crosby Draw site had permanent water available to them in Bob Crosby Draw and at the Pecos River, 2 km to the west. A sample of water drawn from the pool at the Bob Crosby Draw spring in April 1994 has 4,400 mg/l total dissolved solids (TDS) (personal communication, Tom Morrison, State Engineer's Office). This concentration of minerals, much of it probably gypsum (hydrous calcium sulphate), is okay for some aquatic animals such as fish, turtles, and snails and apparently for terrestrial animals such as antelope, all of which were observed in and about the stream and its pools. Use by humans is more problematical because sulphates cause diarrhea. However, we can assume on the evidence for long-term and/or intensive use of the site that the prehistoric peoples were able to consume the water from Bob Crosby Draw. The water in this stretch of the Pecos River, having traveled for several miles through gypsum exposures, is not any better. It is interesting to note that, in New Mexico today, the water source with the highest load of dissolved solids used for domestic consumption has a TDS of 1,000 mg/l.

According to Kuchler (1964), the potential natural vegetation of the project area is creosotebush-tarbush *(Larrea-Flourensia)*, though the site is in a marginal part of the association. Many of the minor species of this association (yucca, agave, sotol, and some species of cactus) that would have been most useful to man either do not occur or do not occur in useful numbers this far north.

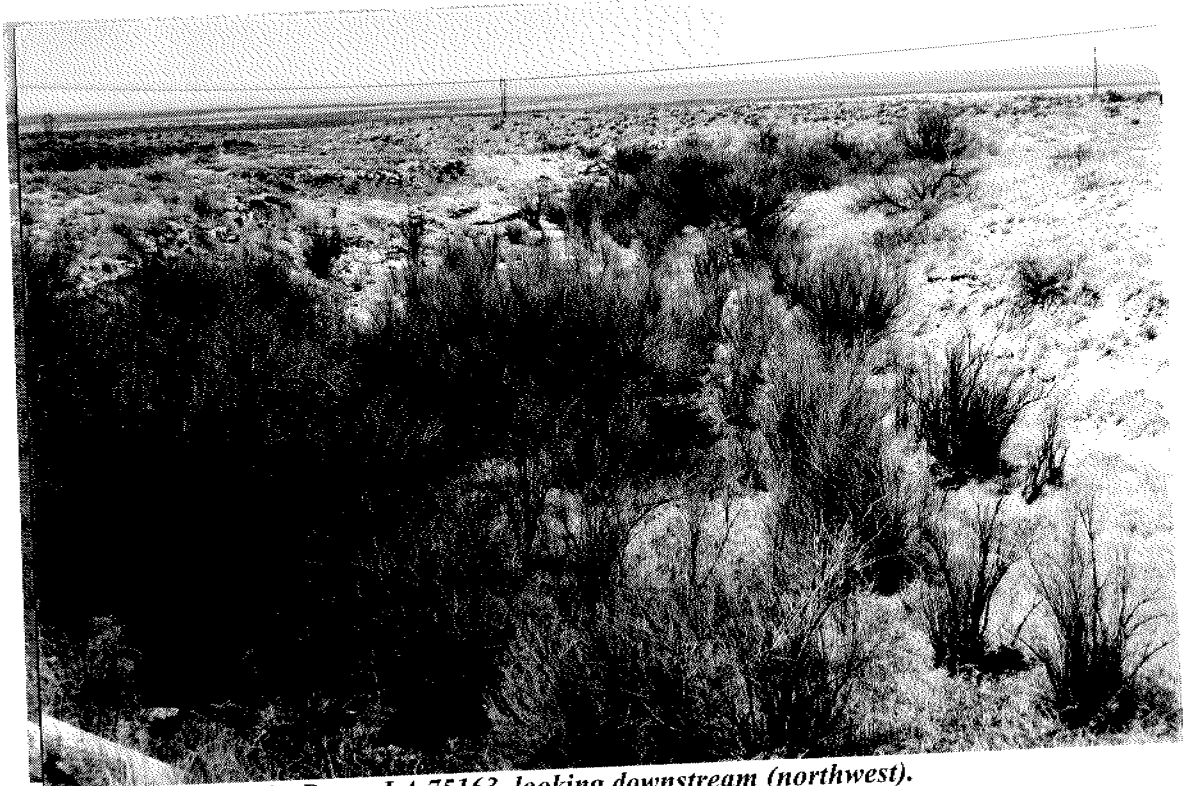
Figure 2. Bob Crosby Draw, LA 75163, looking downstream (northwest).


Figure 3. View of LA 75163 and excavations, looking southwest.

Mesquite occurs on and in the vicinity of the site today, but again, the small numbers of such plants preclude the possibility that it was a major resource for humans.

Dick-Peddie's map (1993) includes the area of Bob Crosby Draw within his Chihuahuan Desert Scrub association, which is dominated by creosotebush and tarbush. However, he notes in his discussion (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 grazing. Because a very slight climatic shift also occurred during the past 150 years, the changes brought on by overgrazing, coupled with continued grazing, could not be reversed to normal vegetative conditions (i.e., desert grassland).

Although scientists cannot say for certain, it is possible that species such as soaptree yucca within Chihuahuan desert scrub areas may indicate these areas were formerly desert grassland. If this is true, then at the time of prehistoric occupation, the project sites were probably within the desert grassland area, for soaptree yucca is quite common on the site and in the surrounding area.

One regional plant resource that would have been very useful to humans is the shin oak (*Quercus havardii*). This prolific, low-growing plant produces large acorns that evidently do not have tannic acid content. For human consumption, high tannic acid requires special preparation. Today, a major concentration of shin-oak grows 10 to 12 km east of the Bob Crosby Draw site. This concentration is the largest and closest to the Pecos Valley in Chaves County (Fig. 4).

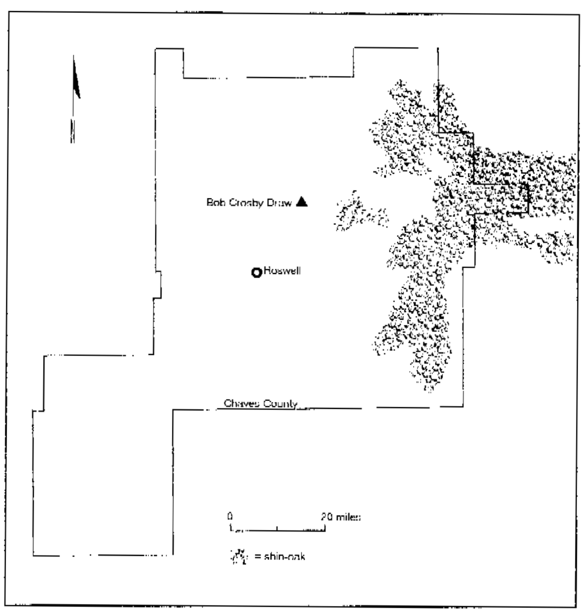

Figure 4. Modern distribution of shin-oak in Chaves County (redrawn from Donart et al. 1978).

Before 1900, one of the natural attractions of the Roswell area was the variety and abundance of wildlife. Early pioneers describe large herds of antelope, cottontailes, jackrabbits, and an abundance of fish (Shingle 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 also moved west of the river.

The Pecos River is also a migratory flyway. The Bitter Lakes Wildlife Refuge, near the project area, harbors an abundance of migratory ducks, geese, cranes, and other species, especially during the spring and fall. The Bob Crosby Draw site is 2 km east of the refuge, which is, and presumably was always, the heart of this important resource.

Roswell's climate today is characterized by mild winters and hot summers. Normalized mean temperatures are 3.3 degrees C in January, 25.9 degrees C in July, and 14.7 degrees C annually. The average annual frost-free season exceeds 200 days (Than et al. 1973). Precipitation is currently summer dominant. The mean normalized annual amount is 295 mm, of which 210 mm (or 71 percent) falls in the growing season, from April through September (U.S. Department of Commerce 1965).

CULTURE HISTORY

The Roswell Area

The prehistoric occupation of the Roswell area is imperfectly known for several reasons. Few projects other than small contract surveys have been done, although several projects have been conducted in the area by the OAS for the New Mexico State Highway and Transportation Department. The area is peripheral to two major culture areas--the Plains to the east and the Southwest to the west--and attempts to relate the Roswell area archaeological remains to one or the other often yield ambiguous results. Also, artifact collecting has been a popular activity for Roswell residents over the past 50-75 years. The loss of information from this activity is serious, if local collections and folklore are any indication. The brief culture history that follows is based in part on work from surrounding regions and in part on the preliminary results from the OAS/NMSHTD projects.

Late prehistoric (i.e., pottery period) sites in the immediate vicinity of Roswell reflect the oasis-like character of the area. 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, habitation structures) of the more sedentary Jornada-Mogollon peoples to the west. For this reason, Jane Kelley (1984) has tentatively included the Roswell area within the geographic reach of her Lincoln phase, which dates to the late thirteenth, fourteenth, and perhaps early fifteenth centuries A.D. Earlier remains (e.g., Rocky Arroyo site; Wiseman 1985) generally fit the Jornada Mogollon configuration and can be tentatively included with them.

Other sites with structures from the ceramic period, however, such as King Ranch (Wiseman 1981), the Fox Place (Wiseman 1991b), the Salt Creek or Townsend site (Akins in prep.), and the Red Lake Tank site (Bullock in prep.) are enigmatic and currently unassignable to an existing culture chronology. These four specific sites are viewed with special interest in reference to the Bob Crosby Draw site.

The late prehistoric remains in the vicinity of Roswell contrast with the extensive scatters of artifacts, including Bob Crosby Draw, that are commonly found in the sand dune country east of the Pecos River and on the Sacramento Plain, north, west, and south of Roswell (Stuart and Gauthier 1981). It is currently unclear how these scatters relate to Jornada-Mogollon or Plains manifestations. Given the geographic location of the sites, they could have been occupied by peoples from either culture area. How do we determine which is which? Some progress is being made in this direction (Speth 1983; Rocek and Speth 1986), but we are far from definitively answering this question.

The Pecos Valley in New Mexico

The following culture history outline for southeastern New Mexico 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 in the Carlsbad area 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 Shingle (1966).

Human occupation of southeastern New Mexico began with the Llano complex ("Clovis Man") of the Paleoindian period and dates to about 13,000 years ago. These people and their successors of the Folsom period hunted large mammals (mammoths and extinct forms of bison) and maintained a nomadic or seminomadic lifestyle. Although most accounts of Paleoindians refer to them as big-game hunters, the people also collected and consumed wild vegetal foods and small animals. Paleoindian occupation and use of the project area is demonstrated by Clovis, Folsom, and Eden projectile point fragments found during the Haystack Mountain survey (Bond 1979), conducted only 8.7 km northeast of LA 75163.

The retreat of the Pleistocene glaciers and subsequent warming of the region resulted in a shift in human adaptation to what archaeologists call the Archaic period. This adaptation 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.

The Archaic period in the greater Roswell region has not been systematically studied. Archaeologists, looking at the remains from single-site excavations or limited surveys, have posited affiliations with the central Texas Archaic (Bond 1979), the Texas Panhandle Archaic (Jelinek 1967), the Oshara Tradition of northwestern New Mexico (Jelinek 1967), and the Chihuahua Tradition and the Cochise Culture of south-central and southwestern New Mexico and adjacent Arizona (Wiseman 1996a).

Further south, along the Pecos River in the Carlsbad area, an Archaic sequence (including hunter-gatherers dating to the pottery period) developed by the Katzes may pertain to the non-Jornada-Mogollon remains of the Roswell area (Katz and Katz 1985a). The sequence starts with the Middle Archaic, rather than the Early Archaic, suggesting an occupational hiatus between the Paleoindian and the Middle Archaic Avalon phase (3000-1000 B.C.). Little is known about the peoples of the Avalon phase other than 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. So far, projectile points have not been found in sites of 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 more remains have been documented. They built relatively small hearths (1 m diameter clusters of small rocks) and burned-rock rings. Previously named projectile point styles associated with the McMillan include the Darl and the Palmillas types. Subsistence involved exploiting both riverine and upland plant and animal species.

The Terminal Archaic period, called the 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), at least in the Carlsbad area, occupation of the floodplain environment reached its zenith. Four major changes also occurred at this time. Brown ware pottery, the bow and arrow, and a type of rock habitation structure (the stone circle or piled-rock structure) appear for the first time. In addition, the subsistence system shifted from a riverine emphasis supplemented by upland foods to one that emphasized upland products supplemented by riverine foods. In spite of additions to the technology, the lifeway remained essentially Archaic. Projectile point styles are dominated by the corner-notched arrow tips called Scallorn points. In many ways, the Globe phase appears to have been transitional between earlier and later adaptive patterns.

After A.D. 1150, during the Oriental phase (A.D. 1150 to 1450), occupation along the river in the Carlsbad area diminished greatly. The people who remained in the area retained their essentially Archaic, hunter-gatherer lifestyle, focused on upland resources, and continued to use small amounts of pottery.

In the Fort Sumner area, north of Roswell, a slightly different late prehistoric horticultural sequence has been defined (Jelinek 1967). These remains also include architecture, but the structures and the pottery, at least in part, seem more directly tied to cultural manifestations 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 the people quit farming to hunt bison full time (Jelinek 1967).

While Jelinek focused his attention on sites 40 or more kilometers north of the project area, minor surveys led him to postulate two separate, though related, phases applicable to our project area. These are the Crosby phase and the Roswell phase. Because the details of each phase are sketchy and discussed in a comparative manner with the equivalent phases in the north (Jelinek 1967), we lack singular, coherent descriptions. 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 to A.D. 1000-1200. The type site for the phase, P9, is 1-2 km south of LA 103931 (Jelinek 1967). It is characterized as a "concentration of several hundred flakes and/or sherds and occasional indications of permanent architecture," but elsewhere, Jelinek states that Crosby phase sites "appear to represent temporary camps." Site P9 differs from Mesita Negra phase sites in that the pottery assemblage is dominated by Roswell Brown rather than the Middle Pecos Micaceous Brown. However, the P9 lithic assemblage is like that of Mesita Negra phase sites. The two identifiable projectile points are wide, corner- and side-notched arrow (?) points with convex blade and base edges. Jelinek (1967:67) contradicts himself by stating that the Crosby phase is "distinct" but then questioning its validity as a separate phase on ceramic grounds.

The Roswell phase is equivalent to the early and late McKenzie phases in the north and dates to A.D. 1200-1300. 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 are left to presume that "permanent architecture" refers to pithouses or pueblos, such as those excavated closer to Fort Sumner. Roswell phase sites differ from McKenzie 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 the McKenzie phase. The lithic assemblage, including numbers of small end scrapers, is like that of McKenzie phase sites. The identifiable projectile points are wide, side-notched arrow points with convex blade edges and straight to convex base edges and a triangular, multiside-notched form.

The period between the presumed abandonment of southeastern New Mexico, some time in the 1400s, and the coming of the unidentified peoples described by the early Spanish explorers in the late 1500s is unknown. It is probable that nomadic use of the region continued during this time. Jelinek (1967) refers the occasional late prehistoric Rio Grande glaze sherds, increased abundance of obsidian, and a tipi-ring site to his post-McKenzie phase. These remains, plus abandoned *rancherias* described by early Spanish explorers, certainly indicate the presence of hunter-gatherers during the late prehistoric and early historic periods, but the inhabitants effectively disappeared as an identifiable people before more detailed accounts and relationships could be recorded. Hickerson (1994) suggests these late prehistoric and early historic peoples may have been the elusive Jumanos, a people so shadowy that scholars write about "the Jumano Problem."

From Spanish contact until after the American Civil War, roaming Apache and other Plains tribes kept Spanish, Mexican, and Euroamerican settlement of southeastern New Mexico in abeyance. Following the Civil War, mass westward movement of Americans and eastward drifting of small groups of New Mexico Hispanics led to settlement of the region. Roswell was founded about 1870. Artesian water was discovered in 1891, and its development promoted widespread irrigation and a rapid influx of people. The railroad reached Roswell in 1894, irretrievably setting the course for urbanization of the area. The town's economy, then as today, was based on agriculture and stockraising.

PREVIOUS ARCHAEOLOGICAL WORK IN THE ROSWELL AREA

Except for a vast number of small-scale contract archaeological projects associated with oil and gas exploration, there have been few archaeological investigations in the Roswell area. Except where noted, the following sites are prehistoric: sample survey of the Abo Oil Field north of Roswell (Kemrer and Kearns 1984); testing of the Townsend site north of Roswell (Maxwell 1986); survey and excavation along the Middle Pecos River northeast of Roswell (Jelinek 1967); excavations at several sites in the Haystack Mountain area northeast of Roswell (Schermer 1980); excavation of the Garnsey Spring Campsite and the protohistoric Garnsey Bison Kill east of Roswell (Parry and Speth 1984; Speth 1983); excavation at the Rocky Arroyo site south of Roswell (Wiseman 1985); excavation at the Henderson site southwest of Roswell (Rocek and Speth 1986); excavation at Bloom Mound southwest of Roswell (Kelley 1984); survey of the Two Rivers Reservoir southwest of Roswell (Phillips et al. 1981); excavation of the historic period Ontiberos Homestead west of Roswell (Oakes 1983); testing of 20 lithic artifact sites west of Roswell (Hannaford 1981); excavation of the Fox Place site at Roswell (Wiseman 1991b); excavation of Corn Camp and La Cresta in the Dunnahoo Hills north of Roswell (Wiseman 1996b); excavation of the Red Lake Tank site (Bullock in prep.); 1997 excavations at the Townsend (Salt Creek) site (Akins in prep.); and excavation at two small sites south of Roswell and west of Dexter (Roswell South Project, Wiseman in prep.).

DATA RECOVERY PLAN

The data recovery plan presented here is taken from the original document (Wiseman 1993). The primary difference between the version presented below and the original is the addition here of language regarding LA 103931. That site was found on an ancillary survey after the data recovery plan was written and approved but before the actual fieldwork began (Wiseman 1994a).

Theoretical Perspective

For a number of years archaeologists have been discussing whether hunter-gatherer groups--called "Neoarchaic" by Lord and Reynolds (1985)--were living close to Southwestern farming groups, a notion that has particular relevance to southeastern New Mexico. Agreement on the matter appears to be consensual and is summarized by Sebastian and Larralde (1989:83):

> An alternative model of Ceramic period occupation in the Roswell District, then, would be that populations of both agriculturists and hunters and gatherers were to be found there. The presence of ceramics on sites created by groups of both types, it could be argued, has caused the remains of two very different settlement and subsistence systems to be lumped together into an apparently anomalous pattern. This alternative model appears to account for at least as much of the observed patterning in the Roswell District as the model that considers all Ceramic period sites to be a part of a single adaptation, and it offers several potential directions for future research.

Areas where the remains of purported pottery-period hunter-gatherers have been found include Los Esteros Reservoir on the Pecos River near Santa Rosa (Mobley 1979), the Llano Estacado along the New Mexico/Texas state line (Collins 1969), along the Pecos and lower Hondo rivers at Roswell (Wiseman 1981, 1985, 1991b), east of the Pecos River near Artesia (Kauffman 1983), along the Pecos River north of Carlsbad (Katz and Katz 1985a), and in the Guadalupe Mountains (Roney 1985). In most cases, the sites believed to be those of hunter-gatherers are open, nonstructural sites or rock shelters and caves. Two exceptions--the King Ranch site (LA 26764) and the Fox Place (LA 68188) at Roswell--have small, oval to circular pit structures (Wiseman 1981, 1985, 1991b).

Various criteria have been used to suggest that a given site or group of sites are those of full-time hunter-gatherers rather than farmers. Criteria include aspects of the chipped stone technology (percentage of biface thinning flakes and material types, for instance), mano and metate types, projectile point types, artifact assemblage composition, items of exchange, subsistence patterns, and rock art. Of these, Mobley (1979) provides the most thorough treatment (see below). The reader wishing more discussion of these matters is referred to Sebastian and Larralde (1989:82-83).

The theory of interstitial hunter-gatherers is both sensible and reasonable, but one very thorny problem remains. How do we make a convincing case using the archaeological record? How do we distinguish hunting-gathering sites created by farmers from those created by full-time hunter-gatherers? Until this is accomplished, we cannot confirm the existence of Neoarchaic peoples in the region.

We, like Sebastian and Larralde (1989), regard Lewis Binford's (1980) subsistence-strategy concepts of foragers and collectors as a useful point of departure, especially when viewed as two ends of a continuum and not as a dichotomy. But first it is useful to review them as a dichotomy. In their simplest form, foragers move the people to the food resources, and collectors move the food to the people. Collectors do this by means of task groups that are sent out for as long as necessary to obtain specific resources and return them to the group. The primary differences are the degrees to which and ways in which people plan, organize, and conduct their quest for food.

It should be mentioned at this point that we view farming (including horticulture and agriculture) as another option in the collector lifeway, rather than a wholly different lifeway. The justification lies in the fact that, in worldwide perspective, farming is also practiced with varying degrees of intensity and is usually part of subsistence systems that have wild plant food components. Therefore, the position taken here is that farming is best viewed as part of the food-acquisition continuum, and as such is the opposite end of the spectrum from simple foraging. In this scheme, hunting-gathering collectors (economies lacking domesticates) fall somewhere in the middle of the continuum. This position is essentially in agreement with a number of scholars, as summarized by D. Harris (1989).

The concept of foraging and collecting as a continuum has two general dimensions. The first is that, in a given year or over a series of years, the strategy of a group--depending on season, climatic regime, economic success, demography, and other factors--often combines both approaches into a "mixed" strategy (see Boyd et al. 1993). Both approaches require, or are facilitated by, an intimate knowledge of resource distributions and detailed planning on the part of the people. But in general, forager behavior is more opportunistic, and collector behavior is more methodical.

The other dimension is that, at least in some regions of the Southern Plains and the Southwest during certain time periods, a collector lifeway became the established or "normal" strategy. Boyd et al. (1993) suggest that this situation occurred on the Southern Plains when bison became more abundant, during the Late Archaic, late prehistoric, and protohistoric periods. Jelinek (1967) posits that the lure of bison was so strong during the late prehistoric period that the horticultural peoples of the Middle Pecos Valley abandoned farming in favor of bison hunting as a lifeway.

In the Southwest, further development of a collector lifeway was facilitated by the addition of cultivated plants (garden farming or horticulture) to the hunter-gatherer diet and involved a greater degree of sedentism. But it is becoming increasingly clear that several different paths led to the adoption of farming and that different preconditions to the change existed in different areas. Once integrated into the diet, cultigens did not inevitably assume paramount importance over other foods. Not all peoples relied on cultigens to the same degree, nor did that degree of reliance necessarily remain the same or progressively increase throughout the prehistory of a given people. Like the shifts back and forth in the hunter-gatherer subsistence mix, the ratios of wild versus domestic foods may have shifted back and forth as well.

Returning for a moment to the forager lifeway, Sebastian and Larralde (1989:55-56) believe that the Roswell area Archaic peoples followed a subsistence strategy of *serial foraging,* rather than the simple foraging lifeway defined by Binford. They define serial foraging as follows:

> A strategy of serial foraging involves a small residential group that moves into the general vicinity of an abundant resource and camps there, uses the target resource and other hunted and gathered resources encountered in the general area until the target resource is gone, or until another desired resource is known to be available, and then moves on to the next scheduled procurement area. Such a strategy could be expected to create a great deal of redundancy in the archaeological record, an endless series of small, residential camps from which daily hunting-and-gathering parties move out over the surrounding terrain, returning to process and consume the acquired foods each evening. If the resources were randomly distributed, all the sites would look generally the same. But since many of the resources appear in the same place year after year or in some other cyclical pattern, some sites tend

to be reoccupied.

Reoccupied sites, then, would look like a clustering of the small sites that would have been produced by a single-event, serial-foraging site.

> The only exception to the rule of basically redundant but sometimes overlapping small campsites would be the winter camps. Given the relatively brief winters of the Roswell District, many of the sites would, on the surface, be no different in appearance from reoccupied short-term camps. Excavation of such sites might recover resources indicating a winter seasonal occupation or features indicative of storage, however. If we were able to differentiate single, large-group occupations from multiple, small-group occupations, we might find that winter sites differ from warm season camps in that they were occupied by larger groups. (Sebastian and Larralde 1989:56)

The settlement types of serial foragers should then start taking on the appearance of collectors' sites.

By way of contrast, people leading a collector lifeway usually have a primary site where they live for a certain part of the year over a series of years. In the Southwest and on the Southern Plains, the basis for this greater sedentism is frequently the cultivation and storage of domestic plants such as corn. Other resources that have been suggested for this role include succulents like agave and sotol (Roney 1985; Sebastian and Larralde 1989) and bison (Boyd et al. 1993). The primary site is a habitation that could be a base camp characterized by hearths and storage pits or a structural site with architecture and storage pits. Generally speaking, the tools and waste materials at these sites indicate the performance of numerous and varied activities and occupations of either long duration or frequent, seasonal return (reoccupation) over relatively long periods of time. Other factors such as permanence of water, fuel supplies, and other necessities are usually implicated in the location of these sites.

Storage, in the form of pits or specialized structures, is believed to be a key factor in the identification of base camps and habitation sites, for they signal the need to preserve quantities of foodstuffs. Generally speaking, the implication is that storage signifies a relatively secure, centralized location belonging to a specific resident group.

Sebastian and Larralde (1989:86) advance an interesting variation on this theme. In some regions, resources could occur in such widely spaced patches that it would be logistically difficult for humans to gather sufficient quantities of food and store it in one place. Under these circumstances, the groups may actually have cached foods in the collection areas and then moved their families from cache to cache as needed throughout the winter season. For this type of system to be possible, territorial rights must be recognized, competition for land and resources must be minimal or nonexistent, and/or the group must have enough warriors to hold the land and resources against competitors.

Since a variety of wild plant and animal foods are also important to collectors, work parties move out and back on a daily basis to gather these resources. For the most part, a specific resource is the target of these work parties, but other resources may be gathered opportunistically. The sites created during these forays are commonly referred to as special-activity sites and are generally characterized by tool kits that are limited in the types of tools. Hearths may or may not be present, but structures and storage pits are absent.

We can now pose the central question of the research proposed here. If full-time hunter-gatherers and farmers both produce special-activity sites during their food quest, how do we tell what group produced what specific site? Of the several scholars working in eastern and southeastern New Mexico, C. M. Mobley (1979) uses the most comprehensive set of criteria to look at this question in the Santa Rosa area, 175 km north of Roswell. The domains of information he uses are individual plant and animal species used; biotic zones or communities exploited; artifact assemblage composition, especially the percentages of projectile points and ground stone items; mano and metate types; core-flake technology, especially platform types, percentage of cortex, and material types; biface technology, especially platform types, percentage of cortex, and material types; items of exchange, especially artifacts, lithic materials, plants, and animals; and rock art (style, subject matter, and techniques).

We propose to use these criteria, in part, in the analysis of the U.S. 70 highway project sites.

Research Questions

1. Are LA 75163 and LA 103931 base camps/habitations or special-activity sites or some combination? Are structures, storage pits, other types of pits, and thermal features (hearths, cooking pits, etc.) present? Do the features in each site form a single cluster, suggesting a single occupation? Or, are two or more clusters of features present, suggesting two or more occupations? If two or more occupations are present, were the activities or site functions during each occupation the same or different?

Determining whether cultural features (structures, storage pits, thermal features, etc.) are present is critical in defining site types. Such features define base camps (or habitation sites), and their absence is generally indicative of special activity sites. Important subsidiary studies will assist in determining site type, as well as overall subsistence patterns, and include floral, faunal, and artifactual data.

2. What artifact assemblages are present at LA 75163 and LA 103931? What types of tools and manufacture debris are present and in what percentages? On the basis of the artifacts, what types of activities were performed at each site?

The types of artifacts at a site help define the kinds of activities that took place at each specific location. Manos and metates imply grinding plant foods, projectile points imply hunting, and scrapers imply hide dressing. Multipurpose tools such as hammerstones, awls, and drills, and manufacture debris such as chipped lithic debris, shell fragments, 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 imply 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), because this line of interpretation makes several assumptions about the data and the activities they represent, and because the technique greatly simplifies a number of complex variables and conditions.

3. What plants and animals were being processed and/or consumed at LA 75163 and LA 103931? What biotic communities were being exploited? Were the site inhabitants exploiting all available biotic communities or only selected ones? During 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 food quest. Animal bones and the pollen and charred remnants of plants will be studied to identify the species present and the biotic zones exploited, characterize the diet and food preparation techniques, and provide insights into the effects of taphonomic processes on the archaeological record. Floral and faunal data also have the potential of providing data on season of the year that they were collected or hunted. Although only certain plant and animal remains provide seasonal data, they are very useful in helping to define the time of the year the sites were occupied. 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.

4. What exotic materials or items indicate exchange or mobility?

Materials and artifacts not naturally 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 pertains 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.

5. When were LA 75163 and LA 103931 occupied? Do the various areas of the sites date to one period, or are several different time periods represented in different areas of each site?

Accurate dating of sites and components is essential for studying change and the direction of change in prehistory. The dating situation is critical in southeastern New Mexico, where dendrochronology, the most accurate and preferred dating technique, works poorly or not at all. This is because most trees are of nondatable species or else have their roots in the water table, making for steady ring growth, rather than the erratic ring growth that permits dating (W. Robinson, personal communication, 1975). 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. In general, techniques like obsidian hydration and thermoluminescence are not reliable in most cases.

Sites such as LA 75163 are notoriously difficult to date because they usually contain few or no datable materials. 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 anticipate submitting samples for radiocarbon dating by less conventional techniques such as accelerator mass spectrometry and bulk sample (low carbon density) processing.

6. What were the biological relationships and nutritional status of the people who inhabited LA 75163 and LA 103931?

In many ways human skeletal materials can answer most of the questions about the biological and cultural relationships that archaeologists ask of archaeological data. The problem is, human skeletal remains are not common, are not recovered in large enough numbers for statistical reliability, and are frequently not sufficiently well preserved for many types of studies. Thus far, analyses of human remains from southeastern New Mexico are few in number, but the results have been interesting, especially regarding the central research question.

The two most provocative human biology studies in the region to date are the analyses of the skeletons from Henderson Pueblo (Rocek and Speth 1986) and the Robinson site (Katzenberg and Kelley 1991). "Physically, the inhabitants of the Henderson Site have resemblances to both the Pueblo populations to their west and, more markedly, to the more scattered peoples of western Texas to their east and south. However, there is no evidence that the Henderson Site was settled by recent migrants from either area; instead, the data point to some degree of stability in the local population" (Rocek and Speth 1986:167).

Although their findings are preliminary and therefore not fully discussed, Katzenberg and Kelley (1988, 1991) have chemical and other data that complement the findings of Rocek and Speth. Although they do not say so in the published conference proceedings, Katzenberg and Kelley (1991) suggested at the 1988 Mogollon Conference that one of the individuals recovered from the Robinson site was skeletally and chemically less like the other Robinson individuals and more similar to people who have high meat diets (Katzenberg and Kelley 1988). The implication is that this individual may have been a visitor from the Plains. Thus, it is very possible that human remains recovered by our project could contribute directly and significantly to the central question of this project.

7. The primary question to be investigated is whether the site was made by indigenous hunter-gatherers or by farmers inhabiting nearby villages like Bloom Mound, Henderson Pueblo, and Rocky Arroyo. The answer to this question depends on the results of the analyses of the preceding research questions. Once these results are in, we will compare them with data from all types of sites in the Roswell region that have produced comparable data. The process will be largely subjective because of the nature of the data. We do not anticipate a clear-cut answer because of the nature of the sites and assemblages in the region.

LA 75163 is a large sandy site beside Bob Crosby Draw (Fig. 5). Because the draw runs along the edge of the Mescalero Pediment, the visual as well as physiographic perception from the west is that the site is on the top and slopes of a low ridge. The site is blanketed in sand; some areas of the site have 0.5 to 1.0 m high, mesquite-topped dunes. The overall site size is 220 m east-west and 150 m north-south. The average depth of cultural deposits below the surface is 20 to 30 cm, though our excavations went as deep as 90 cm, and Human Systems Research found occasional artifacts as deep as 105 cm during their excavations for a buried fiber optics line (Sechrist and Laumbach 1991).

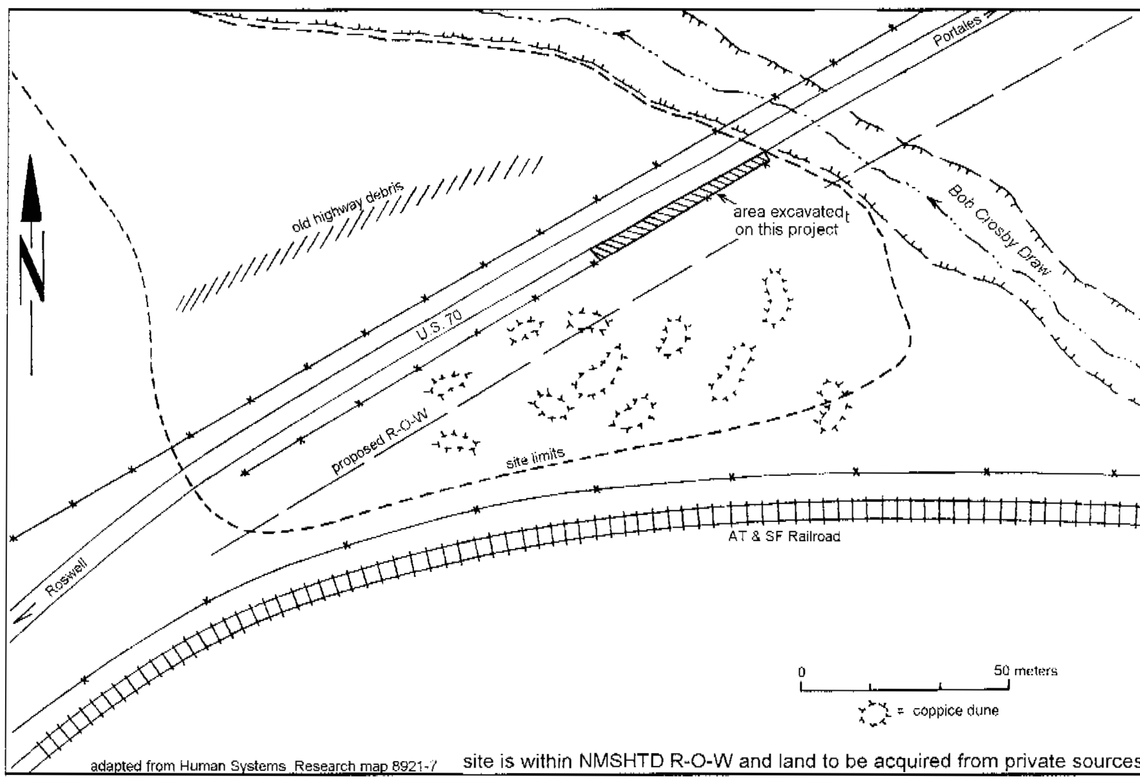

Figure 5. LA 75163 site map.

Clusters of flakes, burned rock, possible hearths, and an occasional potsherd were found on the site surface, both within deflated areas and in areas that are just beginning to deflate. South of the pavement, and to a lesser extent north of it, the existing highway cut runs the 220 m length of the site, an almost continuous exposure of burned rock, and artifacts can be seen eroding out of the cutbank. Two general types of cultural facilities (hearths and pits), one enigmatic feature (a pocket of charcoal-stained soil), and three types of cultural debris fields (burned rocks, lithic chipping debris, and pottery) were documented in the excavations.

LA 75163 is well situated with respect to one major attraction: the water in Bob Crosby Draw. Hundreds of sites in southeastern New Mexico occur at both higher and lower elevations, but comparatively few have the advantage of a nearby spring and large pools of water. Other potential advantages include the position of the site overlooking the nearby Pecos Valley and its marshes, which attract migratory water fowl, and a gentle slope, permitting easy passage to the river from the site for man and game animals. Cliffs that would hinder (though not prevent) access to the river occur along the east side of the Pecos short distances both to the north and to the south of the project sites. Another resource of importance would have been the shin-oak belt, which currently lies only a few kilometers to the east.

Field Methods

This phase of excavations was conducted with respect to bridge improvements. For the bridge project, a 50 by 9 m wide area was excavated within the existing right-of-way south of U.S. 70 and southwest of the bridge over Bob Crosby Draw.

A grid of 1 m squares was established. The artifacts were collected from the undisturbed surface and highway cut and were provenienced by square.

A backhoe removed the tops of three small sand dunes down to the level of the surrounding interdunal surface. Hand excavations proceeded in 1 by 1 m squares and employed the natural (surficial) and cultural strata as the basic provenience units. Where a natural or cultural stratum exceeded 20 cm in vertical thickness, it was divided into two subunits and the artifacts segregated accordingly. Excavations in all squares were carried to the uppermost geologic stratum ("sterile"), in this case, massive gypsum. All fill was screened through one-eighth inch wire mesh.

Site Stratigraphy

Three main stratigraphic units and one minor unit were recognized at LA 75163 (Figs. 6-8).

Stratum 1

The uppermost or surficial unit was comprised of eolian, tan to reddish-tan silty loam. While small numbers of prehistoric artifacts were recovered from this stratum, it is clear that they were introduced through bioturbation. As discussed below, historic artifacts were noted in this stratum in one area of the site. In interdunal areas, the thickness of the stratum varied from as little as 1 or 2 cm to 25 cm near the dunes. Technically speaking, the dunes, which in some cases were as high as 1 m or more, are also part of this stratum.

Stratum 2

The prehistoric cultural stratum was comprised of light-gray silty loam. The color may be attributable to decaying organic matter associated with the human occupation. The stratum was homogeneous in color and texture and was generally soft and easy to dig. A slight increase in compactness of the stratum was noted with increasing depth. In most areas of the site, the upper limit of this stratum was well defined, straight, and essentially horizontal. The bulk of the prehistoric artifacts and burned rocks and all of the cultural features occurred within this stratum. Stratum thickness varied from 15 to 50 cm, mostly because of the undulations in the underlying Stratum 3.

Stratum 3

The geologic stratum underlying the cultural deposits was massive white gypsum. Although cultural pits were dug into this stratum, no artifacts occurred there naturally. The total thickness of the gypsum was not determined.

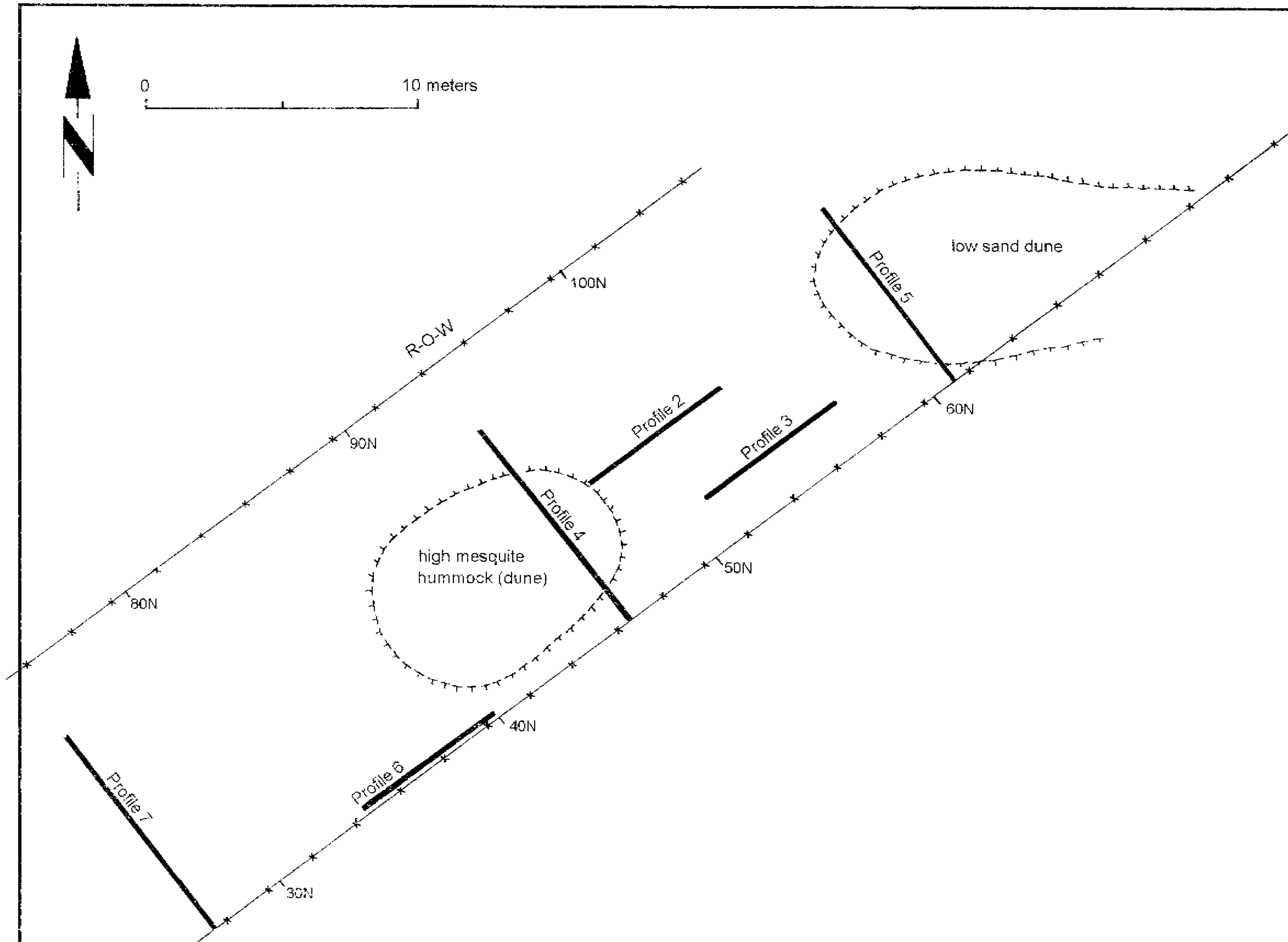

Figure 6. Plan view of fill profile locations, LA 75163.

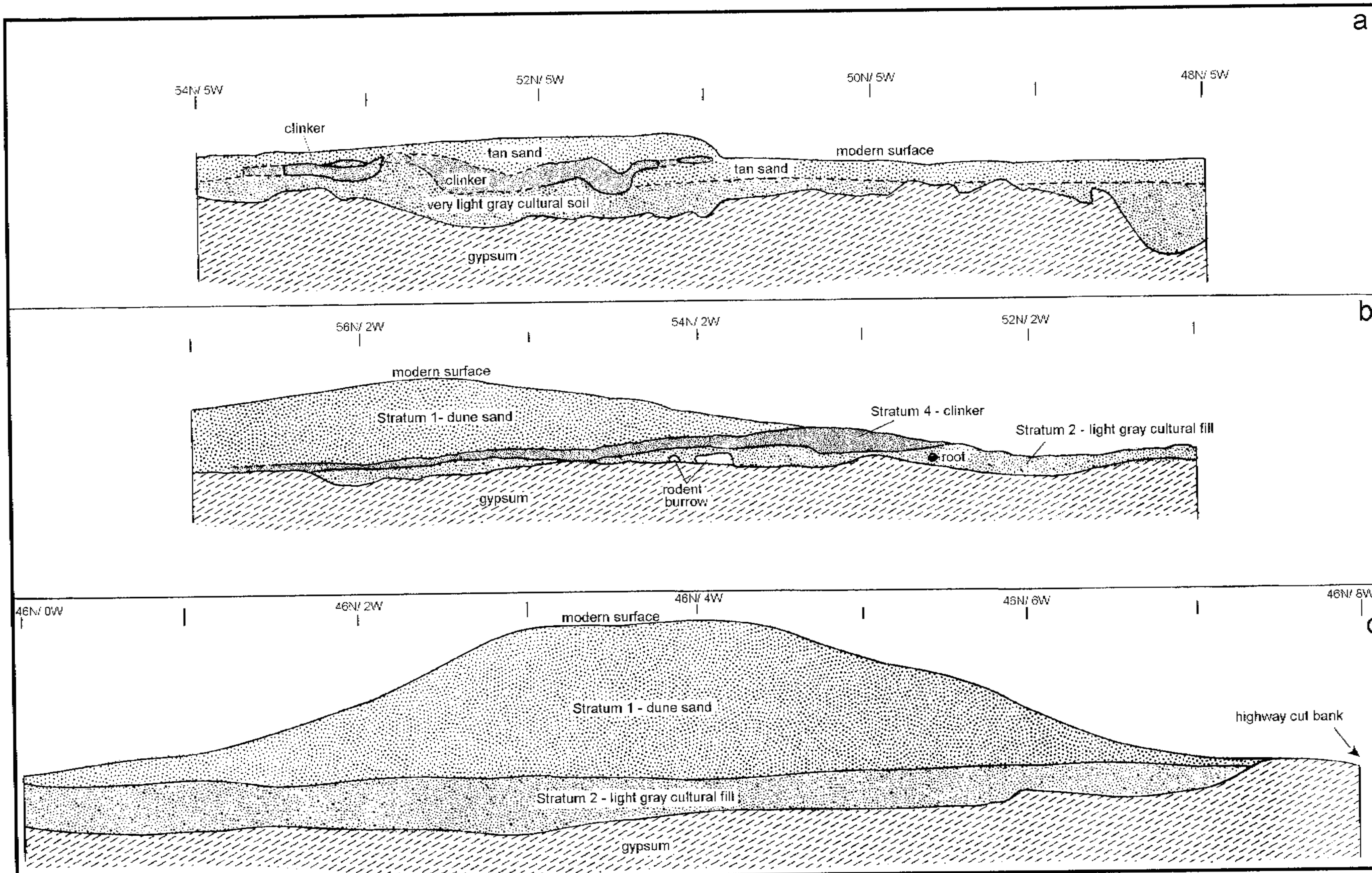

Figure 7. Profiles 2 (a), 3 (b), and 4 (c), LA 75163.

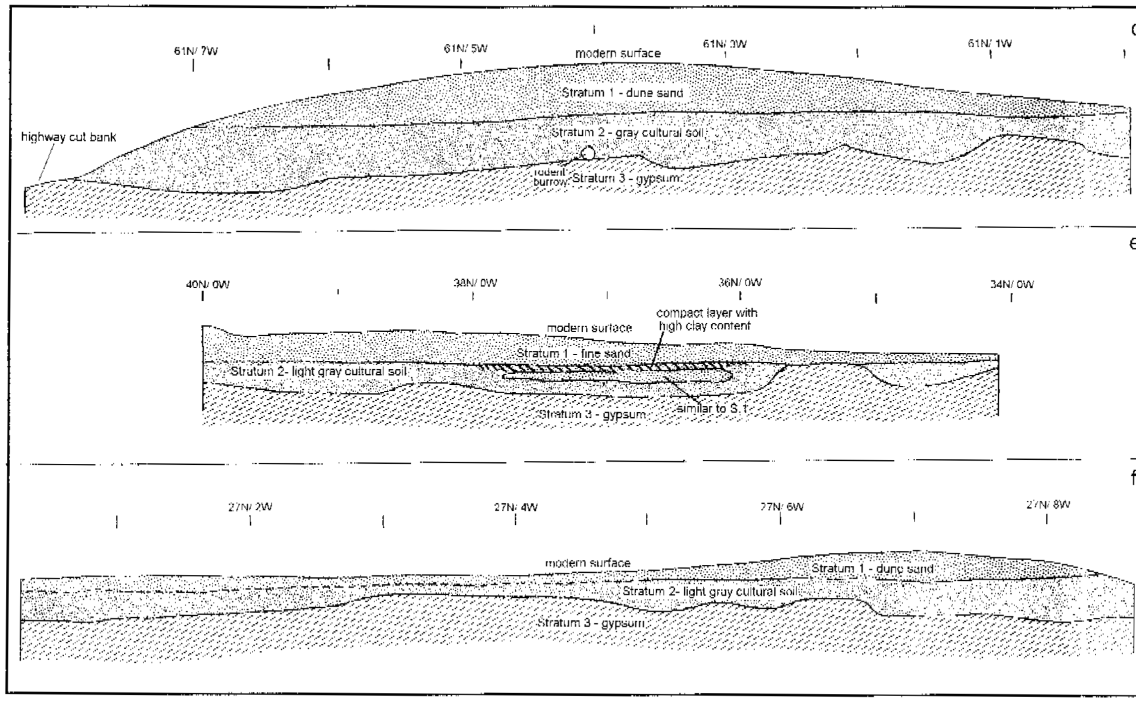

Figure 8. Profiles 5 (d), 6 (e), and 7 (f), LA 75163.

Stratum 4

This minor stratum was composed of burned clay fragments and other historic detritus (metal fragments, etc.) that appeared to be cleanings from a boiler or smelter. In places this stratum was at the bottom of Stratum 1, that is, it separated Stratum 1 from Stratum 2, and elsewhere it was completely within Stratum 1 (Fig. 7). Horizontally, Stratum 4 was restricted to the area between 50N and 57N and between 0W and 7W. Stratum 4 was probably related to the gypsum plant at nearby early twentieth-century Acme or to railroad activities immediately south of LA 75163.

Hearths

Two classes of hearths and one class of possible hearth were excavated. Class 1, or rock hearths, are the most numerous, with seven examples (Fig. 9). These hearths consist of single layers of clustered, burned rocks. Their measurements are: Feature 1, 45 by 46 cm; Feature 2, 60 by 81 cm; Feature 5, 37 by 55 cm; Feature 6, 50 by 50 cm; Feature 9, 51 by 54 cm; Feature 14, 40 by 50 cm; Feature 17, 42 by 62 cm. The average size is 48 by 58 cm. Mostly, the hearths consisted of a single layer of rocks, but occasional rocks were found sitting on top of lower rocks. Thus, hearth thicknesses were 10 cm or less. We could find no evidence that the hearths were made in pits excavated for the purpose. None of the hearths contained charcoal or charcoal-stained soil.

The two possible hearths differ from standard rock hearths in that they contain fewer rocks, and the rocks are more widely spaced (Fig. 10). Their measurements are: Feature 16, 46 by 54 by 6 cm; Feature 18, 40 by 50 by 7 cm. Neither contained charcoal staining or charcoal, and, like the rock hearths, no pits or other evidence of hearth preparation could be found. The rocks in each feature, however, were clearly more clustered than would be the case with burned rocks thrown at random onto the ground.

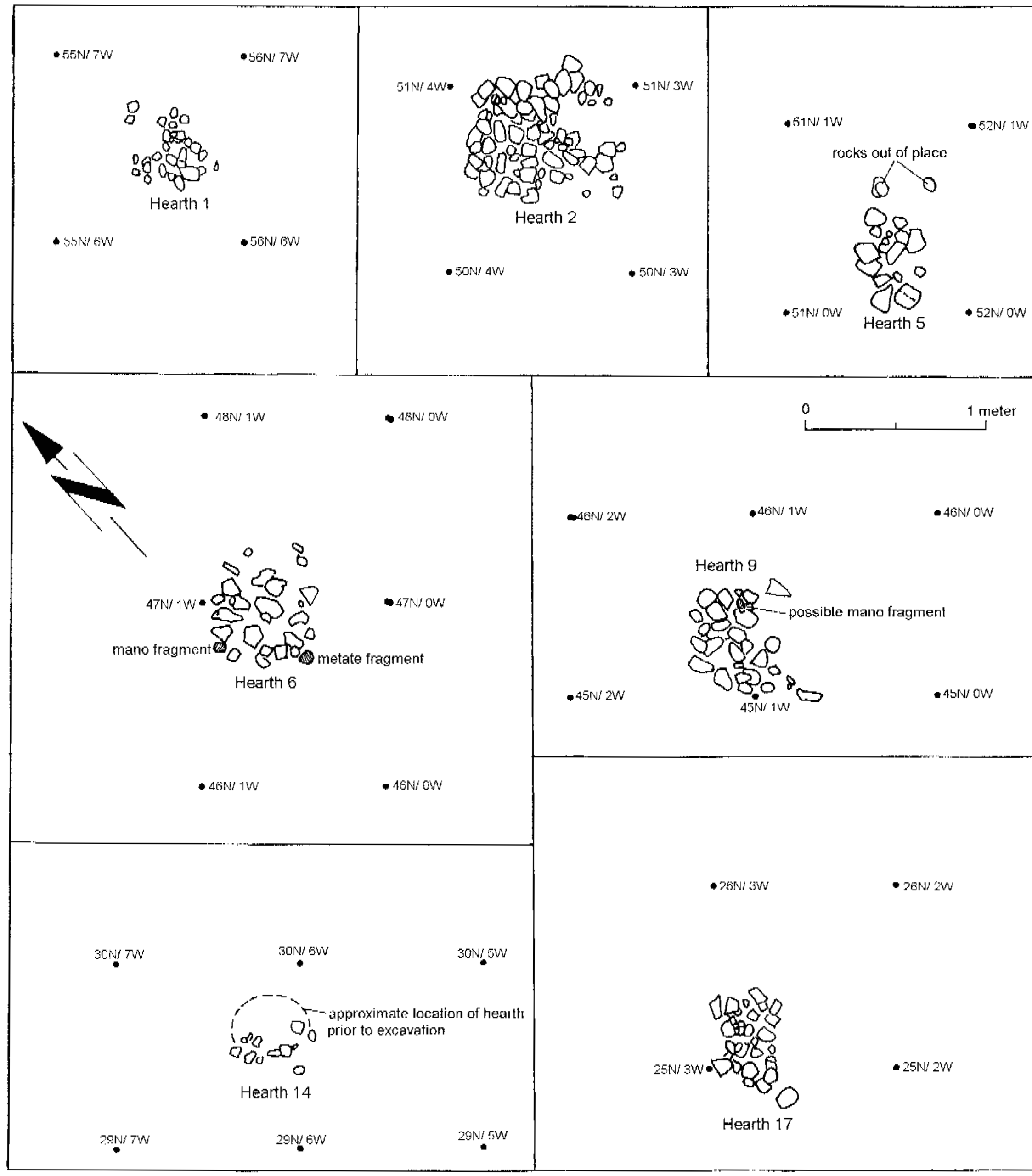

Figure 9. Class 1 hearths, LA 75163.

Interestingly, the bottoms of the rocks in every hearth lay within 5 or 6 cm of the top of Stratum 3, geologic gypsum. If the underlying gypsum undulated, the plane of the hearth followed the undulations. This indicates deflation subsequent to hearth use. The deflation process must have been fairly gentle, allowing the rocks to settle downward but still remain clustered.

The single Class 2 hearth (Fig. 11) was a shallow, oval pit excavated into the top of Stratum 2. Feature 13 measured 50 by 80 by 7 cm and showed no sign of preparation other than removing dirt to make the depression. The heavily charcoal-stained fill contained pieces of charcoal, some of which were up to 3 cm long and 1-1.5 cm thick. However, because the largest piece of charcoal retained an unburned section of wood, none of the charcoal was submitted for radiocarbon dating. The presumption is that the hearth and its wood are fairly recent.

Pits

Three cultural pits and one possible cultural pit were documented. All were excavated into the geologic gypsum, Stratum 3.

The largest pit, Feature 12, was roughly oval and had a basin-shaped cross section (Figs. 12-13). Its size (2.1 by 2.8 m) and depth (0.8 m into gypsum) clearly mark it as a cultural feature, but the sides were not especially even or smoothly finished, as one might expect. Nor does the interior or periphery contain minor features such as a hearth or postholes. A low spot on the north side may be an entryway. The fill at the time of excavation was Stratum 2 material. Its size is commensurate with a large storage pit or a small pit structure, like those at the Fox Place, southwest of Roswell (LA 68188; Wiseman 1991b). However, the inward-sloping sides and uneven nature of the sides and bottom (in part due to rodent intrusion) differ significantly from those of the pits and structures at that site, and the function of Feature 12 can only be surmised.

The medium-sized pit, Feature 8, was an elongate oval with a basin-shaped cross section (Figs. 14-15). Its size (1.15 by 1.55 m) and depth (0.3 m) also clearly mark it as a cultural feature, even though numerous rodent intrusions have destroyed sections of the sides. The sides are not particularly smoothed, but the bottom is. No minor features were found, and the fill was Stratum 2. However, density plots of artifacts (lithic debitage, etc.) indicate a strong concentration of cultural items in and immediately around the pit. Extramural pits such as this one were frequently used as trash dumps after they were abandoned. Feature 8 was presumably used for storage, but its size and long shape would also have been useful as a one-person structure to get out of severe weather.

A smaller pit, Feature 7 (Fig. 16), was next to the Feature 6 hearth. It was not completely excavated because the eastern end extends outside the right-of-way. Prior to post-occupation rodent intrusion, it may have been an elongate oval or perhaps rectangular. The sides were more or less vertical, and the bottom was flat. It measured 50 by 32 cm and 33 cm deep. Its presumed function was storage.

The four smallest pits (Features 3, 4, 10, and 11) were found in the north half of the site (Figs. 17-19). The plan shapes are oval, rectangular, and triangular. The sides, where not destroyed by rodent burrowing, were more or less vertical, and the bottoms were slightly concave. The sizes and depths into gypsum were fairly uniform: Feature 3, 22 by 23 by 35 cm (oval); Feature 4, 23 by 25 by 30 cm (squarish); Feature 10, 38 by 40 by 35 cm (heart-shaped); Feature 11, 30 by 39 by 25 cm (oval). No charcoal, artifacts, or other cultural materials were in the pit fills. If these pits were cultural, their size is commensurate with small pits used in the Southern Plains for caching lithic materials and artifacts (Wiseman 1994b).

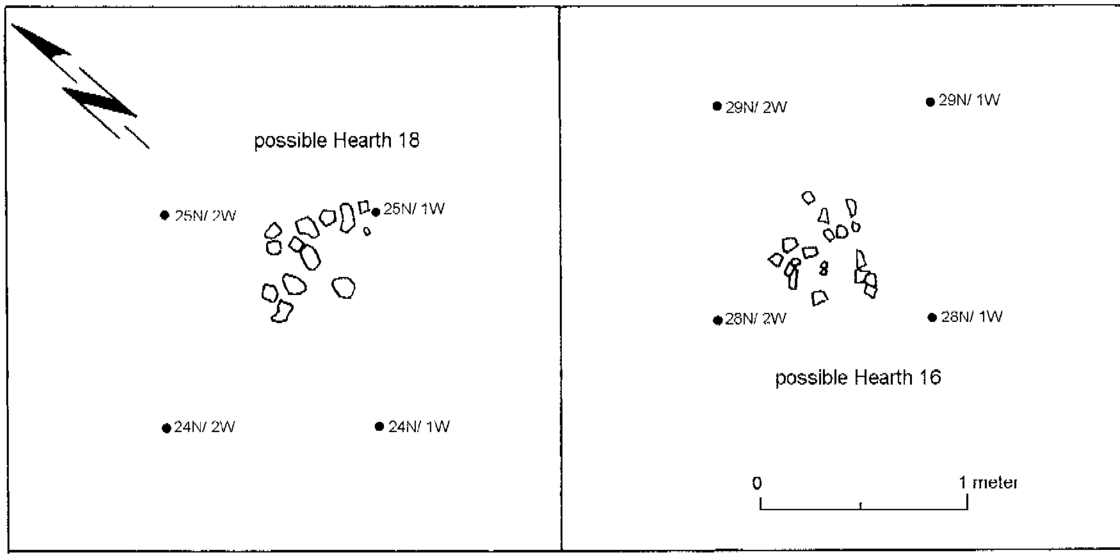

Figure 10. Possible rock hearths (Class 1), LA 75163.

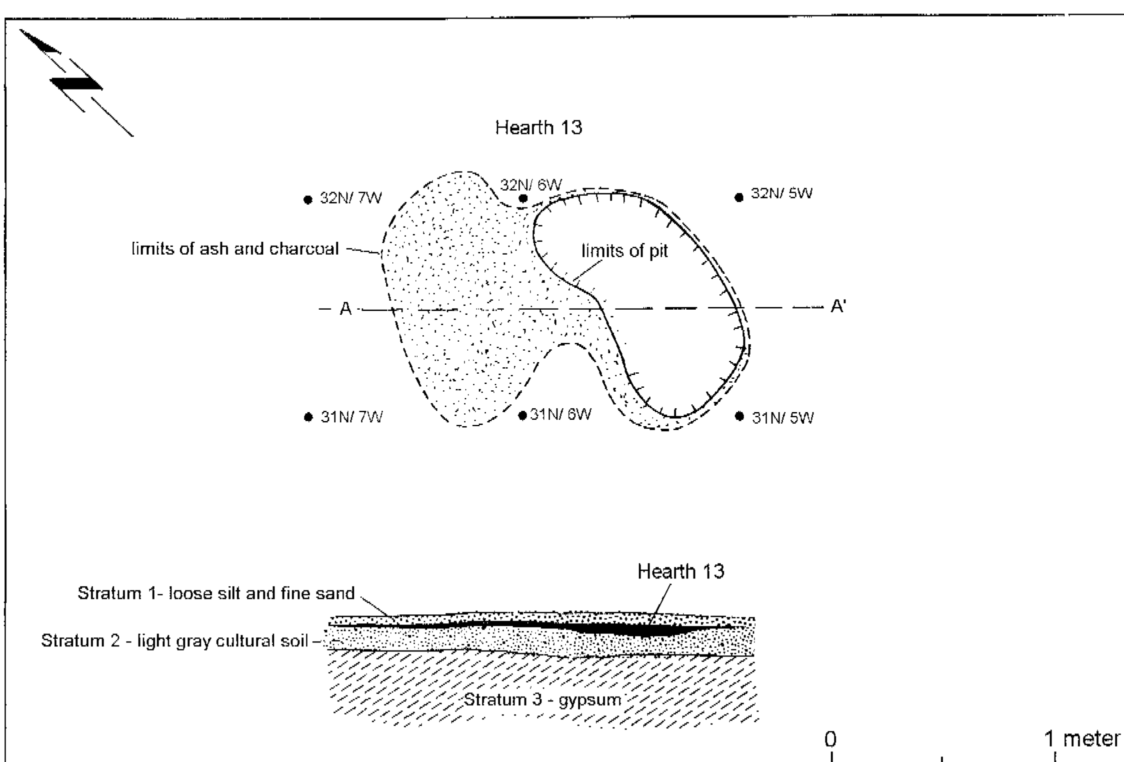

Figure 11. Class 2 hearth, LA 75163.

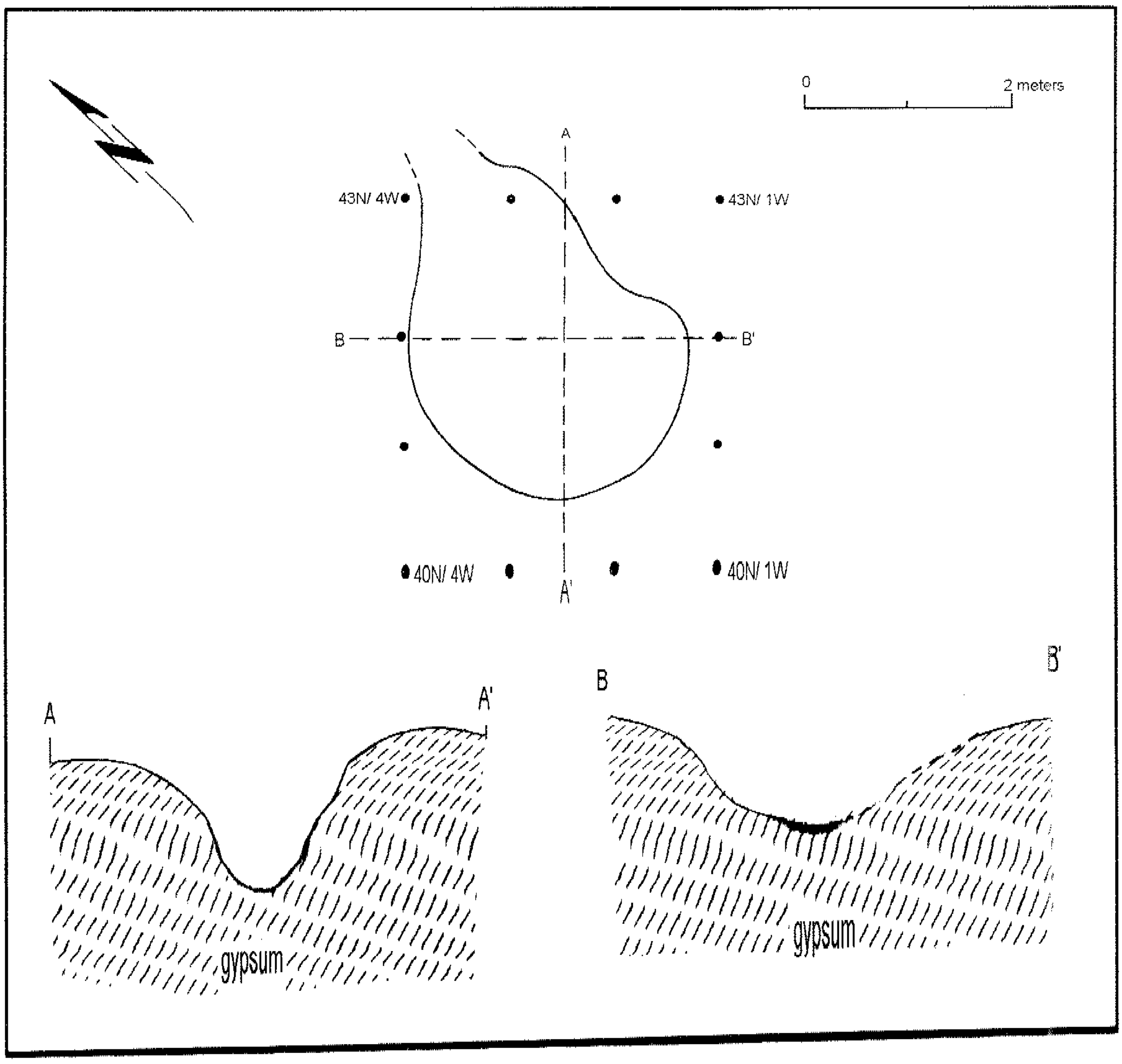

Figure 12. Plan view, Feature 12, possible structure, LA 75163.

Figure 13. Feature 12, LA 75163.

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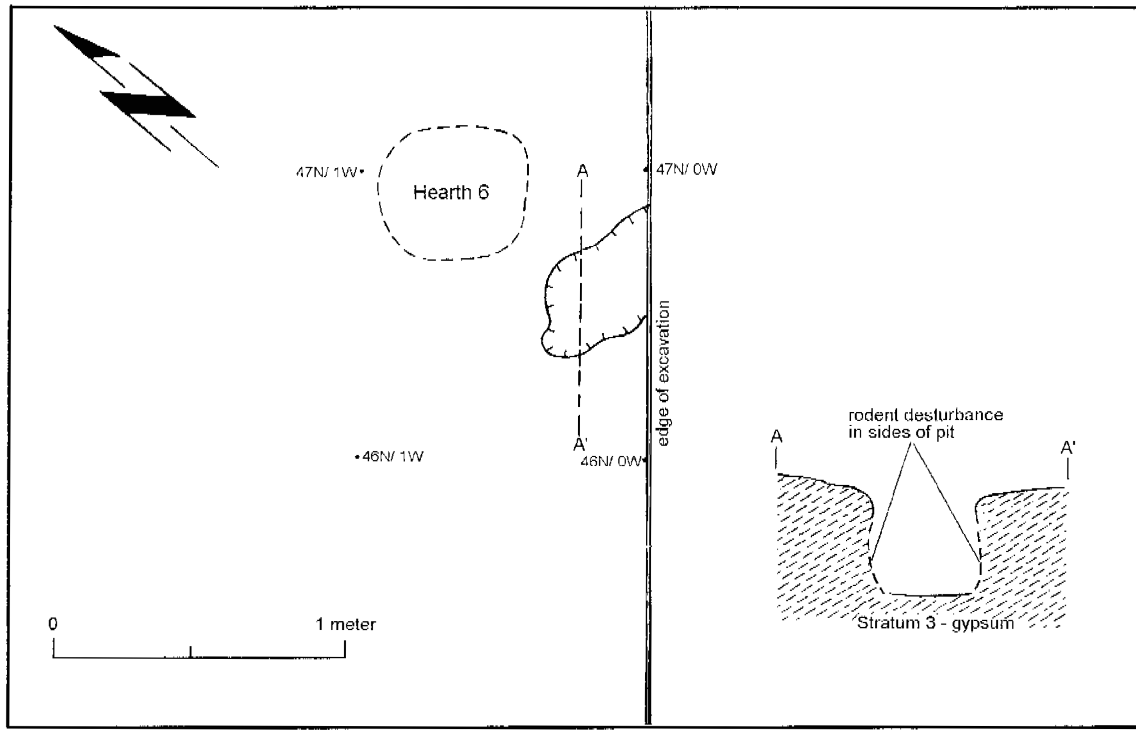

Figure 16. Small storage pit, Feature 7, LA 75163.

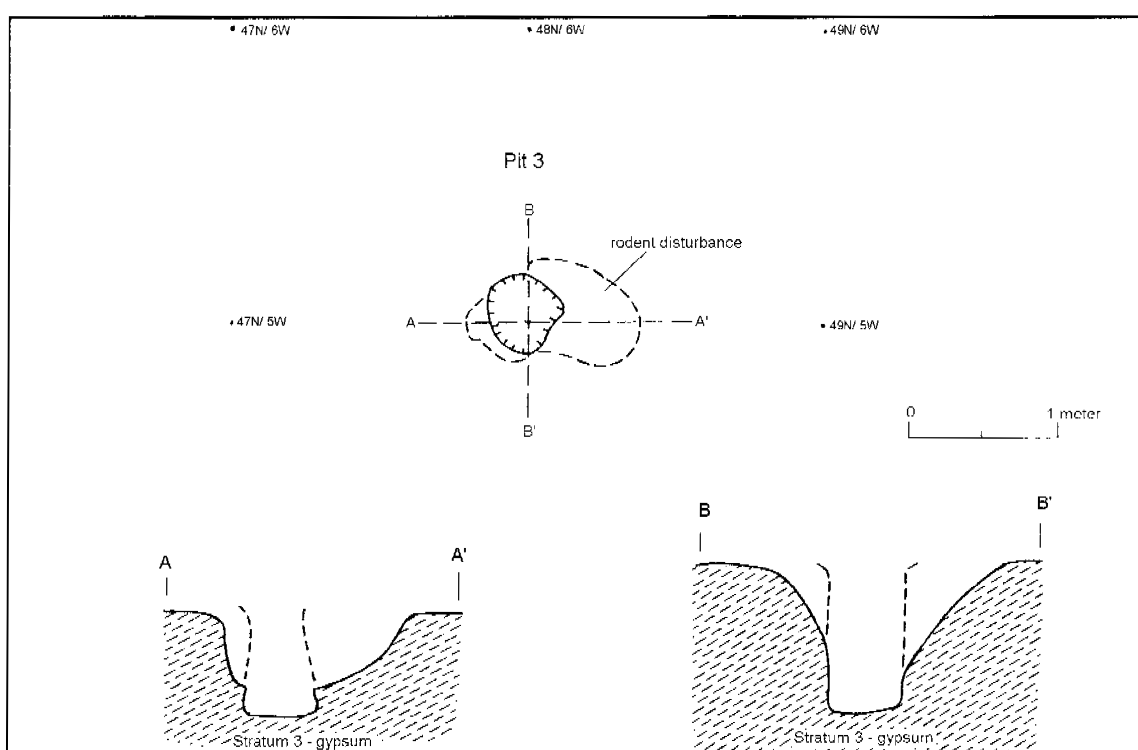

Figure 17. Small cache pit, LA 75163.

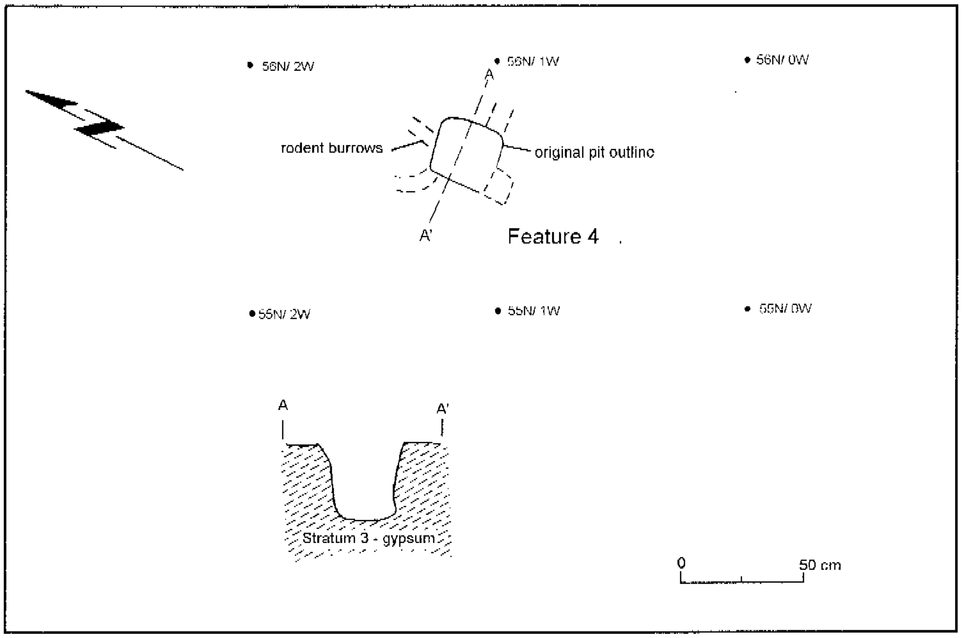

Figure 18. Feature 4, LA 75163.

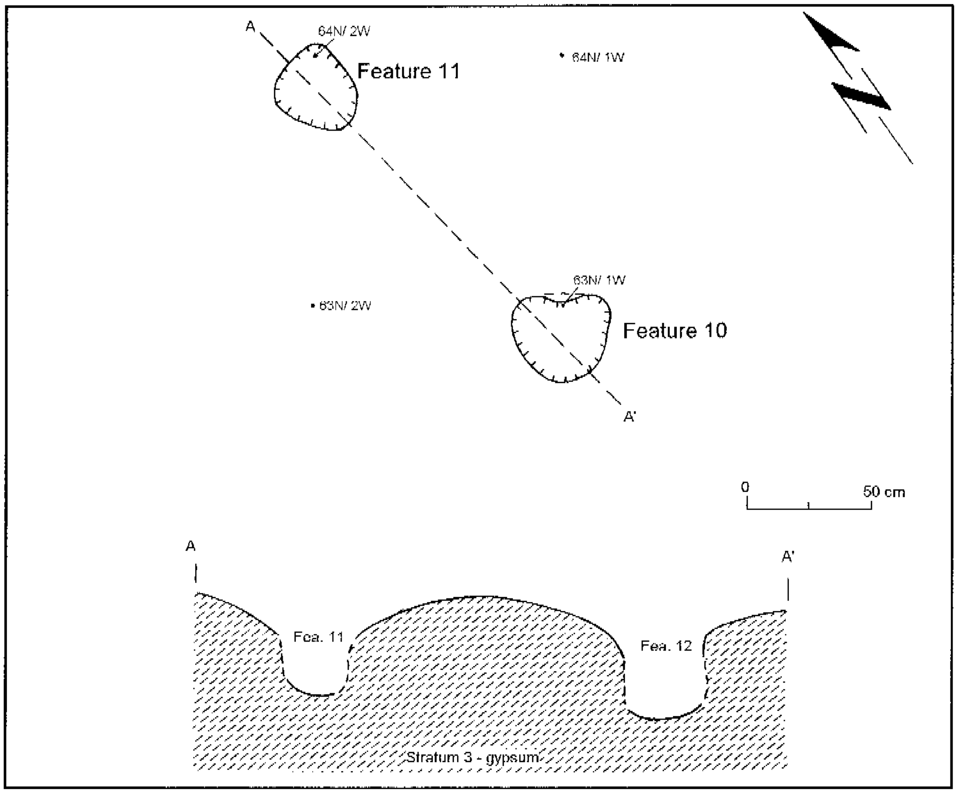

Figure 19. Features 10 and 11, LA 75163.

Positive identification of Features 3, 4, 10, and 11 as cultural features is difficult for two reasons. Rodent burrows intruded all of them and distorted or destroyed major sections of the sides and openings. This is not surprising, since all four were in the part of the site where rodent intrusion was most obvious. One very tenacious kangaroo rat was ultimately dispossessed of his home by our excavations. However, these possible pits differ from the more obvious rodent burrows at LA 75163 in that the readily identifiable burrows angle steeply and penetrate deeply into the gypsum. The rodent tunnels exiting Features 3, 4, 10, and 11 do not, further suggesting that the pits are cultural features.

Enigmatic Feature

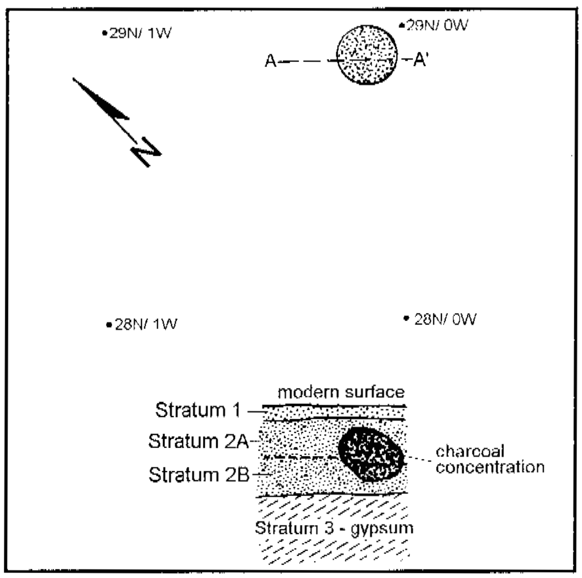

Figure 20. Charcoal concentration, LA 75163.

A pocket of heavily charcoal-stained soil (Feature 15, Fig. 20) in Sq. 29N/0 is of uncertain derivation, especially since this was the only heavily charcoal-stained soil encountered in our excavations. We suspect the fill represents a burrow that was backfilled with cultural fill when the rodent penetrated a hearth lying just across (outside) the right-of-way fence. This spherical feature was 20 cm in diameter, and the top was 10 below the modern ground surface. A charred goosefoot seed and an unidentified charred seed were recovered from this fill (see McBride, this volume).

Cultural Debris Scatters

The distributions of four types of cultural debris are important to our understanding of site structure in the area excavated.

Fragments of burned rocks were commonly noted at the site. Virtually all rocks came from Stratum 2, and 75 percent or more were from the lower half of that stratum. Although burned rocks were common, their distribution across the site was by no means even. Some areas were entirely devoid of them, even though other types of cultural debris (lithic debitage, pottery) were present (Fig. 21).

The single most important factor in the distribution of burned rock appears to have been the location of rock hearths. Where rock hearths and possible rock hearths are present, the concentration of scattered burned rocks is highest. Where hearths are absent, burned rocks are generally absent or very thinly scattered at best.

It is also interesting to note that cultural features other than rock hearths are in areas generally devoid of burned rock. Pit Feature 12, in the central part of the excavated area, lies between two major concentrations of burned rock, yet it had virtually no burned rock in the fill overlying it, and its lower fill contained perhaps three burned rocks total.

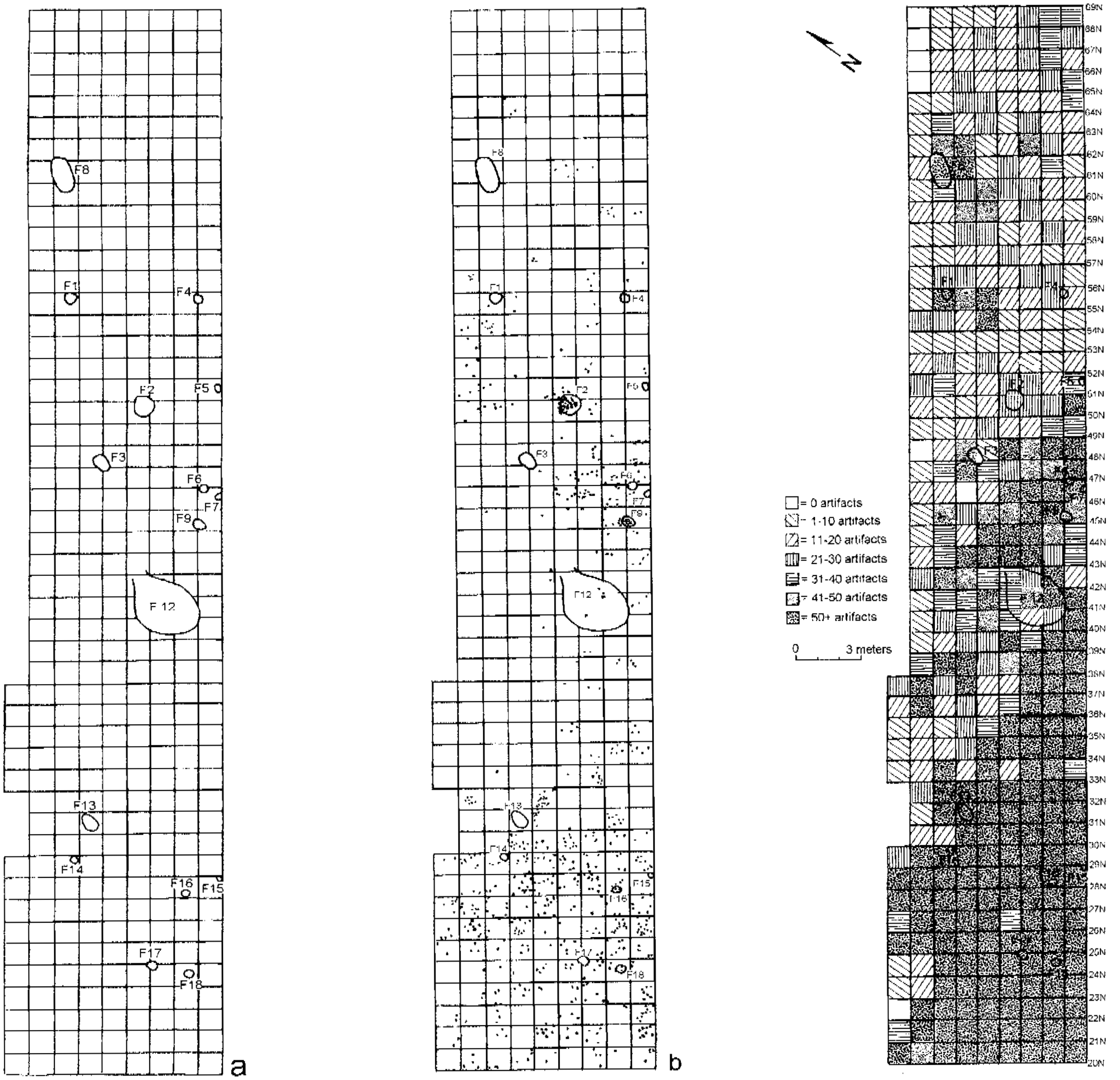

Figure 21. Features (a) and burned rock distribution (b) relative to lithic debitage (c), LA 75163.

Cultural items, dominated by lithic chipping debris, were also differentially distributed across the excavated area (Fig. 21). The distribution was characterized by one major, one medium, and three small concentrations. The major concentration was in the south end of the excavated area (between 20N and 42N), where it clearly extended eastward into unexcavated deposits. The medium-sized concentration is in the central part of the excavated area between 42N and 51N.

The small concentrations, in the northern half of the excavated area, were centered as follows: around Feature 1, a rock hearth; around Feature 8, a pit, and in the northeast corner of the excavated area, where it extended eastward into unexcavated deposits. All of these concentrations, except the one in the northeast corner, were associated with burned rock.

Pottery was far less common than burned rock or lithic chipping debris. Its distribution, however, very closely paralleled that of the lithic debris (Fig. 22). Concentrations were heaviest in the southern half of the excavated area, and a small concentration was present at Feature 8.

By way of contrast, pottery was absent in the northeast corner of the excavations and at Feature 1, two minor but decided concentrations of lithic debitage. Another small concentration of pottery was found in and near Sq. 59N/2W, where lithic debitage and burned rock were nearly absent.

Formal artifact fragments were the least common group of cultural items (N=89), yet their distribution generally corresponded with the distributions of the lithic debris and the pottery (Fig. 23).

Cultural Materials

Over 21,000 artifacts were recovered, all but a few dozen coming from the excavations. The vast majority are chipped lithic debris (N=21,000), with far fewer sherds (N=125), chipped stone artifacts such as projectile points, scrapers, drills, and bifaces (N=63), pieces of grinding stones (N=30), and miscellaneous artifacts (N=4). These are described below in their presumed primary or intended function domains. Descriptive data on individual formal artifacts can be found in Appendix 1.

Although there is always some danger inherent in arranging artifact descriptions in morpho-functional categories, we believe that intended function—rather than impromptu secondary and tertiary uses—are the determinants of artifact form and signal the main uses envisioned by the makers. We also believe that the presence of specific artifact classes in a site are the key to understanding site function or, at the very least, anticipated site function. Artifact descriptions organized according to functional categories also facilitate discussions and interpretations of site function and use of the landscape by the occupants of the sites.

Hunt-Related Artifacts

Projectile Points

The 22 projectile points form one of the most fragmented assemblages we have seen (Fig. 24). Only one point is complete, over half are represented only by the stems, and one is represented by only an "ear."

Projectile point styles range from Early Archaic to late prehistoric. The Archaic forms are more numerous (17 artifacts for every 5 late prehistoric forms). The more complete specimens have been tentatively assigned type names according to Turner and Hester (1993): Baker-like (Early Archaic), Bandy-like (Early Archaic), Ellis-like (Middle to Transitional Archaic), Marcos-like (Late to

Transitional Archaic), Scallorn-like (early late prehistoric), and Harrell-like (late late prehistoric). A single specimen may be either an Ellis or a Hueco style (MacNeish and Beckett 1987). Many of the less diagnostic, more fragmentary points have stem forms that are more common to the Late and Transitional Archaic periods.

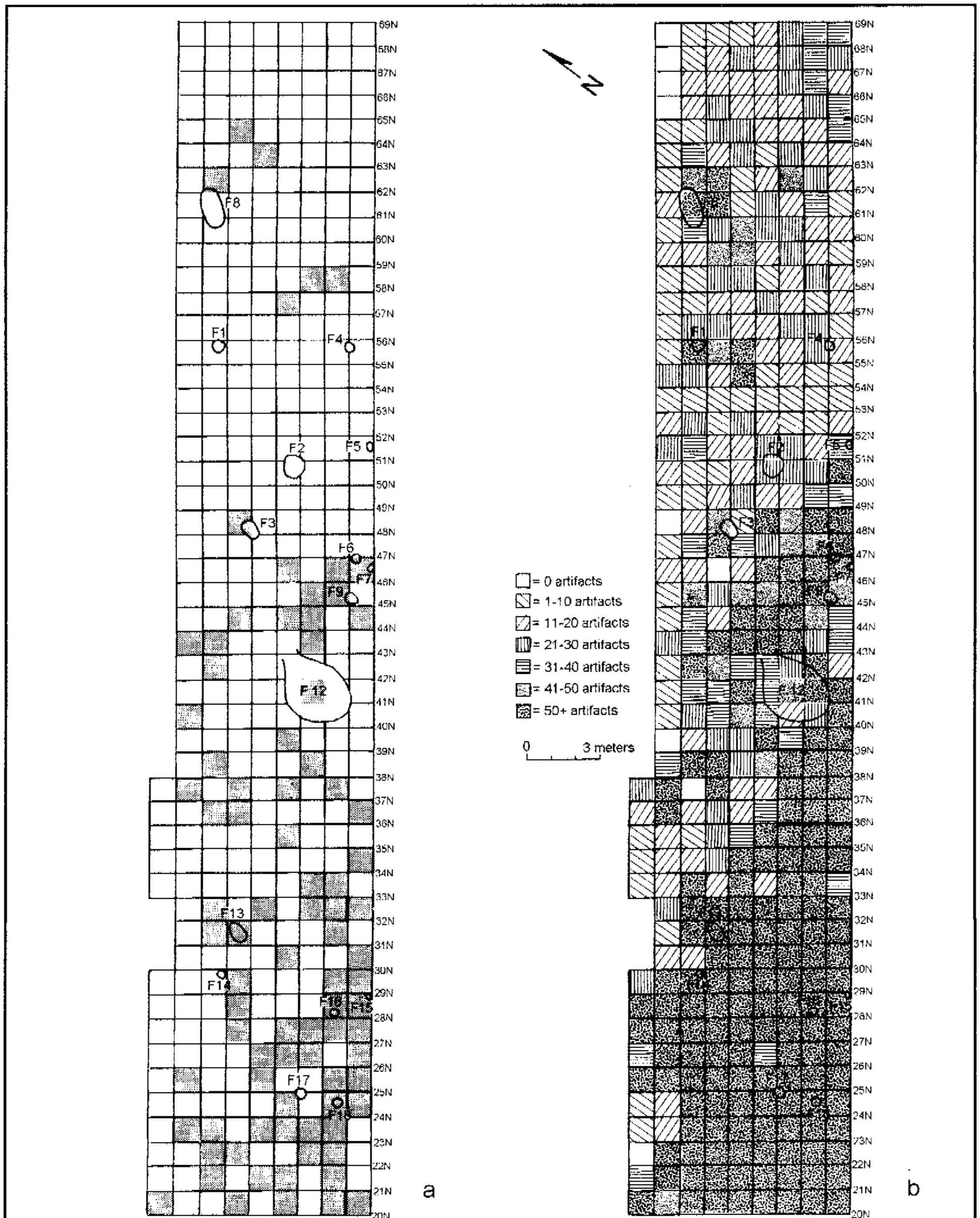

Figure 22. Pottery distribution (a) relative to lithic debitage (b), LA 75163.

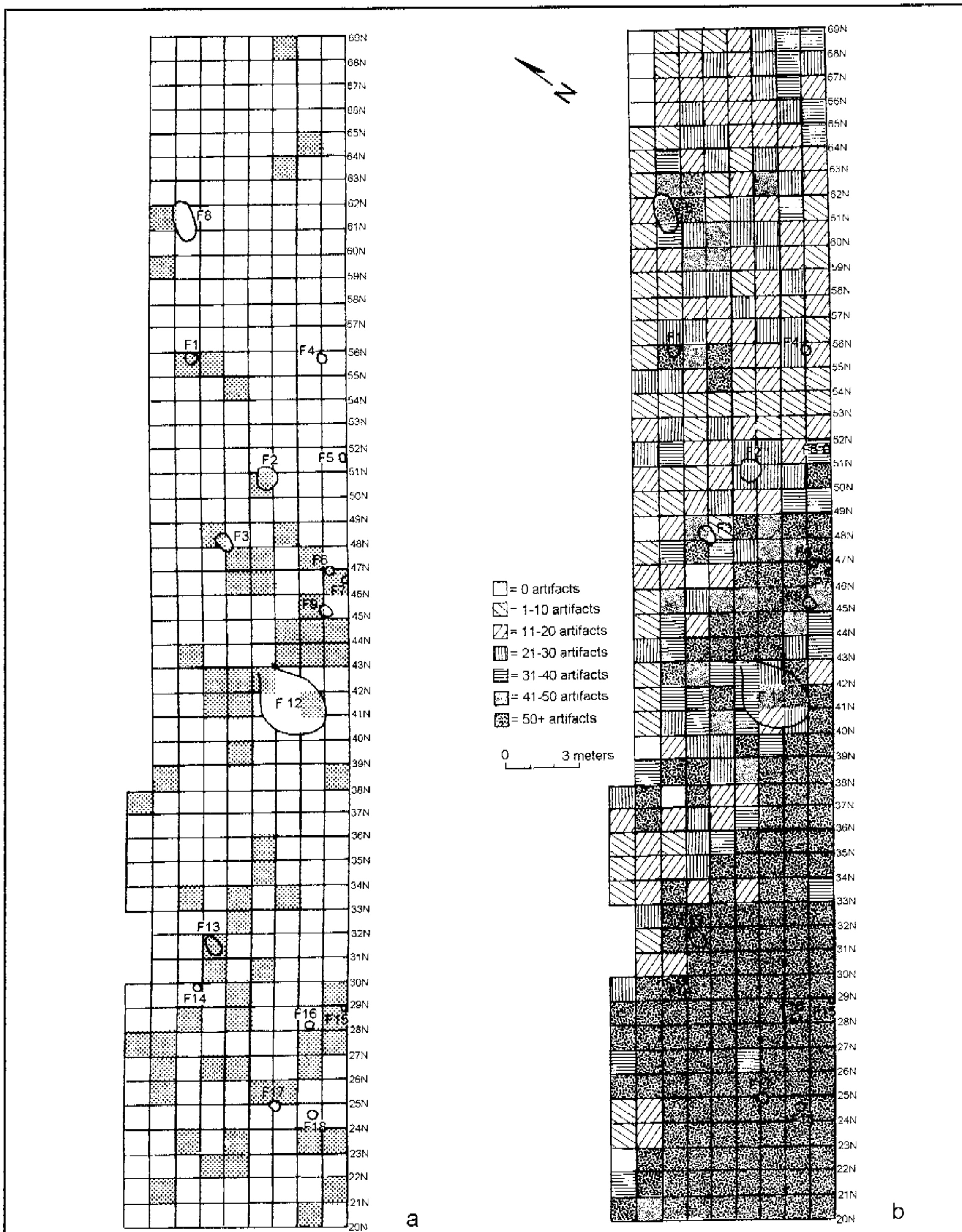

Figure 23. Formal artifact distribution (a) relative to lithic debitage (b), LA 75163.

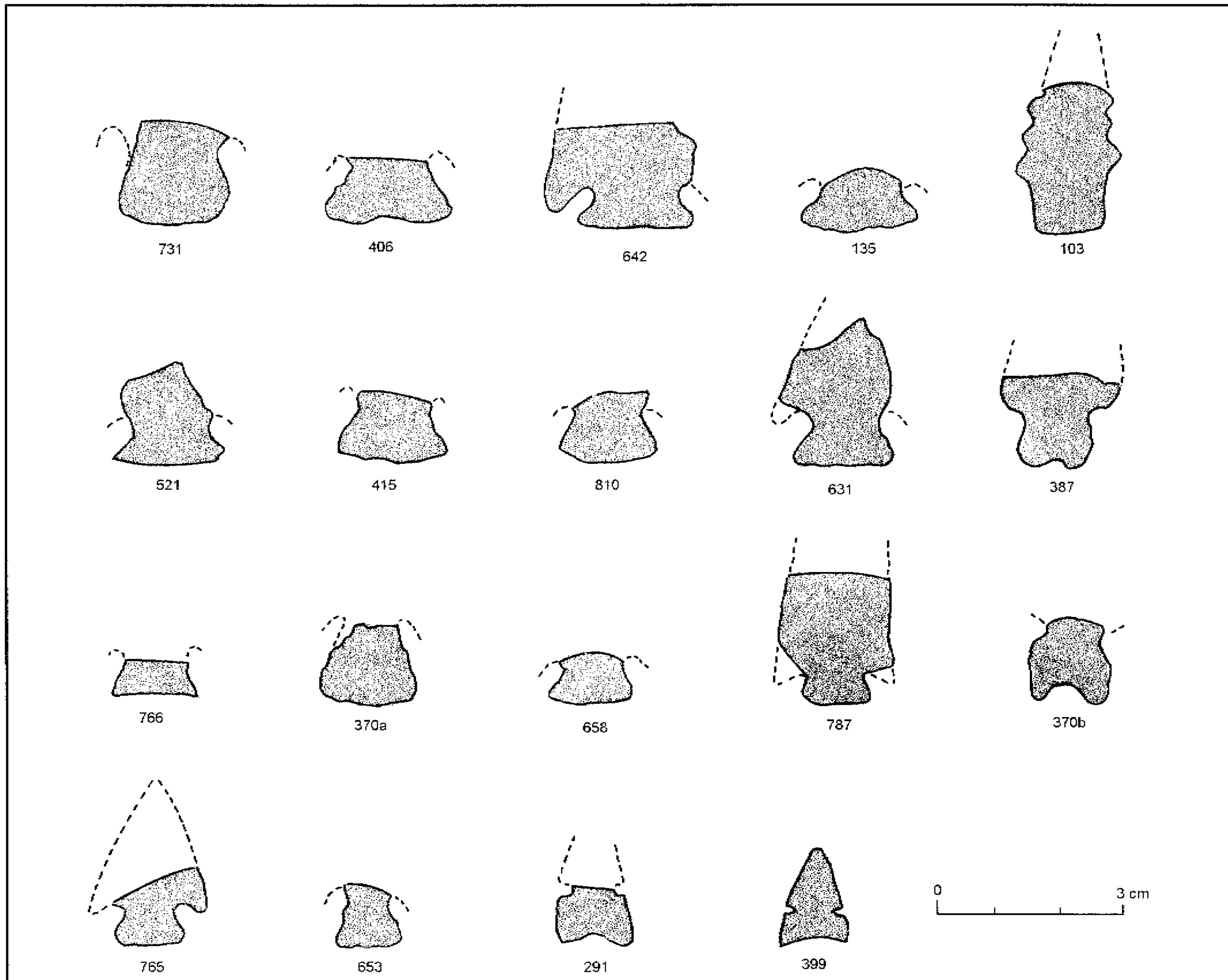

Figure 24. Projectile points, LA 75163.

Researchers have noted for some time that Archaic points in southeastern New Mexico are frequently small compared to those in surrounding regions. The situation is further complicated by the fact that some styles (e.g., those with corner notches) are commonly found among dart and arrow points. Accordingly, archaeologists have developed several techniques for assigning points to one category or the other. Here we follow Katz and Katz (1985a), who use the "neck width," or narrowest part of the stem, as the prime determinant. Their groups are as follows: less than 9.0 mm, late prehistoric (basically arrow points); 9.0 to 14.0 mm, Transitional Archaic; 13.0 to 16.0 mm, Late Archaic; 16.0+ mm, Middle Archaic and earlier. The overlap between 13.0 and 14.0 mm for the Transitional and Late Archaic points illustrates that we are dealing mainly with a continuum, rather than discreet categories.

The results of the style assessments and neck-width measurements of the Bob Crosby Draw points are interesting. In terms of neck-width, 15 points fall within the Archaic range, and 5 fall within the arrow point range. The points represented by an "ear" and small blade fragments are not included. Of those in the Archaic range, one is Late Archaic, three are Late/Transitional, and ten are Transitional. It should be noted that the neck widths of both Early Archaic–style points (Baker-like 387 and Bandy-like 406) fall within the Late/Transitional Archaic overlap range, thereby raising the question of which classification system (measurement or style), if either, is correct.

The lithic materials represented in the projectile point assemblage are cherts of various colors (N=20) and chalcedonics (N=2). All but four are probably local materials. The exceptions are one corner-notched dart point of Edwards chert (631), one corner-notched dart point of possible Tecovas chert (642), one "ear" or barb of a corner-notched dart point of Alibates material (369), and one side-notched arrow point of possible Edwards chert. Seven chert points (33 percent) were heat treated.

Scrapers

The nine scrapers recovered from Bob Crosby Draw are all forms common to the bison-hunting cultures of the Southern Plains during the late prehistoric period (Fig. 25; Boyd 1997). Because of this similarity, we assume that these scrapers were used primarily in animal-hide preparation. Five specimens are end scrapers, three are side scrapers, and one is a combination end/side scraper.

Three of the five end scrapers are complete and range from 29 to 35 mm long, 19 to 32 mm wide, and 8 to 11.5 mm thick. Four are cherts and siltites that we presume are local in origin. One, a working-edge (distal end) fragment, is possibly Edwards chert.

The one end/side scraper is complete and measures 48 by 28 by 9 mm. The form is classic for the Southern Plains, and the material is Tecovas chert.

The three side scrapers are complete; lengths range from 37 to 65 mm, widths from 33 to 39 mm, and the thicknesses from 12 to 19 mm. Materials, including cherts and quartzite, are presumed to be local in origin.

Plant-Food-Related Artifacts

Grinding stones (manos and metates) were fairly common in the deposits, but all specimens are fragmentary. Many display signs of burning, probably because they were used as hearth stones after they broke. Descriptive data are in Appendix 1.

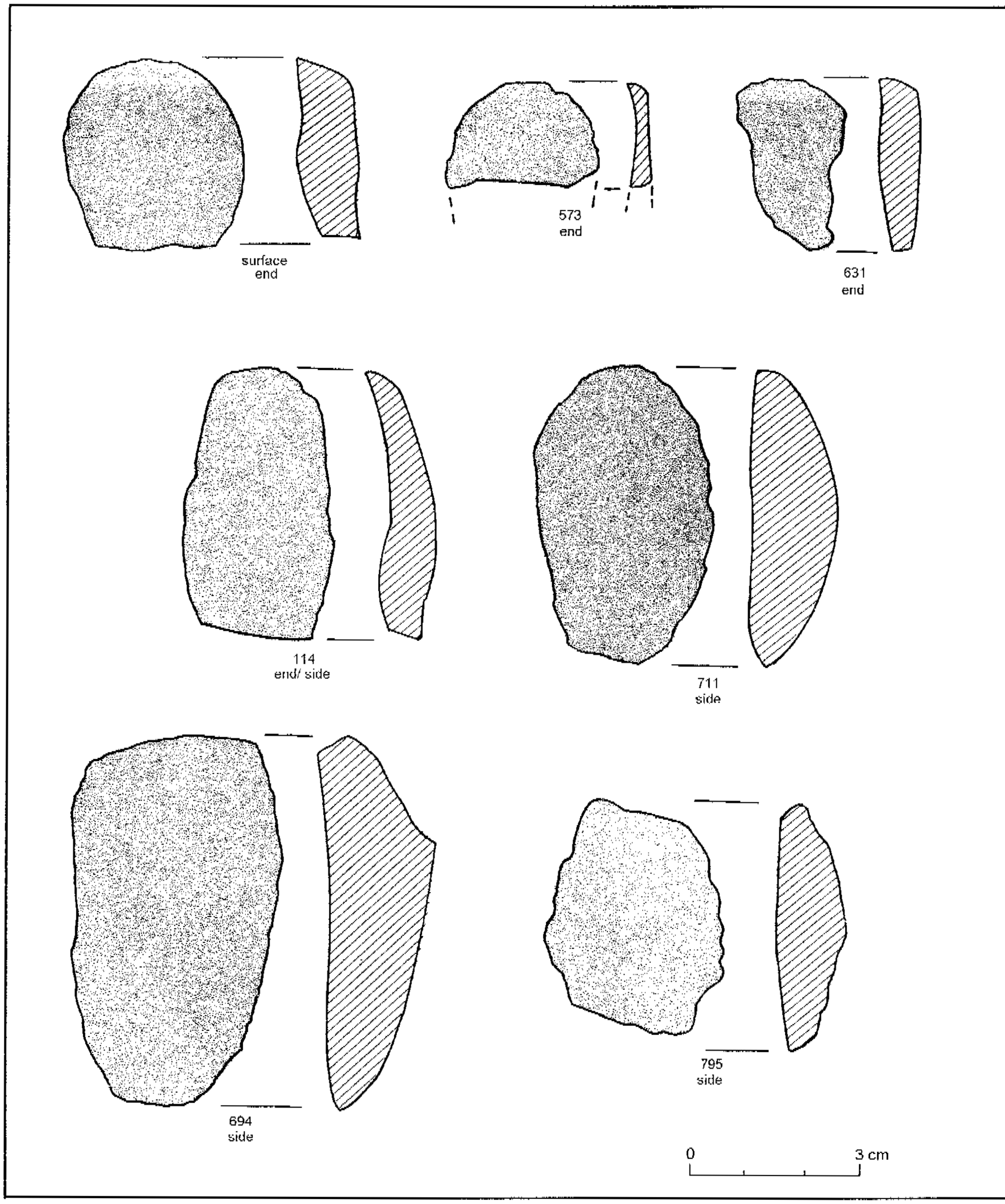

Figure 25. Scrapers, LA 75163.

One-Hand Manos

The nine fragments are all from one-hand manos. Since they are made from cobbles and rock slab fragments of various shapes, usually with little modification other than the grinding surface(s), the primary classification is the number of grinding surfaces (one surface N=6); two surfaces N=3).

Development of the grinding surfaces (amount of wear) varies from minimal to major, with an essentially equal representation of both. Only one of the manos, a single-grinding-surface specimen, has a faceted grinding surface (i.e., two facets comprising a single grinding surface).

Because all manos are fragmentary, complete dimensions are not possible; however, an impression of the overall minimal sizes can be gained from an examination of the various ranges: length, 31 to 97 mm; width, 55 to 99 mm; and width, 25 to 48 mm. Materials include sandstone (N=7), quartzite (N=1), and limestone (N=1).

Basin Metates

The 21 metate fragments are quite small on average, and only two are large enough to reveal critical information on the nature of complete specimens (Fig. 26). Both fragments indicate that the metates are so-called "travel" basin metates in that they are small, thin, lightweight, and readily portable. This was accomplished by selecting thin slabs and edge-trimming them by chipping or pecking and grinding to remove excess stone from the peripheries. No cobbles were used in the Bob Crosby Draw metates. The result is a metate with one or two grinding surfaces that cover most or all of the faces up to the edges or to within 2-3 cm of the edges.

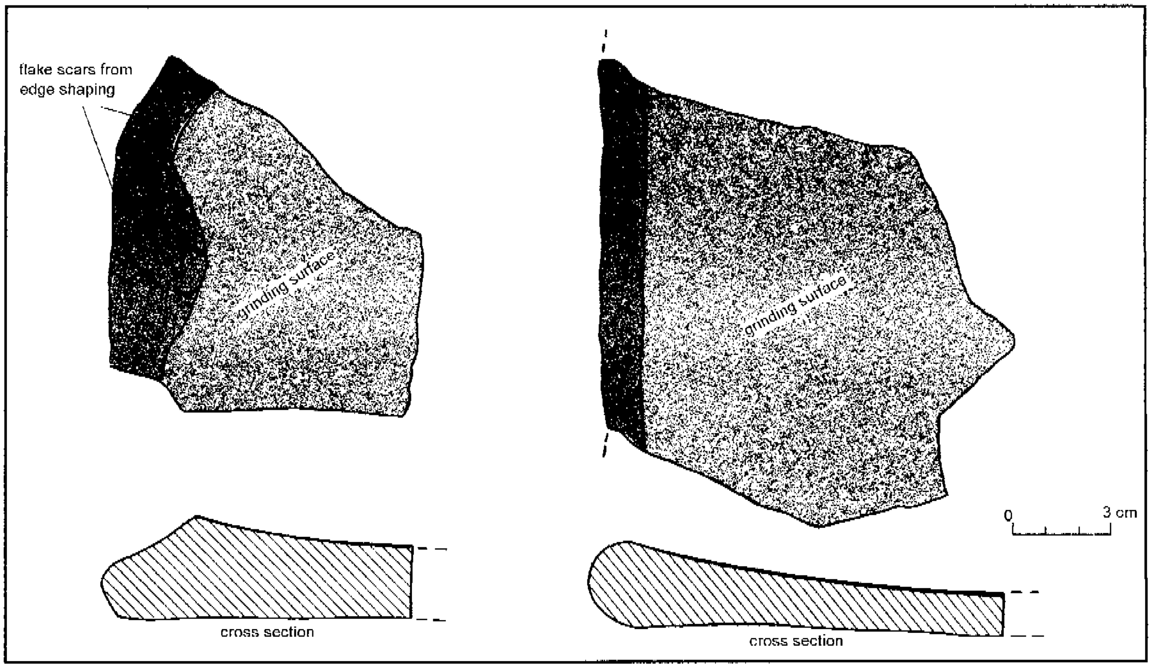

Figure 26. Metate fragments, LA 75163.

As with the manos, documenting complete dimensions is not possible, but an impression of the overall minimal sizes, especially thickness, can be gained from an examination of the various metric ranges: length, 35 to 123 mm; width, 28 to 130 mm; and thickness, 14 to 61 mm. We have no way of deriving the sizes of the grinding basins, but all specimens appear to fall within the general range of complete "travel" basin metates (J. Ross Collection, notes on file with author). Materials include several varieties of sandstone (N=19), limestone (N=1), siltstone (N=1), and an unidentified medium to dark gray igneous (?) rock (N=1).

Manufacture and Maintenance Artifacts

These artifacts are used to make other artifacts, and, in many instances, were probably used for a variety of tasks.

Drills

The two drills are fragmentary, one a proximal end, and the other a midshaft fragment from different artifacts (Fig. 27). The proximal end specimen (818; 55N/4W, 0-36 cm) has an irregularly shaped termination or "wing-tip" to facilitate holding and is made of Edwards Plateau chert. The wing measures 24 by 17 mm, and the shaft is 17 by 10 by 6.5 mm. The midshaft fragment (355; 69N/5W, L.1) is made of light gray chert of presumed local origin and measures 28 by 11 by 10 mm.

Flake Tools

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

In archaeological reporting, items with microscopic use-wear or retouch are usually called "utilized flakes" or "informal tools." Those with macroscopic evidence are usually treated as formal tools and described individually as "side scrapers," "knives," and the like, even if the retouch is restricted to a single edge.

Our philosophy is that all edge-modified flakes (or flake tools), regardless of prominence of wear or retouch, should be classified together. The one exception is the edge-chipped projectile arrow point, which merits treatment as a formal tool (arrow points) because the entire perimeter is retouched.

Because of the problems associated with demonstrating or inferring functions for specific wear and retouch phenomena, we assume that flake tools were used for various cutting and scraping activities.

Flake tools are typed according to several descriptive attributes. The primary focus is on the individual edges bearing use-wear or intentional retouch. The sorting criteria are type (unifaces, bifaces, unifaces/bifaces, and notches—no projections [graver and burin-like tools] were noted); manifestation (use-wear, intentional retouch, or a combination); and edge configuration (straight, convex, concave, sinuous, irregular, and serrated).

Fifty-seven flake-tools have a total of 63 individual edges (Table 1). The number of edges per flake varies as follows: one edge (N=52, 91 percent); two edges (N=4, 7 percent); three edges (N=1, 2 percent). Unifacial edges dominate (N=57, 90 percent), followed by notches (N=4, 6 percent), and bifacial edges (N=2, 3 percent). Use-worn edges (N=44, 70 percent) are the most common, followed by intentionally retouched edges (including two notches, N=18, 29 percent) and combination use-worn and intentionally retouched edges (N=1, 1 percent). Local gray cherts constitute the majority of flake tools (N=29, 50 percent), followed by various intrusives (Edwards chert, Alibates dolomite, obsidian, Tecovas chert, etc., N=16, 28 percent), chalcedony (N=6, 11 percent), and miscellaneous materials (quartzites, silicified wood, palm wood, and other chert; N=6, 11 percent).

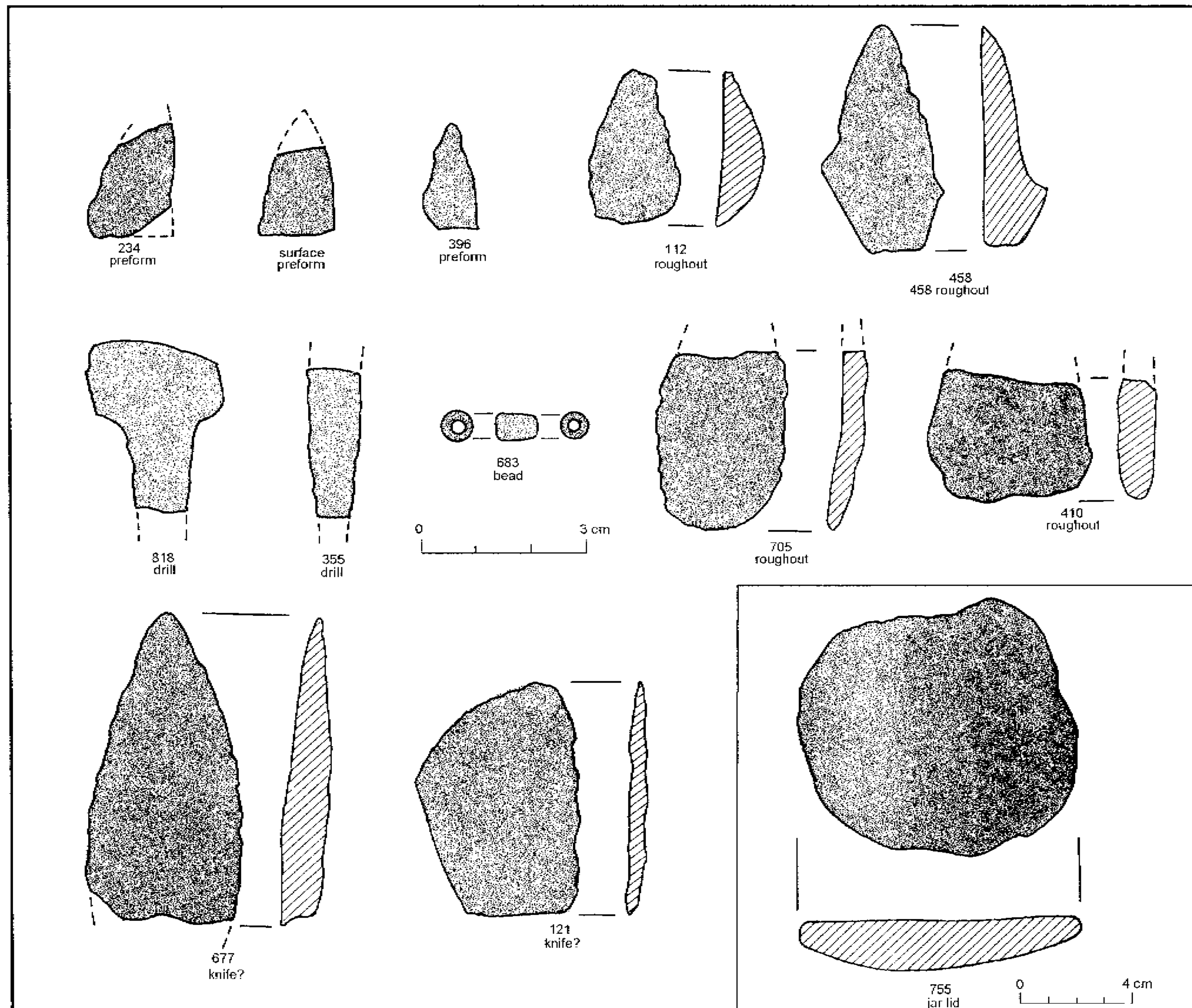

Figure 27. Various artifacts , LA 75163.

Table 1. Flake-tool edge types by use/retouch type, LA 75163

	Use-wear	Intentional Retouch	Combination Use-Wear and Intentional Retouch	Totals
Unifacial:				
straight	25	6	1	32
convex	10	3	-	13
concave	6	3	-	9
irregular	1	2	-	3
Bifacial:				
straight	-	1	-	1
convex	-	1	-	1
Notch	2	2	-	4
Totals	44	18	1	63

The 57 flake tools constitute less than 1 percent of the analyzed sample of lithic debitage (cores, flakes, etc.) from the Bob Crosby Draw site. As an artifact class, the flake tool distribution and density across the site generally correlates with the lithic debitage. In terms of blocks of squares, 32 percent came from the 20s North squares, 30 percent from the 30s North squares, 12 percent from the 40s North squares, 12 percent from the 50s North squares, and 14 percent from the 60s North squares.

Hammerstones

The two hammerstones are made of a liver-colored igneous (?) rock and purple quartzite. The former (571, 32N/5W, L.2) weighs 387 g and measures 84 by 64 by 61 mm. The latter (811, 22N/7W, L.2B) weighs 324 g and measures 77 by 67 by 51 mm. The battering is restricted to the ends of the stones. A number of flakes removed from both may have been used to shape the stones or obtain flakes usable for other purposes.

Knives (?)

Two large bifaces appear to be finished products and may have been used as knives (Fig. 27). Number 121 (55N/4W, 0-36 cm) is triangular and quite thin for its size (42 by 28 by 4 mm); the material is light grayish-tan chert of local origin.

The other (677; 28N/8W, L.2B) is leaf-shaped, somewhat thicker, and made of red quartzite. It measures 56 by 28 by 8 mm. Although it lacks edge-beveling, 677 is of the general size and shape of the Harahey or beveled knife so common to late prehistoric and early historic bison-hunting Plains groups (Turner and Hester 1993).

Facilities-Related Artifacts

Jar Lid

A roughly disk-shaped, plano-convex piece of "dirty" sandstone (755; Fig. 27; 24N/0W, L.2) would have worked well as a jar lid for Chupadero ollas. The convex surface appears to have been the natural exterior surface of a cobble. The flat surface was probably originally a natural cleavage plane in the cobble that, either naturally or through design, separated the piece from the cobble. The flat surface and the edges were pecked and smoothed to shape. The item measures 98 by 94 by 18 mm. The item is similar to the so-called Tompiro disks that are believed to have functioned as jar lids (Beckett 1981).

Personal Adornment

A single tubular bead (683; Fig. 27; 28N/0W, L.2A) is made of white travertine or a similar mineral. The hole was drilled entirely from one end, resulting in a tapering drill hole and openings of noticeably different sizes. Its outside measurements are 8 by 5.5 by 5 mm. Opening measurements are 3 and 2 mm.

Miscellaneous Artifacts

Bifaces

Thirty-eight small fragments of bifaces probably represent a variety of tool types and tool manufacturing rejects/casualties. Fragment types include: 1 nearly complete, 13 bases, 5 medials, 15 tips, 3 edge sections, and 1 indeterminate fragment. Only four are large enough to give an idea of their original sizes and shapes, and their functions can only be guessed (Fig. 27). Four others might be arrow point tips, another six might be dart point tips, and two are probably unspecified projectile point medial blade fragments. The functions of the remaining 22 are not known.

All but two fragments are made of cherts and chalcedonic cherts. The two exceptions are chalcedony. Five are nonlocal in origin, including four Edwards chert and one Alibates material. Three are Alibates/Tecovas look-alikes. Fourteen (36 percent) are heat-treated. Two Edwards chert fragments fit together : 649 is from Sq. 28N/0W (L. 2B, 18-30 cm), and 752 is from Sq. 24N/0W (L. 1, 0-5 cm).

Pottery

The pottery assemblage consists of 126 sherds representing nine previously described types, two descriptive types (polished El Paso Brown and one as yet unidentified type), and two residual categories (Three Rivers/Lincoln and undifferentiated brown) (Table 2). All sherds are small, 20 mm on the average, so the analysis focused on type, temper, and vessel form.

An attempt was also made to identify the minimum number of vessels (MNV) represented in each type. Although actual fits between sherds are the ideal way of making MNV identifications, this is rarely possible in most pottery assemblages. However, the use of multiple criteria and careful comparison can often permit identification of sherds that belong to the same vessel at a high level of probability.

The criteria used to make MNV determinations can include temper type; paste color, color patterning (zoning), and texture; presence/absence of slips, slip colors, thickness, presence/absence of crazing; paint type, colors, quality, adherence to vessel, thickness, and evenness of application; presence/absence and quality of surface polish; design style (especially unique or unusual designs) and execution; and vessel form (bowl, jar, etc.).

Table 2. Pottery, LA 75163

Type or Category	Sherds	MNV
Chupadero Black-on-white	44	12
Corona Corrugated	19	7
El Paso Polychrome	16	2 or 3
South Pecos Brown	12	4
Lincoln Black-on-red and Red	11	3
Three Rivers Red-on-terracotta	6	2
Three Rivers/Lincoln	7	3
Jornada Brown	4	2
Polished El Paso Brown	1	1
Playas Incised (locally made)	1	1
St. Johns Black-on-red or Polychrome	1	1
Viejo period sherd (from Casas Grandes region, Mexico)	1	1
Undifferentiated brown	3	-
Totals	126	39 or 40

As usual, the MNV exercise here can only be considered partly successful. Not all sherds could be assigned to a particular vessel and are counted as residual. The results show that a surprising number of vessels (N=38 or 39) was used/discarded in that part of the site we excavated.

Chupadero Black-on-white

Forty-four sherds (one-third of the sherd assemblage) and 12 vessels (one-third of the MNV assemblage) belong to this type. Generally speaking, all fit the type descriptions quite well, though as usual, a certain amount of variability does occur (Hayes et al. 1981; Hayes 1981; Kelley 1979; Wiseman 1982).

The main criterion for assigning sherds to this type is the treatment of the undecorated surfaces. If a sherd has the typical scraping, it is typed as Chupadero. It is possible that A. J. Jelinek would type some of the sherds to Crosby Black-on-gray and Middle Pecos Black-on-white, but I have yet to be convinced that these types are both valid and useful. I suspect that Jelinek has simply singled out some of the variability inherent in a parent type (Chupadero) that was made over a large region and, as might be expected, embodies a wide variety of clays, slips, etc. Accordingly, I do not accept Jelinek's (1967) idea that Crosby and Middle Pecos were the progenitors of Chupadero.

The primary tempering materials in the Chupadero from Bob Crosby Draw are crushed sherd and crushed aplite (Capitan "granite") (Table 3). A few other materials are also present, including some that may have been made at central New Mexico sites like Gran Quivira and Pueblo Colorado. For instance, the indeterminate body sherd from Sq. 30N/5W (Stratum 2A) with sparse, fine sherd and caliche in a light gray paste, is reminiscent of Chupadero made at Gran Quivira. And the three sherds belonging to Bowl 1, with their fine, sintered and unsintered sherd temper, are reminiscent of pottery made at Pueblo Colorado. These last sherds came from Sqs. 26N/0 (S. 2), 28N/1W (S. 2A), and 32N/2W (Stratum 1).

Table 3. Tempering materials and proveniences, Chupadero Black-on-white, LA 75163

Temper	Number	Provenience *
Sherd only	12	22N/6W, 2A (N=2) 22N/4W, 2B 24N/3W, 2 24N/4W, 1 26N/4W, 1 29N/5W, 2B 30N/5W, 1 31N/3W, 1A 32N/1W, 1 47N/1W, 1 63N/6W, 2A
Aplite only	9	22N/3W, 2A 23N/1W, 2B 23N/2W, 2B 23N/5W, 2 24N/6W, 1 25N/0W, 1 28N/0W, 2B 45N/0W, 2A 46N/1W, 2B
Sherd and aplite	10	23N/6W, 2A 24N/7W, 1 26N/0W, 2 26N/1W, 2 27N/0W, 2A 34N/1W, 2A 34N/2W, 2A 36N/3W, 2A 42N/2W, 2B 59N/1W, 2
Fritted sherd and sherd	4	26N/0W, 2 28N/1W, 2A 28N/2W, 2B 8N/8W, surface
Sherd and caliche	2	30N/5W, 2A 59N/2W, 1
Sherd, caliche, and aplite (?)	2	31N/0W, 2 35N/0W, 2A
Sherd and gray feldspar	1	27N/0W, 1
Fine sherd and rock	1	Feature 13 fill
Fine sherd, rock, and caliche	1	33N/0W, 1 and 2
Fritted sherd and quartz	1	37N/5W, 2
Fritted sherd, quartz, and feldspar	1	44N/2W, 2A
Total	44	

* proveniences by square, stratum, and substratum

The 12 minimum number of vessels includes 7 bowls and 5 jars. Because the sherds are small and we cannot be certain whether our edge-snip showed the entire variety of tempering materials present in a given sherd, let alone the entire vessel, other criteria such as surface finish and paint were also used to estimate MNV.

Corona Corrugated

All but one of the 19 sherds and one of the seven MNVs belonging to this type are tempered with the quartz mica schist, indicating origin in central New Mexico (vicinity of Gran Quivira; Hayes et al. 1981; Hayes 1981) (Table 4). The exception is tempered with Capitan "granite" (aplite), indicating manufacture in central Lincoln County of southeastern New Mexico. All vessels are presumably from jars, though we have no rims to confirm this.

Table 4. Proveniences of Corona Corrugated, LA 75163

Temper	Number	Provenience *
Quartz mica schist	1	21N/1W, 2A
	1	21N/8W, 2B
	1	22N/6W, 2B
	1	24N/2W, 1
	1	26N/4W, 2
	1	28N/0, 2B
	1	28N/3W, 2
	1	29N/0, 2A
	1	38N/1W, 2A
	1	38N/3W, 2A
	1	39N/2W, 2A
	1	39N/6W, 2
	1	40N/3W, 2
	1	43N/6W, 2B
	1	49N/5W, 1
	1	58N/3W, 2
	2	65N/5W, 2B
Capitan aplite	1	47N/0, 2
Total	19	

* proveniences by square, stratum, and substratum

El Paso Polychrome

Based on thinness (2.5 to 6.0 mm, with all but two being 5 mm or less), all but one of the 17 sherds assigned to this ware are probably El Paso Polychrome. Of the 16 sherds, only one is clearly polychrome. Another eight sherds have traces of red or black pigment, but not both. Temper types are somewhat varied in appearance but are mainly composed of white, off-white, and/or altered feldspars and quartz. One sherd (from 34N/2W, 2A) has both white and gray feldspar, and another (from 33N/4W, 1B) has well-formed white feldspar that may be from Capitan "granite" (aplite). Since MNV is virtually impossible to establish on empirical grounds, I am guessing that two or perhaps three vessels are represented. Jars are the most likely forms, though we have no rims to confirm this. The seventeenth sherd is best described as an El Paso Brown with well-polished surfaces. The temper includes a variety of light-colored feldspars. The sherd represents a single MNV and comes from the lower fill of Feature 12.

Jornada Brown

The four sherds (2 MNV) assigned to this type are not examples of the classic form of the Sierra Blanca-Sacramento mountains. The Bob Crosby Draw examples are somewhat thinner on average (4.5-5.5 mm) and less well polished. The temper is highly variable (white and gray feldspar, Capitan "granite" [aplite], off-white feldspar and quartz, and quartz mica schist). The one sherd with quartz mica schist temper is from central New Mexico. Temper particles are small and profuse, and the surfaces are fairly well smoothed and polished. Except for the variety of tempers, these sherds are reminiscent of what I have called early Jornada Brown in places like the Bent site (LA 10835; Wiseman 1991a).

South Pecos Brown

The 12 sherds assigned to this type represent four MNV. Temper is variable, as follows: gray feldspar only (N=6), gray and white feldspar (N=2), gray and other feldspar (N=1), other feldspar only (N=1), and off-white feldspar and quartz (N=2).

Three Rivers Red-on-terracotta

Three Rivers Red-on-terracotta is represented by six sherds and an MNV of two bowls. Tempering materials include Capitan "granite" (aplite) and a crushed rock composed of off-white feldspar and gray feldspar.

Lincoln Black-on-red.

Lincoln is represented by 11 sherds and an MNV of three bowls. All sherds have reddish interior surfaces (10 R 4/4, weak red, according to Munsell) and orange-red pastes. Exteriors are gray or the same color as the interior surfaces. Tempers include Capitan "granite" and white, off-white, and gray feldspars. The one sherd with painted design is in the Three Rivers style. One vessel clearly lacked a design and probably is best termed Lincoln Red.

Three Rivers Ware

Seven sherds could not be attributed to either Three Rivers Red-on-terracotta or Lincoln Black-on-red.

Playas Incised

The one sherd of Playas Incised has a coarsely ground off-white feldspar and quartz temper and a well-polished, red (10 R 3/4, dusky red) exterior surface. The designs are the incised "rice grain" type. The sherd is from 47N/3W, Level 2

St Johns Black-on-red or Polychrome

One tiny sherd of White Mountain Red Ware has the colors and paint characteristics of St. Johns. The sherd is from 24N/3W, Level 1.

Undifferentiated Viejo Period Type

One small sherd of a bowl with a red-slipped interior has the paste and temper of pottery from

Viejo period contexts in the Casas Grandes region of northern Chihuahua, Mexico (David V. Hill, personal communication, 1994). The sherd is too poorly preserved to permit assignment to a type. The provenience is 22N/3W, Level 2A.

Undifferentiated Brown

Three very small sherds cannot be confidently assigned specific types. Their proveniences are 21N/0W, Level 2A; 34N/2W, Level 2B; and 45N/5W, Level 2A.

Distribution of Selected MNVs

The identification of sherds belonging to specific vessels (determination of MNVs) has several advantages. One is that we can get a more accurate idea of the actual number of vessels represented at the site. It is important from several standpoints (for instance, intensity of exchange, degree of reliance on pottery, mobility, etc.) to know whether 50 sherds represent a few vessels or many vessels. Another is that we can get an idea of the relative amount of disturbance that has taken place in the site deposits. This can be especially important in sites with deep deposits. A third advantage is that we can assess the distribution of sherds from specific vessels for potential insights into the relationships among different areas of the site.

It is this last possibility—using MNVs to assess relationships among different areas within the site—that we pursue here. The goal is to elucidate areas of the site that might have been contemporaneous, thereby learning about the site structure and, ultimately, something about the social structure of the site occupants. We recognize that this exercise can result in spurious correlations and interpretations because of the potential for postabandonment disturbance and misidentification of vessel sherd memberships.

To initiate the inquiry, we mapped the sherds from those MNVs represented by two or more sherds (Fig. 28). Thirteen vessels are useful in this regard: Chupadero vessels 1, 6, 8, 9, and 10; Corona Corrugated vessels 5, 6, and 7; Three Rivers Red-on-terracotta vessel 1; Lincoln Red vessel 4; Lincoln Black-on-red vessel 5; Jornada-like Brown vessel 2; and South Pecos Brown vessel 1.

Three aspects of the sherd/vessel distributions are noteworthy. First, most sherds and most vessels were recovered from the main site area, between 20N and 42N. This is not surprising, given the density of other cultural remains in this area and the clear indications that this part of the site was a focal point of the occupation(s) and/or refuse disposal.

Second, the sherds of most vessels were recovered from relatively small areas. Most sherds of any particular vessel were within 5 to 10 m of each other. This is what we would expect in the absence of serious horizontal disturbances.

Third, two vessels had widely spread sherds, Chupadero vessel 6 and Three Rivers Red-on-terracotta vessel 1. The Chupadero sherds are spread 16 m apart, and those of the Three Rivers vessel are 23 m apart. The sherd assignments for these vessels could be in error, but it is intriguing to note in both cases that the sherds link the smaller refuse concentration (between 43N and 52N), with two of the smallest refuse concentrations centered in Squares 62N/6W and 68N/1W. While these associations could be incidental, we feel that there is a better than average chance that they are real, and not attributable to vessel misidentification or postoccupational disturbance.

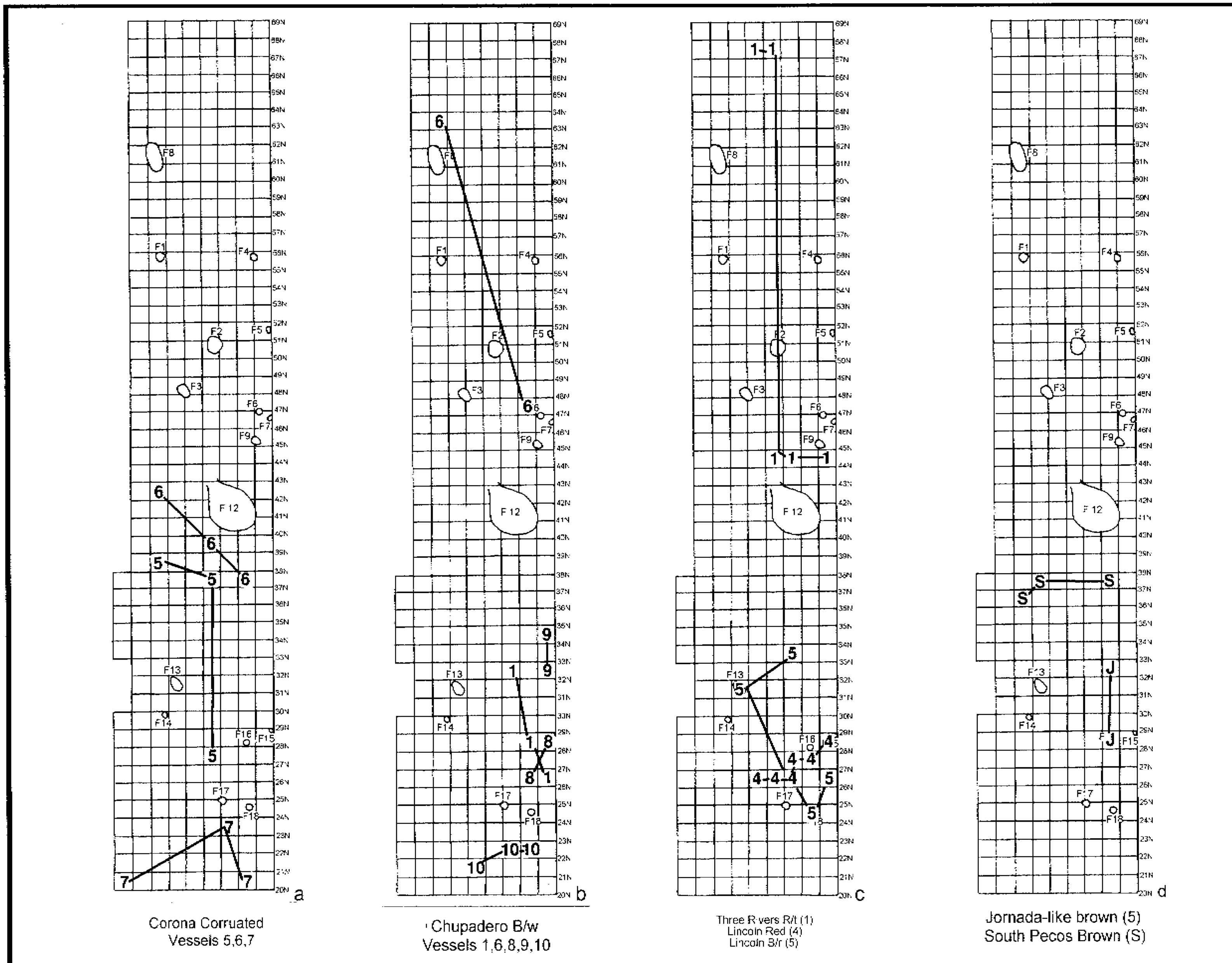

Figure 28. Pottery vessel distributions, LA 75163.

Chipped Stone Manufacture Debris

Lithic manufacture debris—cores, flakes, shatter, and pieces of material—constitutes the bulk of the lithic materials recovered from LA 75163. Of the 21,064 lithics recovered from the surface and excavations, a sample of 9,793 items (47 percent) were analyzed (Table 5). Projectile point rough-outs (early-stage bifaces) and preforms (late-stage bifaces) are also included in manufacture debris because they represent unfinished artifacts.

Table 5. Lithic manufacture debris, LA 75163

Manufacture Debris Category	Number	Percent
Cores:	47	0.5
single platform	10	0.1
two platforms adjacent	7	0.1
two platforms parallel	2	<0.1
three platforms	3	<0.1
tested cobble/pebble	1	<0.1
broken cobble/pebble	1	<0.1
flake core	21	0.2
indeterminate	2	<0.1
Flakes:	8921	91.1
core reduction	4655	47.5
biface thinning	456	4.7
notching	7	0.1
decortication	141	1.4
pot lid	5	<0.1
hammerstone	1	<0.1
possible biface thinning	2	<0.1
indeterminate	3654	37.3
Shatter	817 817	8.3 8.3
Pieces of material *	8 8	0.1 0.1
Totals	9793 9793	100.0 100.0

* unworked raw material units brought into the site by humans

Arrow Point Rough-outs (Early-Stage Bifaces)

This category includes three small bifaces that were probably being developed into arrow points (Fig. 27). These differ from preforms in that they are generally thicker and less well shaped than preforms and therefore represent an earlier stage in manufacture than preforms. The Bob Crosby Draw specimens were discarded because of thinning and/or breakage problems. One (458) retains a large part of the original flake form. The materials are local cherts. Data on individual artifacts are in Appendix 1.

Arrow Point Preforms (Late-Stage Bifaces)

Three small, triangular bifaces are arrow point preforms (Fig. 27). The only complete one is also the smallest (19 by 10 by 4 mm). The materials are varied local cherts, one of which was heat treated. Data on individual artifacts are in Appendix 1.

Knapping Debris

The raw materials and definitions used to classify and analyze chipped lithic debris are described in Appendix 2 and the section entitled Lithic Material Sourcing Study. 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 as flake tools in the section on tools.

Cores

The 47 cores include five subtypes and three residual categories (broken cobbles/pebbles, tested cobbles/pebbles, and indeterminate) (Table 5). The flake core is the most common. Materials are greatly varied but are dominated by the chalcedonies (Table 6).

Table 6. Lithic debitage classes, LA 75163 (N and %)

	Cores	Flakes			Shatter and Other	Site Total
		Core	Biface Reduction Thinning	Other		
Materials						
Local chert	6 13	1566 33	146 32	1360 36	173 21	3251 33
Other chert	6 13	419 9	43 9	364 10	56 7	888 9
Chalcedony	25 53	1498 32	82 18	1293 34	443 53	3341 34
Limestone	-	3 <1	-	-	-	3 <1
Siltite/Quartzite	7 15	749 16	-	240 6	131 16	1127 11
Other	3 6	420 9	185 41	553 14	24 3	1185 12
Totals	47 100	4655 100	456 100	3810 100	827 100	9793 100
Heat treatment						
No	25 53	3628 78	223 49	2961 78	607 73	7444 76
Yes	4 9	228 5	46 10	177 5	46 6	501 5
Possibly	7 15	137 3	13 3	79 2	52 6	288 3
Indeterminate	11 23	662 14	174 38	593 15	122 15	1562 16
Totals	47 100	4655 100	456 100	3810 100	827 100	9793 100

Sizes vary, but on the whole, all are small (Table 7). The longest core, at 91 mm, is 4.5 times longer than the shortest one. However, core weights vary greatly, and the heaviest is over 100 times heavier than the lightest (555.5 g and 5.4 g).

Correlation statistics of core size and weight (Table 8) indicate fairly high standardization of dimensions for all cores as a group. All of the correlation coefficients are in the mid .7s and higher. The highest values, length:width, width:thickness, and thickness:weight, are in the .8s). Given the probability that standardizations of dimensions may in part be imposed by the natural geometry of the pieces of material, correlation coefficients in the .8s and especially the .9s are considered potentially significant from a cultural standpoint.

This position is taken regardless of the actual significance of values assigned by the statistics. We believe that the correlations, to greater or lesser degree, are undoubtedly the result of the natural geometries of the rocks and the presumption that the people were selecting for the blockier examples in the first place.

Not unexpectedly, the correlation values for each core subtype vary from the group values. Only the single-platform cores and the flake cores have sufficient sample sizes for comparative treatment. Interestingly, the correlation coefficients of flake cores are highest for weight:length, weight:width, and weight:thickness. This systematic correlation of weight and dimension is unusual in our experience. It suggests the knapper(s) made a decided attempt to standardize his flake products. If so, it should be reflected in the way he reduced the large flakes into smaller flakes.

Table 7. Summary of core dimensions, LA 75163

Core Type	Length	Width (mm)	Thickness (mm)	Weight (g)
All Cores				
Mean	46.0	36.3	24.6	68.2
Standard deviation	16.9	13.6	13.5	93.4
Range	71.0	59.0	65.0	553.8
Number	44	44	44	44
Flake Cores				
Mean	41.8	30.8	16.5	28.7
Standard deviation	14.0	10.7	7.7	25.9
Range	50.0	42.0	26.0	90.1
Number	20	20	20	20
Single Platform Cores				
Mean	58.1	44.6	36.1	140.3
Standard Deviation	18.8	14.5	13.2	154.8
Range	60.0	46.0	45.0	533.6
Number	10	10	10	10

Table 8. Correlation matrix of core dimensions, LA 75163

Core Type	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
All Cores (N=44)				
Length	1.0000			
Width	.8488	1.0000		
Thickness	.7911	.8591	1.0000	
Weight	.7637	.7930	.8731	1.0000
Flake Cores (N=21)				
Length	1.0000			
Width	.7734	1.0000		
Thickness	.7635	.7708	1.0000	
Weight	.8539	.8887	.8210	1.0000
Single Platform Cores (N=10)				
Length	1.0000			
Width	.7723*	1.0000		
Thickness	.7933*	.8480*	1.0000	
Weight	.7825*	.8327*	.9882*	1.0000

Pearson's r, two-tailed test; significant at .001 unless otherwise specified
* Significant at the .01 level

Regarding single-platform cores, all but one of the coefficients are significant at the .01 level. The exception is the value of .9882 for weight:thickness, which is significant at the .001 level. While the relative tightness of the correlations could be the result of small sample size (N=10), they could also reflect raw material unit selection (selecting for a specific core size) or even the mean upper size limit of raw material units available for use.

Between 9 percent (definite examples) and 24 percent (definite examples plus questionable ones) of the cores show evidence of intentional heat treatment (Table 6). This contrasts with the overall incidence of heat treatment in the lithic assemblage, which ranges from 5 percent (definite) to 8 percent (definite plus questionable).

Core Reduction Flakes

Thirty-one percent (1,429 of 4,655) of the analysis sample of core reduction flakes are complete. Summary statistics of the complete core reduction flakes (Table 9) indicate that, on average, they are small, somewhat longer than wide, and lightweight (1-2 g). A Pearson Correlation matrix (2-tailed test) indicates that the flake dimensions correlate mainly in the .70s. Since we have seen stronger correlation values in assemblages (.80s and low .90s) from other sites in the region, we do not consider the LA 75163 values to be particularly impressive in spite of the statistically high significance level of .001. Thus, we see less standardization (less control) in flake sizes and shapes.

Table 9. Summary statistics of complete core reduction flakes, LA 75163

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	13.2	12.2	3.4	1.4
Standard Deviation	8.0	7.2	2.9	4.2
Range	71.0	50.0	27.0	71.2
Number	1409	1409	1409	1429
Correlation Matrix of Dimensions				
Length	1.0000			
Width	.7473	1.0000		
Thickness	.7977	.8016	1.0000	
Weight	.6897	.6848	.7452	1.0000

Pearson' r, 2-tailed test; N=1409 cases; all figures significant at .001.

Other characteristics of the core reduction flakes include the following attributes (Tables 6 and 10). The primary materials, local gray cherts and chalcedonies, are about equally represented. Heat treatment ranges between 5 percent and 8 percent, the "norm" for the site. Single flake-scar platforms are the most common at 39 percent, followed by multiflake platforms at 24 percent. Seventy percent of the complete flakes have feathered terminations, and 27 percent are hinged, stepped, or broken during detachment. Eighty percent of the complete flakes lack dorsal cortex, and only 3 percent have 51-100 percent cortex.

Biface Thinning Flakes

Unlike the core flakes and cores, the 456 biface thinning flakes are dominated by other materials (41 percent), and local gray cherts run a fairly close second at 32 percent (Table 6). All but 4 of the 185 "other materials" biface thinning flakes are known or suspected imported materials such as obsidian, Alibates dolomite, Tecovas chert, Edwards chert, and look-alike materials of Alibates and Tecovas. Ten to 15 percent of the biface thinning flakes are heat-treated.

Intrusive Lithic Materials

Materials known or suspected of originating from sources outside southeastern New Mexico are numerous in the debitage assemblage from the Bob Crosby Draw site. Over 850 pieces of obsidian, Edwards chert, Alibates dolomite, possible Alibates, Tecovas chert, possible Tecovas, and

Alibates/Tecovas look-alike materials have been identified (Table 11). As a group, these items represent approximately 4 percent of the total recovered lithic debitage sample. No attempt has been made to specifically identify the Alibates/Tecovas look-alike materials with any of the known sources such as Yeso, Salado, Ragland, Tucumcari, and Baldy Hill in east-central and northeastern New Mexico.

Table 10. Attributes of core reduction flakes, LA 75163

Attribute	Number	Percent
Platform types		
cortex	95	6.6
single flake scar	563	39.4
multiple flake scar	349	24.4
pseudo-dihedral	49	3.4
edge or ridgelike remnant	184	12.9
pointed	-	-
destroyed during detachment	186	13.0
indeterminate	3	.3
Total	1429	100.0
Distal termination type		
feathered	778	54.4
modified feathered	240	16.8
hinged or stepped	349	24.4
broke upon detachment	45	3.2
outre passé	-	-
indeterminate	17	1.2
Total	1429	100.0
Dorsal cortex		
0%	1154	82.3
1-10%	71	5.1
11-25%	86	6.1
26-50%	49	3.5
51-75%	26	1.8
76-90%	13	0.9
91-99%	3	0.2
100%, including platform	1	0.1
Total	1403	100.0

The distributions of these materials as individual types and as a group within the Bob Crosby Draw site are uneven across the site. However, the actual density patterns (number per square meter) mirror the overall density pattern of debitage items (Fig. 29). That is, the majority of flakes made from intrusive materials were recovered from squares between 20N and 40N, and fewer examples occur between 40N and 69N. This indicates that, regardless of whether a single occupation or multiple occupations are represented within the excavated area, intrusive materials were thoroughly a part of the lithic technology. In Figure 29, the distributions of imported lithic materials are indicated as follows: (a) Alcibates and Tecovas look-alikes; (b) possible Tecovas; (c) Tecovas; (d) possible Alibates; (e) Alibates; (f) possible Edwards; (g) Edwards; (h) obsidian; (i) all lithic debitage.

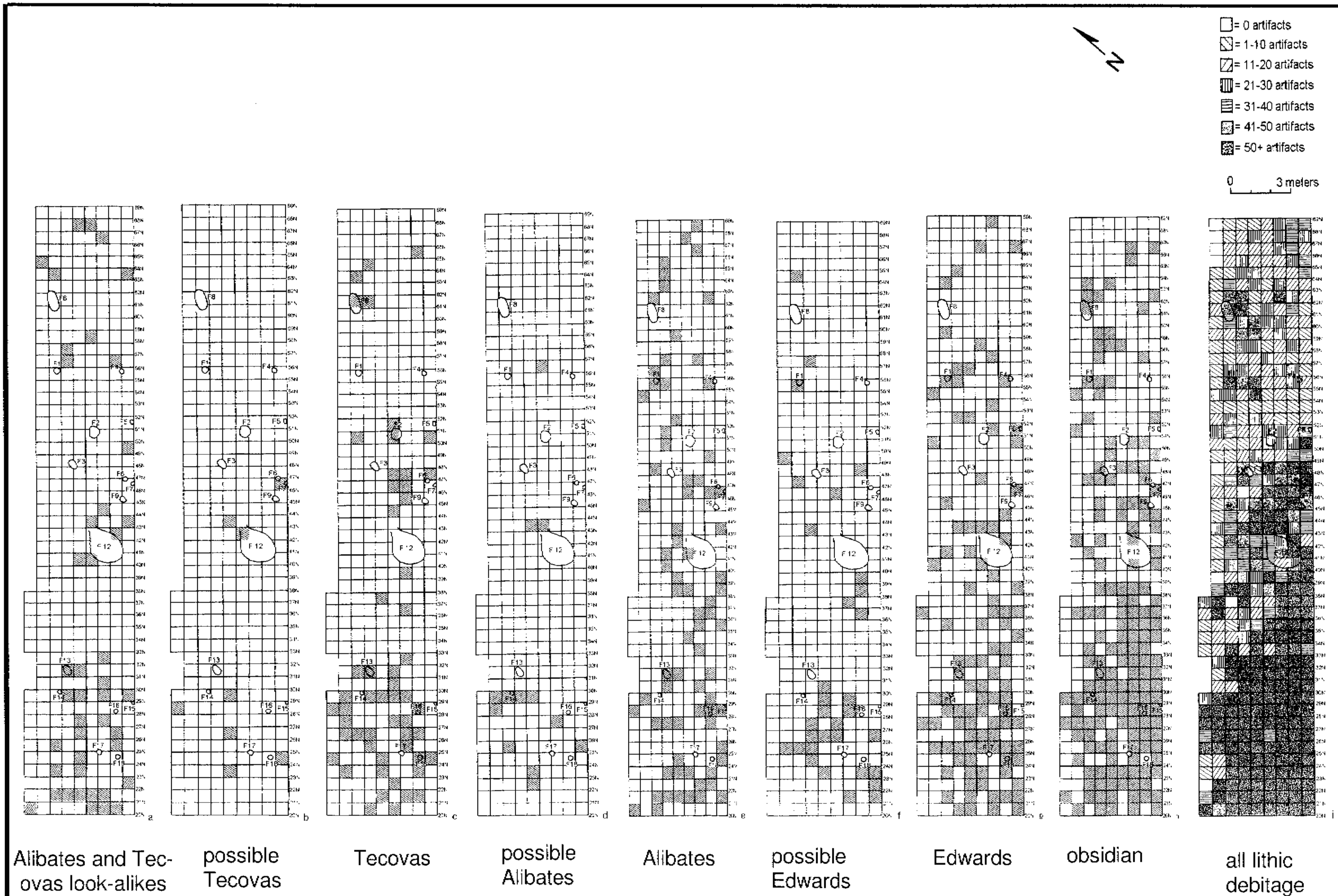

Figure 29. Distributions of imported lithic materials relative to all lithic materials.

Table 11. Intrusive lithic materials, LA 75163

Material	Number	Percent
Obsidian	351	41
Edwards chert	205	24
Possible Edwards chert	42	5
Alibates dolomite	97	11
Possible Alibates dolomite	18	2
Tecovas chert	80	9
Possible Tecovas chert	10	1
Alibates/Tecovas look-alikes	56	7
Totals	859	100

Local Gray Cherts

The flakes of presumed local gray chert in the analysis sample from LA 75163 were subjected to the bulk debitage UV analysis described in the section entitled "Lithic Material Sourcing Study" (below). This analysis characterizes what are presumed to be local materials according to their response to stimulation by long-wave ultraviolet light. The purpose of this study, to be applied to as many site assemblages as possible over the next few years, is to explore the possibility that subregional varieties can be found within the San Andres gray cherts. If found, variation could be useful in discovering and elucidating intraregional human movement (as in seasonal rounds) and/or chert exchange patterns (Table 12).

Table 12. Ultraviolet light responses for local gray chert flakes from LA 75163*

	None	Warm	Medium	Bright	Totals
Number	1866	262	338	14	2480
Percent	75	11	14	<1	100

* Response categories: none = very dark velvety purple; warm = dark brown; medium = medium orange or yellow-brown; bright = bright orange or yellow-brown

The data were assessed for patterning by means of the triangular coordinate graph. The three values graphed are the no-response, the warm response, and the medium/bright (combined) response (Fig. 30).

For perspective, the values for seven other sites in the area have also been graphed. The seven sites include River Camp (LA 103931), described in this report; Corn Camp (LA 6825), a small, multicomponent, mostly pottery-period camp west of the Pecos River and 13 km north of Roswell (Wiseman 1996b); La Cresta (LA 6826), a pottery-period (?) lithic material pick-up quarry west of the Pecos River and 13 km north of Roswell (Wiseman 1996b); Los Molinos (LA 68182), a pottery-period, multicomponent bedrock metate and mortar site with associated habitation midden west of the Pecos River and on the north edge of Roswell (report in preparation); the White Paint site

(LA 54347), a nonceramic camp west of the Pecos River and on the northwest edge of Roswell (report in preparation); and the Rocky Arroyo site (LA 25277), a late Glencoe (?) phase pithouse village on the Rio Hondo 3 km upstream (south) from the Fox Place.

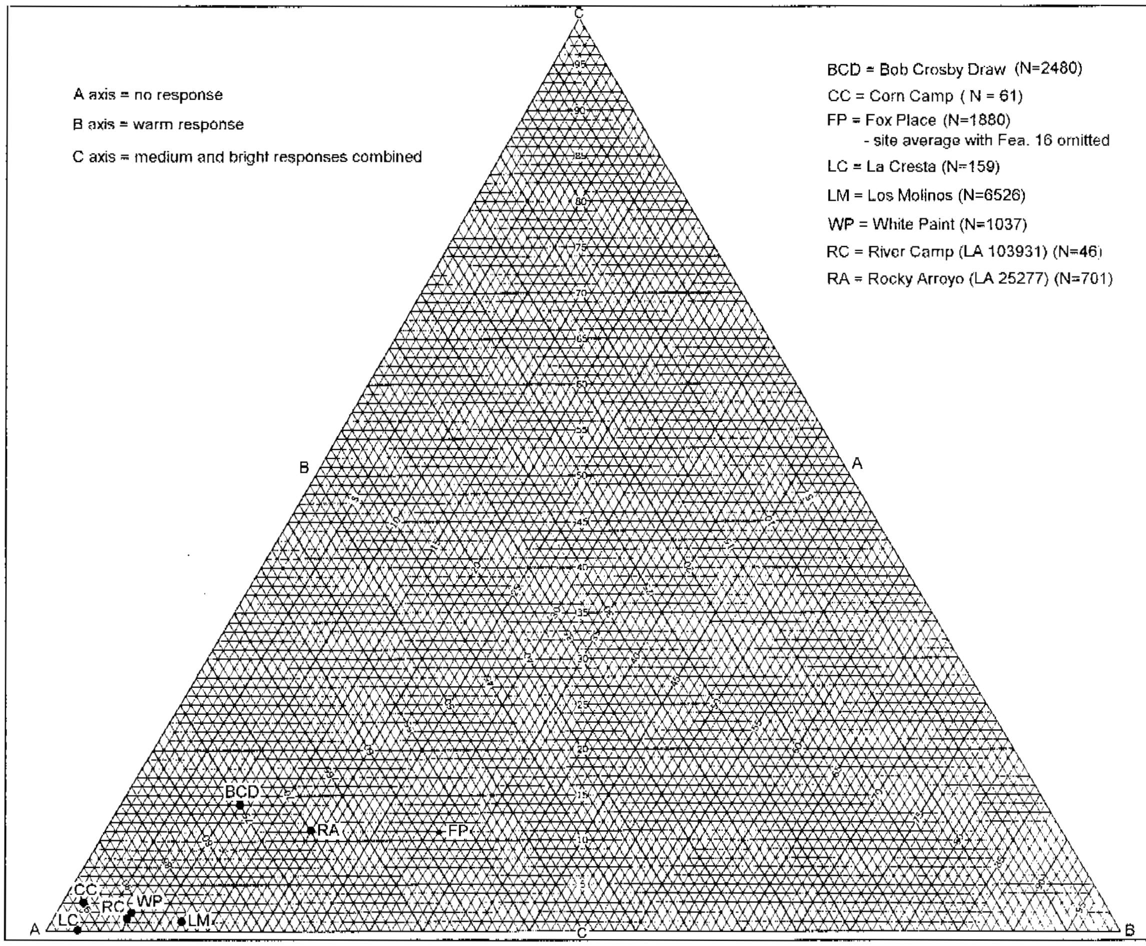

Figure 30. Local gray chert UV response profiles for Roswell area sites.

In Figure 30, River Camp, Corn Camp, La Cresta, Los Molinos, and White Paint are clustered near apex A. This reflects the dominance of no-responses, low percentage of warm responses, and virtual absence of medium and bright responses in the assemblages from these sites. By comparison, the assemblages from Bob Crosby Draw, Rocky Arroyo, and the Fox Place differ rather markedly, though they cannot be said to cluster. In general, the Bob Crosby Draw site average has more no-responses, fewer warm responses, and about the same medium/bright responses as Rocky Arroyo and the Fox Place.

At this point we can only speculate about the meaning of these data. It will be remembered that the flakes in these data sets are believed to represent mainly, if not solely, the gray cherts available near each site. The data sets do not include imported flakes such as Edwards chert and possible Edwards chert to the extent that we were able to identify and remove these materials earlier in the analysis. At any rate, this is the ideal.

The hope is that this approach will permit recognition of intraregional differences in local gray cherts at some level and therefore facilitate recognition of group movements within the region. With this in mind, it is important to note that the five grouped sites--River Camp, Corn Camp, La Cresta, Los Molinos, and White Paint--are all within an area 24 km in diameter starting at the northwest edge of Roswell and extending northeastward towards the Pecos River. The occupants of four of the sites had fairly ready access to outcrops of the San Andres formation, the presumed source of the gray cherts. River Camp is the site farthest from the San Andres sources, but then it also had relatively few gray chert flakes overall.

On the other hand, the Bob Crosby Draw site, the Rocky Arroyo site, and the Fox Place lie outside the area occupied by those five sites. Bob Crosby Draw lies farther to the northeast (though quite close to River Camp), and probably more importantly, is east of the Pecos, where the San Andres formation does not outcrop in the vicinity of the site. The Fox Place and Rocky Arroyo are 8 to 11 km south of the nearest (White Paint) of the four sites but otherwise are in a similar geologic environment. Yet, the UV profiles of the Fox Place and Rocky Arroyo differ significantly. Are we seeing the kind of intraregional difference in lithic materials that we think might exist? The UV profiles of more sites will have to be documented before we can be certain.

One other possibility must be addressed before closing this discussion. Although we identified and removed all suspected Edwards chert items from the bulk lithic data sets, we still have to bear in mind the fact that the Edwards chert identification procedures and criteria are not guaranteed. As mentioned elsewhere, it is clear from the available Edwards source materials that we may not have identified all Edwards present in the various collections. That is, as demonstrated by the available type collections, Edwards chert ranges in texture and therefore in knapping quality. Because these ranges overlap with those of presumed local materials, successful identification of all Edwards chert items in southeastern New Mexico assemblages may never be possible. Thus, we must bear in mind that some of the items that fluoresced medium or bright in the bulk collections from the various sites could be Edwards chert. We believe this possibility to be especially true of the Bob Crosby Draw site because of impressions gained while working with these materials.

One way of assessing this possibility is to look at the artifacts and flakes that have been classified as Edwards or possible Edwards chert. At the Bob Crosby Draw site, one projectile point, one drill, four miscellaneous bifaces, and 205 flakes have been identified as Edwards chert. One projectile point, one scraper, and 42 flakes have been identified as possible Edwards. These 255 items constitute about 2.6 percent of the analysis sample of chipped lithic items. On this basis, it seems unlikely that more than a small percentage of the medium and bright fluorescing bulk flakes are also Edwards. Thus, we believe that the UV differences in the bulk flake assemblages between the Bob Crosby Draw site and the five sites of River Camp, Corn Camp, La Cresta, Los Molinos, and White Paint are probably valid and will be found to be geographically--and perhaps socioeconomically--meaningful in future analyses.

RIVER CAMP (LA 103931)

LA 103931 is 3 km southwest of the Bob Crosby Draw site. It is a small pottery and lithic artifact scatter exposed by the ruts of two two-track roads (Fig. 31). Most of the site is covered by an even mantle of sand that averages 20 to 30 cm deep and is stabilized by closely spaced tufts of grass. Accordingly, the potential for intact subsurface remains and deposits was excellent.

No features were found. Artifacts were noted over an area measuring 10 by 25 m , but the main concentration was smaller, covering an area of about 10 by 10 m. Soil stains and other indicators for features are absent, but the limited exposure afforded by the road ruts was too limited to be certain on this point.

Artifacts noted during the survey included sherds of Chupadero Black-on-white and Three Rivers Red-on-terracotta. Chipped lithic items included chert, chalcedony, and quartzite flakes and a chert biface fragment. The pottery indicated the site was occupied some time between A.D. 1100 and 1400.

Field Methods

The fieldwork was initiated with the establishment of a grid of 1 m squares. The surface artifacts, about one dozen items, were collected from the road ruts and provenienced by square.

Hand excavations proceeded in 1 by 1 m squares and employed the natural (surficial)/cultural strata as the basic provenience units. Where a stratum exceeded 20 cm in (vertical) thickness, it was divided into two subunits and the artifacts segregated accordingly. Excavations in all squares were carried to the uppermost geologic stratum ("sterile"). All fill was screened through one-eighth inch mesh. A total of 128 sq m of site area was excavated.

Site Stratigraphy

Two stratigraphic units were recognized at LA 103931.

Stratum 1, the uppermost or surficial unit, was comprised of eolian deposited, tan to reddish-tan silty loam. Most prehistoric artifacts were recovered from this stratum. The stratum had an homogeneous color and fine texture. Compaction was generally minimal, but in the northern and eastern squares, compaction was slightly greater. Rock was limited in size to small gravels, but this aspect of the stratum was not particularly evident except in the screens. One burned rock was noted in the entire excavated area. The stratum varied from as little as eight centimeters in the road ruts to as much as 28 cm in the areas of undisturbed modern surface.

Stratum 2: This geologic unit is like Stratum 1 except that it contained a greater component of gravels, which appeared to be, on average, larger than those in Stratum 1. Also, the degree of compaction was much greater in Stratum 2. However, the line of demarcation between Strata 1 and 2 was not clear cut. Some prehistoric cultural items came from the top part of this stratum (#2), but the majority came from Stratum 1. Total vertical thickness of Stratum 2 was not determined.

Cultural Debris

Two cultural debris fields of lithic chipping debris and pottery were noted. The distributions of two types of cultural debris are important to our understanding of site structure in the area excavated. Only one small piece of burned rock was noted in the entire excavation.

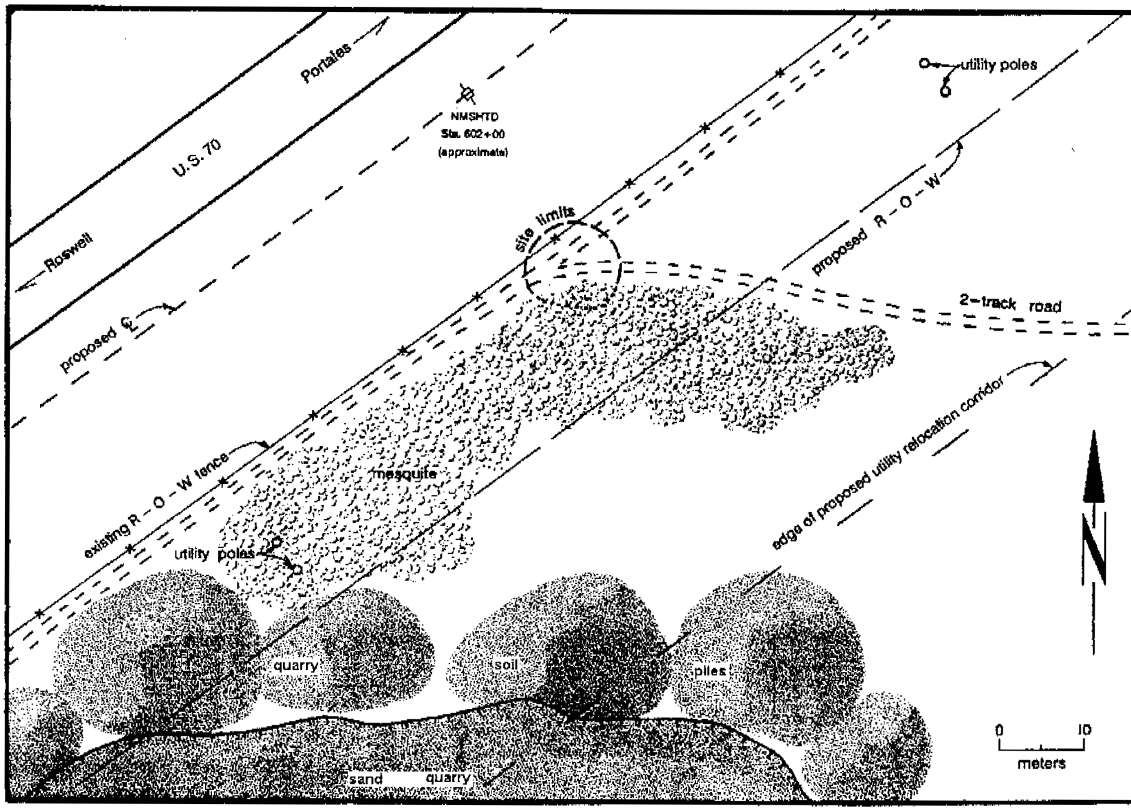

Figure 31. LA 103931 site map.

The artifacts and especially the chipping debris clustered primarily in the northern half of the excavated area (Fig. 32). This concentration is contained mostly within the area between 20N and 29N and between 1E and 9E. Dense mesquite discouraged additional excavation eastward to determine whether the concentration extended farther in that direction or ended at or near the excavation limit.

Pottery was less common than lithic chipping debris, yet its distribution suggested two separate concentrations spaced 6 m apart (Fig. 33). The distribution of sherds belonging to certain pottery vessels indicates that the two clusters are contemporaneous (see below).

Another possibility is that the two potsherd clusters represent two occupations of the site and that the people of the second occupation picked up sherds from the earlier one. However, this possibility is less likely.

Nearly 400 artifacts were recovered, all but a few dozen coming from the excavations. The vast majority are chipped lithic debris (N=317), with fewer numbers of sherds (N=56) and chipped stone artifacts (projectile points and projectile point preforms; N=3). Grinding stones, with one possible exception, were absent. The cultural materials are described below in their presumed primary or intended functional domains.

A single projectile point fragment, the base of a Harrell/Reed-like arrow point, is made of reddish chalcedony (Fig. 34). The fragment measures 7.5 by 15 by 2.5 mm and comes from 28N/2E, L. 1.

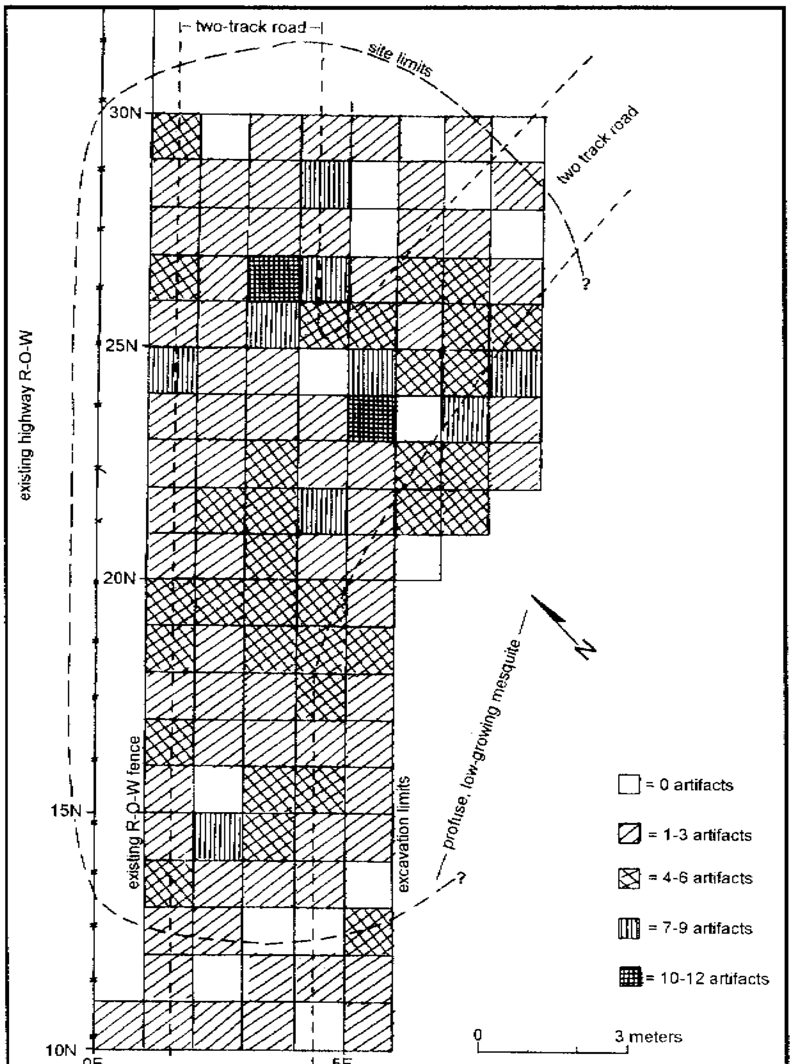

Figure 32. Artifact density and distribution in excavations (includes pottery), LA 103931.

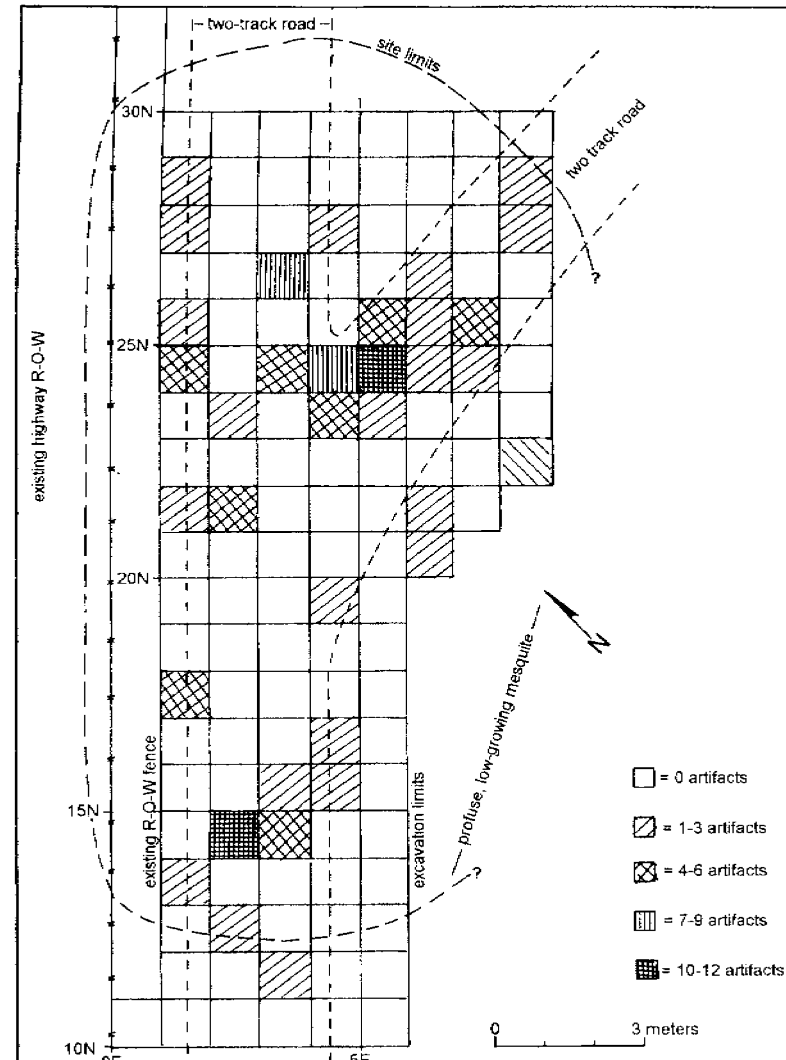

Figure 33. Pottery density and distribution in excavations, LA 103931.

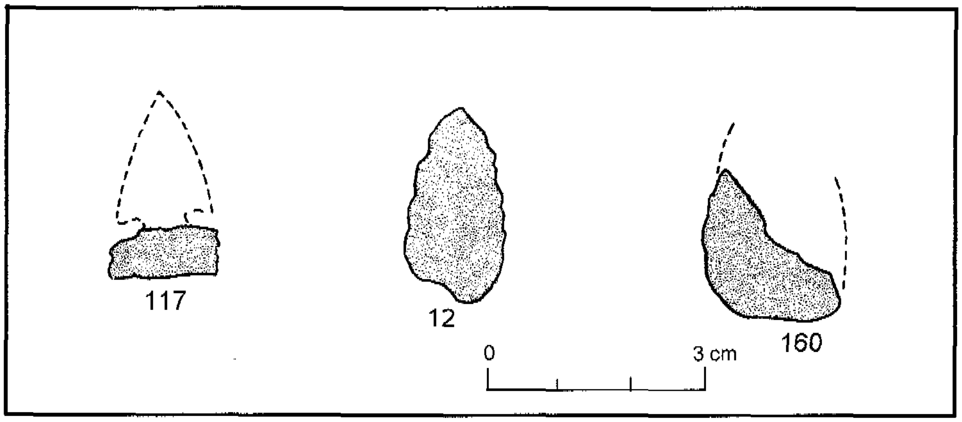

Figure 34. Projectile point (117) and preforms (12 and 160), LA 103931.

Two flakes have evidence of impromptu use as tools. Flake 43, made of light gray and red chalcedony, has one convex edge displaying 12 mm of unifacial intentional retouch. It comes from Sq. 29N/2E (Stratum 1). Flake 103, made of homogeneous local gray chert, has one convex edge displaying 7 mm of unifacial use-wear. It comes from 20N/2E (S. 2).

A small fragment of tabular, reddish-tan sandstone has one ground face and one natural face. The edge has been roughly chipped and ground to shape. Given the treatment of the edge, the fragment could be from a small metate, though the stone would be thin for this type of use. Another possibility is use as a hand-held grinder or "sandpaper" for shaping small items; however, this interpretation is not totally satisfactory because of the absence of differential wear, or even slight grooving, on the grinding surface. The item measures 50 by 33 by 10 mm and comes from 23N/6E, L. 2.

Pottery

The pottery assemblage from LA 103931 consists of 56 sherds representing seven previously described types and one residual category (undifferentiated brown) (Table 13). All sherds are small, on the average, between the size of a quarter and a nickel. Because of this, the analysis focused on comparatively few attributes, including type, temper, and vessel form.

An attempt was also made to identify the minimum number of vessels (MNV) represented in each type, but as usual, the exercise was less than totally successful. Not all sherds could be assigned to a particular vessel and are counted as residual. The results show that at least 16 vessels were used or discarded in the area excavated.

Chupadero Black-on-White

Twelve sherds (one-fourth of the sherd assemblage) and four vessels (one-fourth of the MNV assemblage) belong to this type. Generally speaking, all fit the type descriptions quite well. While the main criterion for assigning sherds to this type is the surface treatment on the undecorated surfaces (the typical scrape marks), all other attributes of the sherds fit nicely into the general type description.

The primary tempering material in the Chupadero from LA 103931 is crushed sherd. The one bowl sherd has sintered sherd temper reminiscent of pottery made at Pueblo Colorado in the Saline-Medano country of central New Mexico. Another has sherd and what may be Capitan "granite" (aplite) temper. The four MNVs include one bowl and three jars.

Table 13. Pottery recovered from LA 103931

Type	Sherds	MNV **
Chupadero Black-on-white	12	4
Corona Corrugated	2	1
El Paso Polychrome	1	1
El Paso Ware	6	3
South Pecos Brown	4	1
Three Rivers Red-on-terracotta	10	2
Three Rivers Ware	18	1 **
Jornada Brown	2	2
Undifferentiated brown	1	1
Totals	56	16

** Seventeen sherds belong to one of the Three Rivers Red-on-terracotta vessels.

Corona Corrugated

Both sherds belonging to this type are tempered with the quartz mica schist, indicating an origin in central New Mexico (vicinity of Gran Quivira). Both sherds are from the same vessel, the form of which is presumably a jar, though we have no rim to confirm this.

El Paso Ware

El Paso Polychrome. The one sherd assigned to this type is from a jar. The exterior surface is slipped red and is well polished. The interior surface is eroded, probably from use. The medium reddish paste has abundant rounded quartz and off-white feldspar typical of the type, though the grains are larger on average and a little more numerous. The MNV is one. This sherd evidently does not have companion sherds among the El Paso Ware sherds.

El Paso Brown. All of the sherds assigned to this category lack clear evidence of paint, lack red and black paste zonation, and are too thick (5.5 to 6 mm) to readily assign them to El Paso Polychrome. Four of the sherds have the rounded quartz and off-white feldspar typical of the El Paso group. The temper of another sherd has a crushed rock reminiscent of Capitan "granite," but the clear feldspar component of that rock and minute quantities of quartz appear to be missing. The sixth sherd has off-white feldspar and quartz that differ in appearance from the more typical tempering materials of El Paso, but that is probably of little consequence other than the fact that it allows us to identify a separate vessel.

The MNV is 3, and the vessel forms are probably all jars. Rim sherds are lacking.

Jornada Brown

The two sherds (2 MNV) assigned to this type are not examples of the classic form of the Sierra Blanca–Sacramento mountains. The LA 103931 examples are somewhat thinner on average (5-6 mm) and less well polished. The finely ground, profuse temper is white feldspar (Capitan "granite"?)

in one instance and off-white and white feldspar in the other. The surfaces are fairly well smoothed and polished.

South Pecos Brown

The four sherds assigned to this type represent one MNV. The temper is mostly off-white feldspar, though all sherds have small numbers of gray feldspar as well. Temper particles are generally large and few in number. The surface treatment falls within the range of the type.

Three Rivers Red-on-terracotta and Three Rivers Red Ware

Twenty-eight sherds represent this ware. Ten sherds (MNV=2) have red designs and can be typed as Three Rivers Red-on-terracotta. Of the 18 sherds lacking designs, 17 can be assigned to one of the Three Rivers Red-on-terracotta. vessels on the basis of paste and temper. Thus, this ware, including painted and unpainted sherds, is represented by a total MNV of 3.

The tempering materials in 27 of the sherds are normal for the type: white, off-white, and gray feldspars and small quantities of quartz. One nonpainted sherd (from 25N/6E, Level 2) has crushed sherd and gray feldspar temper. Not only is the crushed sherd temper surprising, the ground sherds are gray, indicating a white ware origin (Chupadero most likely). It is also possible that this particular sherd is itself Chupadero Black-on-white that was oxidized orange during firing.

Miscellaneous Pottery

Undifferentiated Brown. One very small sherd cannot be confidently assigned to a specific type. Its provenience is Sq. 15N/4E (S. 1).

Distribution of Selected MNVs

As mentioned earlier, the overall pottery sherd distribution at LA 103931 falls into two fairly discrete clusters spaced 6 m apart (Fig. 33). MNV sherd distributions suggest that this division is not temporally meaningful (Fig. 35). Sherds from three vessels (Three Rivers Red-on-terracotta Vessel 2, El Paso Vessel 1, and Corona Corrugated Vessel 1) occurred in both clusters. While it is possible that people during a later occupation picked up sherds from one cluster and carried them to the other, this scenario as less likely simply because the site is small and so few sherds and other artifacts are present.

Chipped Lithic Manufacturing Debris

Projectile Point Preforms

Two small bifaces are probably projectile point preforms, one for arrow points (Fig. 34, center) and the other for Archaic (?) points (Fig. 34, right). The arrow point preform is complete, measures 26 by 14 by 8 mm, is made of red and white chert, and comes from the 21N/4W (surface). The other is a base fragment measuring 22 by 18 by 5 mm, is made of heat-treated red chert, and comes from 15N/5W (surface).

Knapping Debris

Lithic manufacture debris (cores, flakes, shatter, and pieces of material) constitutes the bulk of

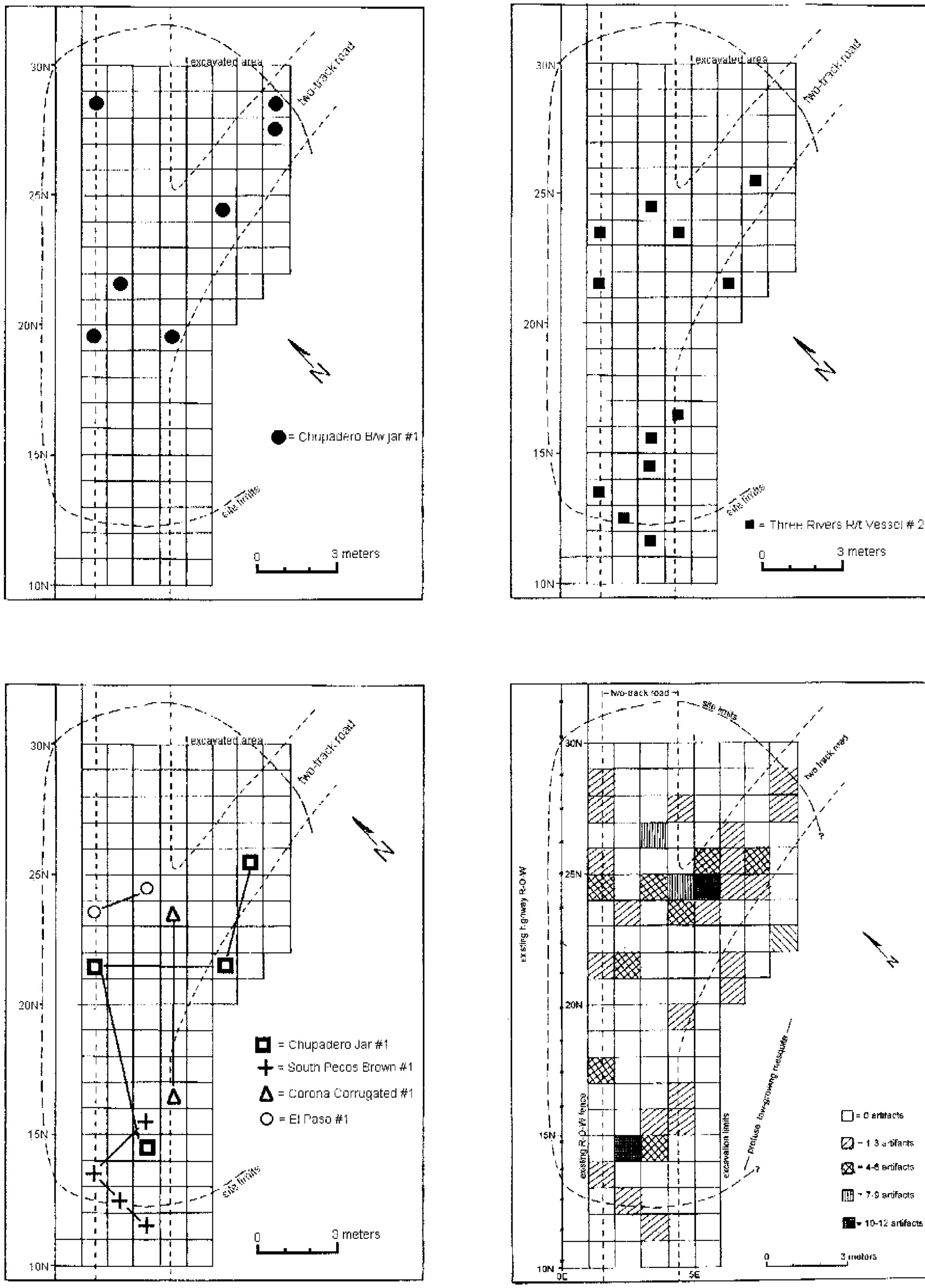

Figure 35. Pottery vessel distribution, LA 103931.

the lithic materials recovered from LA 103931 (Table 14). The raw materials and definitions used to classify and analyze chipped lithic debris are described in Appendix B and the section entitled "Lithic Material Sourcing Study." 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 as flake tools in the section on tools.

Table 14. Lithic manufacture debris, LA 103931

Manufacture Debris Category	Number	Percent
Cores:	21	6.6
single platform	3	1.0
two platforms adjacent	1	0.3
two platforms parallel	2	0.6
tested cobble/pebble	1	0.3
flake core	14	4.4
Flakes:	273	86.1
core reduction	242	76.3
decortication	2	0.6
biface thinning	4	1.3
possible biface thinning	6	1.9
indeterminate	19	6.0
Shatter	22 22	7.0 7.0
Pieces of material *	1 1	0.3 0.3
Totals	317 317	100.0 100.0

* unworked raw material units brought into the site by humans

Cores

The 21 cores include five subtypes (Table 14). The flake core is the most common. Materials are greatly varied but are dominated by the siltites (silicified siltstones) and quartzites (Table 15).

The longest core, at 65 mm, is only slightly twice as long as the shortest one (Table 16). However, core weights vary greatly. The heaviest weighs 20 times more than the lightest (99.3 to 4.5 g).

Correlation statistics of core size and weight (Table 17) indicate variable standardization of core dimensions overall. Three correlations are particularly strong: length:width, length:weight, and width:weight. Correlations for flake-cores, the only class with 10 or more members, are quite high for all pairs. Given the probability that standardizations of dimensions may in part be imposed by the natural geometry of the pieces of material, correlation coefficients in the 0.8s and 0.9s are considered potentially significant from a cultural standpoint, while those in the 0.7s and 0.6s are considered to be potentially less so. We should not overlook the probability that the knappers were selecting for the blockier (as opposed to more tabular) pieces of material in the first place.

Only one core showed evidence of intentional heat treatment (Table 15). Heat treatment is uncommon in the LA 103931 materials and evidently was little used at this site.

Table 15. Lithic debitage classes, LA 103931 (N and %)

	Cores	Flakes			Shatter and Other	Site Total
		Core Reduction	Biface Thinning	Other		
Materials						
Local chert	5 24	32 13	1 10	6 29	3 13	47 15
Other chert	3 14	23 10	2 20	1 5	-	29 10
Chalcedony	5 24	60 25	7 70	7 32	11 48	90 28
Limestone	-	-	-	-	-	-
Siltite/Quartzite	8 38	118 48	-	6 29	9 39	141 44
Other	-	9 4	-	1 5	-	10 3
Totals	21 100	242 100	10 100	21 100	23 100	317 100
Heat treatment						
No	18 86	224 92	6 60	19 90	17 74	284 90
Yes	1 5	-	1 10	-	1 4	3 1
Possibly	-	7 3	1 10	-	2 9	10 3
Indeterminate	2 9	11 5	2 20	2 10	3 13	20 6
Totals	21 100	242 100	10 100	21 100	23 100	317 100

Table 16. Core dimensions, LA 103931

Core Type	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
All Cores				
Mean	40.7	29.6	15.8	23.5
Standard deviation	11.0	10.5	6.4	23.1
Range	38.0	43.0	20.0	94.8
Number	21	21	21	21
Flake Core				
Mean	40.1	29.0	13.3	19.2
Standard deviation	10.7	8.9	4.6	17.3
Range	30.0	30.0	14.0	51.1
Number	13	13	13	13

Table 17. Correlation matrix of core dimensions, LA 103931

Core Type	Length	Width	Thickness	Weight
All cores (N=21)				
Length	1.0000			
Width	.9243	1.0000		
Thickness	.6727	.6706	1.0000	
Weight	.8540	.9323	.7763	1.0000
Flake core (N=14)				
Length	1.0000			
Width	.9310	1.0000		
Thickness	.9139	.8400	1.0000	
Weight	.9060	.9222	.9358	1.000

Pearson's r, 2-tailed test; significant at .001 level

Core Reduction Flakes

Forty percent (98 of 242) of the core reduction flakes are complete. Summary statistics of the complete core reduction flakes (Table 18) indicate that, on average, they are small, somewhat longer than wide, and lightweight (2-3 g). A Pearson Correlation matrix (2-tailed test; Table 18) indicates that the flake dimensions are variably correlated. Some are stronger (length:thickness, length:weight, thickness:weight) than others. Even the stronger correlations are not particularly robust, all suggesting a general lack of standardization of flake shapes.

Other characteristics of the core reduction flakes include the following (Tables 15 and 19). The primary materials are siltites/quartzites, followed by chalcedonies. None show evidence of heat treatment. Single flake-scar platforms are the most common at 41 percent, followed by cortex platforms at 24 percent. Sixty percent of the complete flakes have feathered terminations, but fully a third were hinged and stepped, or broke during detachment. Half of the complete flakes lack dorsal cortex, and 10 percent have 51 percent or more cortex.

Table 18. Complete core reduction flakes, LA 103931

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	17.4	15.9	4.7	2.5
Standard deviation	10.7	8.3	3.3	4.7
Range	66	38	17	36.3
Number	96	96	96	96
Correlation Matrix of Dimensions (Pearson's r, 2-tailed test; significant at .001 level)				
	Length	Width	Thickness	Weight
Length	1.0000			
Width	.6477	1.0000		
Thickness	.8076	.7260	1.0000	
Weight	.8433	.6234	.8299	1.0000

Table 19. Core reduction flakes, LA 103931

Attribute	Number	Percent
Platform Types		
cortex	23	24
single flake scar	40	41
multiple flake scar	5	5
pseudo-dihedral	-	-
edge or ridgelike remnant	14	14
pointed	5	5
destroyed during detachment	10	10
indeterminate	1	1
Total	98	100

Distal Termination Type		
feathered	59	60
modified feathered	6	6
hinged or stepped	30	31
broke upon detachment	3	3
outré passé	-	-
indeterminate	-	-
Total	98	100
Dorsal Cortex		
0%	49	50
1-10%	12	12
11-25%	12	12
26-50%	15	16
51-75%	1	1
76-90%	1	1
91-99%	3	3
100%, including platform	5	5
Total	98	100

Biface Thinning Flakes

Unlike the other debitage categories, 70 percent of the 10 biface thinning flakes are of local chalcedonies (Table 15). One or possibly two are heat-treated.

Exotic Lithic Materials

No known or suspected materials originating from sources outside southeastern New Mexico are present in the debitage assemblage from LA 103931.

Gray Cherts

The flakes presumed to be local gray chert in the analysis sample from LA 103931 were subjected to the bulk debitage UV analysis described in the section entitled "Lithic Material Sourcing Study" (below). The results appear in Table 20.

Table 20. Ultraviolet light responses in local gray chert flakes, LA 103931

	None	Warm	Medium	Bright	Totals
Number	42	3	1	-	46
Percent	91%	7%	2%	-%	100%

None= very dark velvety purple; warm= dark brown; medium= medium orange or yellow-brown; bright= bright orange or yellow-brown.

To gain perspective, the LA 103931 data have been plotted on a triangular coordinate graph along with seven other sites in the area (Fig. 30). The seven sites include the Bob Crosby Draw site (LA 75163), the Fox Place (LA 68188), Corn Camp (LA 6825), La Cresta (LA 6826), Los Molinos (LA 68182), the White Paint site (LA 54347), and the Rocky Arroyo site (LA 25277).

In Figure 30, the River Camp, Corn Camp, La Cresta, Los Molinos, and White Paint are clustered near apex A, reflecting the dominance of no-responses, a low percentage of warm responses, and a virtual absence of medium and bright responses in the assemblages from these sites. The assemblages from Bob Crosby Draw, Rocky Arroyo, and the Fox Place differ rather markedly, though they cannot be said to cluster.

As discussed in more detail for the Bob Crosby Draw site, four of the other sites group with the River Camp: Corn Camp, La Cresta, Los Molinos, and White Paint. All of these sites are within an area 24 km in diameter starting at the northwest edge of Roswell and extending northeastward towards the Pecos River and the River Camp. The occupants of all but the River Camp had fairly ready access to outcrops of the San Andres formation, the presumed source of the gray cherts. By way of contrast, the Bob Crosby Draw site, the Rocky Arroyo site, and the Fox Place lie outside the area occupied by those five sites, though not by far in the case of the Bob Crosby Draw site. Both River Camp and Bob Crosby Draw, the furthest northeast of the seven sites, are east of the Pecos, where the San Andres formation does not outcrop in the vicinity of either site.

LITHIC MATERIAL SOURCING STUDY

Regge N. Wiseman, Byron T. Hamilton, and Matthew J. Hillsman

The presence of Texas lithic materials and artifact types in New Mexico sites has been common knowledge for many decades. In fact, the possibilities of contacts between the Southern Plains and the Southwest intrigued W. C. Holden of Texas Tech University to the point of undertaking long-term survey and excavations to investigate this phenomenon. The work started in the Las Vegas region of northeastern New Mexico in the late early 1920s (Holden 1932) and culminated in the Sierra Blanca region of southeastern New Mexico in the mid 1950s. In her doctoral thesis, which covers the Sierra Blanca portion of that work, Jane Kelley (1984:xxxvii) remarks that the search for evidence of Plains-Southwest contacts was unsuccessful. She was speaking about the earlier manifestations that surely must have preceded the abundant evidence at protohistoric and historic sites like Pecos Pueblo (Kidder 1932).

Why was this long hunt deemed unsuccessful? Certainly, lithic materials and artifacts emanating from early contacts between the two regions are a matter of record. For instance, the present writer has examined distinctive two-bevel and four-bevel knives and classic Plains end scrapers that were retrieved from sites in the Sierra Blanca and Roswell regions. These items were made of Edwards chert, Tecovas chert, and Alibates dolomite. Flakes of these materials are also occasionally found on dune sites in the region, particularly those east of the Pecos. The artifacts and materials are present in numerous southeastern New Mexico sites, but their numbers are small in all assemblages.

Another major problem lies in the identification of intrusive lithic materials, and more particularly, in reliably distinguishing between New Mexico materials that share many of the same colors and similar color patterns with the Texas materials. The situation is further exacerbated by the tendency on the part of most analysts to take the ultra-conservative approach, resulting in the identification of only the most obvious, most typical, least arguable examples of the Texas materials.

Two basic methods have been used to identify lithic materials: visual observation and comparison using type examples, and various scientific instruments. Neither method has proven totally satisfactory for a variety of reasons, including the lack of consistency among observers and the lack of clear-cut results from the instruments. Sophisticated instrumental techniques inject other problems, including cost, preparation time, availability of instruments, availability of trained technicians, and the destructive nature of some techniques.

In the following section, Matthew Hillsman (1992) provides an excellent overview of the investigations and results using various instrumental methods. This section has been taken from his thesis with his permission.

Previous Research

Matthew J. Hillsman

Previous archaeological research involving the use of UV in chert characterization and sourcing in eastern New Mexico and west and central Texas is limited and recent (Banks 1990; Collins and Headrick 1992; Hofman et al. 1991). However, traditionally oriented, regional chert characterization and sourcing studies, involving material locales, visual descriptions, various physical investigations including chemical, mineralogical, or petrological techniques, and statistical analysis of some results, are more abundant and span a number of decades. Examples of these studies are Bryan (1950), Shaeffer (1958), Green and Kelley (1960), Tunnell (1978), Holliday and Welty (1981), Shelley (1984), Mallouf (1989), Bertram (1989), Banks (1990), and Goldsmith (1990). Similar and related studies of cherts on a more global basis are Luedtke (1976, 1978, 1979), Ayers (1977, 1978), Butler and May (1984), Vehik (1985), Hatch and Miller (1985), Sieveking and Hart (1986), Matiskainen et al. (1989), and Prothero and Lavin (1990).

Banks (1990) reports an attempt to study chert specimens from several formations in Wyoming utilizing UV light-excited luminescence. However, he notes that the results are not consistently repeatable.

Ultraviolet-excited luminescence studies of "Edwards" and related central Texas cherts have been carried out by Collins and Headrick (1992), apparently with some success, although experimental details are not published at this writing. Using longwave and shortwave UV light, a fluorescence response study of selected lithic materials, including Alibates, "Edwards," and Tecovas cherts, has been reported by Hofman et al. (1991). Also, they report success in determining the source ("Edwards") of certain artifactual materials from the Folsom and Lindenmeier sites in the collection of the Denver Museum, based on their UV analysis technique. However, experimental details of their studies were not presented.

Bryan (1950:14) described the Alibates Quarry silicified dolomite as being "irregularly but minutely banded in shades of blue-gray or red, with or without bands of white or pearl gray. Some pieces have spots of white on a red background and irregularities in the banding." He continues, "The peculiarities of the flint made distinctive although highly variable patterns which are easily recognizable," and Alibates artifacts "can be identified by persons familiar with the range in color and patterns of the Alibates flint" (Bryan 1950:14). Bryan (1950) also noted that similar material was available at other Texas Panhandle sites.

Shaeffer (1958:190) also observed the "remarkable" range in colors in the Alibates formation: "While the site gives the impression of a range of colors in various combinations with blues rather than reds predominating in the debris, this situation is possibly not true for the formation as a whole" (Shaeffer 1958:190).

Green and Kelley (1960) remark on the long-held belief that Alibates is easily recognizable and distinctive. They note that Green observed occurrences of chert closely resembling some varieties of Alibates at locales in western Texas and eastern New Mexico. Both locales are in separate geologic strata different from that of the Alibates. In addition, they note pebbles of flint weathering out of the Ogallala beds that fall within the range of lesser-known Alibates materials.

Bowers (1975) has provided a geologically oriented description of the minerals and coloration of the Alibates chert, and Tunnell (1978) has described its general color characteristics and features. Ayers (1977) has performed an atomic absorption spectrophotometric (AAS) analysis of Alibates material and five other chert sources. He assayed for seven elements and used discriminant function procedures to successfully distinguish Alibates from the other cherts.

More general discussions of the characteristic attributes of Alibates material are provided by Holliday and Welty (1981) and Banks (1990). Bertram (1989) has assessed the coloration and various categories of lithic debris at the Alibates site in some detail. Banks (1990) also notes a report of Alibates-like material on the west flank of the Llano Uplift in the central Texas mineral region, and the occurrence of "False Alibates" in the lateral equivalent of the Tecovas and Chinle formations, known as the Baldy Hill formation, in northeast New Mexico (Banks 1990:89). Shelley

(1984) reports the occurrence of silicate materials similar to Alibates in a lithic resource area at Salado Canyon, near Yeso, New Mexico, and Goldsmith (1990) reports Alibates "look-alikes" from an area adjacent to the western edge of the Llano Estacado.

Mallouf observed that Tecovas jasper has a wide range of texture and coloration. Specimens are described as "lustrous" in appearance and "aphanitic" in texture (Mallouf 1989:317). Color is highly variable and includes combinations of red, green, caramel, yellow, tan, milky white, orange, pink, bluish gray, and purple (Mallouf 1989). He also notes the appearance of mottling or banding in some samples, with several colors present, and relates their similarity to some Alibates samples. Tunnell (1978) has briefly described characteristics of the Tecovas material.

Holliday and Welty (1981) comment that Tecovas jasper is easily confused with Alibates, particularly when in the form of small flakes. The Tecovas formation jasper is much more widespread geologically and geographically than the Alibates, though the sheer mass of available chert in the Alibates is much greater than in the Tecovas (Banks 1990). Tecovas is easily confused with Alibates and other chalcedonic materials (Banks 1990).

Geno (1976) provides a brief visual description of the "Edwards" bedded and nodular cherts in the Grand Prairie area of central Texas. Bedded "Edwards" cherts are occasionally brown, though the majority are black (depending on various contaminants present), and the nodular chert varies from black (due to included organic matter) to brown (resulting from included dolomite) to gray (because of weathering) (Geno 1976).

Tunnell (1978) describes the Cretaceous chert gravels originating in the Edwards formation occurring in counties around the Callahan Divide between the Colorado and Brazos rivers in west central Texas. Colors range from pale gray and brown to medium gray and brown with mottling occurring as various shades of these hues (Tunnell 1978). Marine microfossils are a common feature of these cherts and, on occasion, are very abundant in them (Tunnell 1978).

Holliday and Welty (1981) report gray to tan cherts in the Edwards limestone along the southeast escarpment of the Llano Estacado. Shelley (1984) and Goldsmith (1990) have noted the occurrence of lithic material macroscopically similar to "Edwards" chert in the San Andres limestone north of Roswell, New Mexico. Kelley (1971) notes the existence of the San Andres chert, but does not comment on its visual characteristics.

Banks (1990:59-61) has comprehensively reviewed the occurrence of chert in the Cretaceous-aged Edwards group, and he comments that "the chert has not been well defined for any single formation" in the group, although "some generalizations are possible at this time." Colors range from very light gray to white; translucent, root-beer-colored material; and common gray to dark gray varieties. Banks (1990:117-147) is a useful reference for archaeological chert sourcing research in this general region of the Southern Plains. He provides color plates and basic descriptions of selected chert types, including "Edwards," Alibates, and Tecovas.

McGinley and Schweikert (1979) have performed a neutron activation analysis (NAA) of some chert collected at sites along the San Gabriel River in Texas, which flows through the Edwards formation. The results of the analysis of nine element abundances suggested to them that elemental heterogeneity is present in the chert of the Edwards formation.

Luedtke (1976) cautions that visual identification of cherts is insufficient for large-scale studies. She cites the large margin of error present, the subjectiveness of observation, and lack of quantification as problem areas. Because cherts are sedimentary in origin, they are subject to numerous local variations that affect their visual qualities and trace-element composition (Luedtke 1976). She states, "A proper understanding of both chemical and visual characteristics must be based on an understanding of the physical characteristics of chert, including its origin, properties and modes of occurrence" (Luedtke 1976:78). She further notes that, because trace elements reflect the origin of chert sediments, NAA is a useful analysis technique, although it does not provide an "atomic fingerprint" (Luedtke 1976:116). Thus, various sophisticated techniques of data analysis are required to properly characterize some sources (Luedtke 1976). Luedtke (1978) also observes that many chert sources are distinguishable with just a few elements and that scanning for them with simpler analytical techniques might be appropriate. However, the statistical technique of discriminant analysis is probably the best procedure for sourcing chert artifacts, but only with quantitative data.

Thompson et al. (1986) describe the use of inductively coupled plasma-atomic emission spectroscopy (ICP-AES) for the multielement analysis of flints. They note that this type of analysis "is a powerful tool for source identification if the data are interpreted by discriminant analysis or other multivariate techniques" (Thompson et al. 1986:243).

Bush and Sieveking caution that in considering elemental analyses, "care, however, must be taken to ensure that the elements used are uniformly distributed and not present in the occasional mineral grain or in pore fluids, which are readily exchanged on exposure [to the surrounding environment]" (Bush and Sieveking 1986:138). Concerning statistical analysis of rock components, they further note, "When dealing with rocks whose composition is likely to be variable a wholly mathematical treatment of the problem is insufficient" (Bush and Sieveking 1986:138). They also recall that "sedimentary rocks are geological bodies whose depositional environment and diagenesis largely accounts for their variability in structure and composition," and they advise that "they are natural products whose history and state of preservation have to be taken into account; they cannot be treated as randomly assembled products of a chemical laboratory" (Bush and Sieveking 1986:138).

Butler and May (1984:300) note that even the application of Munsell color standards "encounters difficulties because of the varied and illusive optical properties of cherts." They also state that "macroscopic differentiation of various cherts depends on the simultaneous assessment of subtle differences in a number of variables that are very difficult to quantify" (Butler and May 1984:300). Vehik (1985:209) stresses that for "macroscopic 'look-alike' cherts . . . an adequate sampling of source area variability must be considered." She further notes that most chert sources are "classic examples of polythetic and overlapping sets," and "sampling of variation and definition of similarities needs to receive greater research effort" than in the past (Vehik 1985:265).

Ives (1985:211) states, "Correlation of artifacts to sources must be based on objective and quantitative data, not on the traditional subjective and observer-dependent criteria of visual attributes." He further notes that "hypotheses of prehistoric chert exploitation or trade based on 'looks alike' statements are not supported by a coherent body of quantifiable data and, hence, promulgate erroneous models of cultural processes" (Ives 1985:217).

Tankersley (1985) studied the mineralogical properties of Wyandotte chert using petrographic thin sections and electron microscopy. The chert's similarity in color and texture to some other cherts precluded the use of macroscopic differentiation. Also, the wide variance in trace elements content precluded NAA sourcing procedures. He noted ,"No one microstructure or mineral inclusion provides Wyandotte chert with a fingerprint; however, the combination of all the mineralogical properties recognized does so" (Tankersley 1985:262).

Prothero and Lavin (1990) applied the technique of petrography to the analysis of a number of cherts from the Delaware River Valley of the eastern United States. They state, "From our work, we believe that petrographic analysis is a powerful tool for discriminating between chert sources. We feel that it has been unjustly neglected by archaeologists." However, they note that the technique might be less useful "in areas like Britain and the Midwest, where most cherts are derived from platform carbonates" (Prothero and Lavin 1990:577).

Hatch and Miller (1985) utilized a methodology combining NAA and discriminant analysis for sourcing Vera Cruz Quarry jasper in Pennsylvania near the Delaware River Valley. They expect that the examples analyzed will represent calibration data for future sourcing of jasper artifacts made of similar appearing materials from the area.

Matiskainen et al. (1989) studied cherts from prehistoric sites in Finland using atomic absorption spectroscopy and statistical discriminant analysis techniques to explain their geochemistry and to source them. They discovered no exact correlation of chert color with element concentration but observed that elemental concentrations varied widely within samples from single dwelling sites. They concluded that "a chemical ion exchange process in the original formations as well as in the podsol of the dwelling sites had created characteristics in the samples, thus ruling out a more detailed study of the material" (Matiskainen et al. 1989:637).

Relatedly, in referring to remarks made by Luedtke, Odell and Henry (1989:237) comment, "Luedtke's main point was that we must understand the basic principles underlying the geological formation of rock types if we hope to practice archaeological source analysis effectively." This point refers to both the European situation and the American one.

Philosophy of the Present Study

Hillsman's discussion (above) clearly shows the major problems involved in lithic material identification. In a more recent publication, Church et al. (1996) outline a broad, intensive approach to the subject. The only problem, however, is that the level of effort, time, and money required is so great that only a very large project will be in a position to carry it out. Thus, it is probably fair to say that the profession has reached something of an impasse, unless we accept the notion that we can make incremental progress toward solution of the problem.

We have undertaken the present study knowing fully well the limitations and problems embodied in the results. Accordingly, we have chosen to alter our approach in that we attempt to identify the most likely regions of origin, rather than specific sources of the materials. Since hunter-gatherers generally range over large territories during their annual rounds, we are more concerned with lithic procurement and exchange on the order of hundreds of kilometers, rather than dozens of kilometers. We are satisfied to demonstrate with a strong degree of certainty that a gray chert flake is Edwards chert, rather than San Andres chert, and leave the determination of point of origin to later researchers.

Our philosophy in the present lithic identification study has several premises:

(1) We must know much more about the facts and processes behind the prehistoric movement of Texas lithic materials into southeastern New Mexico, for these processes were the precursors of the well-known symbiotic relationships between Southern Plains and Southwestern Pueblo

groups during early historic times.

(2) More examples of Texas lithic materials are present in southeastern New Mexico sites than are currently being identified. Archaeologists have been too conservative because of a general lack (with a notable exception or two) of adequate source materials for comparisons and, understandably, a reluctance to risk making mistakes.

(3) Analyses that permit identification of only the classic examples of material types err by being too conservative, potentially missing a large share of the imported items, and underestimating the true extent and impact of the socioeconomic processes operating during prehistoric times. We believe that this margin of error is usually much greater than is often acknowledged.

(4) To date, the search for and discovery of demonstrable and potential sources of Texas materials such as Alibates, Tecovas, and Edwards, and of New Mexico look-alike materials (Baldy Hill, Tucumcari, Ragland, Ogallala, Rock House Canyon, Elkins, Salado Canyon [or Yeso]) have resulted in the collection and characterization of a large body of materials pertinent to the problem. The success of visual study and comparison with type examples, while still susceptible to problems of misidentification, is nevertheless becoming increasingly possible.

(5) At best, we cannot expect, on the basis of visual examination with representative source materials, to identify all of the examples of Texas materials in the project materials. In some cases, the ranges of overlap in attributes among some of the look-alikes (Edwards of Texas versus San Andres of New Mexico) are great and will ultimately require the precision of chemical, physical, and instrumental methods for rectification, if in fact totally reliable results will ever be possible.

(6) We will proceed with our study, recognizing that we will make two basic mistakes in our analyses: We will incorrectly attribute some items as being imports when, in fact, they are of local origin; and we will incorrectly attribute some items to local origin when, in fact, they are imported.

(7) We accept the situation outlined in point 5 because the two mistakes are mutually off-setting. We are willing to permit the entry of these mistakes into our results if we are also increasing our confidence that, overall, we have correctly identified a greater number of actually imported items (that is, have a nearer-to-truth sample on which to continue toward our research objectives).

(8) In the final assessment, mistakes are made in all types of intellectual endeavor. Properly acknowledged and taken into account during the analysis and interpretation of the data, we believe that these mistakes will be partly offset (as in 7) and that the remaining level of error is acceptable, believing as we do that our overall accuracy is improved.

Assembly of the Reference Collection

At the beginning of this project the senior author had a general notion of what ideal examples of Alibates dolomite, Tecovas chert, and Edwards chert look like. But as in all such matters, there is a much broader range of colors and textures within each material type, and these deviate significantly from the ideal examples. These ranges in color, color patterns, and texture intersect to varying degrees with the attribute ranges of other materials. Thus, the first activity was to build a lithic material type collection, both to familiarize the analysts prior to commencement of the analysis and to provide ready reference materials to assist decision-making during the analysis.

A major problem common to lithic sourcing studies, and one that had to be dealt with in this study, is the "look-alike" problem. Even when dealing with archaeologically and geologically documented materials from known sources, we were faced with the fact that lithic materials similar to the widely used Texas materials (Edwards, Alibates, Tecovas) are found within eastern New Mexico. Examples include the gray cherts of the San Andres formation in southeastern New Mexico (i.e., materials local to the Roswell area) vis-à-vis the Edwards Group cherts of central and west-central Texas and several sources of red and gray cherts and chalcedonies in the Yeso-Clovis-Tucumcari region of east-central New Mexico vis-à-vis Alibates dolomite and Tecovas chert of the Texas Panhandle. Again, the problems in distinguishing among the materials revolve around similarities in colors and color patterns, in material grain size as expressed in texture, and in degree (or absence) of translucence.

Table 21. Materials and source areas in the type collection

Material Type	Source Areas Represented in Sample
Classic Materials	
Edwards Group cherts	Bell, Coryell, Gillespie, Glasscock, Hamilton, Irion, Kerr, Kimble, Menard, Runnels, Taylor, and Williamson counties, Texas
Alibates Dolomite	Potter County, Texas
Tecovas Chert	Briscoe and Potter (South Basin) counties, Texas
Hackberry Chert (variety of Edwards group cherts?)	Sterling County, Texas
Look-alike Materials	
Edwards-like	Chaves County, NM (Rock House Canyon; San Andres formation) Roosevelt County, NM (Melrose Bombing Range)
Tecovas-like / Alibates-like	Chaves County, NM (Elkins) DeBaca County, NM (Yeso; Ft. Sumner) Quay County, NM (Ragland; Tucumcari Hills) Roosevelt County, NM (Ogallala formation) Union County, NM (Baldy Hill)

Assembly of the reference collection was accomplished by gifts from individuals and personal collection from source areas. In virtually every case, the individuals who provided samples were the people who collected them from the source areas. Dr. Phillip Shelley of Eastern New Mexico University contributed not only samples, he designed and administered a lithic identification test to Hamilton and Wiseman working as a team. While we did not "ace" the test, we were encouraged to continue our study for one major reason--our mistakes on the test were that we failed to identify all of the imported materials. Conversely, all of the examples we attributed to the classic Texas sources were correct.

Most samples in the reference collection assembled for the project contain two to eight items ranging from single flakes to partially worked cores to tested cobbles. Hamilton produced series of flakes from each core and material unit to expose the color and texture ranges. Because the Bob Crosby Draw materials display a strong degree of heat alteration, duplicate flakes of each reference sample were heat-treated to provide broader comparison.

We acknowledge that we do not have the full range of variability of each specific material type, or even the full range of variability present at the sources represented in the collection. But we do have a considerable range of colors, color patterns, and textures represented in the type collection as a whole and are confident that our capabilities in detecting imported materials are greatly enhanced (Table 21).

Analytical Procedure

Select Items

The chipped stone artifacts (projectile points, etc.) and lithic manufacture debris were visually inspected for the grain quality (i.e., we sorted for the very fine-grained examples), color, and color pattern that generally fit the values known or are believed to belong to the suspected source materials. While the procedures and criteria were developed and implemented using the team approach for some of the earlier projects, Hamilton performed most of the work on the bulk materials. Each item was examined under a binocular microscope set at 10 power, compared frequently with reference materials, and assigned to one of four analytic categories: (1) Not an import. The material compares poorly to the imported types and is remanded to the status of "local" material. (2) Look-a-like. The material shares several attributes with one of the look-a-like (i.e., New Mexico other than Roswell area) type materials and is classified as such. (3) Possible import. The material is probably a fringe example of one of the imported types but lacks enough points of similarity and/or is too small to permit confident assignment to the imported type. (4) Imported material. The material compares satisfactorily in all or most all respects to a specific imported material type and is designated as such.

As anticipated, several ambiguous materials were noted during the analysis and deserve special mention. These include: (1) a whitish chert with red spots, the red spots probably resulting from heat treatment (probably not imported); (2) light, brownish-colored, very translucent chalcedony that lacks fossils (probably not imported); (3) white to very light gray, semitranslucent chert that lacks fossils (classified as possible Edwards chert, since some Edwards examples [e.g., Mertzon area] are white or nearly white); and (4) dark gray to black chert with abundant, evenly distributed, light-colored, ash-like specks (classified as Edwards chert on the basis of written descriptions).

Once we had made the decisions outlined above, we examined all of the possible and probable Edwards pieces under both short-wave and long-wave ultraviolet light. We had earlier examined all of our source samples in this manner and learned that the Edwards pieces gave off one of two signature colors: a medium orange-brown, or a bright orange or yellow color. Comparatively speaking, the former is warm but dark and is the more common response in our particular set of reference samples. The latter is medium in brightness. Interestingly, among our source materials, the majority of the medium orange responses are in samples from sources nearest to New Mexico. Perspective on degree of brightness was gained when we broke a medium orange fluorescing piece and immediately placed it under the UV light. The fresh break fluoresced a bright orange-yellow. We cannot give Munsell values for our categories because the color chips do not respond in a regular, methodical manner to ultraviolet light.

The last hurdle to overcome was the gray San Andres cherts and the problems they pose with respect to distinguishing them from Edwards chert. During the initial visual examination of all artifacts we had been able to eliminate most San Andres pieces on the basis of various criteria, including color patterns, textures, imperfections, and cortex composition and configuration. Under UV light, most pieces of San Andres do not fluoresce (i.e., were velvety purple-black), but a few did give off a medium orange-brown color like some of the Edwards examples (see Hofman et al. 1991:304). Importantly, none of the San Andres pieces we examined gave off the bright orange or yellow color noted for the Edwards examples. This fact, in conjunction with other visual criteria (color, grain quality, etc.), reaffirms our impression that the bright orange or yellow, UV-incited color probably provides the best test for Edwards that we have at the present time.

Given the above position, we subjected all possible and probable Edwards pieces from Bob Crosby Draw to UV examination. Most of the pieces that we had initially grouped as probable Edwards fluoresced bright orange or yellow and are now considered to be positive Edwards identifications. A few fluoresced medium orange-brown and were downgraded to a possible Edwards status. Most of the pieces that we had initially grouped as possible Edwards also fluoresced bright orange or yellow, and we upgraded their status to positive Edwards. A few fluoresced medium orange-brown and were retained in their original "possible Edwards" status. A few examples in both sorting groups did not fluoresce at all and were deleted from further consideration as Edwards or possible Edwards.

Bulk Lithic Debitage

As all experienced analysts know, many discoveries are serendipitous. One such discovery was made by Hamilton when, as an afterthought during the Los Molinos analysis, he passed all gray chert lithic debitage under the ultraviolet light. Checking back through bulk collections from other sites and projects, he discovered that the materials believed to represent the locally available (to the particular site) San Andres gray cherts show a variety of responses as a group that differ from site to site and potentially from area to area within a region.

This suggests there may be systematic differences among cherts from the same geologic formation and that these differences have a spatial dimension. If true, these differences may convey useful information about human movements and/or resource access on an intra-regional level. This is now a standard component in the analysis of eastern New Mexico sites. The UV response categories are the same as those used for the suspected Edwards chert flakes and artifacts.

The results of this study are given in the discussion of lithic manufacturing debris.

FAUNA

Nancy J. Akins

Poor preservation of bone has greatly influenced the assemblage content from LA 75163 and LA 103931. The majority of the fauna recovered consists of small fragments of artiodactyl teeth with smaller amounts of mussel shell, few burned bones, some that are clearly late intrusives, and some that could be either intrusives or prehistoric.

LA 75163

Table 22 gives the bone counts and percentages for LA 75163. Specimens from ground squirrels (*Spermophilus* and *Spermophilus spilosoma*), pocket gopher (*Pappogeomys castanops*), kangaroo rat (*Dipodomys merriami*), cottontail rabbit (*Sylvilagus* sp.), rattlesnake (*Crotalus* sp.), fish (Osteichythes), and probably the egg shell (from a medium-sized bird) are most likely intrusives or late additions unrelated to the prehistoric occupation. All but the fish, which was found in association with aluminum foil, and possibly the egg shell, are from taxa native to the area and could be expected as intrusive burrowers or inhabitants of other species' burrows. The parts found are often complete (Table 23) and have less environmental alteration (Table 24) than specimens that are more likely prehistoric, also suggesting they are late intrusives. The rest of the assemblage consists of very small fragments of undetermined elements (Table 25).

The unidentified taxa are almost all very small fragments that are often rounded and pitted. Artiodactyl tooth fragments are generally small pieces of pitted and stained tooth enamel. The larger pieces indicate that an artiodactyl the size of a cow, possibly bison, is present. None suggest pronghorn or deer; however, since the vast majority of the enamel fragments are very small, either is possible. One piece of enamel is burned. The ubiquity of the artiodactyl tooth enamel and mussel shell suggest both were deposited prehistorically. The turtle fragment is a pitted piece of carapace that could represent either a land or water turtle. Preservation is similar to that of some of the intrusive elements, suggesting it could be intrusive.

Evidence of processing is rare. Five burned bones are from small mammals (N=3), a large mammal, and an artiodactyl (tooth enamel). The spiral break on a cottontail rabbit ulna could easily be a natural break (e.g., Marshall 1989:12, 20).

LA 103931

Few pieces of bone were found at LA 103931 (Table 26). Bone preservation is again poor, but pieces that survived are larger and more identifiable than those from LA 75163. Pitting occurs on a fragment of artiodactyl tooth enamel. The rest of the bone is checked or weathered (Table 27). Body parts include a probable vertebra process, a piece of a scapula, and a tooth fragment (Table 28). Survival of the larger pieces suggests that preservation was better at this site or that the elements are more recent than the prehistoric mammalian fragments found at LA 75163.

Table 22. Taxa recovered from LA 75163

Taxon	Common Name	N	%
small mammal/medium-large bird		1	.2
mammal		3	.6
small mammal	jackrabbit or smaller	6	1.2
small to medium mammal	jackrabbit to coyote	3	.6
medium to large mammal	coyote or larger	8	1.7
large mammal	pronghorn or larger	8	1.7
Spermophilus	small ground squirrel	5	1.0
cf. *Spermophilus spilosoma*	spotted ground squirrel	1	.2
Pappogeomys castanops	yellow-faced pocket gopher	1	.2
Dipodomys merriami	Merriam's kangaroo rat	1	.2
Sylvilagus cf. *auduboni*	desert cottontail	10	2.1
artiodactyl		346	71.2
large artiodactyl	cow, bison, or elk size	2	.4
Bovidae	cow, bison, or mountain sheep	6	1.2
medium bird (egg shell)	quail or chicken size	1	.2
Testudinata	turtle	1	.2
Crotalus sp.	rattlesnake	2	.4
Osteichthyes	fish	34*	7.0
mussel		47	9.6
Totals		486	100.0

* intrusive, probably the same individual

Table 23. Evidence of processing and breakage, LA 75163

Taxon	Fragmentation (n)					Burned (N)	Spiral Break (N)
	Complete	> 75%	50-75%	25-50%	< 25%		
small mammal/medium-large bird					1		
mammal					3		
small mammal					6	3	
small to medium mammal					3		
medium to large mammal					8		
large mammal					8	1	
Spermophilus	5						
cf. *Spermophilus spilosoma*	1						

Pappogeomys castanops			1				
Dipodomys merriami	1						
Sylvilagus cf. *auduboni*	4			1	5		1
artiodactyl					345	1	
large artiodactyl					2		
Bovidae					6		
medium bird (egg shell)					1		
Testudinata					1		
Crotalus sp.	2						
OSTEICHTHYES	26	8					
mussel					46		
Totals	39 8.1%	8 1.7%	1 .2%	1 .2%	435 89.9%	5 1.0%	1 .2%

Table 24. Environmental alteration, LA 75163

Taxon	None	Pitting	Sun Bleached	Checked	Greasy
small mammal/medium large bird					1
mammal	1	2			
small mammal	3	3			
small to medium mammal		3			
medium to large mammal		8			
large mammal	2	2		4	
Spermophilus	5				
cf. *Spermophilus spilosoma*		1			
Pappogeomys castanops	1				
Dipodomys merriami	1				
Sylvilagus cf. *auduboni*	3	5	2		
artiodactyl	1	342	3		
large artiodactyl		2			
Bovidae		6			
medium bird (egg shell)	1				
Testudinata				1	
Crotalus sp.	2				
Osteichthyes		34			
mussel	47				
Totals	65	406	5	9	1

Table 25. Body part distribution, LA 75163

Taxon	Unknown	Long Bone	Flat Bone	Cranial	Mandible	Tooth	Vertebra	Rib	Scapula	Innominate	Front Limb	Hind Limb	Foot	Shell
small mammal/large bird		1												
mammal	2	1												
small mammal	1	5												
small to medium mammal		1	1				1							
medium to large mammal	3	3	1			1								
large mammal	1	7												
Spermophilus							1	1	2			1		
cf. *S. spilosoma*												1		
Pappogeomys castanops														
Dipodomys merriami					1									
S. cf. *auduboni*				2						2	2	2	2	
artiodactyl						346								
large artiodactyl						2								
Bovidae						6								
medium bird (egg shell)														1
Testudinata														1
Crotalus sp.							2							
Osteichthyes							34							
mussel														47

Table 26. Taxa represented at LA 103931

Taxon	Common Name	N	%
medium to large mammal	coyote or larger	1	8.3
large mammal	pronghorn or larger	1	8.3
artiodactyl		1	8.3
medium to large artiodactyl	pronghorn or larger	1	8.3
mussel	bivalve	8	66.7
Totals		12	99.9

Table 27. Environmental bone alteration, LA 103931

Taxon	None	Pitted	Checked
medium to large mammal			1
large mammal			1
artiodactyl		1	
medium to large artiodactyl			1
mussel	8		
Totals	8	1	3

Table 28. Body part distribution, LA 103931

Taxon	Flat Bone	Tooth Fragment	Vertebra Process	Scapula Fragment	Shell
medium-large mammal	1				
large mammal			1		
artiodactyl		1			
medium-large mammal				1	
mussel					8

BOTANICAL ANALYSIS

Pamela J. McBride

The Bob Crosby Draw site is in what Brown (1994) defines as semidesert grassland. Common grasses that occur in the semidesert grassland include curly mesquite grass (*Hilaria belangeri*), black grama (*Bouteloua eriopoda*), and vine mesquite grass (*Panicum obtusum*), among others. Leaf succulents including sotols (*Dasylirion* sp.), yuccas (*Y. torreyi, Y. baccata*, etc.), and weedy annuals such as amaranth are also present. Prickly pear (*Opuntia* sp.) and Turk's head (*Echinocactus horizonthalonius*) are among the cacti that are well represented. Mesquite (*Prosopis glandulosa*) and one-seed juniper are three of the important scrub-shrub species that proliferate in the semidesert grassland. The reduction of grasses by grazing has contributed to the increased invasion of shrubby species such as mesquite, which is the dominant vegetation of the coppice dunes at the site. Prehistoric populations would have also had access to riparian resources along the nearby Pecos River.

Methods

The four 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). Each sample was immersed in a bucket of water and a 30-40 second interval allowed for settling out of heavy particles. The solution was then poured through a fine screen (about 0.35 mm mesh) lined with a square of "chiffon" fabric, catching organic materials floating or in suspension. The fabric was lifted out and laid flat on coarse mesh screen trays, until the recovered material had dried. Each sample was sorted using a series of nested geological screens (4.0, 2.0, 1.0, 0.5 mm mesh) and then reviewed under a binocular microscope at 7-45x.

Flotation Results

Plant remains from LA 75163 (Table 29) were scarce and shed little light on plant resources exploited by the site occupants. Recovered from the northeast quadrant of Sq 29N/0 (Feature 15, a burrow with a rich cultural content backfilled by the rodent), *Chenopodium* sp. and indeterminate seeds comprise the only positively identified charred plant remains from the site. An eroded plant part recovered from a charcoal lens at the juncture of Levels 2A and 2B in Sq 27N/7W (FS 719) shares compelling similarity in size, shape, and texture to the tiny segments of *Zea mays* rachis that proliferate in agricultural sites. However, heavy erosion and the singular status of the specimen require a label of "charred unknown plant."

Uncharred *Portulaca, Chenopodium*, indeterminate, *Euphorbia, Amaranthus, Kallstroemia, Sporobolus*, and Unknown #9171 seeds were recovered from samples as well but probably represent modern contaminants. Feature 13 hearth fill and two samples from a charcoal lens contained only uncharred plant material, with the exception of the charred unknown plant part from FS 719.

Summary

Identifiable plant remains from the Bob Crosby Draw site were restricted to a single charred goosefoot seed. A fragment of a possible corn (maize) cupule was also recovered, but its small size precludes definitive identification. Poor preservation may have contributed to the low density of plant remains. Considering the site's location in a dunal environment, the lack of plant remains at Bob Crosby Draw is not surprising.

Table 29. Plant remains, LA 75163

Taxa	Hearth 13 fill	Sq 29N/0	Sq 27N/2W charcoal lens in Level 2A	Sq 27N/7W charcoal lens at Level 2A/2B contact
CULTURAL WEEDY ANNUALS: *Chenopodium* goosefoot		+*		
Unidentifiable seed		+*		
Unknown plant part				+*
TOTAL PROBABLE ECONOMIC SPECIES	0	1	0	0
PROBABLE CONTAMINANTS: *Amaranthus* pigweed	+			
Chenopodium goosefoot	+	+	+	+
Euphorbia spurge	+			
Kalstroemia caltrop	+			
Portulaca purslane	+	+	+	+
Sporobolus dropseed grass	+			
Unidentifiable	+		+	

+ indicates presence of seeds
* indicates charred plant remain

DISCUSSION

McBride's original report for this project provides a lengthy discussion comparing recovery rates of plant remains for villages and camp sites in southeastern New Mexico. Village sites tend to produce richer samples and therefore better pictures of plant usage by prehistoric peoples. Camp sites, because of their shorter, less intense occupations, tend to produce fewer, more limited samples. It was neither unusual nor unexpected that almost no plant remains were recovered from the current project sites.

After several projects in southeastern New Mexico, I am now convinced that much information and insight into prehistoric hunter-gatherer lifeways can be gleaned from this class of sites, given enough time, persistence, and diligence. We recovered little in the way of useful soil samples from Bob Crosby Draw, yet we did find a rodent-backfilled burrow that had obviously gone through a rich deposit lying just beyond our project limits. This kind of botanical "hotspot" does occur with some frequency in hunter-gatherer sites, but the problem is that we rarely have surficial evidence for their location prior to excavation. Instead, we often encounter them unexpectedly. The point is, we have to excavate large, contiguous areas within camp sites to make our own serendipitous discoveries.

This is a fact of hunter-gatherer archaeology and a problem that archaeologists have to work with. It is *not* acceptable, or in keeping with the spirit and intent of the laws governing the national cultural resource management program, to use these realities as a reason to generally discriminate against shallow camp sites in specific or hunter-gatherer archaeology when it comes to the question of whether these sites should be investigated prior to land-disturbing activities. Instead, archaeologists must accept the challenges posed in working with the situation and develop the approaches, techniques, and attitudes (and patience!) that will eventually create success. The resources do not have to prove themselves worthy of study. Instead, archaeologists have to prove themselves worthy of the opportunity.

Cultural and Temporal Associations of Faunal Remains

A question that always arises with regard to faunal remains recovered from shallow sites like Bob Crosby Draw and River Camp is whether any of them belong to the prehistoric occupation or whether they are the result of post-abandonment intrusions. To a degree, hints can be gained by the condition of the bones themselves and other criteria mentioned by Akins herein. But, aside from butchering, burning, and digestive-tract evidence on the bones, no criteria are definitive, and one is often left wondering about the matter.

In this study, we took the two most common fragment types identified by Akins as possible prehistoric materials, artiodactyl (N=346, mostly tooth enamel) and freshwater mussel shell (N=47), and mapped them on a presence/absence basis (data from Table 22). By comparing their distributions to that of the lithic debitage (Fig. 36), we see that all three are very similar. Accordingly, we believe that the majority, if not all, of the artiodactyl and mussel fragments are prehistoric and belong to the same occupation as the lithic debitage.

The only questionable concentration is that of artiodactyl fragments at the north end of the excavated area. This area is the most rodent-disturbed part of the site, a fact mirrored by evenly distributed tooth enamel fragments. While a prehistoric temporal association of the remains in this cluster is not negated, it does deviate sufficiently to warrant noting.

All other faunal categories that Akins (this report) believes have possible prehistoric affiliation

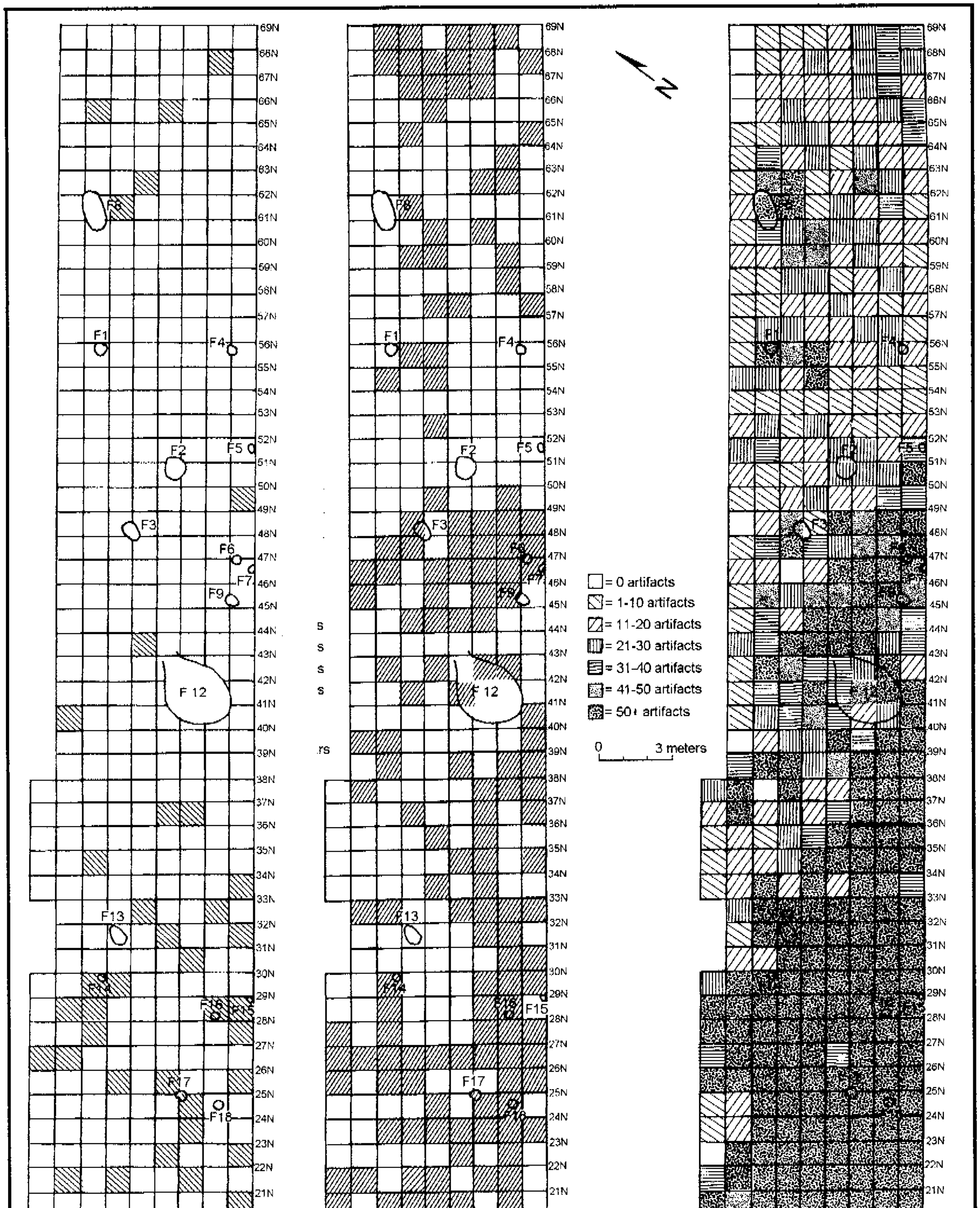

Figure 36. Distribution of faunal remains relative to lithic debitage, LA 75163.

are represented by few examples (Table 22). Because of their fragmentary nature, Akins could categorize them only on the basis of body size. The categories include mammal, small mammal, small to medium mammal, medium to large mammal, large mammal, large artiodactyl, and Bovidae. Given the distributional implications for the artiodactyl and mussel remains, I believe with a fairly high degree of certainty that all of these remains are prehistoric.

Only four fragments (three small mammal and one large mammal) and one artiodactyl (tooth enamel) are burned, lending further weight to the idea that these items are prehistoric. Because 1/8 inch wire mesh was used during excavation, we believe that the low representation of small bones relates to cultural factors or poor preservation, not to excavation technique.

Before continuing, it should be noted that we eliminate the fragment of small mammal/medium bird from further consideration. It is listed in Table 24 as greasy, a definitive characteristic of fairly recent bone.

If we recalculate the percentages of faunal remains for only the possible/probable prehistoric categories (N=349; Table 30), we find that artiodactyl remains, especially tooth enamel fragments, are by far the most common at 81 percent. If we combine this with other categories that probably belong with artiodactyl (for this assemblage, anyway), meaning the large mammal, Bovidae, and large artiodactyl, then this figure rises to 84 percent. The most likely species represented, in decreasing order, are pronghorn and/or bison, and deer.

Because the Bob Crosby Draw site is 50 km (about 30 mi) from the nearest woodland habitat, elk are unlikely, and mountain sheep are almost obviated as possibilities. Cattle (*Bos*) are eliminated by the indications (weathering, etc.) that these remains are possibly or probably prehistoric. I believe that several, perhaps many individual animals are represented. This is because the fragments are both numerous and widespread.

Table 30. Recalculated percentages of faunal remains in order of abundance, LA 75163 (obvious intrusives removed)

Taxon	Common Name	N	%
artiodactyl	mountain sheep, pronghorn, deer, elk, bison, cow (mostly tooth enamel)	346	81
freshwater mussel	Pecos pearly mussel?	47	11
large mammal	pronghorn or larger	8	2
medium to large mammal	coyote or larger	8	2
Bovidae	bison, cow, mountain sheep	6	1
small mammal	jackrabbit or smaller	6	1
small to medium mammal	jackrabbit to coyote in size	3	<1
mammal		3	<1
large artiodactyl	bison, elk, or cow size	2	<1
Totals		429	100

Animals of medium size or smaller account for only 15 percent of the remains. Of these, 11 percent are freshwater mussel (probably the Pecos pearly mussel, *Cyrtonaias tampicoensis* [Lea, 1838]; Wiseman, speculation based on work at LA 68188, the Fox Place; see Metcalf 1982). This does not mean that small animals (rabbits, etc.) were not taken in large numbers, for their fragile bones preserve poorly in shallow deposits.

What we *can* say is that large mammals, probably pronghorn and/or bison but also perhaps deer, were taken in fairly large numbers by the inhabitants of the Bob Crosby Draw site. They also took smaller mammals, but relative dependence on small and medium mammals versus large mammals cannot be accurately assessed because of the possibility of preservation problems. It should be noted that Bob Crosby Draw dates to the Post-McKenzie phase, a period characterized by farmers shifting to bison hunting as a lifeway (Jelinek 1967).

The faunal assemblage from River Camp (LA 103931) is similar in content to that from the Bob Crosby Draw site but differs in several respects, including the absence of readily identifiable, postoccupational intrusives, larger bone fragments on average, and reversed numerical ranking of the primary taxa, artiodactyl and mussel (Akins, this report).

The absence of postoccupational intrusives probably reflects the fact that no significant accumulations of sand or clumps of vegetation occurred within the excavated area. These are the situations in which intrusive burrowing rodents, and their remains, are most often found. Since the ceramic data suggest probable contemporaneity of the two sites, we suggest that River Camp, being smaller and evidencing less intensive prehistoric use, saw less human trampling and therefore less fragmentation of the bones. Reverse ranking of the taxa may reflect the fact that the assemblage is very small (N=12) and is probably skewed by sampling problems.

The main similarity of the River Camp assemblage to that of Bob Crosby Draw is that artiodactyl and probable artiodactyl ("large mammal") elements (25 percent) and freshwater mussel fragments (67 percent) are the primary groups represented. Here, as at Bob Crosby Draw, the artiodactyls are most likely pronghorn and/or bison or perhaps deer. Medium to large mammal (coyote or larger; 8 percent) rounds out the assemblage. For the reasons discussed above for the Bob Crosby Draw, artiodactyls and mussels were an important part of the diet at River Camp. The relative contribution of small to medium mammals is unknown, probably because their remains can be expected to preserve poorly.

The Pottery Assemblages from the Project Sites

Three aspects of the pottery assemblages from Bob Crosby Draw and River Camp are striking: the variety of types present, the duplication of certain types at both sites, and the percentages of imported vessels in each assemblage.

Both assemblages contain pottery types that occur only sporadically in presumed hunter-gatherer sites in southeastern New Mexico: Corona Corrugated and Lincoln Black-on-red at Bob Crosby Draw and Corona Corrugated at River Camp. We can only guess why this would be the case. For instance, the Corona Corrugated, bearing quartz mica schist temper, was mostly imported to farming sites in the Sierra Blanca from central New Mexico. Perhaps it was generally too difficult for those farmers to obtain for them to be willing to trade it to the hunter-gatherers. Lincoln Black-on-red is a late-dating type that also did not occur in particularly large quantities even though its area of manufacture was in the Sierra Blanca. Perhaps it also was too highly valued to trade to hunter-gatherers, even though it is well represented at contemporary farming sites like Bloom Mound and Henderson at Roswell (Kelley 1984; Wiseman 1998).

The similarity in specific pottery types at the two sites is striking. The shared types include Chupadero Black-on-white, Corona Corrugated, Three Rivers Red-on-tan and Red Ware, El Paso Polychrome, Jornada Brown, and South Pecos Brown. The only significant types that are not duplicated include Lincoln Black-on-red, St. Johns Black-on-red or Polychrome, the Viejo period sherd, and the local variety of Playas Incised that are lacking at River Camp. Although sherds from three different vessels of Lincoln were recovered from Bob Crosby Draw, making it comparatively well represented at that site, the other three pottery types are represented by only one sherd (i.e., one vessel) each. Regionally speaking, Playas Incised is not common, and St. Johns and Viejo period sherds are rare.

The overall percentage of imported vessels in each assemblage is virtually identical. As detailed in the following section, 11 (28 percent) of 39 or 40 vessels from Bob Crosby Draw and 3 (19 percent) of 16 vessels from River Camp were made outside the Sierra Blanca region, the primary source area for the pottery found at the two sites. However, given the generally low sherd and vessel numbers for both sites, the figures are remarkably similar.

When combined, all three aspects strongly suggest that the two pottery assemblages are linked. While these similarities could be fortuitous, they could also be real and signal fundamental socio-economic conditions shared by the two sites. This possibility is treated in more detail in the following chapter.

ADDRESSING THE RESEARCH QUESTIONS

1. Are LA 75163 and LA 103931 base camp/habitations or special activity sites or some combination? Are structures, storage pits, other types of pits, and thermal features (hearths, cooking pits, etc.) present? Do the features in each site form a single cluster, suggesting a single occupation? Or, are two or more clusters of features present, suggesting two or more occupations? If two or more occupations are present, were the activities or site functions during each occupation the same or different?

Bob Crosby Draw

First, and perhaps most importantly for this question, the Bob Crosby Draw site is situated next to reliable water (Bob Crosby Spring and the Pecos River). Such placement with respect to this vital resource almost always signals an important focal point of human use of the landscape in arid and semiarid environments like southeastern New Mexico.

Other indicators of the probable importance of Bob Crosby Draw to the prehistoric occupants include a possible pithouse (Feature 12), a possible sleeping pit (Feature 8), a small storage pit (Feature 7), four cache (?) pits (Features 3, 4, 10, 11), and eight hearths. If our interpretations of the pits are correct, then the occupations in this part of LA 75163 can be characterized as more than simple, overnight camping. The cache pits indicate intended return to the site, and the fact that they were empty indicates that at least one return was made.

Artifactual evidence also points to extended periods of occupation or repeated use of the site. Tool manufacturing activities resulted in the accumulation of over 21,000 items of lithic debris. The artifact inventory indicates that a variety of different activities normally included in day-to-day living were performed in at the site.

Temporal evidence (discussed below), based on hearth and artifact types, indicates that at least two and perhaps more periods of occupation occurred within the excavated area of Bob Crosby Draw. These included the last part of the Archaic and the late prehistoric periods. For reasons discussed regarding artifact distribution patterns, we believe that the larger percentage of the cultural items probably represent the late prehistoric period, especially the fourteenth century.

Whatever the case, the amount of cultural debris suggests that each episode of occupation was probably on the order of at least a few weeks and perhaps as long as a few months in duration. The time represented was certainly long enough to include the breakage of about 40 pottery vessels, assuming that they were not broken by a natural catastrophe. The Plains are famous for freak acts of nature, including a severe hail storm that destroyed most or all of the Coronado expedition's earthenware (Snow 1997).

All of these factors--site situation next to reliable water, possible structures and sleeping pits, diverse activities, and large quantities of trash--qualify Bob Crosby Draw as a base camp.

River Camp

The absence of cultural manifestations other than the scatter of pottery sherds, lithic chipping debris, three fragmentary artifacts, and one piece of burned rock at River Camp is noteworthy. While it is possible that features such as pits and hearths lie outside the excavated squares, the mere fact that we excavated 128 sq m and recovered nearly 400 cultural items (including sherds from at least

16 different pottery vessels) suggests that we probably have a fairly accurate view of the site and its contents.

What kind of activity or activities can lead to the creation of a site like River Camp? One clue may be that it is situated a short distance (about 500 m) from the Pecos River and on a terrace high enough to avoid floods. Although the location is not the shortest distance between the Bob Crosby Draw site and the river, it is on the most direct line between the latter site and the closest farming villages in the Roswell area (Henderson, Rocky Arroyo, Bloom Mound; late McKenzie phase farming villages would have been closer to River Camp, but Jelinek [1967] believes they were abandoned by A.D. 1300) and prior to the late prehistoric occupations of both River Camp and Bob Crosby Draw.

Is it possible that the River Camp was a place where people from the Roswell farming villages came to trade with the people of Bob Crosby Draw? How else can we account for a large number of pottery vessels in the absence of evidence for serious occupation? The earliest Spanish entrada in the Southern Plains, that of Vásquez de Coronado in the spring of 1541, encountered Native Americans in that region during their expedition in search of Quivira. The description in *Relación del Suceso* (anonymous) is both interesting and relevant here:

> In these Plains, among the cattle, two types of people are found; one group was called Querechos and the other Teyas. They are well built, and are painted; they are enemies of each other. They have no settlement or occupation other than to follow the cattle, of which they kill as many as they want. They tan the skins, with which they clothe themselves and build their tents. They eat the meat of the cattle, sometimes raw, and they also drink the blood when thirsty. Their tents are in the shape of pavilions. They set them up by means of poles which they carry for the purpose. After driving them in the ground they tie them together at the top. When they move from place to place they carry them by means of dogs, of which they have many. They load the dogs with their tents, poles, and other things. They make use of them, as I said, because the land is very level. The dogs drag the poles. What these people worship most is the sun. The hides of their tents are dressed on both sides, free from hair. The cattle and deer skins that they do not need, and the meat dried in the sun, they trade for maize and blankets to the natives *at the river* (emphasis added; Hammond and Rey 1940:292-293).

While the river is not named, we are probably correct in assuming that the reference is to the Pecos River, the only river the Spaniards had crossed up to that point in their expedition to the Plains. Nor are the presumably southwestern natives named. But as we have already mentioned, trade between southwestern and Plains peoples had already become established by the time of the entrada. The "natives" could have come from any of several southwestern villages between the Roswell area and Pecos Pueblo, the latter located near the headwaters of the Pecos River. The absence of any mention of pottery as a trade item is not a problem. The large numbers of southwestern potsherds documented at prehistoric and historic sites on the Southern Plains is prima facie evidence that these items were part of the process for centuries.

As discussed at some length by Habicht-Mauche (1992), Hickerson (1994), and Riley (1997), the Querechos are generally believed to have been Apaches. In 1540, their territory on the Southern High Plains extended north from about Amarillo, Texas, to and beyond the Canadian River. The Teyas are more problematical, especially regarding their language. However, it appears that their territory joined the Querechos' and extended south, perhaps as far south as Pecos, Texas, or beyond.

The same authors, among others, equate the Teyas with the historic Jumanos and with the prehistoric complex that archaeologists call Garza (Habicht-Mauche 1992; Hickerson 1994; Riley 1997). I certainly have no quarrel with this interpretation and generally consider the late prehistoric hunter-gatherers in the Roswell area to have been, in essence, prehistoric Jumanos. This includes the late-dating (fourteenth-century) occupation at Bob Crosby Draw and River Camp. If all of this is true, then River Camp may have been nothing more than a meeting place for purposes of trade between Jumanos and the farmers from sites like Bloom Mound, Henderson, and Rocky Arroyo at Roswell.

2. What artifact assemblages are present at LA 75163 and LA 103931? What types of tools and manufacture debris are present and in what percentages? On the basis of the artifacts, what types of activities were performed at each site?

Bob Crosby Draw

The Bob Crosby Draw site produced an artifact assemblage dominated by approximately 21,000 pieces of chipped lithic manufacture debris. These materials include early-stage (3) and late-stage (3) bifaces broken during the projectile point manufacture process. It is clear from the remains that artifact manufacturing involved two different processes: raw material reduction (cores to flakes to artifacts) and reuse/remodification of items found around the site.

Reuse of lithic materials is especially evident in the formal tools, for only the small, thick, unworkable fragments (e.g., the stems) of broken projectile points remain. If recycling ever characterized the assemblage of a prehistoric site, that site is Bob Crosby Draw.

Formal tools represent several functional categories, as follows: hunting-related artifacts (20 percent), including 22 projectile points (17 dart, 5 arrow), 5 Plains-style end scrapers, 3 side-scrapers, 1 end/side scraper; and 2 knife fragments reminiscent of beveled (Harahey) knives; plant-food processing artifacts (18 percent), including 9 one-hand manos and 21 small-basin "travel" metates; manufacture and maintenance artifacts (37 percent), including 2 drills, 57 flake-tools, and 2 hammerstones; facilities and food-service artifacts (25 percent), including 39 or 40 pottery vessels (17 bowls and 23 jars) and one jar lid; ornaments (<1 percent), in the form of one bead.

The six projectile point preforms (early-stage and late-stage bifaces) are considered to be manufacture debris, not formal artifacts. Another 38 small fragments of bifaces are unassigned, though many probably belong to the hunting and manufacture/maintenance categories.

Plant-food processing was important at Bob Crosby Draw. We assume that the 30 broken grinding stones indicate long-term grinding at the site (Schlanger 1990). A more or less lengthy occupation is also indicated by the sherds of at least 39 or 40 different pottery vessels, some food-service bowls and others cooking and storage jars. The primary manufacture and maintenance activities were involved in making both formal and informal (flake-tools, N=57) chipped stone artifacts. Other, less-well represented manufacture and maintenance activities involved drilling and pounding. Hide processing, indicated by nine Plains-style scrapers, was conducted at Bob Crosby Draw.

The relative importance of hunting at Bob Crosby Draw during the late prehistoric period seems certain. The arrow points, arrow point preforms, and evidence for reworking broken Archaic points, presumably in part or in total into (probably) arrow points, support this conclusion.

On the other hand, the status and implications of the 17 Archaic point fragments are questionable. These items are too small and thick to rework into other items. This is also true of several blade fragments now counted among the miscellaneous bifaces because they are too small to confidently assign to the projectile point category. These facts suggest that the larger, thinner portions (i.e., the blades) of Archaic points were used specifically as sources of material for manufacture into other items such as arrow points.

We cannot be certain whether these items (fragmentary Archaic point bases and blades) were scavenged from the site itself or from the surrounding landscape and brought into the site for reuse. However, it is also inconceivable that the site was not occupied during the Archaic period simply because of the presumed presence of reliable water. Thus, at least some of the usable, reworkable Archaic point fragments were almost certainly scavenged from within the site by late prehistoric (ceramic) period occupants.

The predominance of informal (flake) tools in the manufacture/maintenance category and relative dearth of formal tools such as drills at Bob Crosby Draw is normal at this type of site in southeastern New Mexico. Clearly, here, as elsewhere, many of the generalized cutting and scraping activities around camp and in habitation (structural) sites during the late prehistoric period were performed with sharp-edged flakes. This situation strongly suggests that core reduction in large measure took place simply to provide these flakes, rather than solely to make projectile points and drills, as is often assumed.

The part of the site exposed during this project yielded a fairly wide variety of artifact types representing all of the essential categories of a base camp occupation. The most prominent types of activities included plant food grinding (manos, metates), food preparation and consumption (pottery vessels), and general cutting and scraping activities associated with equipment manufacture and repair (flake tools, drill, hammerstone).

Bob Crosby Draw site occupants clearly hunted (projectile points) and prepared hides (formalized, Plains-style scrapers). However, the presence of the Archaic points in the site deposits is ambiguous. Are they remnants of hunting equipment repair at the site, or were they scavenged elsewhere and brought back to this site for reworking into other items? This situation creates questions about the overall contribution of hunting to the subsistence mix and therefore to the level of importance of hunting to the site occupants.

River Camp

River Camp had a much more limited artifact assemblage. While this situation could be due to problems associated with short-term occupations (Schlanger 1990), the presence of sherds from several different pottery vessels suggests otherwise.

As at the Bob Crosby Draw site, lithic chipping debris (N=319) is the primary cultural item. Two pieces are projectile point preforms, one probably for an arrow point, and the other possibly for a dart point.

Formal artifacts are limited to a single arrow point. A piece of sandstone may belong to a grinding stone, but if so, it was only lightly used and cannot be definitely attributed to food grinding. That leaves two flake tools as the only other chipped stone artifacts.

Pottery is curiously well represented at this small site. The 56 sherds evidently represent about

16 vessels, including 4 bowls and perhaps as many as 12 jars.

To summarize, the site contains minimal evidence of artifact manufacturing in the form of projectile point preforms and cores and flakes. Two flake tools presumably represent limited cutting and scraping activities. On the other hand, the inordinately large number of pottery sherds, and especially the number of individual vessels, is generally more typical of habitation sites of farming peoples. Yet, as discussed elsewhere in this section, the absence of structures and other features and the virtual absence of burned rock indicate that River Camp is a special- or limited-activity site, not a base camp.

3. What plants and animals were being processed and/or consumed at LA 75163 and LA 103931? What biotic communities were being exploited? Were the site inhabitants exploiting all available biotic communities or only selected ones? What season or seasons were the sites occupied?

Plants

Three kinds of charred plant fragments belonging to the prehistoric deposits were recovered from the Bob Crosby Draw site (McBride, this report). One is identifiable as goosefoot, another is an unidentified seed, and the third is a possible corn cupule fragment. Sechrist and Laumbach (1991) did not recover plant remains during their excavations around the southern periphery of the site.

The identification of a possible corn cupule fragment is tenuous. However, the presence of this plant in the site is not unreasonable given the proximity of farming communities at Roswell. I believes that if the fragment is corn, it was probably brought into the site from one of those villages rather than grown in the immediate vicinity of LA 75163. Support for this proposition is seen in the type of metates and manos at the site. These metates are all of the familiar, small, shallow-basin, highly-portable "travel" type made on thin, trimmed slabs of rock. These grinders and their attendant small one-hand manos simply lack the capacity to grind large quantities of corn (or any other substances); they contrast sharply with the grinding equipment of peoples for whom corn was a dietary staple (Hard 1990).

Food-plant evidence indicates that both wild and domesticated plants were used. Interestingly, while goosefoot (*Chenopodium*) grows in the wild, it also grows in disturbed areas and has been an intentional addition or tolerated intruder in modern Pueblo farm plots (Ford 1968). Thus, if a corn cupule fragment is represented among the remains from Bob Crosby Draw, it is possible that both the goosefoot and the corn were obtained from nearby farmers. The fields of the farmers are presumed to have been along the larger tributaries of the Pecos (Hondo River, North and South Spring rivers, etc.) in the Roswell area.

It might be noted in this regard that Corn Camp, a small site along the south edge of the Dunahoo Hills, some 6 km southwest of Bob Crosby Draw, also produced evidence of corn use (Wiseman 1996b). That site may or may not have belonged to full-time hunter-gatherers, but it clearly was a temporary camp.

No stained soils or other proveniences conducive to the preservation of prehistoric plant materials were noted at River Camp. Consequently, no soil samples were taken for pollen or flotation analysis.

Animals

The faunal analysis by Akins and discussion by Wiseman (this report) reveal the widespread occurrence of probable prehistoric faunal remains at the Bob Crosby Draw site and a smaller number of materials at River Camp. Probably in large part due to selective preservation, artiodactyls (most likely pronghorn, bison, and/or deer) and freshwater mussels are the best represented animals among the remains. Smaller animals such as rabbits were almost certainly taken, but we have no direct evidence of them as prehistoric items at Bob Crosby Draw or River Camp.

The use of artiodactyls for food, hides, and tool materials was well established throughout the New World. The freshwater mussels, most likely *Cyrtonaias tampicoensis*, are a little more problematical. Shell fragments of these animals are found in small quantities in many prehistoric camp and village sites in southeastern New Mexico. Mussel shell ornaments and tools are often recovered, especially in thirteenth- and fourteenth-century A.D. farming village sites like Bloom Mound (Kelley 1984), Rocky Arroyo (Wiseman 1985), the Henderson site (Rocek and Speth 1986), and even the Bonnell site in the Sierra Blanca (Kelley 1984). The Fox Place (Wiseman 1991b; Wiseman in prep.), apparently a hunter-gatherer village of some duration and dating to the thirteenth and fourteenth centuries A.D., yielded about 80 scraping tools made from mussel valves. The question is whether or not the people were eating the flesh of the mussels. We assume that they were, especially given the implication that peoples in the region were consuming a wide range of terrestrial and aquatic species (Wiseman 1985).

Getting back to the data recovery questions, it is obvious from the faunal materials that the inhabitants of Bob Crosby Draw and River Camp were exploiting riverine sources and the animals of the plains. The riverine resource (mussels) simply required gathering the animals from the muck of the Pecos River bottom. The artiodactyls could have been taken in the dune and plains country both east and west of the site or when they came to water at Bob Crosby Spring or the Pecos River.

It should be remembered in this regard that the Bob Crosby Draw site is at the spring. It is also situated at the top of a gentle, ramp-like slope between the plains and the river. River Camp is situated near the river's edge at the bottom of that slope. This slope, restricted by escarpments along the Pecos, is 2 km wide and would funnel animals moving between the plains and the river. Hunters from both sites could easily ambush them during these movements.

In sum, the animal evidence from both Bob Crosby Draw and the River Camp indicates use of locally available resources, whether they had to travel a few kilometers or merely to wait for the animals to come for water near the sites. The plant evidence from the Bob Crosby Draw site indicates use of possible domesticates (corn) and wild plants (goosefoot). Both species could have been obtained from nearby farm villages, or, goosefoot could have been found locally in disturbed habitats. We do not believe that the Bob Crosby Draw occupants were growing corn, though this is an unproven assumption at the present time. Also, the inventory of both the animal and plant species at both sites is obviously incomplete because of preservation factors.

4. What exotic materials or items indicate exchange or mobility?

Lithic Materials

Nonregional lithic materials and items were recovered from the Bob Crosby Draw site, but not River Camp. These involve chipped stone materials and artifacts and pottery. While trade over the vast distances indicated by these materials is not unusual in the archaeological record of North

America, it is important for our conception of the movements, social contacts, and/or exchange networks of prehistoric peoples throughout southeastern New Mexico.

The stone materials are mostly in the form of flakes and include obsidian, Edwards chert, Alibates dolomite, Tecovas chert, and one or more unspecified Alibates and Tecovas look-alikes. We did not source the obsidian, but all of it is of the clearish black variety, probably formed in the Jemez Mountains of north-central New Mexico and sometimes found along the Rio Grande, especially in the Las Cruces district. The straight-line distance to these sources is 300 km (190 mi).

The Edwards, Alibates, and Tecovas materials are classic examples of materials from Texas sources. The closest known sources of these materials are all 240 km (150 mi) from Bob Crosby Draw: Edwards to the east and southeast in west-central Texas, and Alibates and Tecovas to the northeast in the Panhandle.

The Alibates and Tecovas look-alikes could be from sources as close as Salado Canyon/Yeso (De Baca County, New Mexico) of the Pecos River drainage, Ragland/Tucumcari (Quay County, New Mexico) of the Canadian River drainage, or Baldy Hill (Union Co., New Mexico) of the Dry Cimarron drainage. If the look-alike materials are from the Salado Canyon/Yeso source, then they could have arrived in the site vicinity by river transport. However, they would probably be of limited use for knapping because they would be in the form of relatively small cobbles with internal fracture planes caused by the transport process (i.e., bumping along in the river-bottom gravel load). If the look-alikes are from the Ragland/Tucumcari area, then the nearest known sources are 150 to 195 km (95 to 120 mi) to the northeast; or if from the Baldy Mountain source, 385 km (240 mi) to the north-northeast at the New Mexico–Colorado state line.

Several formal tools, informal tools, and biface fragments are made of imported materials: Edwards chert, one corner-notched dart point, the drill, and four biface fragments (two of which fit together; possible Edwards chert (not a look-alike), one side-notched arrow point and one scraper; Alibates dolomite, one corner-notched dart point and one biface fragment; Tecovas chert, the end/side scraper; possible Tecovas chert (not a look-alike), one corner-notched dart point; and Alibates/Tecovas look-alikes, three biface fragments. Sixteen, or 28 percent, of the flake tools are made of obsidian, Edwards, Alibates, Tecovas, or one of the Alibates/Tecovas look-alikes.

In summary, imported lithic materials in the form of flakes and artifacts are surprisingly numerous in the Bob Crosby Draw site assemblage. The materials represent contacts of an unspecified nature with north-central New Mexico, northeastern New Mexico (possibly), the Texas Panhandle, and west-central Texas, all of which are 150 to 385 km (95 to 240 mi) from Bob Crosby Draw.

Pottery

The majority of the Jornada-Mogollon pottery types (Chupadero, Three Rivers, Lincoln, Jornada, South Pecos, "local" Playas, some Corona Corrugated, some El Paso Polychrome vessels, and possibly the polished El Paso Brown) were probably made in the Sierra Blanca, Capitan, and/or Jicarilla Mountains, 80 to 160 km (50 to 100 mi) west of Bob Crosby Draw. While this is a long way to transport large numbers of pots, we currently lack convincing evidence that any but the smallest numbers of pottery vessels were made in the Pecos Valley (Jelinek 1967 notwithstanding). No examples of suspected Pecos Valley–made pottery were recovered from either of the project sites.

Bob Crosby Draw site pottery that was manufactured farther afield includes: two Chupadero vessels (1 bowl, 1 indeterminate vessel) that may have been made in central New Mexico (Gran Quivira/Pueblo Colorado vicinity) 150 km (95 mi) to the northwest; six Corona Corrugated vessels, also from central New Mexico; one or perhaps two El Paso Polychrome vessels from the El Paso region 320 km (200 mi) to the southwest; one St. Johns Black-on-red or Polychrome bowl that was made in the Acoma-Zuni-Springerville region of west-central New Mexico and adjacent Arizona, 320 to 480 km (200 to 300 mi) to the west-northwest; and one Viejo period vessel from the Casas Grandes region of the state of Chihuahua, Mexico, 480 km (300 mi) to the southwest.

River Camp pottery that was manufactured farther afield includes: one Chupadero vessel that may have been made in central New Mexico; one Corona Corrugated vessel, also from central New Mexico; and one El Paso Polychrome vessel from the El Paso region.

In summary, the pottery imported to Bob Crosby Draw and River Camp came from a variety of distant sources in central New Mexico, west-central New Mexico, south-central New Mexico, and northern Chihuahua, Mexico. We assume that these vessels were obtained directly from farming villagers in the Roswell area, a few kilometers southwest of Bob Crosby Draw and River Camp, but some other mediary or direct access to the manufacture areas is also possible.

Summary

The peoples of Bob Crosby Draw and River Camp took part in a trade network that covered a vast geographic area, one that measures something like 865 km (540 miles) in diameter. Regions within this network included the Southern and Rolling Plains of Texas, central and western New Mexico, El Paso, and the Casas Grandes region of northern Mexico. Given the distances involved, we suspect that most or all of these materials and items were obtained through trade with intermediary peoples.

5. What are the dates of the occupations at LA 75163 and LA 103931? Do the various areas of the sites date to one period, or are several different time periods represented in different areas of each site?

No materials suitable for dating by radiometric, archaeomagnetic, or dendrochronologic techniques were recovered from Bob Crosby Draw or River Camp. It is clear from the sediments of Feature 15 at Bob Crosby Draw that such materials do occur in the site, but just not in the part excavated for this project. Because of the problems associated with the obsidian hydration technique (Miller 1996), we are left without a direct means of dating the sites.

Relative dating using hearth type, projectile points, pottery styles, and stratigraphy is possible to varying degrees at both sites, as discussed in the following paragraphs.

Bob Crosby Draw

At Bob Crosby Draw, both dart points (N=17) and arrow points (N=5) are present in the assemblage from the excavated area (as opposed to the site in general). However, because elsewhere we have raised the possibility that the dart points were scavenged from other parts of Bob Crosby Draw or even from other sites in the vicinity for reuse/reworking into other artifacts/tools during the late prehistoric (pottery) period, these items must viewed with caution as a means of dating.

Hearths

All but one of the hearths found in our excavations contain large numbers of burned rocks that appear to have originally rested on the aboriginal ground surface. All lacked charcoal and organically stained soil useful for radiocarbon dating. However, radiocarbon-dated burned-rock hearths on the Roswell-South and Seven Rivers projects along U.S. 285 between Roswell and Carlsbad (reports in preparation) suggest that these features usually date prior to A.D. 1000 or 1100. These hearths and/or small baking facilities can be in shallow pits or on the old ground surface. The latter are characteristic of the Bob Crosby Draw hearths.

At the same sites, pit hearths lacking burned rocks altogether, or having only one to five rocks, usually date after A.D. 800 or 900 and perhaps as late as the 1800s. The one Bob Crosby Draw hearth (Feature 13) that fits this category is a large, shallow pit filled with charcoal-stained soil. A few large pieces of wood from this feature were not submitted for radiocarbon dating because they were not completely charred, suggesting a fairly recent origin.

In summary, physical similarities to dated hearths from southeastern New Mexico suggest that the burned-rock hearths at Bob Crosby Draw probably date prior to A.D. 1000 or 1100. Hearth 13 is like the rockless hearths dated elsewhere as post A.D. 800 or 900. The presence of unburned (rotted) wood in this hearth also suggests that the hearth is of fairly recent origin (twentieth century?).

Projectile Points

If the correlation between hearth type and cultural-temporal affiliation holds for the area north of Roswell, then the dart points at Bob Crosby Draw probably represent initial discard in an Archaic context at the Bob Crosby Draw site (and/or nearby sites) and subsequent pick-up for reuse on the spot by the late prehistoric occupants. An Archaic use of the Bob Crosby Draw site is also more believable simply because the site was obviously very important to prehistoric peoples (to judge by its extensive size), probably in large part because of the nearby spring and swimming hole.

Thus, we assume that the dart points indicate an Archaic occupation of at least some parts of the Bob Crosby Draw site. In the descriptive section of this report we used Katz and Katz's (1985a, adapted from Henderson 1976) minimum stem-width measurement to suggest that all but one of the dart points date to the Transitional Archaic Brantley phase (A.D. 1-750) of the Brantley Reservoir sequence in the Carlsbad area. Under this system, the one exception, with a minimum stem-width of 15 mm, would date to their Late Archaic McMillan phase (1000 B.C.- A.D. 1). This assessment generally agrees with Turner and Hester's (1993) dates for Ellis and Marcos points: Ellis-like (N=2), Middle to Transitional Archaic, 2000 B.C. to A.D. 700 in central Texas and beyond; and Marcos-like (N=1), Late to Transitional Archaic, 600 B.C. to A.D. 200 in central Texas.

However, two of the Bob Crosby Draw dart points are more similar to Baker and Bandy points (Turner and Hester 1993), styles that date to the Early Archaic period in Lower Pecos, Texas. Thus, in spite of the relatively narrow stem widths, these two points could date much earlier: Baker-like (N=1), Early Archaic, 6000 to 4000 B.C. in Lower Pecos, Texas; and Bandy-like (N=1), Early Archaic, 6000 to 4000 B.C. in Lower Pecos, Texas.

Thus, we have a quandary we cannot unravel. For the time being, we suggest that the Archaic period occupation at the Bob Crosby Draw site dates mainly to the Late to Transitional Archaic, or approximately 1000 B.C. to A.D. 750. However, the Middle Archaic and even the Early Archaic periods may also be represented at the site, which means that the earliest occupation could date to 6000 B.C.

The arrow points also suggest occupation over a span of time. No. 370b is side-notched and long-stemmed. The stem width of 9.5 mm suggests that it is an early style of arrow point (Katz and Katz 1985a), but its shape is too aberrant to be certain. Two arrow points are corner-notched, one of which is Scallorn-like. In Texas, Scallorn points date "ca. A.D. 700–A.D. 1200" (Turner and Hester 1993). The 7.5 mm stem width of one places it in the early period for arrow points (Katz and Katz 1985a), which agrees well with the Scallorn style. The second corner-notched specimen has a stem width of 6.5 mm, indicating a more recent date.

The two remaining identifiable arrow points are small, side-notched specimens that fit the general description of Harrell points. Turner and Hester (1993) date this point style to the late prehistoric period, where it occurs primarily in the Trans-Pecos, Lower Pecos, west-central, north-central, and Panhandle regions of Texas (i.e., all areas adjacent to southeastern New Mexico). In southeastern New Mexico, these points are common in contexts dating to the A.D. 1200s and 1300s, and perhaps later. Both Bob Crosby Draw specimens have stem widths of 6.5 mm, well within the normal range for the type and indicative of a date after A.D. 1150 or 1200 (Katz and Katz 1985a).

Pottery

Pottery types recovered from Bob Crosby Draw that are the most useful for relative dating include St. Johns Black-on-red or Polychrome, Corona Corrugated, and Lincoln Black-on-red. According to Breternitz (1966), St. Johns Black-on-red and St. Johns Polychrome date essentially the same: A.D. 1175 to 1300. Corona Corrugated was first made about A.D. 1225 and lasted until about 1460 (Hayes et al. 1981). These types provide a tighter range of dates than longer-lived types such as Chupadero Black-on-white.

Lincoln Black-on-red is not well dated. The available tree-ring dates are in the mid A.D. 1300s (Breternitz 1966). However, judging by its context in several Sierra Blanca sites (region of manufacture), it seems to have started no earlier than 1300 or 1325 and probably ended by 1400 or shortly thereafter.

The Viejo period potsherd from the Bob Crosby Draw site raises an interesting possibility from a couple of standpoints. Although other Viejo period potsherds have been recovered from southeastern New Mexico sites (Anchondo or Victoria Red-on-brown at Tintop Cave; Wiseman 1996a), it is remarkable to find them so far from their origin point in the state of Chihuahua in northern Mexico.

Unfortunately, all of the northern Chihuahuan pottery types are relatively poorly dated, mainly because DiPeso (1974) was unable to provide refined dates based on his work at Paquime (or Casas Grandes). He dates the various pottery types primarily to the period level, rather than the shorter-term phases. To compound the situation, several individuals have taken issue with DiPeso's dates. The final result has been several considered opinions that, in the final analysis, have steadily moved the dates for DiPeso's periods toward the modern era.

These revisions to the dating of the Paquime cultural sequence suggest that the Viejo period started at an unspecified time prior to A.D. 600 (Phillips 1989) and ended about A.D. 1200 (Dean and Ravesloot 1993). Thus, our Viejo period sherd was probably made no later than about A.D. 1200, but it could have been brought into the Bob Crosby Draw site after that date.

Stratigraphy and the Excavated Area of Bob Crosby Draw Site

The dating information just discussed pertains to the entirety of the Bob Crosby Draw site, an area much larger than the part excavated for this project. For reasons to be elaborated, the dating of the excavated portion of the site may be more restricted.

We have already mentioned and discussed evidence for the intensive reuse of chipped lithic materials for manufacture into other artifacts and tools. It is clear, for instance, that all fragments of dart points from our excavations are not usable for any purpose. The primary question is whether they were dropped at the site during the Archaic period or brought into the site during the late prehistoric period to rework into usable tools, subsequently broken, and then deposited where we found them.

The rock hearths are the primary evidence arguing for in-place Archaic remains within the excavated area. They cluster in two areas: one between 24N and 30N, and the other between 45N and 56N. The stones of the hearths of the first cluster (24N-30N) were all disturbed/displaced to greater or lesser degrees, probably reflecting displacement through erosion. Those in the other cluster (45N-56N) appeared to be mostly in place but with each hearth canted to fit the underlying, rolling microtopography. We interpret this to mean that the hearths in this second group were subjected to gentle downward deflation that resulted in the stones maintaining their positions relative to each other even though the hearth as a whole dropped or tilted out of its original position.

If the hearths are Archaic in date, can we gain some sense of the dating of the possible pithouse, the possible sleeping pit, the storage pit, and the four possible cache pits? If we accept the argument that the basic distribution of the major artifact categories derives from the fourteenth-century occupation of this part of the site, then the position of these pit features with that artifact distribution might be informative. That is, the relationship of the various features to the artifact density distribution may give us some idea of the temporal relationship of each feature to the cultural refuse in its vicinity.

This can be done by examining Figure 21. The possible pithouse, Feature 12, lies between the two major refuse deposits. Although cultural materials were retrieved from the feature fill, the quantities are lower than in the squares adjacent to the feature. This suggests that Feature 12 dates to the last part of, or even subsequent to, the deposition of the refuse in this area. If this is correct, the possible pithouse would date to the fourteenth century or possibly later. Natural backfilling or slumpage could then account for the few artifacts in the fill.

The possible sleeping pit, Feature 8, is essentially covered (filled?) with the same density of refuse as the nearby squares. In fact, the small size of this particular refuse concentration and its "targeting" on the pit suggest that the pit was used and abandoned prior to the deposition of the trash. To our way of thinking, the use of low spots in the landscape as preferential trash disposal loci qualifies as one of the great, until now undefined, "lawlike generalizations of cultural behavior" that the New Archaeologists were seeking in the late 1960s and 1970s.

The storage pit, Feature 7, is completely covered by the lesser of the two primary refuse deposits, indicating that it predates the deposition of those materials. Thus, it probably predates or, at the latest, dates early within the depositional history of the lesser refuse deposit. Because it is so close to the Feature 6 hearth, it is unlikely that the two were contemporary. But which is earlier?

Three of the possible cache pits, Features 4, 10, and 11, lie outside all refuse deposits, leaving us with no stratigraphic insight as to their dating. The fourth one, Feature 3, lies under the edge of the lesser of the primary refuse deposits and therefore probably predates that deposit, though perhaps not significantly so.

Summary

It seems reasonably clear that the Bob Crosby Draw site *as a whole* was occupied on several occasions over a period of at least 1,000 to 2,500 years, and perhaps longer. These occupations occurred during the Late Archaic, terminal Archaic, and late prehistoric periods. In terms of the Christian calendar, this means the period from perhaps as early as about 1000 B.C. to (with greater certainty) A.D. 1400. Individual projectile points could mean that both the Early and the Middle Archaic periods are also represented at Bob Crosby Draw, possibly extending the occupation span back to as early as 6000 B.C.

The situation is less clear for the specific area of the site excavated by this project, which represents less than 10 percent of the total site area. The rock hearths lying at the bottom of the deposits in the excavated area probably represent one or more occupations prior to A.D. 1000-1100. Undoubtedly, some mixing of cultural materials has occurred between this lower deposit (not definable stratigraphically) and the overlying, later occupations represented by the fourteenth-century pottery.

In the excavated deposits as a whole, the distributions of several artifact classes are essentially congruent. That is, using the chipped stone knapping debris as a background pattern (Figs. 22 and 23), we see that the distributions of the pottery sherds and the projectile point fragments are very similar. This suggests that all three classes of artifacts were deposited in the same event or events and that those events occurred during the fourteenth century. The fact that all of the dart points were rejects from intensive reuse/reworking makes sense in this regard.

Thus, relying heavily on distributional evidence for our interpretations, we are assuming that most of the cultural items belong in one sense or another to the fourteenth-century occupation. We acknowledge that some admixture with earlier, lower deposits has occurred through bioturbation, but this contamination cannot be specifically identified. We suspect the mixing is not serious--that most of the cultural materials belong to the late prehistoric period. However, we have no way of testing this proposition.

River Camp

Datable materials are scant at River Camp. Nonetheless, the projectile point and the pottery types, especially the Corona Corrugated, agree, placing the occupation in the fourteenth century.

Projectile Points

The single identifiable projectile point is a Washita (Turner and Hester 1993). This point type is commonly found in all types of late prehistoric (pottery period) sites in southeastern New Mexico, including sites dating to the fourteenth century A.D. (Kelley 1984; Jelinek 1976; Leslie 1978).

Pottery

Corona Corrugated is the most useful pottery type for dating River Camp. Corona Corrugated dates about A.D. 1225 to 1460, but more importantly, it is not commonly found on sites in the Pecos

Valley or to the east.

In the Roswell area, Corona Corrugated is generally associated with the larger, more substantial habitation sites like Henderson (10 percent), Bloom Mound (6 percent), the Fox Place (5 percent), and Rocky Arroyo (8 percent). However, even in these sites, the percentages of corrugated sherds (in parentheses) in the pottery assemblages are low. This contrasts sharply with Lincoln phase sites to the west, where percentages of Corona are often on the order of 20 to 80 percent (e.g., Block Lookout or Smokey Bear, the Salas site, and the Baca or Baca Sawmill site; Kelley 1984; Wiseman 1975; Wiseman el al. 1976). The total sherd assemblages, excavated and unexcavated, at all of these sites are quite large and are estimated to number in the tens or hundreds of thousands.

Corona Corrugated is uncommon at sites like Bob Crosby Draw and the River Camp. When it does occur, the quantities are often minimal. For instance, Jelinek (1967) reports corrugated in only 11 of his 62 sites north of our project area. In all but two instances, the percentages are under 5 percent, and several are less than 1 percent. Jelinek's survey assemblages are small, ranging from 3 to 3331 sherds and averaging 373 sherds per site. As an aside, his site P-31 has 28 percent Corona (42 of 150 sherds), making this site especially interesting in this regard.

Thus, the presence of Corona Corrugated at River Camp is unusual. Furthermore, because this type occurs in both Bob Crosby Draw and River Camp, the same people may have used both sites. The sites are so close to one another that, surely, the presence of Corona at both is not coincidental.

Summary

Although the relative dating evidence from River Camp is minimal, the projectile point and Corona Corrugated sherds suggest a late prehistoric date. Because Corona Corrugated is present, and this type is uncommon in sites of the region, we suspect that River Camp was contemporaneous with, and perhaps inhabited by, the people from the Bob Crosby Draw site. The late prehistoric occupation of that site appears to have taken place during the fourteenth century, in Jelinek's (1967) post-McKenzie phase.

6. What were the biological relationships and nutritional status of the people who inhabited LA 75163 and LA 103931?

No human remains were recovered from either site.

7. The primary question to be investigated is whether the project sites were made by indigenous hunter-gatherers or by farmers inhabiting nearby villages like Bloom Mound, Henderson Pueblo, and Rocky Arroyo.

Under Questions 1-6, we addressed various aspects of the project results, including the implications of the archaeological data regarding the culture and adaptation of the prehistoric peoples who occupied Bob Crosby Draw and River Camp. Here, we address the focal question of the entire project--whether we can identify the sites as those of full time hunter-gatherers or of area farmers.

Bob Crosby Draw

Under Question #6 we discussed the dating of the occupations at the Bob Crosby Draw site. We acknowledge that an Archaic component is probably present in the form of burned-rock hearths, Archaic projectile point fragments reworked by late prehistoric occupants, and an undetermined amount of lithic knapping debris that is inextricably mixed with the late prehistoric debris. We simply do not have enough information on the Archaic occupation to treat it in much detail.

The late prehistoric materials include a possible pithouse, maybe a sleeping pit, possibly a small storage pit, and perhaps one or more of the possible cache pits, as well as (probably) the bulk of the lithic knapping debris, sherds representing about 40 pottery vessels, and assorted small tools and grinding equipment fragments. This particular component (or components) dates to the A.D. fourteenth century.

The relatively late date of the late prehistoric components actually post-date Jelinek's sequence of farming villages stretching north along the Pecos River from the vicinity of Bob Crosby Draw to the modern town of Fort Sumner. A fourteenth-century date corresponds with the early part of Jelinek's post-McKenzie phase, which he estimates started about A.D. 1300 and presumably lasted until the Spanish entrada of 1540. He characterizes this period as one of "temporary camps, generally in localities not favored by the sedentary population" (Jelinek 1967:159).

The preceding phase, the late McKenzie (A.D. 1250-1300), is the final phase in his sequence of farming occupation along this stretch of the Pecos Valley. Jelinek (1967) suggests the late McKenzie people quit farming in favor of a hunting-gathering lifeway based on bison hunting. He further suggests that this change was prompted by the appearance of greater numbers of buffalo and the willingness of the people to give up what must have been a marginal farming existence. Jelinek, interpreting pollen and faunal data, notes that the shift in conditions that brought more bison into the region would also have improved conditions for farming. Nevertheless, he posits, the people still opted to make the change.

The invocation of a concept of cultural simplification is not without precedent. It certainly goes against common thought that centers on the notion of cultural evolution and especially of the core notion of unilineal evolution. But one only has to look at history to see that all of the major "civilizations" (Egypt, Rome, etc.) reached a pinnacle, then devolved into much simpler conditions. For the most part, the Egyptian and Roman people did not leave their lands; they changed their social, political, and religious organizations. There is no reason why this could not have happened to simple farming societies under the right circumstances.

Mark Wimberly and Alan Rogers (1977:451-453), in building a model of cultural succession based on a model of ecological succession (Margalef 1968), use their model to propose that the Late Formative Jornada-Mogollon peoples in the Tularosa Basin and adjacent Rio Grande Valley of south-central New Mexico and far west Texas, underwent cultural simplification at the end of the El Paso phase (about A.D. 1400). This change was occasioned by a shift in climate that no longer permitted the large-scale farming that El Paso phase peoples employed.

Wimberly and Rogers further suggest that, rather than abandon the region altogether, at least some of the people remained and reemployed the smaller-scale farming techniques, house-type (pithouses), pottery (El Paso Brown), and other cultural phenomena that their ancestors had used several centuries earlier. They further suggest (I believe correctly) that the Mansos, an agrarian people chronicled by the early Spanish explorers in the El Paso–Las Cruces region, were these now culturally simplified Jornada-Mogollones. If correct, this scenario is more satisfying and relieves us of the virtually inexplicable problem of regional abandonment, followed by the "appearance" of simple agrarian peoples from places unknown by the time of the Spanish entradas.

Now back to Bob Crosby Draw. It seems likely under the conditions proposed by Jelinek that peoples who had inhabited the region for several hundred years would continue to do so even though they changed their relationship to the land and its resources. Certainly their residential locations might change, but that does not mean that they would automatically abandon home territory unless they were forced to do so by some other factor such as invading peoples.

Did other people invade this part of the Southern Plains between A.D. 1300 and the coming of the Apaches some time around 1500 (Gunnerson 1974)? Following that date, and for the next 400 years, the Southern Plains were swept by waves of southward moving tribes, finally culminating in the late nineteenth century with the stabilization brought by American control of the West. But previous to 1500, we as yet have no evidence of invasions. Accordingly, for the discussion here, we assume that the late McKenzie peoples, upon abandoning their farms and villages along the Pecos River, stayed in the region to hunt and gather wild foods. In this regard, they might have been the people who inhabited Bob Crosby Draw and River Camp.

But all of this still poses questions. How can we be certain that this last scenario is true? What archaeological evidence might inform us about these possible relationships? Can we be sure that Bob Crosby Draw and River Camp were not hunting and gathering camps of farmers from sites like Bloom Mound, Henderson, and Rocky Arroyo near Roswell? If anything, the situation has gotten more complex, not simpler!

At this point, a review of project data and comparison with other regional information is useful. As discussed earlier, excavations at Bob Crosby Draw uncovered a possible pithouse. Small, round to oval pithouses have now been found at several sites in the Roswell area, including King Ranch (Wiseman 1981, 1988), the Fox Place (Wiseman in prep.), and Salt Creek, or the Townsend site (Akins in prep.). These have been interpreted as the domiciles of probable hunter-gatherers because they are quite small and simple. Importantly, they contrast significantly with the contemporary structures of area farmers, such as the adobe-walled pueblo and large, deep, ceremonial structure at Bloom Mound (Kelley 1984), the large pueblo at the Henderson site (Rocek and Speth 1986), and the large, deep pithouses and ceremonial room at the Rocky Arroyo site (Wiseman 1985; Wiseman in prep.). They also differ from the *cimiento* surface structures and large, shallow pithouses at various sites along the Pecos River (Jelinek 1967).

The preponderance of lithic chipping debris over pottery sherds also suggests that Bob Crosby Draw is a hunting and gathering site. The sherd-to-lithic ratio is extreme at 0.006. In contrast, eastern Jornada-Mogollon farming villages in the Roswell-Sierra Blanca region favor sherds over lithics: 18.0 at the Salas site (Wiseman 1975), 34.0 at Rocky Arroyo (Wiseman in prep.), and 38.0 for Feature 4 at Smokey Bear (Wiseman et al. 1976).

The pottery-to-lithic ratios for 50 of Jelinek's (1967) sites along the Pecos River north of Bob Crosby Draw are generally closer to even. At many sites (N=33, or 66 percent), lithics are more numerous than sherds (sites to left of value 1.00 in Fig. 37). Sample sizes (sherds and lithics combined) varied from 17 to 5,321 items. Forty (80 percent) produced more than 100 sherds and lithics combined. The ratios of all but seven sites range between 0.01:1 and 2:1. Four modes appear to be significant: 0.009-0.2 (N=9), 0.6-1.0 (N=14), 1.4-1.6 (N=5), and 1.8-2.0 (N=4).

Although we are not in position at present to explore all of the implications, it is interesting to note that the ratio for the Fox Place (Schaafsma and Wiseman 1992; Wiseman 1991b, 1996c; Wiseman, in prep.) is only 5.0. Another hunting-gathering site with structures, LA 116503 at Red Lake Tank east of Roswell (Bullock in prep.), has a ratio of 0.2 sherds per lithic. Both values are well within the range of the Jelinek sites.

Plains artifacts and lithic material types are another potential indicator of contacts between the two regions and could also tell us whether our project sites are those of full-time hunter-gatherers or of farmers on hunting and gathering trips. As mentioned elsewhere in this report, Plains-style end scrapers and drills, some made of local materials and some made of Plains materials, were recovered from Bob Crosby Draw. Numerous flakes of Plains materials such as Alibates, Tecovas, and Edwards chert were also recovered from Bob Crosby Draw.

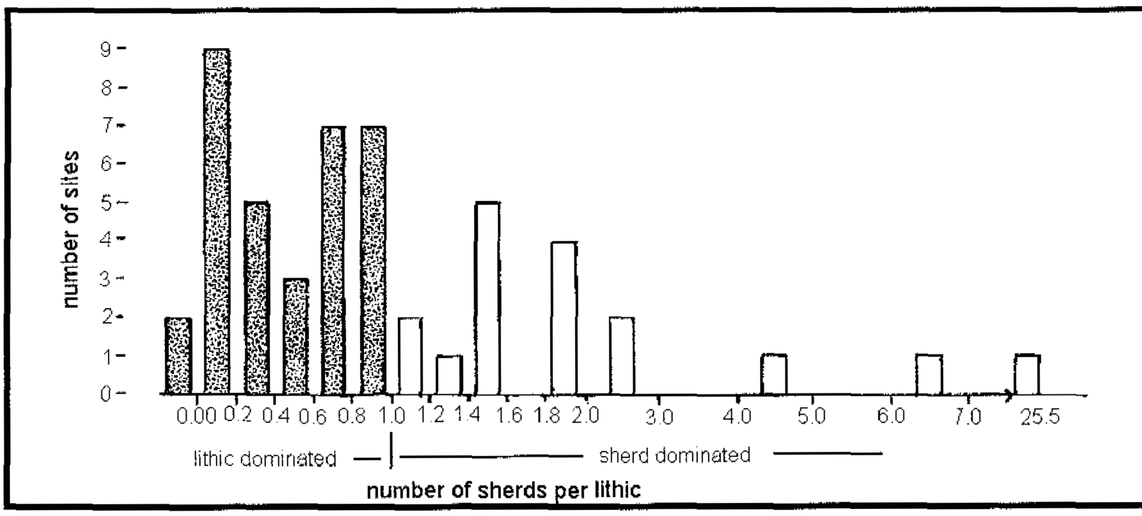

Figure 37. Ratios of pottery sherds to lithic debitage at Jelinek's (1967) sites.

But finds of Plains artifacts and lithic materials are not limited to Bob Crosby Draw or to suspected hunter-gatherer sites in general. For instance, the farming village of Bloom Mound produced two two-bevel knives (Kelley 1984: Fig. 73, left center and lower left). A four-bevel knife of Alibates was recovered from the Baca site (LA 12156), a Lincoln phase pueblo north of Lincoln, New Mexico (notes and photographs in writer's possession).

A stone elbow pipe recovered from the Bonnell site in the Sierra Blanca (Kelley 1984: Plate 53, lower center) is a form often believed to have a Plains origin and/or contact (Kidder 1932). However, unpublished research by the writer shows that elbow pipes appear in some parts of the Southwest (i.e., Chaco Canyon) prior to their appearance on the Plains, making the assumption questionable. However, the late Glencoe date (thirteenth or fourtenth century; Kelley 1984) of the Bonnell artifact is good for Plains contact or origin. This artifact type obviously merits further study.

Knapping and/or tool resharpening debris of Plains lithic materials such as Alibates, Tecovas, and Edwards chert on sites in southeastern New Mexico has been observed for years. However, the information potential remains largely unexplored, in part because of look-alike problems for all three materials. I believe that the assessment of the presence and use of these materials is integral to understanding a number of social and economic factors, especially those involving relationships of peoples of the Roswell region with Plains dwellers.

One of our unstated hopes has been that the quantification of Plains materials in Roswell region assemblages would help us identify full-time hunter-gatherers who, presumably, had greater access to those materials. After all, as noted previously, the occasional trading of Plains artifacts to Jornada-Mogollon farmers is to be expected. In the sites of farmers, these items and their resharpening debris would show up on a rare basis. On the other hand, the use and resharpening of tools of Plains materials by Plains individuals would be more frequent and would, therefore, differentiate the Plains site assemblage from that of farmers. We believe that this would be especially true at hunting and gathering camps of the two groups.

Looking at the biface thinning flakes from the Bob Crosby Draw site (Table 6), we see that known or suspected imported materials constitute nearly 40 percent of the 456 flakes. In my experience, this is an unusually high percentage. Looking at all knapping debris (including biface thinning flakes), imported materials constitute nearly 4 percent of the assemblage, of which known or suspected Texas materials constitute over 2 percent of the total assemblage and over half of the imported materials. Obsidian and Alibates/Tecovas look-alikes comprise the remainder. While these percentages (4 percent and 2 percent) are not noteworthy from a statistical standpoint, they are double or more the figures normally noted on sites in the region. While this difference is in part due to our new protocol for identifying Edwards chert and possible Edwards chert, we believe that it also reflects a greater number of flakes of this material in the Bob Crosby Draw assemblage.

Other evidence bearing on the question involves the study of ultraviolet responses of the (presumed) local gray cherts in the Bob Crosby Draw knapping debris. As shown in Figure 30 and Table 11, the nearly 15 percent of medium and bright ultraviolet responses of the Bob Crosby Draw assemblage are unusually high for Roswell region assemblages. The only other responses that are similar are those of the Fox Place and Rocky Arroyo. Even at that, Byron Hamilton, who analyzed all of the assemblages in Figure 30, felt that the quality of the Bob Crosby Draw assemblage was higher than that of the Fox Place and Rocky Arroyo. This raises the question of whether we are identifying all of the Edwards materials in the Roswell assemblages.

Given the wide range in the quality and other attributes of central Texas gray cherts ("Edwards"), will we ever develop techniques that permit us to identify with certainty *all* pieces of the material that were traded into New Mexico sites? The problem revolves around the fact that the lowest-quality pieces of Edwards overlap and are not readily separable from the higher-quality examples of San Andres chert.

I was not particularly surprised to find a number of Texas materials at Bob Crosby Draw. Nor was I surprised to find obsidian, a southwestern material. The presence of obsidian in southeastern New Mexico is not unusual, for one can always find a flake or two with diligent searching. The surprise is in the relatively large numbers of flakes. This material once again underscores the breadth and relative degree of intensity of the trade networks that included southeastern New Mexico.

In many ways, I was aware that our attempts to answer this question--how to distinguish between hunting and gathering camps made by farmers versus those made by full-time hunter-gatherers--would rely on the results of a "fishing expedition," that is, on serendipitous discovery of evidence that could form the basis of more systematic inquiry in the future. I believe that we have been partly successful and partly unsuccessful.

On the success side, we have documented evidence that the site was used primarily as a base camp operation during the late prehistoric (pottery) period. The possible structure, a possible sleeping pit, a storage pit, perhaps one or more cache pits (that indicate anticipated return to the location), and considerable refuse represent this period. Bob Crosby Draw was used on one or more occasions during the late prehistoric period. Use during the Archaic period also occurred, though we know little about that occupation.

Also on the success side, we documented the presence of larger-than-usual numbers of Texas lithic materials, which in part may be due to improved means of identifying them in these assemblages. We also have several Plains-style chipped stone artifacts, including some made of classic Plains materials.

I am fairly pleased with the results of the biface thinning flake study, especially of the large number of these flakes that are made of known or suspected Plains materials. These indicate that probably even more tools and items made of these materials were passing through the site than the recovered tools and other flake types suggest. That is, a number of tools were evidently made at the site from bifaces brought into the site. Since those particular tools were not broken at Bob Crosby Draw, they were taken away, leaving only the manufacture flakes to attest to their former presence at Bob Crosby Draw. We would have been even more pleased if some, or many, of these tiny flakes had resulted from resharpening edge-worn tools.

Finally, an ultraviolet-light study of the local gray chert knapping debris demonstrates that Bob Crosby Draw stands apart from other sites in the study sample. Most of the other sites have very low response rates. Even though Bob Crosby Draw, with its relatively high response rate, is similar to Rocky Arroyo and the Fox Place in this regard, the analyst detected a qualitative difference between the Bob Crosby Draw materials and those from the other two sites. Unfortunately, we have not been able to quantify and discuss this phenomenon in cogent terms. While we believe that these qualitative differences are probably meaningful with respect to discriminating farming sites from hunter-gatherer sites, our ability to demonstrate this falls short of definitiveness.

The lithic materials and Plains artifacts, in conjunction with the variety of southwestern pottery sherds also recovered from Bob Crosby Draw, testify to the breadth of the trade network in which the people or peoples participated. This "widespread trade" phenomenon is certainly not unknown in southeastern New Mexico, but to have all of these materials and items in one small part of a very large site is particularly noteworthy.

All of this raises two questions. Is this variety primarily the result of the archaeological recovery process (intensive excavation of a large area and screening with 1/8 inch mesh)? Or does Bob Crosby Draw truly stand apart from other sites investigated in the area?

River Camp

As noted earlier, no known or suspected lithic materials attributable to outside sources were recovered from River Camp. This is surprising, given the proximity of the Bob Crosby Draw site and the possibility that the occupants of both sites were one and the same people. Perhaps this really is not a problem, given the fact that the imported materials at Bob Crosby Draw actually constitute only 4 percent of the overall lithic debris assemblage. In a simple statistical sense, the few flakes recovered from River Camp should be local materials. Or, if River Camp was a place where trading took place between the Bob Crosby Draw people and farmers from the Roswell area, perhaps the site occupants were the visiting group.

Comments

The preceding paragraphs permit us to outline a possible scenario of the Bob Crosby Draw site, River Camp, and prehistoric occupation of the Roswell area. We have some evidence that the material culture of the occupants of Bob Crosby Draw was partly distinct from that of local farming groups at Roswell. The Bob Crosby Draw material culture also seems to differ from that of sites believed to be hunting and gathering sites situated west of the Pecos River but within a few kilometers of Bob Crosby Draw (Corn Camp [Wiseman 1996b] and possibly Los Molinos [Wiseman in prep.]). This suggests that the Bob Crosby Draw people were probably full-time hunter-gatherers living along the west margin of the Southern Plains.

If our guess about River Camp is correct--that it was a place where people from the Bob Crosby Draw site came to trade with people from farm villages in the vicinity of Roswell--the location of the trade ground immediately east of the river has other potential implications. It could signal nothing more than the use of a water source as a meeting place. Several points along the Pecos River and some of its tributaries were used in historic times as meeting places between southwestern peoples and Plains peoples, especially during the era of the Comanchero trade (Kenner 1969; Morris 1997:188).

But the Bob Crosby Draw--River Camp data could also indicate that the Pecos River constituted a territorial/social boundary. The definition of human territorial boundaries is a subject of growing interest among anthropologists in general and some archaeologists. Unfortunately, the discovery and definition of territorial boundaries has proven to be a difficult one because of the nature of human hunter-gatherer groups, their activities, the way they relate to the land and its resources, and their various attitudes about the concept of ownership (Kelly 1995).

Attempts to define hunter-gatherer boundaries using archaeological materials have met with some success. Sampson (1988) investigated the question using pottery distributions in South Africa. The scale of his study area, involving many square kilometers and dozens of sites, is immense by most archaeological standards. It clearly underscores the tentativeness of the scenario offered here. The primary objective here is to stimulate thinking and research along these lines in the hopes that we will eventually gain perspective on this facet of the prehistoric anthropology of southeastern New Mexico.

CONCLUSIONS

The cultural remains at LA 75163 and LA 103931 belong primarily to the late prehistoric period. Remains of one or more Late to Transitional Archaic occupations were found just above gypsum bedrock, but little information about this period could be gleaned from the shallow deposits. Unanalyzed recent historic materials recovered from the site consist mainly of coal clinkers and other detritus derived from a boiler or similar source and undoubtedly derived from activities at the nearby early twentieth-century settlement of Acme.

Less than 10 percent of LA 75163, the Bob Crosby Draw site, lay within the highway project. The excavated area was a single large block of 1 by 1 m squares that measured 50 by 9 m and averaged 20 to 30 cm deep. One-eighth-inch wire mesh was used to screen all excavated fill. The excavated part of this large burned rock and artifact scatter proved to be a base camp. This designation is predicated on a possible pithouse, a possible sleeping pit, a small storage pit, one or more cache pits, and more than 21,000 pieces of knapping debris.

The chipped stone industry includes 4 percent intrusive materials from the Southern Plains (Alibates, Tecovas, and Edwards cherts) and the Southwest (Jemez [?] obsidian). Several formal artifacts, informal artifacts, and the knapping debris--including projectile points, Plains-style side and end scrapers, a drill, bifaces, flake tools, biface thinning flakes, and core reduction flakes--are also made of these materials.

The 126 southwestern pottery sherds, representing at least 39 or 40 individual bowls and jars, date the late prehistoric occupation(s) to the fourteenth century, or the early part of A. J. Jelinek's (1967) post-McKenzie phase (A.D. 1300-1540).

The floral and faunal data indicate that goosefoot, possibly corn, antelope and/or bison (possibly deer), and freshwater mussel were consumed at the site. This list is only partial because of preservation factors. Corn, if present, was probably brought in from elsewhere rather than grown near Bob Crosby Draw. The metates and manos are of types normally found in hunter-gather contexts and are not conducive to grinding large quantities of vegetal materials.

Items and materials documenting trade with peoples of other regions are relatively plentiful at Bob Crosby Draw. Plains artifact types and lithic materials and nonlocal southwestern pottery encompass a vast area, on the order of 865 km (540 mi) in diameter.

River Camp, a small artifact scatter near the Pecos River, evidently was a limited-activity locus. It lacked features such as hearths and pits, yielded only small quantities of artifacts, and produced only one piece of burned rock. Pottery suggests a fourteenth-century occupation and the possibility that the occupation involved individuals from the Bob Crosby Draw site.

The artifact assemblage of 400 items included only 56 potsherds, but these represented at least 16 individual vessels. This rather amazing figure, plus the evidence for limited occupation, leads to the conclusion that people met there to trade pottery and (presumably) other items and materials.

The primary data recovery question posed in the planning documents for this project asks whether we can discover criteria useful for distinguishing hunting and gathering sites of full-time hunter-gatherers from those of farmers on hunting and gathering trips. The answer is a heavily qualified yes, at least in the case of Bob Crosby Draw and River Camp. The criteria rely heavily on lithic material types and the presence of Plains artifacts. In southeastern New Mexico, one potential key to the solution is the examination of all presumed local gray chert bulk debitage under long-wave ultraviolet light. Preliminary results show promise for making finer-grained geographical distinctions within the region.

A large part of any successes enjoyed by this project is directly attributable to the field techniques employed. At Bob Crosby Draw, we started at one end and worked toward the other end by means of broad-scale excavation, opening up one vast, contiguous area on a one-by-one basis and passing all fill through one-eighth-inch wire mesh. In this manner, we documented the nature, extent, and relationships among the deposits. The technique permitted more accurate assessment of temporal and functional relationships among the features and artifacts, something that simply is not possible with the usual techniques employed in eastern New Mexico sites.

I stress above all that New Mexico archaeologists should and must implement more intensive techniques in excavating hunter-gatherer sites in general and sites in eastern New Mexico in particular. That means opening up vastly larger areas, consistently using finer screen sizes to recover cultural materials, and dating large numbers of carbon samples. For far too long we have been using the yardstick of the Anasazi and Mogollon sites--with their substantial architecture, thousands of artifacts, and pretty pots--to measure the worth of hunter-gatherer sites, with their more expedient shelters and relatively few artifacts.

More radiocarbon dates are necessary to establish the cultural time line, perhaps the single most critical aspect of archaeology because it provides the framework for everything we do. We cannot study cultural change or stability through time if we do not know what the time frame is. Radiocarbon dating must be viewed as one of the routine costs of doing business.

In effect, we have been discriminating against hunter-gatherer sites because they fail to meet the criteria of bulk and numbers. This is inappropriate, indefensible, and antithetical in a discipline that studies humankind. It is seriously detrimental to the cultural patrimony of this country and effectively circumvents the very laws and regulations intended to protect that patrimony.

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APPENDIX 2: ARTIFACT DESCRIPTIONS, LA 75163
(see FS number/provenience correlation list at end of appendix)

Abbreviations

+ incomplete measurement because of breakage

Chipped Stone Artifacts

Type, projectile points: D=dart point; A=arrow point; c=corner-notched; s=side-notched; b=basally notched; st=stemmed; proj. pt.=probably a projectile point.

Type, scrapers: E=end scraper; E/S=end/side scraper; S=side scraper.

Part: C=complete; b=base; bl=blade fragment; de=distal end only; e="ear" at lower corner of blade; med=medial; nc=nearly complete; s=stem.

Material: blk=black; brn=brown; gy=gray; or=orange; rd=red; wht=white; yel=yellow; lt=light; med=medium; dk=dark; mott=mottled; w/=with

Ground Stone Artifacts

Type (metates and manos): one or two grinding surfaces

Part: b=basin fragment; c=corner fragment; e=edge fragment; m=medial fragment

Material: SS=sandstone; ig.=igneous; gy=gray; lt=light; med=medium; dk=dark

Wear: l=light; m=moderate; h=heavy

Manufacture evidence: border=flat space between grinding surface and edge of metate

Cross sections: L=longitudinal; T=transverse; f=flat; st=slight curvature; sr=strong curvature

Form: C=cobble; Ck=chunk; S=slab; o=oval; r=rectangular; s=squarish

Projectile Points

FS Number	Type	Part	Material	Length (mm)	Width (mm)	Thickness (mm)	Neck Width (mm)	Remarks
103	stD	½ C	med brn-gy chert	27+	18	7.5	12.5	deeply serrated blade
135	cD	s	lt gy & blk chert	10+	18+	5+	13	
291	sA	s	lt gy chert	9+	13	2.5	6.5	Harrell-like
369	cD?	e	Alibates	5+	5+	2		
370a	cD	s	med gy-brn chert	14+	15+	4+	10	
370b	sA?	s	med brn-gy chert	14+	14+	5+	9.5	aberrant
387	stD	b	dk brn-gy chalcedony	16+	19	5.5+	10	Baker-like?

399	sA	C	poss. Edwards chert	16	12	2.5	6.5	Harrell-like; may be heat treated
406	cD	s	lt gy-brn chert	11+	20+	4.5+	13.5	Bandy-like?
415	cD	s	lt-med gy chert	12+	18+	3+	12	heat treated
521	cD	s	med gy chert	18+	18+	5+	12	heat treated
524	s?D	bl	wht C w/ gy mott	12+	16+	3+		wedge-shaped fragment; possibly burned
554	cD	s/b	lt brn & gy mott chert	13+	19+	5+	10+	probably Ellis-like or Hueco; heat treated
631	cD	b	Edwards chert	24+	19+	4.5+	10.5	Ellis-like; probably heat treated
642	cD	b	poss. Tecovas chert	17+	25+	5+	13	Marcos-like; may be heat treated
653	cA	s	med dk gy chert	10+	10+	3.5+	6.5	
658	cD	s	lt tan & med gy chert	8+	13+	5+	10	heat treated
731	bD	s	med gy chert	18+	16+	6+	15	heat treated
765	cA	b	red chert	13+	16+	4+	7.5	Scallorn-like; may be heat treated
766	cD	s	lt gy chert	7+	7+	1.5+	10	edge-trimmed, thin flake
787	cD	b	tan & rd gy chert	23+	19+	4	9.5	
810	cD	s	gy-tan & med rd-gy chert	13+	16+	3.5+	11	probably not heat treated

Other Hunt-Related Artifacts

FS Number	Type	Part	Material	Length (mm)	Width (mm)	Thickness (mm)	Remarks
			Knives (?)				
121	knife?	3/4 C	lt gy-tan chert	42	28+	4	thin and well made; no use-wear
677	knife?	3/4 C	red quartzite	56+	28+	8	no obvious use-wear
			Scrapers				
surface	E	c	dk gy siltite	35	32	11.5	end and one lateral edge steeply retouched
573	E	dc	tan chert	18+	27+	3.5	very thin for an end scraper; edge steeply retouched
631	E	c	gy-rd chert w/ wht mott	29	19	8	distal and lateral edges steeply retouched
837	E	dc	poss. Edwards chert	11+	24+	3+	distal (working) edge
80/864	E	c	coarse lt gy chert	35	23	7.5	flake modified only on irregularly shaped, steeply retouched end

114	E/S	c	Tecovas chert	48	28	9	distal and one lateral edge steeply retouched
694	S	c	purple quartzite	65	39	14	one lateral edge steeply retouched
711	S	c	coarse fingerprint chert	53	33	15	both lateral edges shaped and one steeply retouched
795	S	c	coarse dk gy chert	37	36	12	one lateral edge retouched; aberrant shape

Miscellaneous Bifaces

FS Number	Part	Material	Length (mm)	Width (mm)	Thickness (mm)	Remarks
74	tip	wht chalcedony	11+	7+	2.5+	arrow point tip?
100	base	off-wht & lt gy chert	9+	11+	4+	
121	tip	fingerprint chert	17+	11+	3.5+	arrow point tip?
133	base	Edwards chert	26+	9+	45+	large biface (roughout), probably originally oval in shape
185	med	lt gy chert	11+	14+	3+	projectile point fragment?
189a	med	lt gy chert	15+	10+	4+	projectile point fragment?
189b	nc	lt gy & tan chert	45	32+	11.5	large, oval biface (roughout) weight 17+ g
280	tip	rose chert	7+	5+	2+	arrow point tip?
302	med	fingerprint chert	20+	21+	4+	dart point fragment?
349	med	med gy-brn mott chert	8+	11+	4+	
390	tip	Alibates/ Tecovas look-alike	4+	5+	1+	
410	base	rd & gy chert	23+	30	8	
417	tip	clear chalcedony	14+	11+	4+	dart point fragment?
423	tip	dk gy-rd chalcedony	12+	11+	3+	arrow point tip?; burned or overly heat treated
467	tip	lt gy-brn chert	18+	16+	5+	
476	edge	lt pink chalcedony chert	12+	5+	2+	heat treated; projectile point fragment?
526	edge	dk yel-or chert	10+	16+	6+	probably heat treated
530	tip	med brn-gy chert	21+	13+	4+	heat treated
545	tip	rose chert w/ wht & gy mott	24+	18+	5+	dart point tip?

566	edge	lt brn chert	10+	7+	2+	heat-treated projectile point fragment?
571	base	med gy chert	13+	8+	4+	basally ground dart point fragment?
584	base	red chert	10+	17+	5+	heat treated; outré passé break
591	tip	lt brn-gy chalcedony chert	10+	9+	2+	dart point tip?
648	base	dk gy & rd chert	11+	23+	8+	probably heat treated
649	tip	Edwards chert	20+	20+	5+	fits medial fragment #752
673	base	Edwards chert	14+	18+	5+	outré passé break
692	base?	rose chalcedony	14+	8+	2+	may be from a side-notched chert arrow point; heat treated; false Alibates material
705	base ½	med gy-brn & dk gy chert	32+	23+	6	
723	base	Tecovas look-alike	6+	16+	4+	outré passé break
724	base	Alibates	17+	27+	5+	heat treated
752	med	Edwards chert	16+	24+	6+	fits tip fragment #649
756a	tip	tan chert	17+	18+	4+	
756b	base	Tecovas look-alike	10+	12+	5+	heat treated
768	tip	lt gy chert	7+	6+	2+	projectile point tip?
770	tip	lt gy-brn chert	15+	9+	5+	may be a drill tip; no use-wear
788	frag	lt tan-gy chert	11+	10+	2+	original shape uncertain
789	base	med gy chalcedony chert	26+	22+	8+	cortex flake w/ minimal bifacial chipping
839	tip	off-wht & lt gy chert	21+	13+	3+	steeply-retouched flake fragment; practice piece?

Chipped Stone Manufacture Debris

FS Number	Type	Part	Material	Length (mm)	Width (mm)	Thickness (mm)	Remarks
Surface	proj. pt. preform	prox. 2/3	lt gy, rd, & blk chert	16+	14	2.5	triangular w/ straight base
112	proj. pt. roughout	C	red chert	28	16	8.5	thinning problems
234	proj. pt. preform	base half	fingerprint chert	22+	15+	3.5	triangular; heat treated
396	proj. pt. preform	C	off-wht chert	19	10	4	triangular w/ str. base; reworked
458	proj. pt. roughout	C	lt & med gy chert	42	23	7-12	thinning problems; heat treated
633	proj. pt. roughout	tip	lt gy & tan chert	18+	15+	6.5+	heat treated

One-Hand Manos

FS Number	Type	Part	Material	Cross Sections		Wear	Form	Length (mm)	Width (mm)	Thickness (mm)	Remarks
				L	T						
88	1	e	gy-tan SS	st	f?	m	oC	31+	81+	40+	
467	1	e	med-gy SS	sr	sr	h	Ck	56+	99+	41+	grinding surface is double faceted
490	1	e?	med-gy fine SS	f	f	l	S	45+	77+	25+	
582	1?	m	dolomite/ limestone	f	f	l	C?	70+	68+	27+	
621	1?	e	reddish SS	st?	st	h	oC	39+	89+	48+	
632	1	e	med-gy fine SS	f	f	l	rCk	67+	85+	30+	
10	2	e	med gy quartzite	st st	st st	l l	sC	97+	74+	45+	
51	2	e	tan SS	st st	sr st	h l	oC	70+	95+	37+	
178	2	e	SS	f f	f f	h l	S	61+	53+	27+	

Basin Metates

FS Number	Type	Part	Material	Wear	Manufacture	Length (mm)	Width (mm)	Thickness (mm)	Remarks
186	1	e	med dk gy igneous	h	none; 35 mm border	50+	69+	14+	
358	1	b	med gy SS	h	none	49+	43+	38-49+	
363	1	b	SS	h	none	35+	28+	17-22+	
365	1	e	lt brn-gy SS	h	shaped	68+	62+	32-39+	
388	1	b	med gy SS	h	none	50+	40+	22+	could be a mano fragment
395	1	e?	yel-tan SS	h	border	56+	72+	21+	
522	1	b	med gy SS	h	recip. grind. striae	71+	32+	14-21+	
597	1	e?	med dk gy siltstone	l	minimal edge grinding	87+	76+	23+	
650	1	b	"dirty" SS	h	none	35+	28 +	10-15+	650, 651, and 655 appear to be from the same artifact
651	1	e?	"dirty" SS	h	none	53+	51+	18-29+	
655	1	b	"dirty" SS	h	none	45+	36+	11-19+	
684	1	e	med tan-gy ig. SS	h	edge-chipped; 30 mm border	47+	63+	21-24+	
693	1	e	limestone	h	no border	36+	29+	14-18+	
754	1?	b	SS	h	none	38+	25+	27+	could be a mano fragment
759	1	e	"dirty" SS	h	edge pecked and ground; no border	123+	130+	29+	
810	1	b	"dirty" SS	h	none	44+	36+	12-21+	
254	2	c	SS	h h	partly edge-ground	68+	54+	42-58+	
257	2	c	SS	h h	partly edge-ground	49+	49+	47-61+	
397	2	e	med gy SS	h h	edge chipped and round	109+	109+	22-33+	
455	2	b	lt gy SS	h h	none	42+	36+	26+	
609	2	b	SS	h h	"sharpening" pits in both surfaces	93+	83+	12-31+	

Specimen No.	Provenience
10	13N/highway cut-slope surface
51	14N/4W, surface
74	56N/6W, 0-10 cm
88	49N/5W, 0-46 cm
100	56N/5W, 0-26 cm
103	49N/4W, L. 2
112	49N/3W, 0-34 cm
114	51N/3W, 0- ? cm
121	55N/4W, 0-36 cm
135	49N/2W, 0-33 cm
178	Feature 6 hearth stone or fill
185	47N/3W, L. 2
186	47N/4W, L. 2
189	48N/1W, L. 1
234	60N/7W, 0- ? cm
254	Feature 6 hearth stone or fill
257	62N/7W, L. 1
291	64N/2W, L. 2A
302	65N/1W, L. 2B
349	69N/2W, L. 2B
355	44N/1W, L. 2A
358	46N/1W, L. 2A
363	44N/6W, L. 2B
365	45N/0W, L. 2B
369	45N/1W, L. 2B
370	45N/2W, L. 2A
387	42N/1W, L. 2B
388	42N/4W, L. 2
395	43N/3W, L. 2
396	43N/4W, L. 2
397	" , at bottom in NW corner
399	43N/5W, L. 2B
406	44N/2W, L. 2B
410	43N/3W, L. 2
415	39N/7W, L. 2
423	40N/4W, L. 2A
455	38N/8W, L. 2
458	39N/0W, L. 2B
467	Feature 9 hearth stone or fill
490	36N/3W, L. 2A
521	34N/2W, L. 2B
522	"
526	34N/6W, L. 2
530	35N/3W, L. 2B
545	31N/3W, L. 1B/2 (mixing by roots and/or rodents)
571	32N/5W, L. 2

Specimen No.	Provenience
10	13N/highway cut-slope surface
51	14N/4W, surface
74	56N/6W, 0-10 cm
88	49N/5W, 0-46 cm
100	56N/5W, 0-26 cm
103	49N/4W, L. 2
112	49N/3W, 0-34 cm
114	51N/3W, 0- ? cm
121	55N/4W, 0-36 cm
135	49N/2W, 0-33 cm
178	Feature 6 hearth stone or fill
185	47N/3W, L. 2
186	47N/4W, L. 2
189	48N/1W, L. 1
234	60N/7W, 0- ? cm
254	Feature 6 hearth stone or fill
257	62N/7W, L. 1
291	64N/2W, L. 2A
302	65N/1W, L. 2B
349	69N/2W, L. 2B
355	44N/1W, L. 2A
358	46N/1W, L. 2A
363	44N/6W, L. 2B
365	45N/0W, L. 2B
369	45N/1W, L. 2B
370	45N/2W, L. 2A
387	42N/1W, L. 2B
388	42N/4W, L. 2
395	43N/3W, L. 2
396	43N/4W, L. 2
397	" , at bottom in NW corner
399	43N/5W, L. 2B
406	44N/2W, L. 2B
410	43N/3W, L. 2
415	39N/7W, L. 2
423	40N/4W, L. 2A
455	38N/8W, L. 2
458	39N/0W, L. 2B
467	Feature 9 hearth stone or fill
490	36N/3W, L. 2A
521	34N/2W, L. 2B
522	"
526	34N/6W, L. 2
530	35N/3W, L. 2B
545	31N/3W, L. 1B/2 (mixing by roots and/or rodents)
571	32N/5W, L. 2

573	33N/4W, L. 1A
579	31N/5W, L. 2A
582	" , L. 2B
609	30N/4W, L. 2B
621	29N/0W, L. 2B
631	29N/6W, L. 2B
632	" , 5 cm above Stratum 3 (geologic sterile)
642	29N/4W, L. 2B
648	29N/0W, L. 2A
649	28N/0W, L. 2B
650	" , L. 1
651	28N/0W, L. 2A
653	28N/1W, L. 2A
655	"
658	28N/2W, L. 2A
674	28N/7W, L. 2B
677	28N/8W, L. 2B
683	28N/0W, L. 2A
684	28N/8W, L. 2B
693	26N/2W, L. 2
694	26N/3W, L. 1
705	26N/7W, L. 2A
711	27N/1W, L. 2A
731	27N/7W, L. 2A
752	24N/0W, L. 1
754	" , L. 2
755	"
756	24N/1W, L. 1
759	" , L. 2A
765	24N/4W, L. 1
766	" , L. 2
770	24N/6W, L. 2
787	23N/5W, L. 1
795	22N/0W, L. 2
810	22N/7W, L. 2A
811	" , L. 2B
818	21N/1W, L. 2A

APPENDIX 3: DEFINITIONS OF CHIPPED STONE DEBITAGE TERMS

Material Types

A bewildering variety of material types, colors, and color combinations occur in the lithic material of most prehistoric sites in southeastern New Mexico. In an attempt to do justice to the situation, I and Byron T. Hamilton have devised a chipped lithic material code of nearly 100 varieties. Since this amount of detail is too great to present in reports, a standardized presentation of six groups is used: local gray cherts, other cherts, chalcedonies, limestones, siltites/quartzites, and other materials. However, readers desiring more details of the lithic material varieties at specific sites should contact the writer.

Gray Cherts

A variety of gray cherts suitable for knapping is available in the Roswell region. 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 Roswell (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. Numerous 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. Eighteen 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. Phillip Shelly recently informed me that the 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 for knappers are the small sizes and the internal fractures and textural irregularities common to a large percentage of the nodules.

Other Cherts

This residual category includes 20 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 siliceous siltstones that embody many of the colors and color combinations of the local gray cherts described above. The grainy structure of these cherts requires greater strength and therefore imposes greater difficulty in knapping. These materials comprise the majority of the "other chert" category.

A few cherts of radically different colors and 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 utility. However, the writer suspects 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. These cherts occur in low frequencies in regional assemblages.

The Pecos River gravels are the suspected source of most of these 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. It is also interesting to note that many tan chert flakes and artifacts, if they have fresh breaks on them, are light to medium gray inside. Since it is obvious that not all gray chert patinates in this manner, these "tan" cherts almost certainly come from a different source.

The red and black jasper or chert may also be from a source other than the Pecos River gravels. During fieldwork at the Harrison-Greenbelt site in the Panhandle of Texas (Donley County), I noted a high frequency of red and black chert and was told that this chert is a variety of Tecovas chert.

Chalcedonies

These slightly to mostly translucent, cryptocrystalline materials include 17 sorting varieties with gray and brownish-gray colors. The colors of most pieces are the same as those of the local gray cherts, including a "fingerprint" variant. A San Andres limestone origin for these materials seems likely.

Two varieties of chalcedony that 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 material types.

Limestones

Limestones and associated sedimentary rocks (dolomites, sandstones, etc.) belonging to the San Andres formation (Permian) constitute the singly largest geologic surface outcrop in southeastern New Mexico. During prehistory, these rocks, some of them indurated with silica, were used for chipped stone and ground stone artifacts.

Quartzites, Fine Quartzites, and Siltites

Siltites, or silicified siltstones, are a common component of the San Andres formation in the project area. Not surprisingly, flakes of this material were frequently found in the cultural assemblages as well. Grain sizes include true siltstones and mudstones. Both light gray and light brown colors are represented. A slight brownish cast was occasionally observed in these materials in the rock outcrops in the Hondo Valley, indicating that some of the coloring is natural. 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. Several 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 variety of miscellaneous local materials and several imported stones. The imported stones include Alibates material (both the orange-red and the purple varieties), Tecovas or Quitaque chert, Edwards chert, and clear obsidian.

The source or sources of the obsidian was not determined chemically. However, the Bob Crosby Draw examples, clear black in color, are similar to material documented in the Rio Grande gravels at Las Cruces in south-central New Mexico and on the eastern flank of the Jemez Mountains of north-central New Mexico. A local resident said 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, nor is it expected to be accurate, because the Capitans are composed of igneous intrusives (monzonites and quartz monzonites in this case), not extrusives like those that produce obsidian.

Alibates material, a silicified dolomite, comes from the famous quarries in the Canadian River Valley north of Amarillo, Texas. Several similar materials, called Alibates look-alikes, have been documented in the Canadian River Valley and nearby Llano Estacado (High Plains) caprock near Tucumcari, Ragland, and Yeso in east-central New Mexico; and Baldy Peak on the Colorado/New Mexico line, east of Raton, New Mexico. Tecovas, or Quitaque, comes from one or both sources in the Texas Panhandle, one in the Canadian River Valley west of the Alibates quarries, and the other along the eastern Caprock east of Plainview, Texas.

Edwards chert comes from a vast area in central and west-central Texas. The closest known sources to New Mexico are in the vicinities of Big Spring and Abilene, Texas.

Core Types

The terms for three core types--two-platforms-adjacent, two-platforms-parallel, and flake--require explanation. 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. Flakes struck from the two platforms may be removed from different faces or from the same faces of the core.

Flake Cores

Flake cores are large flakes used as sources of flakes. Usually the ventral surface of the original flake was used as the striking platform, and flakes were removed from the dorsal surface. The patterning and nature of the flake scars leave little doubt that these are not unifacial artifacts, but cores.

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 that were removed from the opposite direction.

Core Reduction Flakes

Core reduction flakes comprise the majority of any chipped stone debitage assemblage. Flakes removed to trim the core (after initial decortication), to shape the core, and to obtain flakes suitable for making formal artifacts, and flakes that fail to meet the requirements for making formal artifacts, are all 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 convey 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 activities. They have one or more ridges or high points on the dorsal surfaces that 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 to overcome a series of step fractures and other failures that 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

Multiple-Flake-Scar Platforms

Multiple-flake-scar (MFS) platforms differ from Old World faceted platforms in several important ways. Multiple-flake-scar 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 have been removed from any convenient direction on the core. Thus, reduction flakes from these cores can have flake scars that 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. The dihedral method 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 the aiming point for sequential flake detachment. It permitted easier isolation of the aiming point and therefore greater control over the final product. Flake platforms produced by the dihedral technique display two flake scars ending in a central peak. The flake scars display ripples and other landmarks indicating removal from opposite directions.

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 and 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.

Distal Termination Types

Only one distal termination type, the modified-feathered, needs explanation. It 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 that 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

This category refers to 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 that 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 in shape that they may have been the product of minute intentional retouch. These examples are recorded as intentional retouch.

Flakes bearing evidence of use-wear and/or intentional retouch are described as pieces of manufacture debris and as flake tools. As such, they are described and otherwise taken into account in both the manufacture debris and tool sections of this report.