MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

Excavation of LA 61282, The Airport Road Site: Late Archaic and Classic Period Occupation Near the Santa Fe River, Santa Fe, New Mexico

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ARCHAEOLOGY NOTES 274

SANTA FE 2004 NEW MEXICO

ADMINISTRATIVE SUMMARY

In October and November 1988, the Office of Archaeological Studies of the Museum of New Mexico (OAS) excavated LA 61282, the Airport Road site within the right-of-way of NM 599 at its intersection with Airport Road in Santa Fe, New Mexico. The excavation was conducted for the New Mexico State Highway and Transportation Department (now the Department of Transportation—DOT) as part of the investigations along the Northwest Santa Fe Relief Route. This project was funded by the DOT and the Federal Highway Administration.

Data recovery at LA 61282 revealed a multicomponent Late Archaic and Classic period limited-activity site. The Late Archaic period component, radiocarbon dated to between 2000 and 1400 B.C., consisted of 24 subsurface pits, hearths, and refuse areas. Associated artifacts displayed a strong emphasis on hunting, with meat processing and consumption evidenced by over 800 animal bone fragments recovered from features and from throughout the excavation area. The presence of piñon nutshells and a majority of large-mammal animal bones suggested at least one fall occupation. Superpositioning and layering of features and deposits reflected multiple occupations throughout the Late Archaic period.

The Classic period component consisted of a ceramic and lithic artifact concentration in the northeast part of the site. There was no depth to the cultural deposit, suggesting a brief occupation from A.D. 1350 to 1490. This component may represent foraging by occupants of Cieneguilla Pueblo, which is 5 km to the northwest.

MNM Project No. 41.539
DOT Project No. DE-0107(802)

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CHAPTER 1

Introduction

In October and November 1988, the Office of Archaeological Studies of the Museum of New Mexico (OAS) excavated LA 61282, the Airport Road site within the right-of-way of NM 599 at its intersection with Airport Road in Santa Fe, New Mexico. The excavation was conducted for the New Mexico Department of Transportation (DOT) as part of the investigations along the Northwest Santa Fe Relief Route. This project was funded by the DOT and the Federal Highway Administration.

The site location and legal description of LA 61282 are provided in Appendix 1, and is entered in the New Mexico Cultural Resource Information System (NMCRIS) files of the Archeological Records Management Section (ARMS) of the New Mexico State Historic Preservation Division in Santa Fe. Figure 1 shows the site location.

LA 61282 was first identified during the northwest Santa Fe Relief Route inventory completed by the OAS in July of 1987 (Maxwell 1988). Archaeological testing was completed in December of 1987, resulting in a recommendation that LA 61282 had the potential to yield important information on Archaic period settlement and subsistence in the Santa Fe area. A data recovery plan was proposed and accepted (Lent 1988), and data recovery was undertaken in the fall of 1988.

Data recovery was directed by Daniel Wolfman with assistance from numerous OAS staff members. Timothy Maxwell was principal investigator.

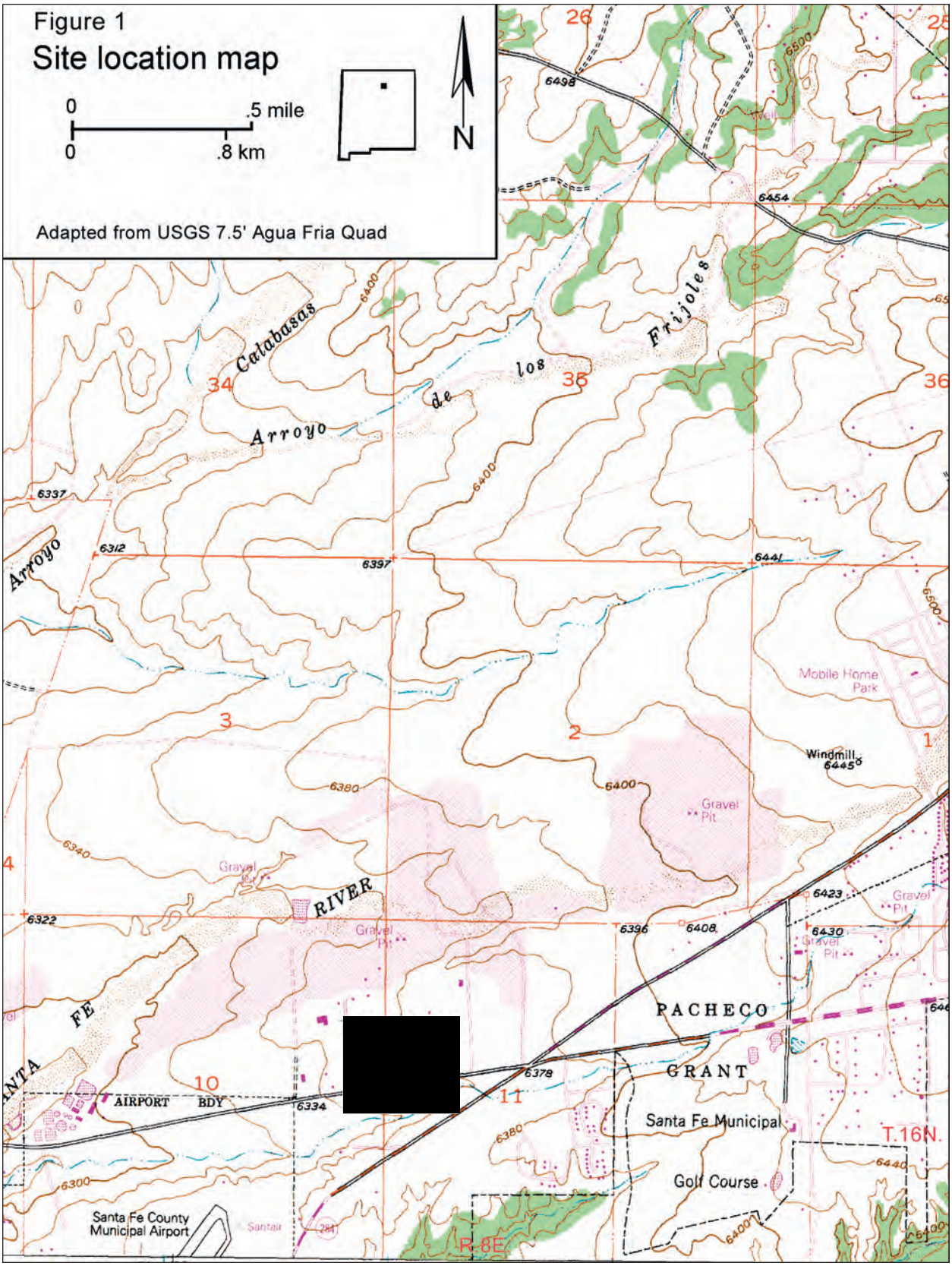

Figure 1. Site location map.

CHAPTER 2

Contemporary Environment

The project area was within a structural subdivision of the Southern Rocky Mountain physiographic zone known as the Española Basin (Folks 1975). The basin is bounded on the west by the Jemez Mountains and to the east by the Sangre de Cristo Mountains. An alluvial plain dissected by numerous arroyos stretches westward from the foothills of the Sangre de Cristos. Elevation in the project area ranges from 1,910 to 2,252 m (6,266 to 7,388 ft).

Local topography alternates among nearly level plains, rolling terraces, and steep, rocky slopes. The major drainage is the Santa Fe River, which has a fairly wide, level floodplain; the smaller tributary arroyos have cut deeply into the alluvial plain to form steep-sided valleys.

Soils of the project area are of the Panky-Pojoaque-Harvey association (Folks 1975:4). They are level to hilly, deep, loamy to clayey soils that formed on old alluvial fans and on dissected, eroded terraces. The association is composed of 35 percent Panky soils, nearly 25 percent Pojoaque soils, and almost 20 percent Harvey soils. Lesser contributors include Cerrillos, Agua Fria, Silver, Fivemile, Santa Fe, and La Fonda soils. All the major soils occur on gentle to moderate slopes and have sandy or clayey loam near surface deposits. In the site area, the soil is Panky fine sandy loam, which consists of 5 cm of light brown fine sandy loam, 5 to 15 cm of reddish brown loam, 15 to 25 cm of reddish brown heavy clay loam, and 25 to 60 cm of reddish brown heavy clay loam. These soils would have been encountered during hand excavation. Backhoe excavation reached to 1.5 m below the ground surface, which is a pinkish white sandy clay loam with a high calcium carbonate content.

LA 61282 was located strategically within or near four main plant communities: the piñon-juniper woodland, the rabbitbrush community, the shortgrass plains, and the Santa Fe River riparian community (Kelley 1980). At the edge of the piedmont is the grassland community that extends to the edge of La Bajada. The most areally extensive plant communities are the piñon-juniper woodland and the shortgrass plains. The rabbitbrush community is restricted to the floodplain of primary and secondary tributaries of the Santa Fe River. The riparian community would have been restricted to the prehistoric channel of the Santa Fe River. Combined, these plant communities were the main source of floral resources for prehistoric populations, as well as being the habitats that supported game mammals.

To the east of the project area, the piñon-juniper woodland is the dominant plant community, covering an estimated 80 percent of the land. The piñon-juniper woodland near Arroyo Hondo, as surveyed by Kelley (1980:59-60), was fairly homogeneous in stand composition and would have provided abundant fuel wood and piñon nut crops. Though the piñon-juniper woodland covers a large area today, modern and prehistoric piñon-juniper woodland characteristics and distribution may differ. For example, piñon germination is retarded by a thick cover of grama grass. Grazing throughout the Santa Fe area over the last 150 years may have reduced the grama grass cover and increased the ability of piñon to propagate. Under cooler, moister conditions, healthy grama grass cover during prehistoric times may have dramatically altered the piñon-juniper woodland productivity and distribution (Kelley 1980:9-10). Piñon nuts and fuel wood may have been abundant, but their distribution may have been more restricted.

The piñon-juniper woodland had 135 of the 271 plant species observed within the Arroyo Hondo area (Kelley 1980:60). Of these, 63 species are edible or have medicinal qualities. With the exception of piñon, however, most species observed are not abundant or are most productive in disturbed soils. Besides piñon, economic plant species found in the piñon-juniper woodland and in archaeological context include yucca, prickly pear and pin cushion cacti, *Chenopodium* sp., *Amaranthus* sp., and Indian ricegrass.

The rabbitbrush community of the arroyo channels and terrace slopes might provide the abundance and variability in plant species that is unpredictable for the piñon-juniper woodland. Because of run-off, flooding, and erosion, the arroyo channels and terraces are more disturbed and thus support the grasses, shrubs, and succulents that favor such conditions. Plant species of the

rabbitbrush community include prickly pear, yucca, *Chenopodium* sp., *Amaranthus* sp., and Indian ricegrass.

The open shortgrass plains occur at an elevation of 1,525 to 2,050 m (5,000 to 6,725 ft). This area has the longest growing season, but receives the lowest mean annual precipitation (Kelley 1980:112). Under optimal conditions, this community would be highly productive with abundant edible grasses and shrubs. Critical common species of the shortgrass plains are Indian ricegrass and dropseed. Indian ricegrass seeds are available in the early summer; dropseed is a late summer species. Potentially, the major constituents of the shortgrass plains could support a summer to early fall occupation.

The Santa Fe River riparian community has a wide variety of edible plants that could have been harvested throughout the summer. Species such as cattails would have been available in easily exploited patches. Unfortunately, many of the tubers, roots, and other edible portions of these plants are rarely preserved in open-air contexts.

The fauna of these plant communities have been described in Wetterstrom (1986), Lang and Harris (1984), and Kelley (1980). Mammals most abundant on the piedmont would have been cottontail and black-tailed jackrabbit; a variety of squirrels, rats, mice, and gophers; prairie dogs; coyote; and mule deer. Pronghorn antelope would have roamed the shortgrass plains. Distribution and abundance of these species would have depended on available forage and prey species. It is likely that in good years a full range of small, medium, and large mammals would have been available.

The Santa Fe area has a semi-arid climate. Most of the local rainfall occurs as intense summer thunderstorms that produce severe runoff and reduce usable moisture. The area receives 229 to 254 mm of rainfall per year, and an average annual snowfall of 356 mm (Kelley 1980:112). The growing season ranges from 130 to 220 days and averages 170 days. The last spring frost usually occurs in the first week of May, and the first fall frost occurs around the middle of October. The mean yearly temperature is 10.5 degrees C.

Paleoenvironment

Paleoenvironmental reconstructions for the northern Rio Grande are few. The most recent and perhaps most reliable study used dendrochronological data from Arroyo Hondo Pueblo (Rose et al. 1981). This temporally extensive study is very useful for Pueblo period investigations. Unfortunately, the detail that it provides begins with A.D. 985, which is more than 2,000 years later than the LA 61282 occupation. Rainfall periodicity described in the Arroyo Hondo study might be of interest for evaluating potential Late Archaic period settlement patterns, except that general climatological evidence for the American Southwest indicates long-term trends that do not fit the Arroyo Hondo profile (Cordell 1979; Cully 1977; Wills 1988). Inferences about Late Archaic period climate can be drawn from the general studies and are provided below, though they lack the temporal control and regional specificity that would make them more applicable to the LA 61282 occupations.

Occupation of LA 61282 occurred early in the Medithermal, which began after 4000 B.P. (Antevs 1955). As proposed by Antevs (1955), ranges of precipitation and temperature during the Medithermal were substantially similar to those of the modern climate. Evidence of this climatic regime was a decrease in xerothermic plants, accumulation of water in desert basins, stabilization of dunes, arroyo filling, and the development of glaciers in high mountains (Antevs 1955). Sedimentary evidence from the San Augustin Basin in southwestern New Mexico shows an increase in moisture from 5000 to 3500 B.P., with dry periods of unspecified length at 2500, 1500, and 500 B.P. (Powers 1939; Cully 1977:97).

Palynological evidence from western New Mexico and eastern Arizona suggests that between 5000 and 3000 B.P. light summer rains were more prevalent with a winter-dominant precipitation pattern (Schoenwetter 1962). From 3000 to 500 B.P. there was a return to summer-dominant precipitation pattern typified by heavy rains. Periodicity in precipitation and rainfall is indicated in the pollen record by a span of increased summer rainfall from 3400 to 2800 B.P.; decreased annual precipitation with cooler temperatures between 2800 and 2500 B.P.; warmer temperatures and more precipitation between 2500 and 2300 B.P.; warmer temperatures with less precipitation between 2300 and 2100 B.P.; and a return to cool temperatures with more precipitation between 2100 to 1600 B.P. (Peterson 1981). The actual length of these periods of different temperature and moisture regimes is generalized and the variation within any of the 200- to 500-year spans undoubtedly is comparable to the more recent record provided by Rose et al. (1981) for Arroyo Hondo Pueblo. The importance of this variability within the long-term patterns to Late Archaic populations is its effect on the distribution and abundance of food sources.

Changes in the range of the major plant communities, such as the piñon-juniper woodland or shortgrass plains, should be reflected in the temporal and spatial patterning of site types and subsistence strategies (Wills 1988). Examples of changes in climate and the corresponding effect on biotic community range include an extension of shortgrass plains with an increase in summer-available seeds, and increased or greater distribu-

tion of antelope herds. Extension of piñon-juniper woodland would result in a decrease in local antelope, but in increases in mule deer range and fall piñon nut harvests.

Late Archaic base camps at or near both shortgrass plains and piñon-juniper woodland would reap the benefits of both zones within a daily foraging radius of 5 to 7.5 km. In fact, placement of LA 61282 at the edge of an extensive tract of shortgrass plains, and more than 15 km from the forested uplands of the Sangre de Cristo mountains and foothills, suggests a strategy specifically geared to summer or fall exploitation. The importance to hunter-gatherers of the transition zone between the piñon-juniper woodland and the shortgrass plains is emphasized by the location of Late Archaic period sites with pit structures and evidence of periodic reoccupation.

CHAPTER 3

Cultural Historical Background

This section focuses on the Late Archaic period because most of the cultural materials recovered from and features excavated at LA 61282 date from this period. The Classic period is summarized briefly to place the component and artifact-collection area in perspective.

The Late Archaic Period

The Late Archaic period as used in this discussion is the period from 1800 B.C. to A.D. 600, which in the Oshara tradition sequence are the Armijo and En Medio phases (Irwin-Williams 1973). From the Middle Rio Puerco River valley sites, two major changes were observed in settlement and subsistence during this period. The settlement pattern showed the first evidence of seasonal aggregations, as indicated by the dense and extensive occupation floors at the Armijo Shelter (Irwin-Williams 1973:10). A change in subsistence is evidenced by the first indications of corn use, and by the presence of a stone tool kit that exhibited a wider selection of plant-processing implements. The temporal indicator for the Armijo phase is the Armijo style projectile point, which has an ovate blade with shallow corner-notches and a concave or slightly indented base. The projectile points from the En Medio phase have larger triangular blades with moderate to deep corner-notching. There is considerable variability in size during the En Medio phase.

Armijo phase sites in the Santa Fe drainage basin exhibit the first evidence of longer occupation, as demonstrated by the excavation of several pit structures less than 1 km from LA 61282 (Schmader 1994). Two sites, LA 54749 and LA 54751, yielded structures with radiocarbon date ranges from the late Armijo or early En Medio phases (Schmader 1994).

LA 54749 yielded two radiocarbon dates from Structure 2 (Schmader 1994:41). The 2-sigma calibrated date ranges (95 percent probability) were 1440 to 1140 B.C. and 1300 to 920 B.C. These two date ranges have end dates that are 220 years apart, yet they are from the same occupation context. Though Schmader (1994:41) suggests an occupation around 1200 B.C., the old-wood effect could render the dates at least 100 to 250 years later (Schmader 1994:96). Revision of the dates to include a possible 250-year error places the occupation sometime between 1300 and 700 B.C. This is a significantly less fine-grained estimate than the 1200 B.C. date suggested in the report.

LA 54751 yielded radiocarbon dates from Structures 1, 3, and 5 that ranged collectively from 1930 to 830 B.C. (2-sigma calibrated dates, 95 percent probability). Structure 3 from LA 54751 had the most formal architectural features. It was 3 m long by 2.5 m wide with a 1 m long east-oriented entry and a perimeter of six postholes inside the shallow sloping walls. The postholes indicate a semipermanent construction. A semipermanent shelter with a formal entry most probably was built for cold weather habitation. An expected interior hearth is missing, though numerous extramural thermal features close to the structure yielded charred seeds from plants that mature in the late summer or early fall.

Structures 1, 2, 4, and 5 from LA 54751 were less formal than Structure 3 (Schmader 1994:49-68). Structure 1 was too eroded to provide information on subsistence and season of occupation. Structure 2 was also heavily eroded, but yielded a metate fragment and possible postholes. The presence of charred pigweed and purslane seeds suggested processing and consumption during the late summer or early fall. Structure 4 was roughly 2 m in diameter with ephemeral stains of postholes and a single interior basin-shaped metate. Structure 5, located 1 m west of Structure 3, was roughly 2 m in diameter with an interior hearth and five postholes. The presence of an interior hearth may indicate cold-weather occupation.

In summary, Structures 1, 2, 4, and 5 are small pit structures that would have accommodated one or two individuals comfortably; Structure 3 may have accommodated a small family. None of the features were associated with heavy concentrations of chipped stone debris. Low numbers of projectile points and hunting-related tools, but no faunal remains, were recovered from the sites. The structures are differentiated by pres-

ence or absence of hearths and postholes, and floor contact artifacts. The differences in hearth and posthole occurrence may reflect season of occupation or function. The differential distribution of metates on structure floors may result from reuse of site furniture by subsequent occupants.

The data from the Tierra Contenta project suggest that during the Armijo phase the Santa Fe drainage was occupied seasonally for short periods by small groups during episodes of resource abundance (Schmader 1994). The absence of faunal remains and the limited chipped stone debris suggest occupation when plant gathering was more successful than hunting. The clustered distribution of these sites indicates that a periodic, semipermanent water source was available. Repeated occupation of this area is evidence of suitable conditions for successful subsistence, though the lack of dense deposits or a midden suggests that favorable conditions were short-lived and would not support consecutive years of occupation.

Undoubtedly, more Armijo phase sites exist in the Santa Fe area; however, the small artifact assemblages associated with the Tierra Contenta project sites suggest short occupations resulting in low impact on the Santa Fe River and surrounding environs. These sites were found in eroded areas where drainages cut through stained deposits buried by clean alluvial overburden. While eroded settings contribute to the poor preservation of non-durable goods, they may be the only available window on Armijo phase and earlier occupation.

Between 800 B.C. and A.D. 400 to 600 during the En Medio to Basketmaker II periods in the northern American Southwest, important changes in settlement patterns and subsistence strategies are recognized in material culture and subsistence data, and in site structure and distribution. Changes in mobility and the gradual adoption of cultigens that began during the Armijo phase are continued and elaborated on through time (Wills 1988; Vierra 1985). The archaeological record shows evidence of a less mobile lifestyle; increased dependence on cultigens; increase in duration of occupation; technological organization focused more on expedient tool manufacture; and the construction of more formal facilities, such as pit structures and storage pits (Vierra 1990; Stiger 1986; Fuller 1989; Vogler et al. 1983; Irwin-Williams 1973; Schmader 1994). Chipped stone technology, which was dominated by biface manufacture before the En Medio phase, showed increasingly more use of local raw material, and manufacture of expedient or less formal tools (Kelly 1988; Andrefsky 1994; Vierra 1994). How and when these changes occurred in the upper Middle Rio Grande Valley is still poorly understood because of the small number of excavated sites with reliable absolute dates. Currently, most explanations and interpretations of upper Middle Rio Grande settlement and subsistence patterns rely heavily on the data from the middle Rio Puerco Valley (Irwin-Williams 1973; Biella 1992).

Ten sites from the Late Archaic and Basketmaker II periods were identified in the San Cristobal area of the eastern Galisteo Basin by Lang (1977). Projectile points from the sites were in the style of the Oshara and Cochise traditions. Lang (1977) suggested that populations from the south used the San Cristobal area between 800 and 400 B.C., as evidenced by one site with a Chiricahua dart point and another with a San Pedro dart point. The occupation pattern of San Cristobal during this Cochise tradition intrusion shows small, specialized activity sites that reflect short-duration seasonal occupation (Lang 1977:317-326).

Lang (1977:327-328) assigns the span of 380 B.C. to A.D. 400 to the Basketmaker II period for the San Cristobal sites. He suggests that there was a shift from hunting-dominated occupations during the early part of the Basketmaker II period to more generalized hunting and gathering (Lang 1977:342). Some sites were reused, a practice that was not evident for earlier or later sites until A.D. 900. Evidence of reuse during the latter portion of the Basketmaker II period includes a site with eight hearths, grinding implements, and a greater focus on flake tool production and use (Lang 1977:345-346). According to Lang's (1977:328-329) climatic reconstruction, the periods from 50 B.C. to A.D. 200 and from A.D. 250 to 400 may have been the best for a hunting and gathering adaptation. These periods had an average precipitation similar to or greater than modern, combined with warmer than modern temperatures during the early period, and equal to or cooler than modern temperatures during the later period. Warmer temperatures combined with above average precipitation would have supported a more abundant and perhaps more diverse plant community, and larger herds of large game mammals. Year-round habitation could have been supported in the eastern Galisteo Basin and the Santa Fe drainage basin during these periods.

Farther south, at Cochiti Reservoir, Biella and Chapman (1977:201) suggest Late Archaic period dates for most of the 90 nonstructural artifact scatters with hearths. These sites represent the first recognizable and most intensive use of the Cochiti Reservoir area. There were no conclusively identified Early to Middle Archaic period occupations. The large number of Cochiti Reservoir sites is in marked contrast to the low number of Late Archaic period sites in the eastern Galisteo Basin (Lang 1977). The analysis of the Cochiti Reservoir sites examined variability in site placement relative to diverse biotic resources. It was expected that site locations would reflect variability in residential

group size, in activity performance, and in tool manufacture relative to raw material distribution (Chapman and Biella 1979:386-393).

Estimates of residential group size were based on the number of hearths and their spatial relationship, and on the spatial distribution of hearths relative to artifacts. There was a consistent co-occurrence of hearths, fire-cracked rock, milling stones, and chipped stone densities, which suggested mini-camps used by a single commensal group. The spatial pattern was an arc enclosing 3 to 4 m of open space with the hearths at the apex of the arc associated with fire-cracked rock concentrations. Ground stone was commonly associated with the hearth, if it was not broken. Sites with more than one hearth that experienced larger-group occupation or had multiple occupations were not located near areas of potentially greater vegetative diversity.

Investigation of variability in activity performance was based on a functional dichotomy of base camp and location. Base camps had a hearth with ground stone and chipped stone debris. Base camp assemblages consisted of a full range of core reduction debris distributed in the discard arc outside the hearth area. Smaller amounts of core reduction and biface manufacturing debris were clustered near the hearth, with larger amounts of debris forming the discard arc. The distribution of tools and manufacturing debris indicated that manufacturing and processing were not spatially segregated. Locations only had chipped stone debris that was distributed in a circular pattern, reflecting single occupation or activity. Early-stage reduction debris was most commonly present. Locations were used for generalized activities or for such a short time that formal tools were not used, broken, and discarded, nor was abundant flake debris generated by intensive production and use of expedient tools.

Technological variability was strongly influenced by locally abundant and suitable lithic raw material. Most tools were made from local material using a core-flake reduction technique. Obsidian mainly occurred as formal tools that were worn out or broken. If core reduction debris was present, it often exhibited waterworn cortex indicating that it was obtained from river gravel sources. There was little evidence of formal tool production or gearing up using local material. This suggests that the small mobile commensal groups commonly moved between areas where raw material for tools was available. Abundant raw material also allowed a less efficient and more expedient technology that generated considerably more waste than finished or used products.

The archaeological evidence for the Late Archaic period at Cochiti Reservoir has been summarized (Chapman 1979:72) as a "picture of short-term residential occupations by very small complements of commensal groups, which characterize the Late Archaic adaptation within the Cochiti Reservoir locale. Considerable redundancy for site location is evident in all aspects of subsistence-related behavior, including strategies of food resource processing and consumption; strategies of raw material selection for tool manufacture; reduction trajectories involved in tool manufacture; and the character of site space utilization."

Archaeological evidence of seasonal movement within and between different environmental zones was scarce because floral and faunal remains were poorly preserved or absent (Chapman 1979:73). The Late Archaic period Cochiti Reservoir inhabitants appear to have been residentially mobile because the sites, except for hearths, lacked permanent structures or facilities. The distance between moves could not be determined, though it was probably determined by the distance between seasonally abundant resource patches. The lack of evidence of gearing up or of an intense biface manufacturing industry suggests that the group(s) moved to areas where raw material was available. The limited evidence of biface production also suggests that anticipated activities and tool needs between base camps could be supported by flake tools, existing formal tools, or by minimally reduced cores or nodules of material available from the river gravel.

There is no explanation of the difference in Archaic period site frequencies in the eastern Galisteo Basin and the Cochiti Reservoir areas. The different spatial-temporal distribution could result from changes in the paleoenvironment that necessitated periodic shifts in subsistence strategies. The difference may arise from settlement behavior: sites along the Rio Grande were reoccupied often, resulting in greater artifact and feature accumulations. Less frequent reoccupation and a more dispersed settlement pattern would result in sites with lower archaeological visibility, such as those found in the eastern Galisteo Basin.

In the Santa Fe area, the most abundant pre-Pueblo period sites are from the Late Archaic and Basketmaker II period. Recent projects have identified Late Archaic-Basketmaker II components southeast (Viklund 1989; Lang 1992), southwest (Hannaford 1986; Lent 1988; Schmader 1994), and east (Lang 1993) of Santa Fe. A review of the NMCRIS files for eight USGS 7.5' quadrangle maps that include and surround the Santa Fe area yielded 31 sites or components from the Late Archaic and Basketmaker II-III periods as of 1993. They are all open-air sites consisting of lithic artifact scatters with or without hearth complexes or fire-cracked rock concentrations.

Site clusters in the Airport Road area (Hannaford 1986; Schmader 1994) southwest of Santa Fe, along the Cañada de los Alamos to the south of Santa Fe (Lang

1992), and along the Santa Fe River suggest that certain lowland locations were repeatedly occupied for short durations by small groups over a long period of time. Basketmaker II sites are reported in all environmental zones from the Santa Fe River valley to the foothills of the Sangre De Cristo mountains. This distribution suggests that Late Archaic-Basketmaker II populations exploited resources available in all environmental zones. Because the Santa Fe River Basin and the surrounding montane and piedmont environments offer considerable resource diversity, it is possible that Late Archaic-Basketmaker II were the first groups to occupy the area year-round. A vertical mobility pattern was suggested by Chapman (1980) from the Cochiti Dam and Reservoir data. This spatially less extensive settlement pattern is in direct contrast to large-area mobility patterns suggested for San Juan Basin Late Archaic-Basketmaker II populations (Elyea and Hogan 1983; Vierra 1990; Fuller 1989).

Most of the sites from the Santa Fe area were identified as limited or temporary base camps and limited-activity sites. Characteristics typical of these two site types are low numbers of or no processing facilities and equipment, a low-density artifact scatter or small artifact cluster, and very few unbroken tools. Brief occupation is suggested by low artifact counts and limited artifact variability. A number of characteristics that would suggest longer, more permanent settlement are absent from the survey data. Facilities and equipment are usually associated with longer occupations or planned reoccupations (Binford 1980; Vierra 1980; Elyea and Hogan 1983; Camilli 1989; Nelson and Lippmeier 1993). Formal tools, which are minimally reported, can be considered personal gear, which was highly curated, and rarely deposited at limited-activity sites (Binford 1979; Kelly 1988). Reuse of a limited base camp or activity area may result in overlapping or refurbishment of features and a higher artifact density (Camilli 1989). Reoccupation may result in a more scattered feature and artifact distribution, but higher artifact counts. Most sites exhibit low surface artifact density with evidence of multiple occupation resulting in spatially extensive sites with low artifact densities.

The best evidence for longer duration seasonal occupation comes from the Tierra Contenta project sites. It could be argued that the Tierra Contenta project sites (Schmader 1994) are En Medio phase, not Armijo, though they have been presented in the Armijo phase discussion of this section. Feature 8, a pit structure at LA 54752, yielded a 2-sigma radiocarbon date range from 190 B.C. to A.D. 80, making it the best dated En Medio phase structure in the Santa Fe area.

A small number of Late Archaic-Basketmaker II period sites that have not been excavated may also be residential base camps. They include LA 88335 (Seton Village 7.5' quad), LA 21547 and LA 79657 (Montoso Peak 7.5' quad), LA 44835 and LA 88436 (Agua Fria 7.5' quad). These sites have artifact assemblages in high-density clusters, and tend to be more diverse, reflecting the greater number of site activities. These sites have lithic artifact concentrations with diagnostic projectile points, ground stone, and a small assemblage of formal tools. If reused or reoccupied, these sites can be very difficult to interpret unless the deposits are spatially distinct. If they are residential sites, Late Archaic-Basketmaker II use of the Santa Fe River valley and environs may have been more intensive than previously believed.

In the Sangre de Cristo foothills east of Santa Fe, LA 76546 yielded obsidian hydration dates between 100 B.C. and A.D. 300 (Lang 1993:94). Excavation revealed mixed, multicomponent deposits: a stone tool assemblage with debris from core reduction, biface tool manufacture, expedient and formal tool production and use; and grinding implements. However, no thermal or habitation features were identified. This site is strategically located near a large chipped stone raw material source (LA 65206) above a major tributary of the Santa Fe River, with immediate access to montane environments. The lack of structures and thermal features may indicate a relatively brief, warm-weather occupation with LA 76546 used as a staging area for hunting, gathering, and processing. The accumulation of chipped stone debris and tools could result from reoccupation over a 300-year period. Future investigations in the foothills may yield a greater number of camp sites providing stronger support for vertical mobility models.

Excavation of artifact scatters LA 75680, LA 75681, and LA 75686 on the terraces of the middle reaches of Cañada de los Alamos have yielded evidence of mixed Archaic and Pueblo period chipped stone assemblages. Estimated occupation dates are derived from temporally diagnostic projectile point styles, obsidian hydration, and pottery. The Early and Middle Archaic period components have already been presented. This discussion focuses on the En Medio, Basketmaker II, and early Basketmaker III period materials (Lang 1992). Each site yielded surface distributions indicative of palimpsest deposition over a long period of time. The artifact counts are low, but the assemblage diversity is moderate to high. Assemblage distributions reflect many brief occupations primarily related to hunting and small-scale gathering. A general absence of features and facilities combined with low artifact counts supports this observation. Obsidian hydration dates ranging from 100 B.C. to A.D. 700 suggest use by small groups or individuals for resource procurement and processing, with resources transported to a base camp or habitation for final processing, consumption or storage.

It is possible that Cañada de los Alamos served as a migratory route for medium and large game mammals during the fall. The presence of burned bone and the evidence of multiple occupations strongly suggest the successful staging of hunting expeditions from these sites.

The Cañada de los Alamos sites appear to represent the limited-activity sites of a logistically organized subsistence strategy. To date, Late Archaic period habitation sites have not been identified at the eastern edge of the Galisteo Basin or in the rugged canyons of the Apache Canyon and Glorieta pass areas. Potentially, the Late Archaic to Basketmaker II use was staged from the lower elevation residential sites of Cochiti Reservoir and the Tierra Contenta area.

Important to the Armijo and En Medio phases in other parts of the Southwest is the introduction of plant domestication that focused on maize. Wills (1988, 1995) and others (Wills and Huckell 1994; Smiley and Parry 1990; Simmons 1986) suggest that by 1500 B.C., and definitely between 1200 and 1000 B.C., maize was introduced into hunter-gatherer diets in the Mogollon Highlands, Black Mesa in northeast Arizona, and the Chaco Canyon area of northwest New Mexico. It is widely accepted that maize spread into the American Southwest from northern Mexico (Wills 1988; Galinat 1985). The processes by which maize cultivation spread are still debated, especially with regard to potential routes, rate, transmitters (Berry and Berry 1986; Matson 1991; Wills 1988), and initial importance to and effect on hunter-gatherer subsistence strategies and settlement patterns (Wills and Huckell 1994; Wills 1995). Current consensus is that the spread of maize cultivation was gradual, but not in geographical stages. The best evidence recovered from cave sites suggests that caves were used as storage facilities; this evidence also created a bias in our understanding of maize introduction that has been difficult to overcome with the excavation of open-air sites.

Closely related and difficult to unpack are the issues of reliance on domesticated plants and sedentism. Late Archaic hunter-gatherers of the American Southwest are typically defined as highly mobile with different degrees of mobility relating to season, group size, biotic composition of annual territory, and eventually degree of reliance on cultigens (Kelly 1992). Some investigators have suggested that early agriculture was incipient and that after seeds were planted the group moved away, only to return to harvest in the fall (Berry and Berry 1986); thus, the effect on mobility patterns would be minimal.

Wills (1988; 1995) strongly disagrees with this view because of the investment needed to bring planting to harvest, the potential for crop loss due to pests without proper maintenance, and the lack of evidence for incipient agriculture in the ethnographic record. Increased reliance on agriculture would tie at least some members of the group to the field location throughout the growing season, eventually resulting in a loss of range as other groups moved into unoccupied territory (Wills 1995). The decision to rely on agriculture, therefore, would result in fewer base camp moves during the year and in a greater reliance on logistical forays for food and other resources. Furthermore, successful farming would precipitate annual return to the base camp or a nearby location, resulting in higher site density or in evidence of reuse of facilities or discarded materials (Wills 1988; Camilli 1989).

So where is the evidence of the transition to agriculture during the Armijo phase in the northern Rio Grande? To date, the earliest evidence of corn use from the northern Rio Grande comes from Ojala Cave (LA 12566) in the lower Alamo Canyon area of the Pajarito Plateau (Hubbell and Traylor 1982:320-321). Excavation yielded radiocarbon dates of 650 ± 145 B.C. and 590 ± 75 B.C. for Chiricahua Cochise and San Jose/Armijo style artifacts. This site also showed evidence of repeated occupation during the Armijo and early En Medio phases, perhaps supporting Wills' hypothesis that site reuse should increase with reliance on agriculture. The two maize kernels, however, were recovered only from Occupation Level 5, suggesting very limited cultigen use.

The absence of maize from Armijo and subsequent En Medio phase sites in the northern Rio Grande continues to perplex investigators. Explanations of the absence of a partly agrarian economy are based on environmental factors that would preclude successful agriculture and favor continued hunting and gathering and mobile settlement pattern. In other words, the risks of farming outweighed the benefits, which in turn were outweighed by the benefits of continued mobility and hunting and gathering. Maintaining a seasonally mobile settlement pattern would have required sufficient unclaimed or open territory to move about in. Based on incomplete information on Late Archaic period site distributions, it appears that most of the area between the western slope of the Jemez Mountains and the eastern slope of the Sangre de Cristo Mountains and north from La Bajada to the Colorado border was inhabited by mobile populations as late as A.D. 750. Seasonal movements between suitable environments defined by elevation along the Rio Grande and its northern tributaries may have reduced the territory required by hunter-gatherers, allowing more groups to live within a smaller area for a longer period, as evidence shows is the case in other parts of the American Southwest.

The Classic Period

Wendorf and Reed (1955) mark the beginning of this period (A.D. 1325 to 1600) by the appearance of Glaze A and locally manufactured red slipped pottery (see also Mera 1935; Warren 1979). Characterized by Wendorf and Reed (1955) as a "time of general cultural florescence," regional populations reached their maximum size, and large communities with multiple plaza and room block complexes were established. Although the reasons for the appearance and proliferation of the glazewares are debatable, many researchers, including Eggan (1950), Hewett (1953), Mera (1935, 1940), Reed (1949), Stubbs and Stallings (1953), and Wendorf and Reed (1955), believe that the similarity of the new pottery to White Mountain Red Ware is evidence of large-scale immigration into the area from the San Juan Basin and Zuni region. Steen (1977) argues, however, that the changes seen during this period resulted from rapid indigenous population growth. Steen believes that the population growth was enabled by favorable climatic conditions that allowed Rio Grande populations to practice dry farming in previously unusable areas. Steen also suggests that there was "free and open" trade between the northern Rio Grande region and other areas, accounting for the observed changes in Classic period material culture.

It is unclear, therefore, how much of the population increase during this period resulted from immigration or from intrinsic growth. Besides populations migrating from the west, it has also been suggested that some population growth was due to the arrival of people from the Jornada branch of the Mogollon to the south, and perhaps from northern Mexico (Schaafsma and Schaafsma 1974).

Large villages of this period found in the Santa Fe vicinity include the Agua Fria Schoolhouse site (LA 2), Arroyo Hondo (LA 12), Cieneguilla (LA 16), LA 118, and LA 119. The latter portion of Building Period 2 and Building Period 3 at Pindi Pueblo are early Classic period occupations. When Glaze C pottery appeared (ca. A.D. 1425), however, only Cieneguilla was still occupied; the size of its population is unknown. Dickson (1979) believes that abandonment of the large villages was due to the drought conditions revealed by tree-ring studies (Fritts 1965; Rose et al. 1981), and subsequent agricultural failure.

CHAPTER 4

The Research Design

In the research design written by Stephen Lent in 1988, data recovered from LA 61282 were to be analyzed from the long-range theoretical perspective that "culture change occurs primarily as a response to demographic and environmental stress" (Lent 1988:14). Culture change, as evidenced by the northern Rio Grande Late Archaic populations, is indicated by the shift from hunting and gathering to a greater reliance on cultigens, as has been observed in other areas of the American Southwest. The pre-excavation assumption was that LA 61282 might yield early evidence of an agricultural adaptation in the northern Rio Grande. Unfortunately, ethnobotanical analysis of flotation samples produced no evidence of agriculture or use of cultigens. So the problem became not to understand the conditions under which a major change in Archaic population behavior occurred, but why this change was so slow to occur in the northern Rio Grande. In other words, the excavation yielded assemblages and site structure that suggested homeostasis and persistence rather than change.

From the research design, the middle-range research perspective and methods can be readily applied to the recovered data (Lent 1988:14). To this end, pattern recognition studies at the site and inter-site levels are proposed to potentially "isolate the organizational variables characteristic of different systems to draw meaningful inferences concerning past behavior" (Lent 1988:14). This goal may be accomplished by developing and evaluating a model of Archaic land use patterns by using information from general hunter-gatherer studies (Binford 1980; Vierra 1985; Vierra and Doleman 1984; Kelly 1988, 1992). The following discussion of the problem orientation is quoted directly from the research design (Lent 1988:15-16):

> Archaic hunting and gathering adaptation is a mobile adaptation in which small groups characteristically range over large segments of land in response to resource availability. Ethnographic studies have confirmed that these subsistence pursuits tend to encompass vast areas. Therefore, it is probable that the portion of the settlement system represented by the Archaic phase resources located within the project area represent only a fraction of the overall system. Binford (1980) distinguishes between two basic types of mobility, foraging and collecting strategies. Foraging is a positioning strategy in which a group moves its residential base in response to the availability of food resources. A foraging strategy can be understood as an encounter strategy in which entire residential groups moved through the landscape in search of food. Foragers tend to display high residential mobility, procure food on a day-to-day basis, and usually do not store foods. Site types among foragers include the residential base or camp and the location where extractive activities occur. Collectors, however, are characterized by low residential mobility, high logistical mobility, and storage. Site types include residential bases, logistical field camps, stations where task groups gather information, and caches (Binford 1980). Differences in mobility may be a conditioning factor in assemblage variability. Binford (1979) has distinguished three types of gear hunters and gatherers commonly use. These include personal gear, situational gear, and site furniture. Site furniture consists of tools or raw materials left on a site in anticipation that the site will be reoccupied at a later date. Situational gear consists of the tools one needs to perform a specific activity. Personal gear is curated gear that a hunter and gatherer carries in anticipation of unforeseen events. When lithic materials were still in use, such gear commonly included discoidal cores. Binford writes, "informants always spoke of carrying 'cores' into the field; as they put it, you carry a piece that has been worked enough so that all the waste is removed, but that has not been worked so much that you cannot do different things with it (Binford 1979:262).

Recent investigation of Late Archaic period sites north of the Santa Fe River indicates that a full range of site types exists in the Santa Fe area. Differences in artifact assemblage, and in feature or facility composition

and distribution reflect different subsistence strategies, occupation duration, and the tendency for sites to be reoccupied (Post 1996a). The Las Campanas sites were primarily base camps, but they exhibited sufficient variability to suggest that all base camps were not equal and that seasonality or subsistence focus would have a strong effect on site structure and formation. One site, LA 84758, had multiple thermal features associated with fire-cracked rock, a structure foundation, well-worn ground stone, and a lithic reduction strategy focused on core reduction and expedient tool production, all of which suggested a greater focus on plant gathering and a long-term occupation (perhaps for a full season). LA 84787 had five discrete chipped stone scatters that had few features, no structural remains, low frequency of fire-cracked rock, less ground stone, an emphasis on core reduction and expedient tool production, but more formal tool production. These concentrations reflected shorter duration, possibly less generalized subsistence activities, and occupation during part of a season. Evidence for reoccupation indicated no change in site activities, discard patterns, or facility construction. A third site, LA 86148, was a chipped stone concentration that may have been formed by two short-duration occupations with no remaining thermal features or structures, a trace of ground stone, and a focus on core and biface reduction and expedient cutting tools. LA 86148 appears to be a base camp of a small, highly mobile group that focused on hunting and, secondarily, on plant gathering.

Lent (1991) suggests that an important part of Archaic settlement may be a biseasonal pattern. A group may live at a primary residential camp during late summer and fall and move to camps at higher altitude locations in the warm weather months to procure raw materials and exploit game herds.

The Las Campanas sites reflect the range of variability within the archaeological record in differential mobility, occupation duration, and seasonality. In other words, the limited data base for this area suggests flexibility rather than rigidity in occupation patterns. Reoccupation was common; use of local materials predominated; technologies were geared to on-site and anticipated activities, suggesting logistically organized components within the settlement and subsistence system. Variability in artifact and site structure patterns at LA 61282 can be examined more from a dynamic perspective rather than just as another component of a fixed hunter-gatherer site typology.

General Research Questions

What evidence can be inferred from data recovered from LA 61282 that the Late Archaic component represents the remains of an indigenous rather than an immigrant population? This question deals with the problem of indigenous population growth and cultural development in the northern Rio Grande versus immigrant or imported populations that account for culture change and development from the Late Archaic into the Pueblo period. This question is difficult to answer given the limited number of excavated Archaic period sites in the northern Rio Grande; it will be dealt with as part of the regional conclusions.

What are the functional differences, at both assemblage and site structure levels, between the smaller "logistical/special use" sites and the larger base camps? Are there perceived differences in the lithic assemblages? Are these differences reflected on an intersite and intrasite level? What are the implications for a regional Archaic settlement system? By comparing the excavated lithic assemblage from LA 61282 with those from some of the undated lithic scatters in the project, is it possible to infer that they actually represent some component of a Pueblo hunting and gathering system? This question addresses the problem of the appropriate use of site typologies in Archaic hunter-gatherer models. Research in the Jemez Mountains (Lent et al. 1986) suggests that logistical organization by Pueblo forager/hunters will be indistinguishable from Archaic logistically organized or limited-activity sites. This problem requires comparison at the regional level across different site types from Archaic, Pueblo and unknown periods. The Las Campanas and Santa Fe Relief Route data bases may be useful in this pursuit of empirically defined patterns and their inferred behavioral correlates.

Will site function be reflected in the lithic assemblages of small logistical sites? That is, will it be possible to infer site function from the debitage and tool assemblages? What is the range of expectations of the artifact assemblage for, say, a piñon nut collecting locus? This question can be investigated using the data bases mentioned for the previous question. Variability in assemblage composition and attribute frequency may be useful for defining the range of site activities and functions for small, limited or special activity sites.

Does the distribution of the Archaic phase sites in the project area reflect the intensive use of the area relative to similar samples in the San Juan Basin? It would be expected that, given the dissimilarities between the two environments, there would be contrastive variables on an assemblage basis level. This question implies that there are environmental and cultural variables that influenced Archaic settlement patterns. It suggests that differences in the environments and resource structure of the northern Rio Grande and the San Juan Basin should influence the settlement patterns.

Given the assumption that reliance on cultigens is a less efficient strategy than hunting and gathering, what are the implications of this critical transition within the northern Rio Grande? Why does agriculture appear at a relatively late time? The apparent late adoption of cultigens in the northern Rio Grande continues to be a compelling problem (Cordell 1978; Lent 1988; Wills 1995). Environmental, demographic, and economic factors that influenced the adoption of agriculture across much of the Colorado Plateau and Mogollon Highlands between A.D. 1 and 300 may not occur in the same combination in the northern Rio Grande. Is the apparently richer environment offered by the Rio Grande and surrounding basin and range country a sufficient cause of the late adoption?

Obsidian from sources in the Jemez Mountains is present in substantial quantities on the surface and subsurface of the site. Does this suggest residential mobility by the occupants? Relative proportions of local and nonlocal lithic raw materials may reflect group mobility. The form in which material is transported to the site and how it is reduced may also indicate the level and direction of mobility. Efficient reduction of obsidian would suggest that a near future return to the source area was not planned. Expedient reduction may indicate that suitable raw material was abundant or that there was regular and expected access to obsidian sources (Andrefsky 1994; Bamforth 1991).

LA 61282 is a multicomponent sherd and lithic scatter containing Late Archaic and Rio Grande Classic components. Subsurface deposition, however, is confined to the Archaic component. What are the implications for multiple reuse of this locale through time by discrete cultural groups? Artifact analysis will be used to identify patterns that reflect logistical mobility or daily foraging by Archaic and Pueblo populations. LA 61282 is located within 5 km of Cieneguilla Pueblo, which is well within a daily foraging radius (Binford 1981a; Flannery 1976). Expedient reduction of local lithic raw materials is one expected pattern. Reoccupation during the Late Archaic period may have had seasonal or functional differences that are reflected in the refuse discard patterns, refuse content, and organization of the lithic reduction technology.

CHAPTER 5

Excavation Methods

The excavation strategy for LA 61282 was based on the testing results (Lent 1988). Testing revealed intact Archaic period deposits 30 to 35 cm below the modern ground surface in an area designated as Excavation Area 1 (Dogleash 1). Four other areas, Excavation Areas 2 through 5 (Dogleashes 2-5) had surface artifacts and a potential for shallow cultural deposits. Excavations in the four occupation areas were to expose the cultural deposits, define their extent, record the deposits, and recover the cultural materials in a manner suited to addressing the research questions.

Data recovery at LA 61282 began with relocation of the five primary artifact clusters. Auger holes were placed in Excavation Areas 1, 3, and 4 to determine the depth of the cultural deposit. The 20 auger holes in Excavation Area 3 and the two auger holes in Excavation Area 4 yielded no evidence of subsurface cultural deposit. Main attention was focused on Excavation Area 1, which had yielded a substantial cultural deposit during testing. To the east of Excavation Area 1, eight auger holes yielded no cultural materials to a depth of 100 cm. Based on these auger tests, excavation focused on the area defined by the testing.

Excavation Area 1 was originally examined with two excavation units. These units were reopened and seven adjacent 1-by-1-m units were excavated to the cultural level 25 to 30 cm below the modern ground surface. Early results evidenced multiple features and occupation surfaces. These units were excavated in 10-cm levels and all soil was screened using 1/4-inch steel mesh. The project director observed that the majority of the artifacts occurred in the upper 10 cm of soil and again within the cultural deposit or on the occupation surfaces. Because the intervening soils were considered to have low potential they were no longer screened.

Excavation was expanded to a roughly 8-by-8-m area with the new units covering 2 by 2 m. This increase in excavation unit decreased the recovery and distribution resolution, but enhanced the pace of the work. Excavation continued to expose the occupation surfaces and the tops of deflated pit features, thermal features, and heavily stained discard areas.

Hand excavation revealed 18 pit features or soil stains within the 8-by-8-m area. Pits and thermal features were cross-sectioned and the soil was removed in cultural or natural levels. Charcoal and one-liter soil samples were collected. The feature stratigraphy was profiled and the remaining half excavated according to natural stratigraphy. Irregular soil stains were excavated within unit limits, and soil and charcoal samples were collected from each unit or from especially dark or rich deposits. Feature plan views and profiles were drawn when the excavation was completed. Photographs of excavation progress and completion documented feature idiosyncrasies and spatial relationships. Descriptive narrative of the feature excavation was kept on standard OAS forms.

Upon completion of the excavation within the main concentration at Excavation Area 1, six mechanically excavated trenches were located around the perimeter and adjacent to the other four excavation areas. The mechanically excavated trenches were 0.8 m wide and were continued into soils lacking cultural deposits. Exposed features or stains were excavated in the manner described above.

The excavation was transit mapped, locating the excavation areas, trenches and dogleashes. The excavation was backfilled on completion of the project.

CHAPTER 6

Excavation Results

Excavation identified 24 prehistoric thermal and pit features, and stained refuse areas. Artifacts or features from the Armijo and En Medio phases of the Oshara tradition and Classic period of the Rio Grande sequence were recovered and exposed. The site excavation map is presented as Figure 2. The majority of the excavation was conducted on Dogleash 1, the results of which are the focus of this section on site stratigraphy, feature descriptions, and artifact analyses. This section is primarily descriptive; analysis interpretation has been integrated into Chapter 9 (Research Questions and Conclusions).

Site Stratigraphy

The LA 61282 cultural deposit was shallow with a maximum depth of 35 cm below the modern ground surface. This shallow depth of the cultural deposit placed it within the upper levels of the Panky fine sandy loam described in Chapter 2 (Contemporary Environment).

Hand and backhoe excavation within and adjacent to the dogleash areas yielded four natural stratigraphic layers (described below). Stratum 2 consistently yielded cultural materials that were the focus of data recovery.

Stratum 1 was the topsoil that covered the site. It ranged from 7 to 10 cm thick and was a soft brown (7.5YR 5/4) sandy loam typical of the Panky fine sandy loam. The soil contained 1 to 5 percent gravel, was only marginally sticky when wet, and lacked calcium carbonate. Stratum 1 yielded artifacts with frequencies for individual excavation units ranging from three (Unit 12) to 108 (Unit 20) in Excavation Area 1. Except for the obsidian flake concentration in Feature 5 of Excavation Area 1, Stratum 1 consistently yielded the highest artifact counts.

Stratum 2 was a 20 to 25-cm-thick layer of yellowish red (5YR 5/6) sandy loamy clay that was homogeneous, displayed a blocky structure, and became sticky when moistened. This layer included the second and third strata described for Panky fine sandy loam. The soil lacked gravel and cobbles. Within Stratum 2 were the subsurface cultural deposits encountered in and around Excavation Areas 1 and 4. The upper 5 to 10 cm of Stratum 2 consistently displayed a decrease in artifact counts and no evidence of human occupation. At 20 to 25 cm below the modern ground surface, charcoal-stained and mottled soil were the early indications of a subsurface cultural deposit and activity level. As the charcoal-stained soil concentrations were defined and the extent and depth determined, 25 thermal or pit features or informal discard areas were exposed. These features existed within an 8 to 10-cm-thick layer that extended to 35 cm below the modern ground surface. Within the cultural deposit, two activity levels were encountered, but could not be consistently differentiated, except by feature edge elevations.

Excavation Area 1 displayed the most complicated occupation history within Stratum 2. Recovery from Excavation Area 1 yielded 2,198 artifacts, 408 of which were associated with features or activity levels within Stratum 2. The cultural deposit within Stratum 2 was mixed, and it was difficult for excavators to consistently distinguish continuous activity surfaces and associate them with artifact distributions and features. Many of the features were shallow with irregular edges, suggesting that they were discard areas or the result of hearth cleaning. Excavation did indicate that at least two occupation episodes were present, and artifact and faunal analyses suggest that there were multiple occupations within the two main occupation levels. This complex occupation history contained within such a thin cultural deposit made it difficult to isolate occupations into analytical units.

Stratum 3, which contained no cultural material, was beneath the cultural deposits and Stratum 2 in all excavation areas. It was a compacted pinkish-white (7.5YR 8/2) clay loam with a heavy calcium carbonate content. This layer corresponds to the lowest defined stratum for the Panky fine sandy loam and was 35 to 50 cm thick. Excavation was halted at the top of this level in Excavation Area 1, and it was observed in all the backhoe trenches located adjacent to the excavation areas.

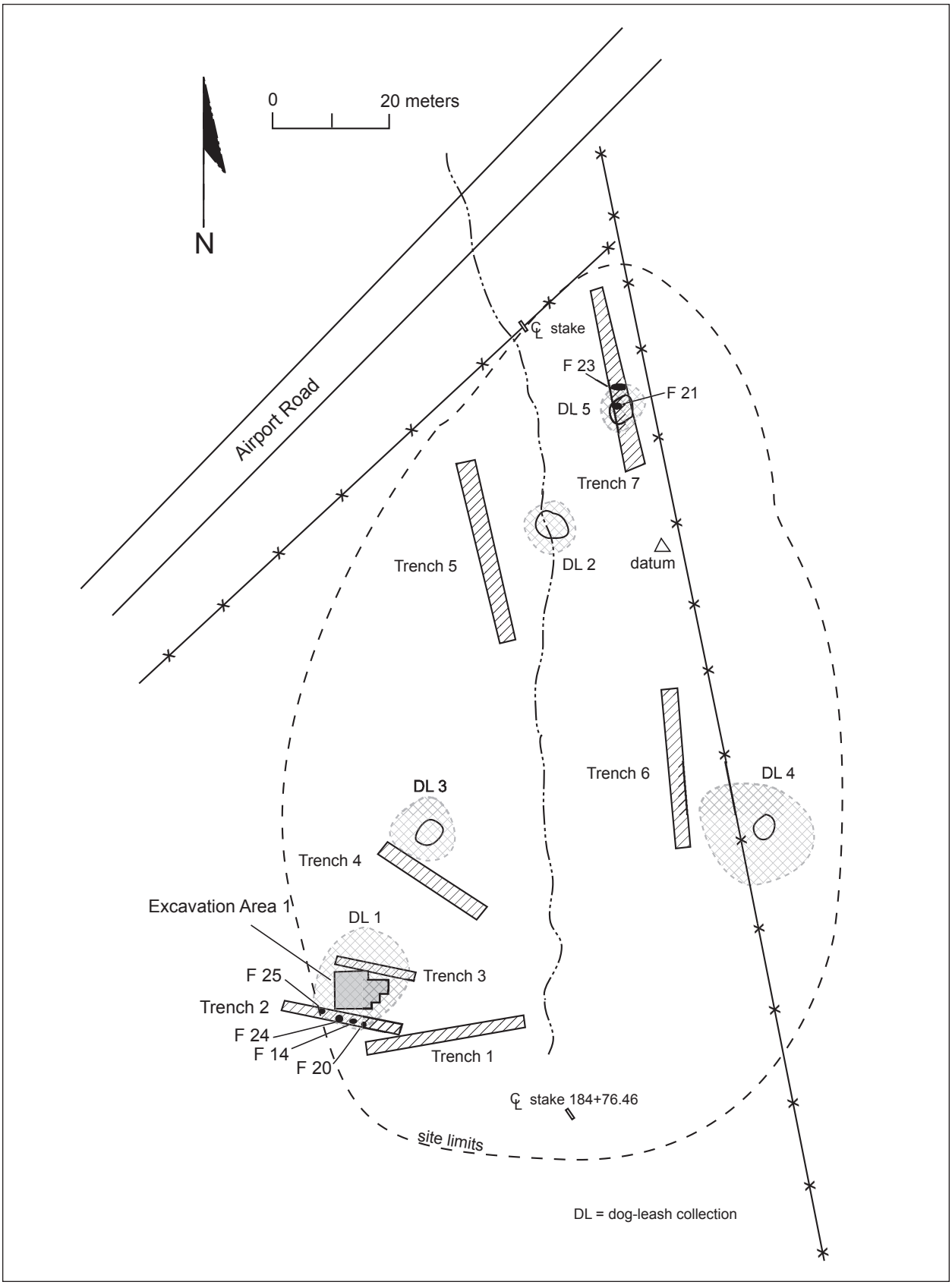

Figure 2. Site excavation map.

Stratum 4 was only encountered in backhoe trenches and auger holes. It consisted of a reddish yellow (7.5YR 6/8) fine sand that was encountered 70 to 90 cm below the modern ground surface. This stratum represents the bottom of the reworked alluvium that is characteristic of the Panky-Pojoaque-Harvey soil association (Folks 1975:4). This layer did not bear any cultural material.

Feature Descriptions

Excavation revealed 25 features beneath artifact concentrations at Excavation Areas 1 and 5. Excavation Area 1 had 23 features and Excavation Area 5 had two possible features. Feature descriptions are presented in numerical order by excavation area, beginning with Excavation Area 1 (Fig. 3).

Excavation Area 1

Feature 1

TYPE: Hearth.

LOCATION: Excavation Units 4 and 5, approximately 0.5 m northwest of Feature 2; associated with Activity Level 1 at 2.70 meters below datum (mbd).

DIMENSIONS: Pits A and B combined were 75 cm east to west, 35 cm north to south, and 15 cm deep at center (Fig. 4). Individually, Pit A was approximately 40 cm east to west, 35 cm north to south, and 12 cm deep. Pit B was 40 cm north to south, 35 cm east to west, and 14 cm deep.

SHAPE: Feature 1 was bifurcated with sloping walls; the west end of pit was slightly deeper than the east end.

CONSTRUCTION: Excavated into the native soil with an unmodified interior.

MATRIX: Dark gray-black sand mixed with charcoal with fire-cracked rock located in Pit A. This suggests that Pit B was the latest pit with Pit A used to contain the hearth discard or cleanings.

ARTIFACTS: Three pieces of microdebitage of smoky gray obsidian were recovered from flotation. The largest dimension of these flakes was less than 0.5 mm. The obsidian was not heavily burned, suggesting the few flakes entered the hearth after it had cooled or after site abandonment.

SUBSISTENCE INFORMATION: 17 microchips of heavily burned to calcined small-mammal bone were recovered from flotations. The burned condition of all bone suggests that fragments were tossed into an active fire.

PERIOD: Armijo phase, based on stratigraphic association with radiocarbon dated features.

COMMENTS: No diagnostic artifacts were recovered within the superimposed pit area.

Feature 2

TYPE: Irregular stain; possible discard area.

LOCATION: Southeast quad of Excavation Unit 5, southwest quad of Excavation Unit 3, northeast quad of Excavation Unit 6, and northwest quad of Excavation Unit 2; in Activity Level 1.

DIMENSIONS: 122 cm north to south, 96 cm east to west; approximately 5 cm deep.

SHAPE: Irregular with mottled edges that were difficult to follow; the west edge was better defined. The pit bottom was irregular, suggesting that the vertical limit reflects vertical stain migration rather than formal construction.

MATRIX: Gray-black sand mixed with charcoal flecks.

ARTIFACTS: Four obsidian core-flakes were recovered by excavation. Twenty-four pieces of obsidian microdebitage weighing a combined 0.5 g were culled from flotation samples. These artifacts, along with charcoal chunks, a burned adobe fragment, and 40 bones (39 animal, one bird), reflect discard from food consumption, processing, and feature maintenance. The burned adobe fragment was recovered from the southern portion of the feature.

SUBSISTENCE INFORMATION: 40 nonhuman bone fragments were recovered from within Feature 2. Five large-mammal bones and one bird bone were recovered from 1/4-inch screening. Thirty-four small-mammal bone microchips were culled from flotation. Twenty-seven chips were heavily burned to calcined suggesting they were discarded into an active fire. Seven chips were unburned and could have come from activity area or hearth seat maintenance. The occurrence of small- and large-mammal bone and bird bone in Feature 2 indicated a broad subsistence spectrum during the Activity Level 1 occupation.

PERIOD: Armijo phase, based on stratigraphic association with radiocarbon dated features.

COMMENTS: The irregular shape and size of this feature, along with evidence of bone fragments, may indicate that it was a refuse or discard area associated with use of Features 1, 3, and 4. Features 1, 3, and 4 form a perimeter around Feature 2 suggesting that an intermediate space was selected for hearth refuse and primary activity area refuse (Schiffer 1987). This evidence contradicts the typical hearth seat model suggested by Binford (1983), which suggests that refuse would be moved out from central activity areas as cleared space is needed to support repetitive activities through time. It is most likely that reuse of this area has muddled spatial associations that may reflect feature/discard area relationships.

Feature 3

TYPE: Circular pit.

LOCATION: Mostly within the north half of Excavation

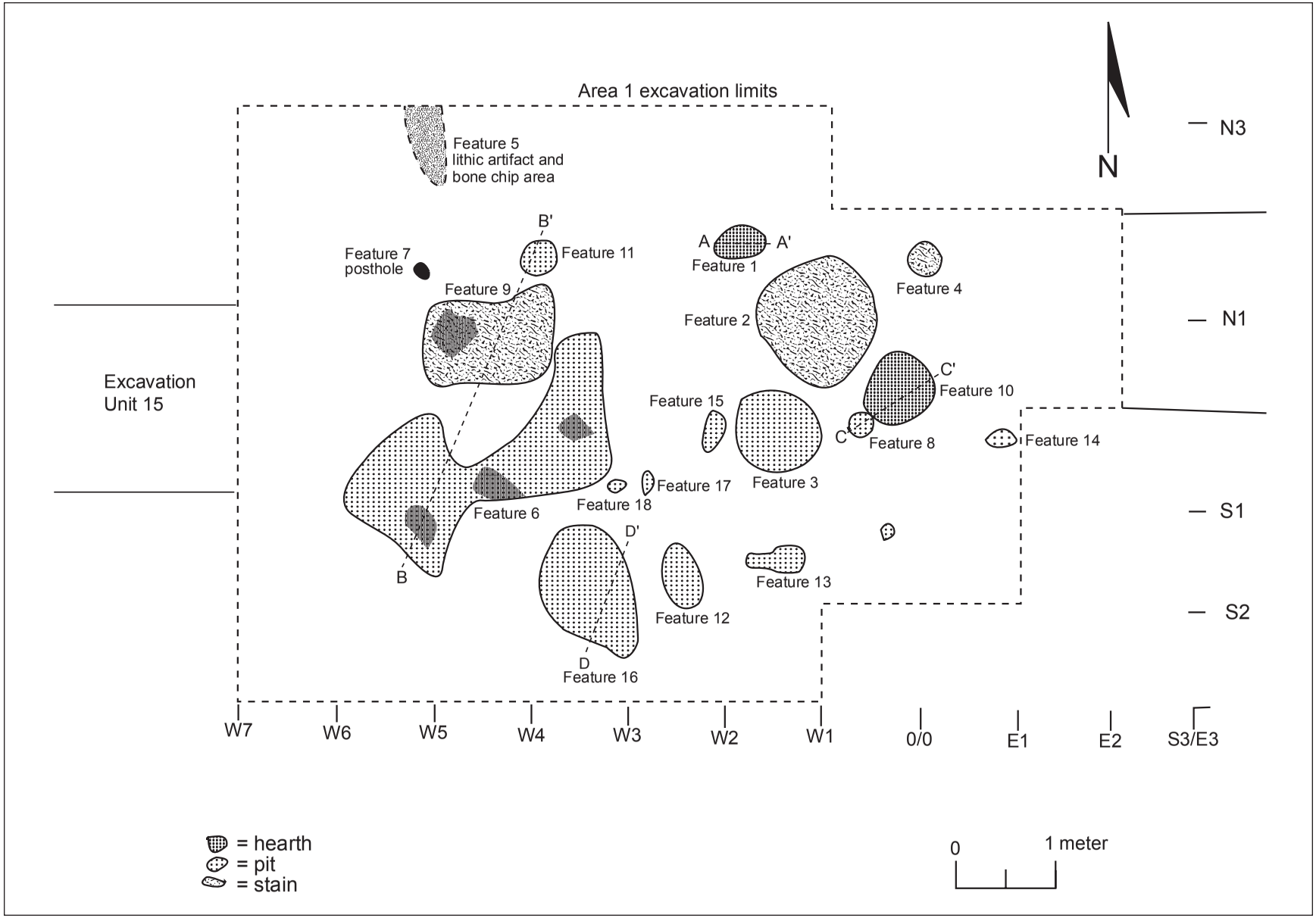

Figure 3. Excavation Area 1 feature locations.

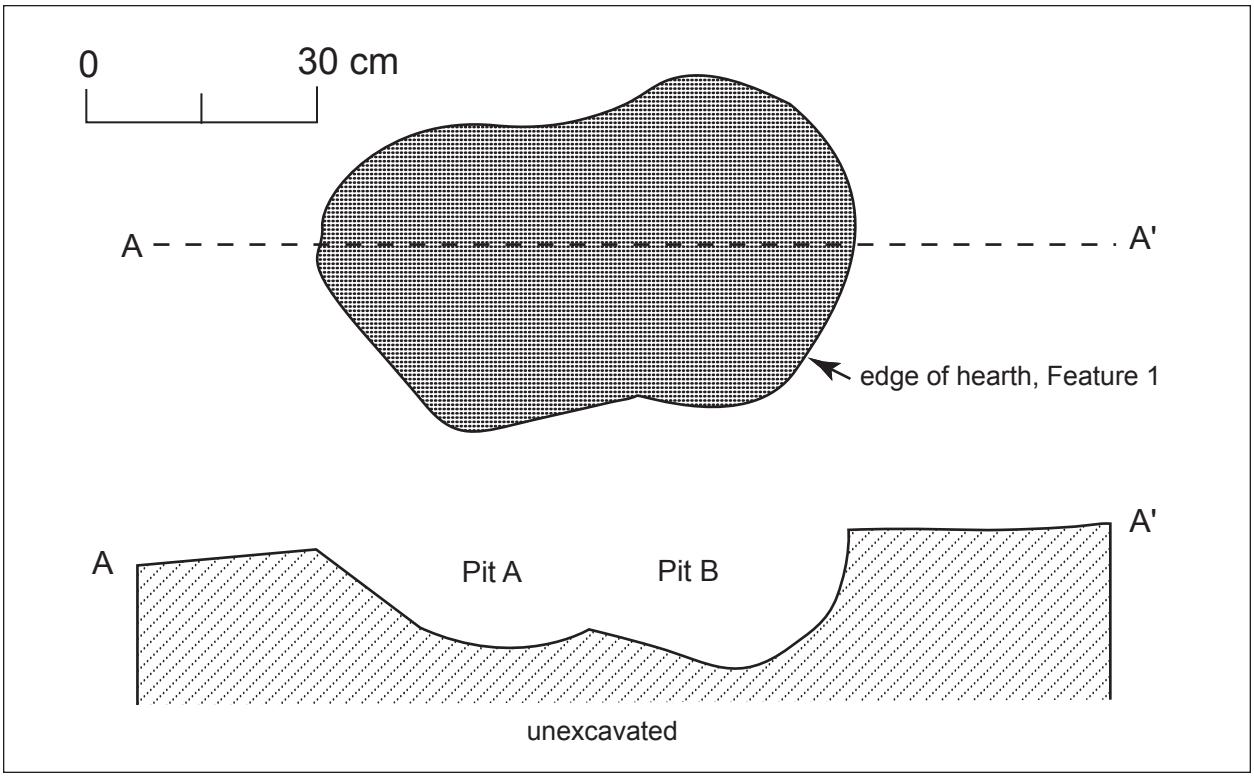

Figure 4. Feature 1 plan and profile.

Unit 10, with the northernmost section of the feature in the southern edge of Excavation Unit 6. Feature 2, in Excavation Unit 6, is approximately 20 cm northeast of Feature 3.

DIMENSIONS: 90 cm east to west, 88 cm north to south, and 20 cm deep.

SHAPE: Circular with near vertical sides on the northern portion, and sloping sides on the southern portion. Base was basin-shaped.

CONSTRUCTION: Excavated into the native soil.

MATRIX: Dark gray-black stained soil with charcoal flecks and burned pebbles. Rodent disturbance was noted in the northeast area of this feature.

ARTIFACTS: 10 chipped stone artifacts were recovered by excavation, including two obsidian core-flakes, three manufacturing flakes, one chert core-flake, and one piece of angular debris. Eight pieces of obsidian microdebitage were culled from flotation with a combined weight of 0.1 g. The flakes showed no evidence of heat alteration, suggesting that they entered the hearth when it was not in use or after site abandonment.

SUBSISTENCE INFORMATION: One mule deer metacarpal and four large-mammal bones were recovered by excavation. None of the bones were burned. Nineteen burned bones, 11 of which were heavily burned or calcined, were culled from flotation. The large-mammal bone appears to have entered the hearth after it was used. The small-mammal bone was mostly burned and may have been discarded into an active fire. As was evident for Feature 2, Feature 3 faunal remains suggested a mixed hunting strategy.

PERIOD: 2110 to 1775 cal B.C. (Beta-95886, wood charcoal [piñon]). This rather broad date range is firmly within the Armijo phase. Even accounting for old-wood use (the charcoal was hearth wood), a period overestimation of 200 to 300 years would place the occupation in the fourteenth or fifteenth centuries B.C.

COMMENTS: No diagnostic artifacts were recovered. The radiocarbon date is firmly in the early to middle portion of the Armijo phase. The available subsistence evidence suggests a mixed hunting strategy with processing and consumption indicated by the unburned and burned bone distribution. Chipped stone artifacts included core and biface flakes with microflakes that may remain from edge maintenance. The size and formal shape of Feature 3 suggests that it had a more specialized function than smaller or less informal features.

Feature 4

TYPE: Amorphous stain.

LOCATION: Excavation Units 3 and 12 within Activity Level 1; feature was approximately 0.5 m northeast of Feature 2.

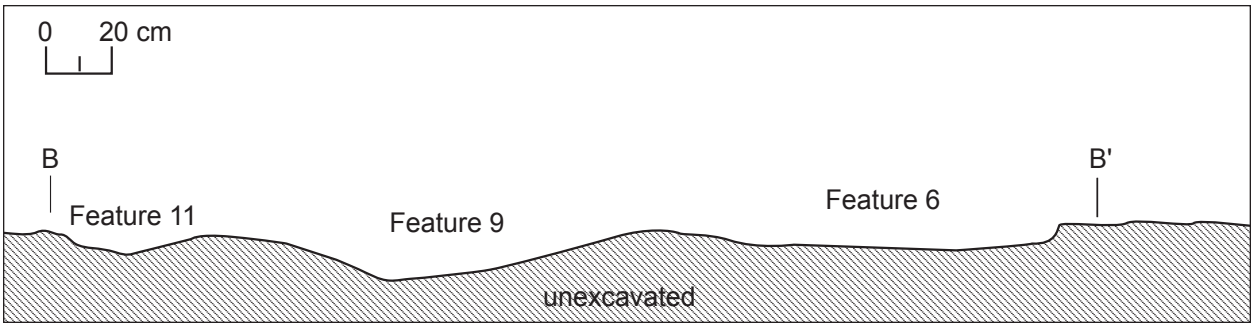

Figure 5. Features 6, 9, and 11 profiles.

DIMENSIONS: 55 cm east to west, 40 cm north to south, and 5 cm deep.
SHAPE: Irregular outline and uneven bottom.
CONSTRUCTION: No evidence of formal construction was found.
MATRIX: Dark gray-black sandy loam with charcoal flecks, which changes to mottled dark brown sandy loam at the bottom of the feature.
ARTIFACTS: None.
SUBSISTENCE INFORMATION: None.
PERIOD: Stratigraphically associated with other Activity Level 1 features.
COMMENTS: This relatively small, shallow, irregular stain was similar to the larger Feature 2. The lack of microflakes or bone chips suggests that Feature 4 was never a container; rather, that it was a surface stain. Charcoal and ash may have migrated downward, artificially creating the appearance of feature depth.

Feature 5

TYPE: Lithic concentration and bone chip discard area.
LOCATION: Northeast corner of Excavation Unit 21, approximately 65 cm north of Feature 7, a posthole.
DIMENSIONS: 70 cm north to south, 40 cm east to west, and 30 cm deep.
SHAPE: Subtriangular.
CONSTRUCTION: Not applicable.
MATRIX: Reddish brown silty clay loam (5YR 4/4) in the southern portion of feature, with a brown silty clay loam (7.5YR 4/4) in the middle, and a brown sandy clay soil (7.5YR 5/4) with small pebbles in the northern section of Feature 7.
ARTIFACTS: One core-flake, 49 manufacturing flakes, one piece of angular debris of obsidian, and one piece of chert angular debris were recovered during excavation, which did not include screening. An incredible 11,463 core and biface flakes, angular debris and microdebitage were recovered from flotation samples. The average weight of these artifacts was 0.02 g. This highly unusual concentration of debris appears to represent discard from a single biface reduction episode. Comparison with debris from replicated Late Archaic period projectiles suggests that the Feature 5 obsidian debris is from two or three projectile points.
SUBSISTENCE INFORMATION: 220 bone chips were culled from flotation. Of these, 213 were indeterminate mammal and seven were medium mammal. Only 38 chips were burned, suggesting that they originated from hearth cleaning and bone processing activities.
PERIOD: Stratigraphically associated with other Activity Level 1 features.
COMMENTS: The location of this concentration, 1 m north of the Feature 6/9 cluster, suggests that the artifacts were discarded from cleaning of work or activity spaces. The fact that chipped stone microflakes and bone chips co-occur suggests deposition from more than one dumping episode. Midden formation is an activity related to longer duration occupation as maintenance of activity space becomes necessary (Kent 1992). Feature 5 is one of the only discard areas associated with biface production reported for the Santa Fe area and the northern Rio Grande valley. It has enormous potential for comparison with replicated assemblages and for understanding the relationship between chipped stone debitage frequencies and tool production.

Feature 6

TYPE: Amorphous shallow pit, overlapping shallow pits, or possible discard area.
LOCATION: Northeast quad of Excavation Unit 14, southeast quad of Excavation Unit 16, northwest corner of Excavation Unit l9, extending into Excavation Unit 13 from the southwest corner to the southeast and upward to the northeast corner of Excavation Unit 13. Feature 6 is adjacent to Feature 9 in the northern section of Excavation Unit 13; Feature 16 is approximately 30 cm to the south of Feature 6 in Excavation Unit l9. It is associated with Activity Level 1.
DIMENSIONS: 280 cm east to west, 250 cm north to south, and 10 cm deep (Fig. 5).
SHAPE: Irregular and difficult to define.
CONSTRUCTION: No evidence of formal construction.

MATRIX: Dark gray-black sandy loam mixed with small slivers of bone and fire-cracked rock fragments. The stained soil was not homogeneous throughout the feature. Pockets of less-stained soil suggested that multiple discard episodes occurred, rather than the burning and collapse of a single feature, such as a structure.

ARTIFACTS: 209 chipped stone artifacts were recovered from Feature 6. Six material types, with Jemez and Polvadera obsidian being most abundant, were identified (Table 1). Five artifact types consisted of an abundance of microdebitage, and almost equal counts of core and manufacturing flakes. A full range of reduction activities, as well as activity space maintenance, are indicated by the artifact types.

SUBSISTENCE INFORMATION: 241 pieces of animal bone were recovered from Feature 6. Undifferentiated small (n=126) and large (n=47) mammal bone were the most abundant. Identified species included *Lepus californicus*, *Sylvilagus audubonii*, and *Odocoileus* sp. The faunal assemblage reflected a mixed hunting strategy and the probable mixing of discarded refuse from multiple occupations. Seventy-seven percent of the bone was heavily burned or calcined, indicating primary discard into an active fire, and then secondary deposition in Feature 6 as part of feature and activity space maintenance.

PERIOD: Stratigraphically associated with other Activity Level 1 features.

COMMENTS: Feature 6 was described as a poorly defined, extensive shallow stained pit that contained chipped stone, burned animal bone, and fire-cracked rock. It lacked distinct limits or form and exhibited mixed deposits of darkly charcoal-stained soil and mottled less-stained soil. Three pockets of darkly charcoal-stained soil may represent remnants of discard episodes. The artifact assemblage had chipped stone debris from all stages of stone tool production. Expedient and formal tool production were represented, as was tool maintenance. The evidence of mixed reduction strategies cor-

Table 1. Feature 6: chipped stone artifact type by material type.

Count Row percent Column percent	Core Flake	Manufacturing Flake	Retouch Flake	Angular Debris	Core	Totals
Pedernal chert	13 56.5 48.1	2 8.7 5.4	4 17.4 3.0	4 17.4 40.0	- - -	23 11.0 -
Miscellaneous chert	2 22.2 7.4	- - -	- - -	5 55.6 50.0	2 22.2 100.0	9 4.3 -
Jemez obsidian	2 1.5 7.4	1 0.8 2.7	129 97.7 97.0	- - -	- - -	132 63.2 -
Basalt	4 80.0 14.8	1 20.0 2.7	- - -	- - -	- - -	5 2.4 -
Quartzite	1 100.0 3.7	- - -	- - -	- - -	- - -	1 0.5 -
Polvadera obsidian	5 12.8 18.5	33 84.6 89.2	- - -	1 2.6 10.0	- - -	39 18.7 -
Totals	27 - 12.9	37 - 17.7	133 - 63.6	10 - 4.8	2 - 1.0	209 100 100

responds well with the faunal evidence, which indicates that small and large mammals were hunted, processed, and consumed. The poorly defined feature limits, shallow deposit, and wide range of artifacts and faunal remains suggest that Feature 6 formed as an accumulation from multiple discard episodes. Reuse of the same area for dumping suggests that the temporal interval between occupations was short.

Feature 7

TYPE: Possible posthole.
LOCATION: Southeast quarter of Excavation Unit 22.
DIMENSIONS: 18 cm in diameter by 8 cm deep.
SHAPE: Circular with steep sides.
CONSTRUCTION: Excavated into Activity Level 1. A cobble was placed in the bottom of the pit.
MATRIX: Dark gray-black sand mixed with charcoal.
ARTIFACTS: None.
SUBSISTENCE INFORMATION: None.
PERIOD: Probably associated with other features in Activity Level 1.
COMMENTS: Based on its shape, Feature 7 is described as a possible posthole. No wood was recovered from within the feature. No other postholes were evident. It may be the remains of a drying rack or simple shelter associated with the Feature 2 and 3 complex.

Feature 8

TYPE: Undifferentiated pit.
LOCATION: Excavation Unit 22 about 20 cm east of Feature 3, 110 cm southeast of Feature 2, and 165 cm southwest of Feature 4.
DIMENSIONS: 33 cm north to south, 31 cm east to west, and 8 cm deep.
SHAPE: Circular with a gently sloping west wall, a steep east wall, and a uniform basin-shaped bottom.
CONSTRUCTION: Excavated into Activity Level 1.
MATRIX: Dark gray-black sandy loam mixed with charcoal flecks.
ARTIFACTS: None.
SUBSISTENCE INFORMATION: None.
PERIOD: Probably associated with other features in Activity Level 1.
COMMENTS: No diagnostic artifacts were recovered from within the pit. The fill was a mixed primary deposit of charcoal and a secondary deposit of eolian sand. Close association with Feature 3, a large hearth area, suggests that Feature 8 may have been a temporary holding pit for coals used in processing. The fill and the pit sides were not burned, further indicating that fire was not used in the pit.

Feature 9

TYPE: Irregularly shaped stain.
LOCATION: Northeast corner of Excavation Unit 16, the southern edge of Excavation Unit 18, and the northwest quad of Excavation Unit 13.
DIMENSIONS: 130 cm east to west, 100 cm north to south, and 10 to 20 cm deep (see Fig. 5).
SHAPE: Roughly oblong with sloping, poorly defined edges and an irregular bottom.
CONSTRUCTION: Excavated into Activity Level 1.
MATRIX: Dark gray and ashy with small fragments of charcoal, burnt bone, and obsidian. Rodent disturbance was noted in the northeast corner of the unit. The transition from darkly stained soil to mottled soil was used to define the boundaries of this feature.
ARTIFACTS: Excavation recovered 13 obsidian manufacturing flakes and three fragments of angular debris, including Pedernal chert, basalt, and quartzitic sandstone. Fifty obsidian microflakes were recovered from flotation samples. These flakes had an average weight of 0.02 g. The chipped stone was primarily debris from tool manufacture or maintenance. The microflakes may have been swept into Feature 9 as part of activity area maintenance.
SUBSISTENCE INFORMATION: Excavation and flotation samples yielded 116 fragments of animal bone. Small (n=101), medium (n=4), and large mammal (n=6) bones were present. Identified species included *Lepus californicus* and *Odocoileus* sp. A mixed subsistence strategy is suggested by the assemblage. Sixty-six percent of the bone was heavily burned to calcined. Their condition results from discard into an active fire, or in part from the use of large-mammal bone for fuel.
PERIOD: 1935 to 1645 cal B.C. (Beta-95887, wood charcoal [piñon]). This rather broad date range is firmly within the Armijo phase. Even accounting for old-wood use, since the charcoal was probably hearth wood, a period overestimation of 200 to 300 years would place the occupation in the fourteenth to sixteenth centuries B.C.
COMMENTS: Feature 9, which is adjacent to Feature 6 in the north central section of Excavation Unit 13, may remain from multiple occupations. The feature depth and extensive size suggest that it was initially a hearth or shallow roasting pit that was used to contain activity area refuse. The presence of burned and unburned bone reflects hearth activities as well as bone or meat processing. Proximity to Feature 6, another multi-episode discard area, indicates that they are temporally related and reflect facility or activity area reuse.

Feature 10

TYPE: Reused hearth.
LOCATION: In the southeastern quad of Excavation Unit 2, along the northwestern edge of Excavation Unit 22, and into the southwestern corner of Excavation Unit 12.

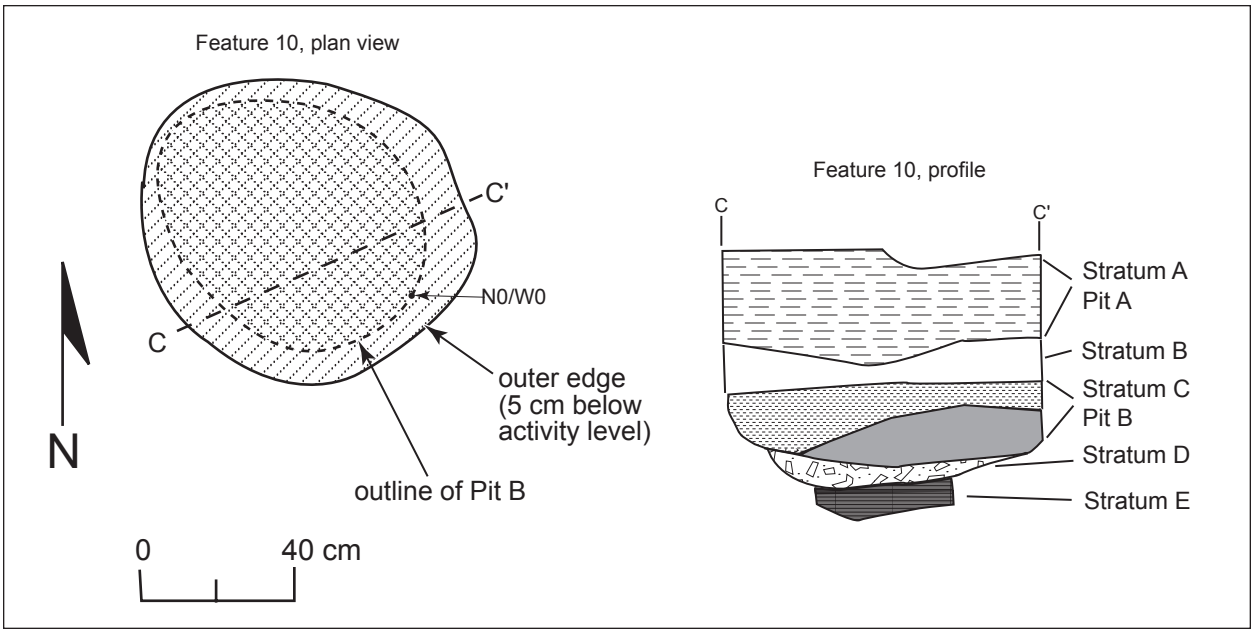

Figure 6. Feature 10 plan and profile.

Feature 2 is approximately 20 cm to the northwest of Feature 10, and Feature 3 is 0.5 m to the southwest of Feature 10.

DIMENSIONS: 86 cm east to west, 82 cm north to south, and 60 cm deep (Fig. 6).

SHAPE: Circular with steep sides and a basin-shaped bottom.

CONSTRUCTION: Excavated into Activity Level 2. It exhibited no other formal construction traits.

MATRIX: This pit fill had five stratigraphic layers (A through E). Stratum A (20 cm thick) consisted of a dark greyish brown sandy clay (l0YR 3/2) with small gravels, caliche, charcoal fragments, lithic artifacts, and burnt bone. It represented the latest use episode. Stratum B (10 to 14 cm thick) was a layer of yellowish brown sandy clay (l0YR 4/3) with charcoal flecks. Stratum C (6 to 15 cm thick) was a layer of black sandy clay (l0YR 2/1), almost oily in texture, with fire-cracked rock at the bottom. A charcoal pocket was encountered near the center of this stratum and extended along the east edge. This fill represents the second use episode. Stratum D (6 cm thick) was similar to Stratum B and consisted of yellowish brown sandy clay (l0YR 4/3) with flecks of charcoal and traces of caliche. Stratum E (6 cm thick) was a black sandy clay (l0YR 2/1) with charcoal fragments. This layer represents the third use episode.

ARTIFACTS: One basalt manufacturing flake and two Polvadera Peak obsidian manufacturing flakes were recovered from excavation. The twenty-two pieces of obsidian microdebitage recovered from flotation had a combined weight of 0.6 g. Eighteen of the microflakes were from Level 1 and probably entered the feature after it was no longer used. The low frequency of microflakes from lower strata suggests that they were incidental to feature use.

SUBSISTENCE INFORMATION: 79 animal bone fragments were recovered from Feature 10. Nine were recovered by excavation and 70 were culled from flotation samples. Small, medium, and large mammals were represented, though small-mammal bone was the most abundant (n=52). Distribution of animal bone by use episode within Feature 10 showed 54 fragments from the latest episode, 19 fragments from the middle episode, and eight fragments from the lowest or earliest episode. The higher frequency in the upper level may be partly accounted for by post-abandonment mixing. Roughly equal proportions of unburned to burned bone occurred within each use episode, suggesting that bone was discarded into an active fire and that fragments from processing entered the hearth when it was cold, perhaps as a result of activity area maintenance.

PERIOD: Three radiocarbon dates were obtained from Feature 10: 1745 to 1450 cal B.C. (Beta-77671, wood charcoal [piñon]); 1870 to 1520 cal B.C. (Beta-77672, wood charcoal [juniper]); and 1870 to 1520 cal B.C. (Beta-77673, wood charcoal [piñon]). All dates are solidly within the Armijo phase date range. Beta-77671, which is from the middle-use episode, is later than Beta-77672 and Beta-66763, which are from the earliest use episode. How much time separates the use episodes could not be ascertained from the carbon-14 dates. The fact that the dates are relatively close does suggest that only a short time passed between use episodes.

COMMENTS: Feature 10 displayed three stratigraphic levels from three discrete use episodes. Each episode was separated by a relatively clean layer of eolian deposit, indicating sufficient passage of time to allow for early stages of natural feature filling. The recovered artifacts and bone fragments were similar for each episode, suggesting that use and perhaps general site activities did not change through time. Feature 10 is the strongest evidence of site reuse, with at least three or more occupations represented by the array of features and artifact and refuse distribution across the excavation area.

Feature 11

TYPE: Circular pit.
LOCATION: South central portion of Excavation Unit 18, approximately 10 cm north of Feature 9.
DIMENSIONS: 47 cm north to south, 43 cm east to west, and 8 cm deep.
SHAPE: Circular with gently sloped sides and a basin-shaped bottom.
CONSTRUCTION: Excavated into Activity Level 1.
MATRIX: Dark ashy sandy loam with charcoal fragments.
ARTIFACTS: Two obsidian manufacturing flakes were recovered by excavation. Nine obsidian microflakes were culled from flotation. They had a combined weight of 0.2 g. The microflakes could have entered the feature as part of the refuse discard associated with Features 6 and 9, which are immediately to the south.
SUBSISTENCE INFORMATION: 25 small-mammal bones were recovered from flotation samples; 18 fragments were unburned and seven were heavily burned. This suggests that most of the bone entered the hearth when it was cool, which would result from cleaning, processing and production debris from the activity space.
PERIOD: Stratigraphically associated with Activity Level 1.
COMMENTS: This feature was easily defined due to the mottled and hard-packed walls and floor. A large rock in the northern portion of the feature was recovered from the fill, and may be associated with feature use. The small feature size suggests that it was used to support food processing rather than being the primary locus of food processing.

Feature 12

TYPE: Irregular stain or possible shallow pit.
LOCATION: Excavation Unit 20.
DIMENSIONS: 100 cm (estimated) east to west, 60 cm north to south, and 8 to 15 cm deep.
SHAPE: Irregular oval with gently sloping sides and an irregular bottom.
CONSTRUCTION: Excavated into Activity Level 2, or charcoal and refuse were deposited on top of Activity Level 2 and diffused to a depth of 15 cm.
MATRIX: Mottled sand with dark staining. The fill contained charcoal flecks and obsidian flakes. Deposits occurred as pockets, perhaps reflecting multiple discard or hearth cleaning episodes.
ARTIFACTS: Chipped stone recovered from excavation included one chert manufacturing flake, four obsidian core-flakes, 104 obsidian manufacturing flakes, and three pieces of obsidian angular debris. Twenty-four obsidian microflakes were culled from flotation samples; their combined weight was 0.3 g. The co-occurrence of the manufacturing concentration and the microflakes suggests that Feature 12 partly functioned as a discard area.
SUBSISTENCE INFORMATION: 18 animal bone fragments were recovered, 12 from large mammals with one fragment identified as *Odocoileus* sp. All large-mammal bone was heavily burned to calcined. Six unburned small-mammal bones culled from flotation samples. The majority of large-mammal bone in the Feature 12 assemblage corresponds well with an occupation that employed a mixed hunting strategy, or which focused primarily on large game mammals.
PERIOD: Stratigraphically associated with features in Activity Level 2.
COMMENTS: Excavation recording of Feature 12 was insufficient to determine the actual dimensions and location. Feature location and size are estimated based on notes and incomplete drawings. What is clear from the recording is that Feature 12 was a diffused and mottled refuse deposit, as evidenced by the burned bone and the abundant tool manufacturing debris. The 15-cm depth of the deposit in the northeast portion of the feature may be the disturbed limits of a hearth or pit feature. The feature fill and limits have been obscured by later refuse discard that resulted from large mammal processing and consumption, and activity area clearing.

Feature 13

TYPE: Bifurcated pit.
LOCATION: Southeast quarter of Excavation Unit 20, approximately 75 cm south of Feature 3.
DIMENSIONS: Pit A was 40 cm east to west, 27 cm north to south, and 6 cm deep; Pit B was 22 cm east to west, 20 cm north to south, and 4 cm deep.
SHAPE: Pit A was oblong with an irregular outline. Pit B was roughly circular. Both pits had moderately steep walls and irregular bottoms.
CONSTRUCTION: Excavated into Activity Level 2.
MATRIX: Dark, black, ashy sand mixed with charcoal and pockets of small gravel in both pits.
ARTIFACTS: No diagnostic artifacts were recovered.
SUBSISTENCE INFORMATION: None.
PERIOD: Probably associated with the features that are assigned to Activity Level 2.

COMMENTS: Feature 13 was the remains of two small pit features. The pits are on the perimeter of the intense activity area that included Features 10, 12, and 16. The pits were defined by their darkly charcoal-stained ashy fill. No artifacts or subsistence remains were recovered. The pits probably served an ancillary function for the intensive meat processing and consumption that is evident from adjacent features and discard areas.

Feature 14

TYPE: Circular pit.
LOCATION: Northeast quad of Excavation Unit 22, approximately 70 cm southeast of Feature 10.
DIMENSIONS: 27 cm east to west, 26 cm north to south, and 12 cm deep.
SHAPE: Circular with vertical walls and a basin-shaped bottom.
CONSTRUCTION: Excavated into Activity Level 2; lacked evidence of more formal construction or specialized function.
MATRIX: Brown to gray sandy clay with a minute amount of charcoal flecks.
ARTIFACTS: One obsidian microflake weighing 0.2 g was culled from a flotation sample. It was probably redeposited after the feature was no longer in use.
SUBSISTENCE INFORMATION: None.
PERIOD: Stratigraphically associated with other features excavated into Activity Level 2.
COMMENTS: No functional interpretation can be offered for this pit. Its small size, but steep walls, suggest that it was a lightly used hearth or subsurface container for processed foods or materials.

Feature 15

TYPE: Undifferentiated pit.
LOCATION: Northwestern quarter of Excavation Unit 20, approximately 20 cm west of Feature 3.
DIMENSIONS: 65 cm north to south, 31 cm east to west, and 9 cm deep.
SHAPE: Oblong outline with moderately steep walls and an irregular basin-shaped bottom.
CONSTRUCTION: Excavated into Activity Level 2.
MATRIX: Dark, gray-black sandy loam mixed with charcoal flecks.
ARTIFACTS: Two obsidian microflakes weighing a combined 0.2 g were culled from a flotation sample. They were probably redeposited after the feature was no longer in use.
SUBSISTENCE INFORMATION: Two unspecified mammal bone microchips were culled from a flotation sample. These chips were unburned and may reflect bone processing or marrow consumption. The unburned condition indicates that they were not discarded into an active fire prior to secondary deposition in Feature 15.

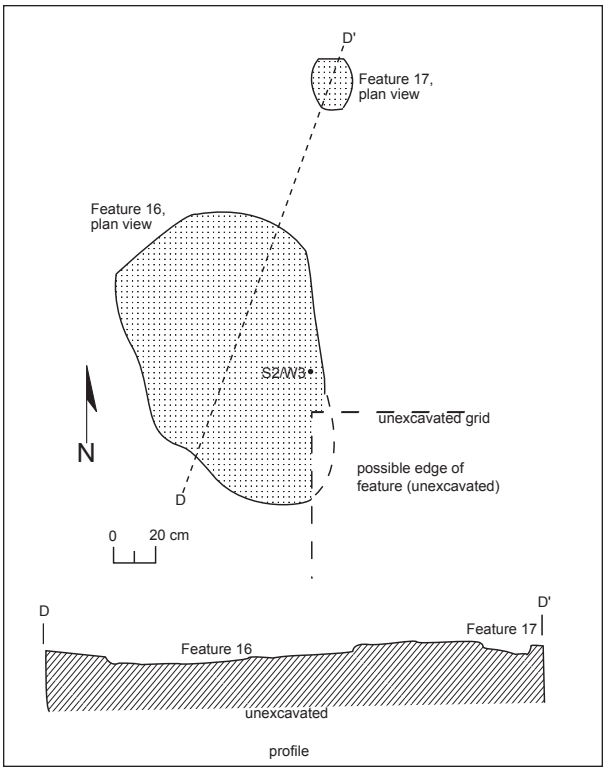

Figure 7. Features 16 and 17 plan and profile.

PERIOD: Stratigraphically associated with other features excavated into Activity Level 2.
COMMENTS: No functional interpretation can be offered for this feature. Its proximity to an intensively used activity area suggests it was ancillary to primary processing, production, or consumption activities.

Feature 16

TYPE: Shallow, poorly defined pit.
LOCATION: Center of the northeast and southeast quarters of Excavation Unit l9, and along the western edge of Excavation Unit 20.
DIMENSIONS: l40 cm north to south, 94 cm east to west, and 5 cm deep (Fig. 7).
CONSTRUCTION: Shallow depth suggests that Feature 16 was a surface deposit that diffused into sandy soil, and that feature depth does not reflect formal construction.
MATRIX: Sandy clay with charcoal stains and small pebbles. Soil is mottled brown and gray in areas where cultural deposit is less dense.
ARTIFACTS: The chipped stone assemblage had eight obsidian manufacturing flakes, 13 pieces of chert, and two pieces of Polvadera obsidian angular debris. These artifacts reflect core reduction and tool manufacture, which were common site activities. Fifteen pieces of

obsidian microdebitage were culled from two flotation samples. The microflakes weighed a combined 0.2 g.
SUBSISTENCE INFORMATION: 216 animal bone fragments were recovered from the excavation and culled from flotation samples. Eighty-two of the 86 small-mammal bones were culled from flotations. Of these 82 bones, 70 were heavily burned to calcined suggesting that they were discarded from hearth cleaning. All large-mammal bone was recovered by excavation. Artiodactyla and *Antilocapra americanus* suggest a heavy emphasis on large game mammals. All of the large-mammal bone was at least lightly burned, with the majority heavily burned to calcined. The light burning may reflect meat roasting.
PERIOD: Stratigraphically associated with other features excavated into Activity Level 2.
COMMENTS: Feature 16 was a shallow, poorly defined discard area associated with Activity Level 2, which displayed the high proportion of large-mammal bone relative to small-mammal bone indicative of a more specialized hunting focus. The bone was mostly burned, which reflected hearth clean-out and limited bone processing. Activity Level 1 features seem to have a greater abundance of unburned small-mammal bone, suggesting different activities and subsistence focus.

Feature 17
TYPE: Undifferentiated pit.
LOCATION: Northwest quarter of Excavation Unit 20, approximately 20 cm east of Feature 18.
DIMENSIONS: 28 cm north to south, 20 cm east to west, and 5 cm deep (Fig. 7).
SHAPE: Subrectangular with moderately steep to gently sloped walls and an irregular basin-shaped bottom.
CONSTRUCTION: Excavated into Activity Level 2.
MATRIX: Dark gray to black, charcoal-stained sandy clay.
ARTIFACTS: Seven obsidian microflakes were culled from a flotation sample. Their combined weight was less than 0.1 g.
SUBSISTENCE INFORMATION: Two heavily burned small-mammal bone fragments were culled from a flotation. These fragments could have originated from Feature 16, which was a nearby discard area.
PERIOD: Stratigraphically associated with other features excavated into Activity Level 2.
COMMENTS: The content and shape of this pit offer no clues to its function.

Feature 18
TYPE: Small undifferentiated pit.
LOCATION: Southeast quarter of Excavation Unit 13, approximately 10 cm east of Feature 6 and 50 cm north of Feature 16.
DIMENSIONS: 12 cm in diameter by 8 cm deep.
SHAPE: Circular with sloping sides.
CONSTRUCTION: Excavated into Activity Level 2.
MATRIX: Dark gray-black sand.
ARTIFACTS: None.
SUBSISTENCE INFORMATION: None.
PERIOD: Stratigraphically associated with other features excavated into Activity Level 2.
COMMENTS: The small size of this feature indicated a possible posthole, which was ruled out by the sloping walls. The function of this feature is unknown.

Feature 19
TYPE: Undifferentiated pit.
LOCATION: Backhoe Trench 2, northwest of Feature 20.
DIMENSIONS: 39 cm northwest to southeast, 28 cm northeast to southwest, and 6 to 9 cm deep.
SHAPE: Oval with gently sloping south wall and steeply sloping north wall.
CONSTRUCTION: Excavated into sandy loam.
MATRIX: Dark brown to gray sandy clay with charcoal flecks and small pebbles.
ARTIFACTS: None.
SUBSISTENCE INFORMATION: None.
PERIOD: Associated with the Excavation Area 1 occupation, and appeared to be contemporaneous with Activity Level 2.
COMMENTS: Feature 19 was located south of Excavation Area 1. Its presence south of the Activity Level 2 feature cluster suggests that more activity space extended to the south. The function of this feature is unknown.

Feature 20
TYPE: Small undifferentiated pit.
LOCATION: Trench 2, which was 10 cm east of Feature 19.
DIMENSIONS: 32 cm east to west, 20 cm north to south, and l8 cm deep.
SHAPE: Oval outline with steep to vertical sides and a regular basin-shaped bottom.
CONSTRUCTION: Excavated into the sandy loam at a depth commensurate with Activity Level 2 in Excavation Area 1.
MATRIX: Dark gray-black sand with minute amounts of charcoal, some caliche, numerous gravel, and a few small burned rocks.
ARTIFACTS: None.
SUBSISTENCE INFORMATION: None.
PERIOD: Stratigraphically associated with features excavated into Activity Level 2.
COMMENTS: Features 19 and 20 are an extension of Activity Level 2, which includes the Feature 10, 12, and 16 feature cluster. Feature 20 function could not be determined by the excavation.

Feature 24

TYPE: Undifferentiated pit.

LOCATION: Backhoe Trench 2, two meters west of Features 19 and 20 at the same level.

DIMENSIONS: 44 cm in diameter by 10 cm deep.

SHAPE: Oval with moderately sloped walls and a basin-shaped bottom.

CONSTRUCTION: Excavated into Activity Level 2.

MATRIX: Dark ashy sandy loam with charcoal flecks.

ARTIFACTS: None.

SUBSISTENCE INFORMATION: None.

PERIOD: Stratigraphically associated with features excavated into Activity Level 2.

COMMENTS: This oval pit appeared as a black stain at the base of Trench 2, approximately 30 cm below ground surface. It is spatially and probably temporally associated with Features 19 and 20, and with the other features in Activity Level 2 within Excavation Area 1. The sides and base of this feature were mottled. No evidence was available of the function of this feature.

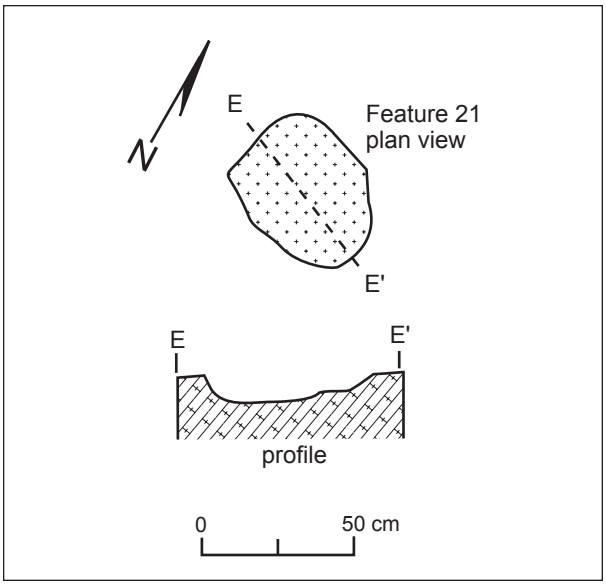

Figure 8. Feature 21 plan and profile.

Feature 25

TYPE: Amorphous stain.

LOCATION: Trench 2.

DIMENSIONS: 2.4 m east to west, l.7 m north to south, and l5 cm deep.

SHAPE: Irregular outline with indistinct walls and a floor that was difficult to follow.

CONSTRUCTION: Excavated into Activity Level 2.

MATRIX: Darkly stained sandy loam, which at the feature edge turned into a very light tan sandy loam mixed with caliche and gravel.

ARTIFACTS: None.

SUBSISTENCE INFORMATION: Two unburned indeterminate mammal bones were culled from flotation sampling.

PERIOD: Temporally associated with Activity Level 2.

COMMENTS: Feature 25 was unusual because it was a large, irregularly outlined soil stain that lacked internal features, artifacts in the fill, or distinct boundaries. It was similar in dimension to the combined Features 6 and 9 area, but different from this area in its near absence of refuse or stained pockets. Instead, the relatively homogeneous but shallow stains were reminiscent of a shallow deposit that might accumulate within an enclosed living space. Archaic period structures from the Tierra Contenta excavations (Schmader 1994) lacked systematically definable outlines. Some structures were less formal in shape, and all structures rarely contained large quantities of artifacts. Most of the structures had internal features or postholes, which were lacking in Feature 25. It is noteworthy that Feature 25 was found when the excavation was ending; thus, more subtle features may have been missed in the rush to finish the project. The size of Feature 25 was consistent with small pit structures. It would not accommodate a large family, but it would have been adequate to provide shelter for three or four individuals. Designation of Feature 25 as a structure is tenuous, but it is the best candidate encountered by the excavation.

Excavation Area 5

Feature 21

TYPE: Undifferentiated pit.

LOCATION: Backhoe Trench 7, approximately 145 cm southeast of Feature 23.

DIMENSIONS: 54 cm northwest to southeast, 34 cm northeast to southwest, and 6 to 9 cm deep (Fig. 8).

SHAPE: Oval with moderately sloped walls and a basin-shaped bottom.

CONSTRUCTION: Excavated into a clay loam.

MATRIX: Mottled to dark gray-brown clay loam mixed with charcoal flecks.

ARTIFACTS: Two obsidian microflakes weighing less than 0.1 g combined were culled from a flotation sample. It appears from these flakes that limited tool maintenance occurred around Feature 21.

SUBSISTENCE INFORMATION: None.

PERIOD: 1020 to 410 cal B.C. (Beta-95877, wood charcoal [piñon]). This rather broad date range is within the terminal Armijo phase or early to middle En Medio phase of the Oshara tradition.

COMMENTS: Feature 21 may have been a lightly used hearth. This is suggested by the stained fill within the

feature and by the absence of a stained halo around the feature from intensive occupation or activity.

Feature 22
TYPE: Undetermined or natural stain.
LOCATION: Backhoe Trench 5.
DIMENSIONS: l.5 m north to south, 80 cm east to west, and 6 cm deep.
SHAPE: Irregular.
CONSTRUCTION: Excavated into the native soil.
MATRIX: Dark sandy clay with small pebbles.
ARTIFACTS: None.
SUBSISTENCE INFORMATION: None.
PERIOD: Natural staining lacking temporal or cultural affiliation.
COMMENTS: This large, dark amorphous stain lacked cultural material. The fill was granular and may represent a decomposing clay deposit. No charcoal was present and artifacts were lacking. The field excavator suggested that it was natural deposit.

Feature 23
TYPE: Undifferentiated pit.
LOCATION: Near the west wall of Backhoe Trench 7.
DIMENSIONS: 25 cm east to west, 20 cm north to south, and 8 to 15 cm deep.
SHAPE: Oval with moderately sloped walls and a basin-shaped bottom.
CONSTRUCTION: Excavated into the sandy loam.
MATRIX: Dark charcoal-stained sandy loam.
ARTIFACTS: None.
SUBSISTENCE INFORMATION: Two unburned small-mammal bone fragments were culled from a flotation sample. This limited evidence suggests a short-term, small-scale hunting occupation that produced Features 21 and 23.
PERIOD: Associated with Feature 21, En Medio phase.
COMMENTS: Feature 23 may have been a lightly used hearth. This is suggested by the stained fill within the feature and by the absence of a stained halo around the feature from intensive occupation or activity.

Summary

Twenty-four cultural features and one natural feature were defined by the excavation. Twenty-two cultural features were in Excavation Area 1, and two cultural features were in Excavation Area 5. The natural feature (Feature 22) was also in Excavation Area 5. The features in Excavation Area 1 displayed wide morphological and content variability. Combined, the features could have supported a wide range of domestic activities related to food processing and consumption, as well as raw material processing and the production of material goods. Multiple occupations are suggested by the feature density; apparent functional redundancy of some features; evidence of multiple discard episodes associated with activity space and feature maintenance; and obvious overlapping deposits.

Feature suites were encountered in two separate activity levels. Activity Level 1 included Features 1, 2, 3, 4, 5, 6, 7, 8, 9, and 11. This feature cluster included four probable discard areas, two hearths, a possible posthole, and three undifferentiated pits that may have been temporary warming pits or limited-use hearths. Features 2, 5, 6, and 9 were discard areas with Features 6 and 9 formed by multiple episodes. Faunal evidence indicated processing and consumption of small and large mammals, including *Sylvilagus audubonii*, *Lepus californicus*, *Odocoileus* sp., and *Antilocapra americanus*. Burned bone suggested that bone was discarded into an active fire as a maintenance behavior, or that bone was used as fuel. The presence of abundant unburned bone microchips suggested bone processing or splintering with minute pieces swept into dormant hearths or directly into discard areas. Feature 5 was highly unusual because of the more than 11,000 obsidian microchips associated with abundant unburned bone chips. Combined, the artifacts and bone suggest activity area or work space cleaning with the Feature 5 area selected for discard because it was outside the main activity space. Such planned discard is expected for longer term occupations when removal of sharp or dangerous items from activity space would have periodically occurred (Kent 1992). Features 3 and 11 were small hearths that could have been used to roast or dry meat, or for heating. Combined, the feature cluster in Activity Level 1 appeared to be from a short-term domestic occupation.

Activity Level 2 included Features 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 24, and 25. This feature cluster was close to the Activity Level 1 cluster, but was 5 to 8 cm deeper. The cluster included one formal, reused hearth; two discard areas; eight small, undifferentiated pits; and one possible structure outline. These features formed an arc south of the Activity Level 1 cluster. Farthest south was Feature 2, the possible structure outline. Staining, artifact density, and other indicators of occupation intensity were low near Feature 25, and increased to the north into the main cluster. Features 12 and 16 were discard areas that contained primarily large-mammal bone, though small-mammal bone was present. The bones were burned and unburned, and suggested a pattern of use similar to that described for Activity Level 1. The arc-shaped feature distribution was consistent with organized activity space meant to optimize feature use without interfering with activity area traffic. The Activity Level 2 feature cluster was similar to Activity Level 1, and reflected domestic activity.

Chipped Stone Artifacts

A total of 13,363 chipped stone artifacts was recovered from all excavation areas during site testing and data recovery (Table 2). By far the largest assemblage (13,162 artifacts) was retrieved from Excavation Area 1. Most of the artifacts from the other areas were recovered during the site testing. This section will describe the assemblage by excavation area according to morphological, technological, and functional attributes. Morphological attributes include material type and texture, artifact type, and dimensions. Technological attributes include dorsal cortex type and percentage, condition, flake platform type, and thermal alteration. Functional attributes include edge wear and damage to debitage and formal tools. Additional analysis and interpretation will be provided when the research questions are more specifically addressed.

Excavation Area 1

Excavation and testing recovered 1,992 pieces of debris from core reduction and tool manufacture and maintenance, 24 cores or tools, and 11,139 pieces of microdebitage. All microdebitage was culled from flotation samples. Actual microdebitage counts may have been higher had the excavation methods included more on-site fine-screening of feature and activity area fill. The high frequency of microdebitage reflects the heavy emphasis on tool manufacture and maintenance during all occupations of Excavation Area 1.

Raw material. The lithic raw material types by artifact type are shown in Table 3. The dense concentration of obsidian microdebitage from Feature 5 is omitted from this table because the high frequency overshadows less abundant artifact types, weakening any conclusions that may be made about general material acquisition and use patterns.

Table 2. Artifact types by excavation area.

Count Column percent	Excavation Area					Totals
	1	2	3	4	5	
Core flakes	539 4.1	8 9.1	2 4.2	14 66.7	2 4.5	565 4.2
Manufacturing flakes	1270 9.6	76 86.4	40 83.3	- -	40 90.9	1426 10.7
Angular debris	190 1.4	2 2.3	3 6.3	6 28.6	2 4.5	203 1.5
Microdebitage	11,139 84.6	- -	- -	- -	- -	11,139 83.4
Cores	11 0.1	- -	- -	- -	- -	11 0.1
Bifaces	3 0.02	2 2.3	1 2.1	- -	- -	6 0.04
Projectile points	8 0.06	- -	2 4.2	- -	- -	10 0.1
Scrapers	2 0.02	- -	- -	1 4.8	- -	3 0.02
Totals	13,162 98.5	88 0.7	48 0.4	21 0.2	44 0.3	13,363 100

Undifferentiated obsidian and Polvadera obsidian were the primary raw material types identified within Excavation Area 1. Undifferentiated obsidian refers to a wide range of visually distinctive varieties that are generally not indicative of a particular source. Considerable overlap exists in the macroscopic characteristics of obsidian from the Tewa source of the Jemez Mountain subgroup. Cerro Toledo, Cerro Rubio, Cerro del Medio, and Obsidian Ridge source areas within the Tewa source exhibit a full range of shades of gray, degrees of translucence, and smoky to banded qualities (Baugh 1997). It is difficult to differentiate, therefore, without trace element analysis or other element-based analysis. Furthermore, these subsources within the Tewa source occur in a geographically limited region, rendering fine-grained material identifications less useful for pattern recognition studies that can be used to make inferences about the organization and structure of Archaic hunter-gatherer mobility. Polvadera obsidian can be distinguished macroscopically from other obsidian by the abundant tungsten inclusions. This distinction is consistent and may be important for interpreting hunter-gatherer mobility, since the Polvadera source is located in the northeastern portion of the Jemez Mountains, and is geographically discrete from the Tewa source areas.

In the Excavation Area 1 assemblage, undifferentiated and Polvadera obsidian accounted for 40.5 and 35.5 percent, respectively. This relatively equal abundance may reflect a wide-ranging, logistically organized subsistence strategy, such as would be consistent with hunt-

Table 3. Excavation Area 1: material type by artifact type.

Count Row percent Column percent	Core Flakes	Manufacturing Flakes	Bipolar Flakes	Angular Debris	Cores	Bifaces	Scrapers	Projectile Points	Totals
Madera chert	2 20.0 0.3	5 50.0 0.4	- - -	- - -	3 30.0 27.3	- - -	- - -	- - -	10 0.5 -
Pedernal chert	47 25.5 7.8	79 42.9 5.8	2 1.1 66.7	52 28.3 25.2	- - -	2 1.1 66.7	- - -	2 1.1 25.0	184 8.4 -
Miscellaneous chert	72 23.6 11.9	186 61.0 13.7	- - -	39 12.8 18.9	6 2.0 54.5	1 0.3 33.3	1 0.3 50.0	- - -	305 13.9 -
Obsidian	386 43.4 64.0	417 46.9 30.6	- - -	81 9.1 39.3	- - -	- - -	1 0.1 50.0	5 0.6 62.5	890 40.5 -
Basalt	11 57.9 1.8	5 26.3 0.4	- - -	3 15.8 1.5	- - -	- - -	- - -	- - -	19 0.9 -
Quartzite	2 50.0 0.3	- - -	- - -	- - -	2 50.0 18.2	- - -	- - -	- - -	4 0.2 -
Quartz	- - -	1 100.0 0.1	- - -	- - -	- - -	- - -	- - -	- - -	1 0.05 -
Quartzitic sandstone	- - -	2 66.7 0.1	- - -	1 33.3 0.5	- - -	- - -	- - -	- - -	3 0.1 -
Polvadera obsidian	83 10.6 13.8	666 85.3 48.9	1 0.1 33.3	30 3.8 14.6	- - -	- - -	- - -	1 0.1 12.5	781 35.5 -
Totals	603 - 27.4	1361 - 61.9	3 - 0.1	206 - 9.4	11 - 0.5	3 - 0.1	2 - 0.1	8 - 0.4	2197 100 100

ing large mammals (Binford 1980). It may also reflect part of the seasonal round with late fall movement between Santa Fe River basin lowlands and Jemez Mountain uplands, with obsidian obtained at or near the source and transported to the lowland site in conjunction with base camp relocation. There was a difference in the artifact type distributions for the two obsidian classes: Polvadera obsidian was dominated by manufacturing flakes (85 percent), whereas undifferentiated obsidian was more evenly divided between core-flakes (43.4 percent) and manufacturing flakes (46.9 percent). If this difference occurs with different temporal components, it may reflect changing subsistence strategies. This difference may also reflect different processing activities, with Polvadera used to replace exhausted or lost bifaces, and undifferentiated obsidian used to produce flakes for immediate use. These different temporal and functional issues will be examined later in this report.

The other main raw material classes that were identified were Pedernal chert and miscellaneous chert. Pedernal chert is a well known and documented northern Rio Grande raw material (Warren 1977). It has a primary provenance at the volcanic plug known by the same name, Pedernal, which is located west of Cañones, New Mexico about 90 km north of LA 61282. This multicolored, multitextured, widely used and probably traded raw material also occurs in the axial gravel of the Rio Grande trough at least as far south as White Rock Canyon (Warren 1977:18). Because it is available in the Rio Grande axial gravels, and has been identified as a low frequency constituent of the Plains surface piedmont gravel (Lang 1997), it is probably not a good indicator of long-distance trade or travel. It occurs in a high enough frequency, however, to suggest that it was obtained from the Rio Grande axial gravel rather than from the Plains surface piedmont. A more western or northwestern origin for the raw material can be suggested, therefore, and a more planned acquisition strategy would be expected to be indicated by the morphological and technological attributes of the chipped stone debris. This is partly borne out by the proportion (42.9 percent) of manufacturing flakes. Pedernal chert had the highest percentage of angular debris of any major raw material, however, indicating that cobbles or nodules were brought to the site in a partly reduced or unreduced state.

Miscellaneous chert incorporates the wide range of variability that occurs within the Rio Grande axial and Plains surface piedmont gravels. This class is a catch-all for macroscopic variability that has not been attributed to a particular source. Interestingly, there was only a very low frequency of Madera chert, which has a primary source in the Sangre de Cristo mountain foothills above Santa Fe. It would be expected that regular trips between LA 61282 and the Sangre de Cristo mountain hunting territories would result in acquisition and transport of Madera chert. This expectation is not met, further strengthening the hypothesis that the predominant directional orientation for site residents was west or northwest.

For the most part, the Pedernal chert and miscellaneous chert artifact frequency distribution reflects an emphasis on biface production and planned reduction. This mirrors the obsidian pattern. The strong pattern for LA 61282, Excavation Area 1, with regard to raw material acquisition and use is, therefore, an emphasis on the production of formal tools or blanks to be used for specific tasks, probably related to hunting and meat processing.

Reduction and technology. The Excavation Area 1 assemblage exhibited a very strong technological pattern of biface or tool manufacture and maintenance. Table 3 shows that even without the microdebitage there was an unusually high frequency of manufacturing flakes (61.9 percent). Deviation from this emphasis on tool production is found in the undifferentiated obsidian and the Pedernal chert, which had more core-flakes or angular debris than other raw materials. Generally, core-flakes and angular debris occurred in low counts, which is consistent with a focus on tool or biface production. Other artifact types included cores, bifaces, scrapers and projectile points. Scrapers occurred in low numbers, which is interesting considering the high frequency of tool manufacturing debris that was recovered. Each of these artifact classes, including microdebitage, is discussed or described.

Microdebitage was the most abundant artifact type, mostly because of the unusual dumping episode recovered as Feature 5. This abundance is unusual for most open-air archaeological sites. Microdebitage is often found through water-screening of ethnobotanical samples. Based on the recovery study conducted for this project, even 1/8-inch steel mesh is insufficient to recover the vast majority of microdebitage that accompanies biface production. By count it is the most abundant, by weight or volume it is the least represented. Conducting a full-fledged technological analysis of the microdebitage recovered was beyond the project scope. The microdebitage can, however, be characterized in ways that are appropriate given the size and the information potential of each artifact.

Microdebitage was recovered from Feature 5 and eleven other features. These small flakes or debris were always less than 3 mm in size and weighed between 0.1 and 0.15 g. Although the smallest of the flakes lacked distinguishable morphology, other flakes exhibited platforms and bulbs formed by pressure-flaking during the final stages of biface production or maintenance. Most of these artifacts were of obsidian, but miscellaneous

chert and Pedernal chert were also recovered, confirming that they were subjected to all stages of tool production or maintenance. Their occurrence throughout Excavation Area 1 points to the pervasive emphasis on tool manufacture and suggests that the presence of microdebitage may not be a strong indicator of a primary deposit. Because they are so abundant in tool manufacture, they become analogous to pollen, rain, or background contamination on a nearly microscopic scale. The recovery of microdebitage may be more a function of recovery method than human activity, at least in the case of Excavation Area 1. If all of Excavation Area 1 had been water-screened, the result would have been astounding, and would have been further indication of the intensity of use of this small space.

The excavation of Feature 5 provided an unparalleled opportunity to compare archaeological recovered debris from tool-making with debris generated by the replication of Basketmaker II dart points. James Moore, a staff archaeologist with the OAS, has been replicating Pueblo and Archaic bifaces and projectile points for at least 20 years. As part of his effort to understand the process of and patterns that may result from tool-making, Mr. Moore has carefully recovered all the debris that he generates from a sample of 70 finished or nearly complete tools. The majority of these are made from obsidian and, therefore, are prime candidates for comparison with the Feature 5 assemblage.

The goals of this study were to quantify the Feature 5 and replicate assemblages by count and weight; to pass both assemblages through 1/4-inch and 1/8-inch mesh screens to determine what is recovered and lost through conventional methods; and, finally, to compare the quantity and volume of the Feature 5 and replicate assemblages in order to estimate the potential minimum number of projectile points represented by archaeological assemblage.

Tables 4 and 5 provide counts and weights for the Feature 5 and replicate assemblages. Table 4 shows the actual counts and weight of the artifacts recovered by water-screening of seven bags of Feature 5 fill. A total of 11,983 pieces of debris weighing 244.2 g was recovered. The "Recovered" columns list the count and weight of debitage captured by the 1/4-inch and 1/8-inch screens. Of the 2,276 artifacts that were recovered by conventional screening, 554 came from 1/4-inch screening, and 1,722 came from 1/8-inch screening. Based on these frequencies, the archaeological evidence of biface manufacture produces a 3:1 ratio of small debris (less than 7 mm) to large debris (7 mm or greater maximum dimension). The percentage of early- or middle-stage reduction debris by weight is the inverse of the frequency, with 203.5 g or 83.3 percent accounted for by larger debris. As the biface or blank is reduced, the size and weight of the debris are reduced, but the count increases. As the 19 percent recovery rate suggests, the 2,276 artifacts recovered by conventional screening may be a representative sample of the early and middle stages of biface manufacture. The 81 percent of debris not recovered, however, indicates that the 2,276 artifacts are the tip of the iceberg relative to the actual amount of debris that was generated. The inverse proportions of weight versus count by artifact size have interesting implications regarding biface reduction, tool manufacture and logistically organized subsistence activities.

The archaeological and replication data confirm that a significant decrease in weight occurs as a biface blank or preform is reduced. These data strongly support the observation that logistically organized hunters could significantly reduce the weight of tools or preforms during early- or middle-stage reduction. Early-stage reduction in size and weight allowed transport of more blanks or preforms to the hunting site or territory. By delaying final tool production until the hunt was successful, task-appropriate tools could be made. Thus, the reduction sequence occurred in two different locations, which might allow archaeologists to identify hunting sites that were actually part of a logistical subsistence strategy and evidence for a flexibility that was incorporated into task planning and completion. This flexibility would be especially useful when hunting territories did not coincide with suitable raw material sources for tool production, and exhausted or broken tools could not be readily replaced (Kelly 1988; Andrefsky 1994).

Since the recovery of archaeological materials is highly influenced by the methods and tools used, the use of 1/4-inch or even 1/8-inch screen would result in the recovery of a high frequency of early- and middle-stage biface flakes to the exclusion of microdebitage. If microdebitage is a strong indicator of late-stage biface production, such as would occur immediately preceding hunting, then the hunting sites would be missed and logistical hunting camps would be more visible. This would bias the record of hunting in a particular area. In the case of LA 61282, evidence of all stages of biface manufacture was recovered, suggesting that hunting was staged directly from the site rather than from a hunting location. So LA 61282 occupants located the site near a prime hunting territory, but also near other primary resource areas in order to minimize the need for logistically organized forays.

Manufacturing flakes were the second most common artifact type in the assemblage. Manufacturing flakes are those artifacts that displayed attributes consistent with empirically and archaeologically derived evidence of tool manufacture. Manufacturing flakes were identified for all material types except quartzite. They were the most abundant artifact type for all material types except basalt, quartzite, and quartzitic sand-

Table 4. Feature 5: obsidian microdebitage counts and weights.

				Recovered: 1/4-inch		Recovered: 1/8-inch	
Size		Count	Weight (g)	Count	Weight (g)	Count	Weight (g)
Level 3 (25-30) NE Corner							
Bag 1 of 4	All	2682	39.9				
	8 mm			81	17.7		
	4-7 mm					398	10.2
	Total recovered	479 (17.9%)	27.9 (69.9%)				
	Total lost	2203 (82.1%)	12.0 (30.1%)				
Bag 2 of 4	All	1505	63.8				
	8 mm			139	49.5		
	4-7 mm					295	10.2
	Total recovered	434 (28.8%)	59.7 (93.4%)				
	Total lost	1071 (71.2%)	4.1 (6.6%)				
Bag 3 of 4	All	2420	33.6				
	8 mm			84	17.4		
	4-7 mm					304	9.3
	Total recovered	392 (16.2%)	26.7 (79.5%)				
	Total lost	2028 (83.8%)	6.9 (20.5%)				
Bag 4 of 4	All	607	44.6				
	8 mm			107	39.7		
	4-7 mm					107	3.3
	Total recovered	214 (35.3%)	43.0 (96.4%)				
	Total lost	393 (64.7%)	1.6 (3.6%)				
Level 3 (25-30) NW Corner							
Bag 1 of 3	All	987	8.2				
	8 mm			17	3.3		
	4-7 mm					86	2.2
	Total recovered	103 (10.4%)	5.5 (67.1%)				
	Total lost	884 (89.6%)	2.7 (32.9%)				
Bag 2 of 3	All	2197	31.3				
	8 mm			68	12.6		
	4-7 mm					361	10.6
	Total recovered	429 (19.5%)	23.2 (74.1%)				
	Total lost	1768 (80.5%)	8.1 (25.9%)				
Bag 3 of 3	All	1585	22.8				
	8 mm			58	12.6		
	4-7 mm					171	4.9
	Total recovered	229 (14.4%)	17.5 (76.8%)				
	Total lost	1356 (85.6%)	5.3 (23.2%)				

stone. Especially interesting was the high percentage of manufacturing flakes from nonobsidian material types. Pedernal chert and miscellaneous chert had 43 to 61 percent manufacturing flakes, while undifferentiated obsidian had only 47 percent manufacturing flakes. Apparently, obsidian was used in the production of a wider range of tools than was chert. In contrast to undifferentiated obsidian, Polvadera obsidian, which made up the majority of the Feature 5 assemblage, had 85 percent manufacturing flakes, suggesting that it was used in a more task-specific manner or potentially reduced with fewer activities intended for the finished products.

Technological attributes of cortex, platform type, and portion provide insight into material type variability and tool manufacture. As a rule, cortex is expected to occur on a very low frequency of manufacturing flakes.

Table 5. Basketmaker II projectile point, replication flake counts and weights.

			Screened Recovered			
	Total		1/4-inch		1/8-inch	
	Count	Weight	Count	Weight	Count	Weight
BM II A						
8 mm	73	11.2	43	9.3		
Total recovered (%)			58.9	84.8		
4-7 mm	3240	9.6			217	4.1
Total recovered (%)					6.7	42.7
>3 mm		2.8		not screened		
Total	3313	23.6				
BM II B						
8 mm	60	11.9	43	10.2		
Total recovered (%)			72.6	85.7		
4-7 mm	3160	10.6			217	4.7
Total recovered (%)					7.0	44.3
>3 mm		3.0		not screened		
Total	3220	25.5				
BM II C						
8 mm	66	14.3	64	14.2		
Total recovered (%)			97.0	99.3		
4-7 mm	5380	25.2			506	13.6
Total recovered (%)					9.4	54.0
>3 mm		4.2		not screened		
Total	5446	43.7				

By definition, manufacturing flakes are left over from tool manufacture, which, according to models of tool manufacture, occurred after raw material had been reduced or prepared, including removal of the dorsal cortex. When small nodules of raw material were employed in tool manufacture, however, it is possible that decortication would be part of the reduction continuum. This assemblage basically follows the expected pattern of low frequencies of cortical flakes. Interestingly, there were 27 manufacturing flakes of undifferentiated obsidian that had dorsal cortex. The cortical manufacturing flakes indicate that small-sized raw material may have been used in tool manufacture, or that flake blanks removed from larger parent material included some cortex.

Flake-portion frequencies partly reflect the stage of manufacture as well as the ability of raw material to withstand force applied through direct or indirect percussion methods of tool production. Replication studies demonstrate that thinner flakes result as tool production progresses, and that the flakes are less resistant to force or impact (Moore 1994:310-312). The proportion, therefore, of complete to partial flakes decreases. In this assemblage, only 580 of 1361 flakes were whole. The second most common flake portion was distal fragments, which result from platforms disintegrating as they become thinner and less resistant to force. For all material types, the ratio of whole to partial flakes was less than 1:1, with the exception of Polvadera obsidian, which had a slightly higher ratio at 1.1:1. This ratio increase reflects the Feature 5 assemblage, where a high percentage of larger manufacturing flakes was recovered. The larger flakes, which may be more resistant to force, are interpreted as early-stage waste products.

Flake platforms should reflect the technical aspects of core reduction or tool production. In staged tool production, different techniques for strengthening, isolating, or preparing platforms were employed to increase the likelihood of successful flake removal. Early-stage tool production or core reduction generally result in a narrower range of platform types and preparations. Undifferentiated and Polvadera obsidian exhibited a wide variety of platforms and preparations. Undifferentiated obsidian flake platforms were relatively evenly distributed with single facet, battered/crushed, and abraded/collapsed slightly more common than other types. Polvadera obsidian displayed higher frequencies of collapsed, single facet, battered/crushed, and abraded. Basically, the empirical observation that the assemblage displayed an emphasis on tool manufacture was strongly supported by the diversity of platform types and preparations.

Flake size may also reflect the size of the raw material or blank and the stage of manufacture. Intuitively, it is obvious that as the tool is reduced or finished, the resulting debris should be small in size, and that smaller debris should be more frequent than larger flakes. This has been demonstrated statistically for replicated assemblages, though there are many other factors that may affect artifact size besides raw material size or reduction stage (Patterson 1990:550). The histogram (Fig. 9) shows the frequency distribution for whole manufacturing flakes for all materials. There is a rapid increase in frequency from the 5 mm to 10 mm bars with flakes ranging between 7.5 and 15.5 mm long making up most of the distribution. Naturally, if the microflakes were added to this distribution, there would be a steep decrease in the flake-size frequency from less than 7.5 mm to 7.5 mm or longer flakes. The predominance of the medium-size biface flakes indicates all stages of reduction with final tools the most likely intended product rather than preforms or blanks for transport. The latter strategy would correspond to gearing for a move or a logistical foray into an area having low-quality raw materials, or to an area too distant from the base camp for tool refurbishment. A one-way ANOVA test for homogeneity for whole manufacturing flake lengths by material failed to yield significant differences at the 0.05 significance level. This suggests that all materials were reduced in the same manner, though the recovery of far fewer chert or chalcedony microflakes relative to Polvadera obsidian indicates that the latter was the most intensively reduced raw material.

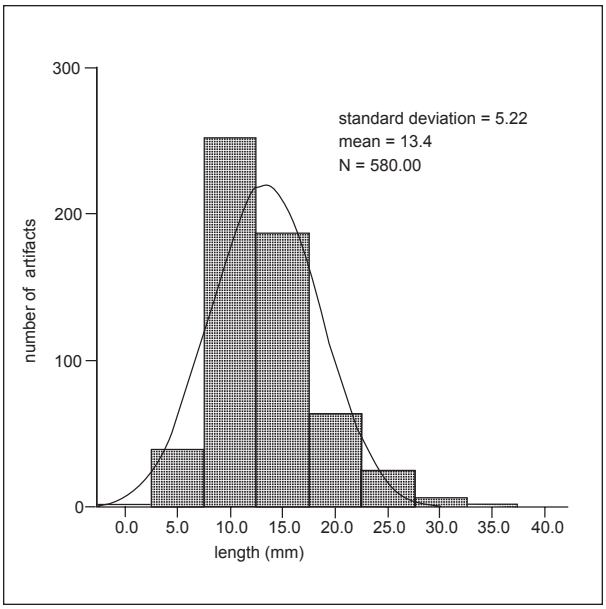

Figure 9. Histogram of whole manufacturing flake lengths (all material types).

In Excavation Area 1, assemblage core-flakes accounted for 603 artifacts, or 27.4 percent of the

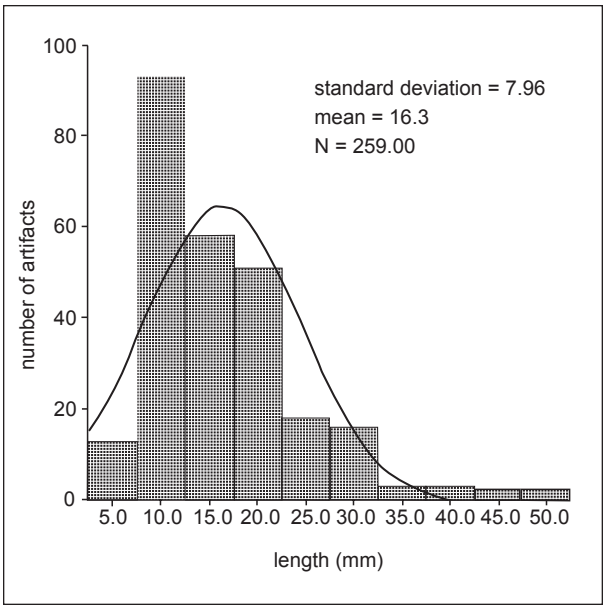

Figure 10. Histogram of whole core flake lengths (all material types).

assemblage. Core-flakes remain from the early stages of raw material preparation, blank or manuport production, or from the production of expedient tools. Expedient tools are those that exhibit no shape or size modification. The unmodified edges of the core-flakes were suited to cutting, scraping, stripping, and gouging actions that accompanied a wide range of base camp domestic activities. High frequencies of core-flakes occur where raw materials are abundant, tool forms are not task-specific, and when a wide range of domestic activities were conducted. Core-flakes can be examined for the same variables as manufacturing flakes, but there should be marked differences at the attribute level indicative of differences in reduction strategies.

Dorsal cortex was observed on only 19.1 percent of the core-flakes. In general, this is a low frequency for Archaic and Pueblo period assemblages of the Northwest Santa Fe Relief Route (Wolfman et al. 1989) and in the Santa Fe area (Post 1996a). A major contributor to this distribution is noncortical obsidian core-flakes, which accounted for 321, or 66 percent, of the total noncortical core-flakes. The other raw materials, however, showed a similar high percentage of noncortical flakes, ranging from 64 percent in basalt to 100 percent of quartzite. For cortical flakes, less than 5 percent had more than 50 percent dorsal cortex, indicating that early-stage core reduction was rare. The dorsal cortex data suggest a core reduction strategy based on intensively reducing raw material before transporting it to the site.

Core reduction is by definition an earlier stage of tool manufacture and should result in core-flakes that are larger, thicker, and more resistant to shock. Whole core-flakes are expected to occur at a greater frequency than biface flakes. In this assemblage, however, whole core-flakes comprised only 43 percent of 603 artifacts. Across all material types, the proportion of whole core-flakes ranged from 20.8 to 100 percent; the typical proportion for the most frequent material types is just under 50 percent. This unusual core-reduction pattern suggests that factors other than stage of manufacture and resilience of core material may have influenced core-flake distribution.

Core-flake platforms are expected to show a similarly diverse distribution of material types. Single-faceted platforms are most commonly expected to co-occur with core reduction, but multifaceted, abraded, and crushed or collapsed platforms were well represented in this assemblage. This platform variability, combined with the high breakage rate, suggests that core reduction was linked to formal tool production.

Finally, core-flake size may provide additional insight into the level of core reduction. Figure 10 shows a flake-length distribution similar to that of biface flakes. The most frequent class is between 7.5 and 12.5 mm, with a rapid fall-off for flakes longer than 22.5 mm. This emphasis on relatively short core-flakes may reflect raw material size or reduction intensity. When viewed in combination with the low dorsal cortex percentages, it is most likely a function of reduction intensity. Furthermore, the mean difference in length between core-flakes and biface flakes is only 3 mm, suggesting that they are products of the same activity.

Only two cores were recovered from Excavation Area 1 (Table 6). They were made from miscellaneous chert and had multidirectional platforms, reflecting the expedient core reduction and tool production that would be expected in a residential camp assemblage. The two small cores (maximum dimensions less that 70 mm) both showed dorsal cortex, indicating that they may have started out small, because a result of intensive reduction should be the removal of most or all of the dorsal cortex. The small number of cores recovered from Excavation Area 1 further emphasizes its primary function as a hunting camp with specialized tool manufacture dominating core reduction and expedient tool production and use.

Tools are primarily facially modified projectile points, bifaces or scrapers. Table 7 provides basic descriptive information.

Complete and fragmentary projectile points were the most common tool type. Ten specimens were recovered from testing and data recovery. Four of these, FS 82-30 (point base), FS 108-1 (serrated projectile point, En Medio style), FS 191-31 (point base), and FS 293-1 (point base and partial blade), were excavated from Excavation Area 1.

Table 6. Summary of all cores recovered.

Excavation Area/FS	Material	Texture	Cortex	Cortex Type	Core Type	Length (mm)	Width (mm)	Thick (mm)	Weight (g)
0/20	misc. chert	fine	present	waterworn	bidirectional	67	62	50	276.5
3/16	misc. chert	medium	present	waterworn	multidirectional	70	57	46	227.6
0/13	quartzite	medium	present	waterworn	unidirectional	68	66	43	274.5
3/15	misc. chert	medium	present	waterworn	unidirectional	63	50	11	103.0
4/11	madera chert	medium	present	waterworn	multidirectional	52	50	40	149.6
4/26	misc. chert	medium	absent	undetermined	multidirectional	53	33	17	41.2
0/17	madera chert	medium	present	waterworn	multidirectional	66	59	49	231.2
0/24	quartzite	coarse	present	waterworn	pyramidal	111	94	40	516.4
4/10	madera chert	fine	present	waterworn	multidirectional	98	76	44	405.9
1/276	misc. chert	medium	present	waterworn	multidirectional	59	47	42	113.2
1/276	misc. chert	medium	present	waterworn	unidirectional	44	28	25	27.2

FS 108-1 is a serrated obsidian projectile point (Fig. 11a) similar to others found on sites in the Rio Puerco of the East (Irwin-Williams 1973). The unique feature of this point is the pronounced serration of the lateral edge. Basically, the blade is triangular with slightly convex edges that have been carefully serrated from the tangs to within 10 mm of the pointed intact tip. The base is short and slightly convex with contracting sides. The stem is deeply corner-notched. Serration is often observed in Armijo style dart points, which correlates with the carbon-14 dating for Excavation Area 1 subsurface contexts. The overall shape and form of the point, however, are more similar to the En Medio style, which is traditionally dated to 800 B.C. and later.

FS 293-1 is a complete Polvadera obsidian dart point base and proximal half of the blade (Fig. 11b). The base is concave, thinned by parallel flaking, and has pronounced "ears" or basal lobes. From ear to ear the base measures 19 mm. It has shallow, broad corner-notches that were probably meant for hafting. The blade shape cannot be determined because it is too short and is marred by irregular, deep flake scars. This dart point style is associated with the Armijo phase of the Oshara tradition. The radiocarbon dates for Excavation Area 1 place its manufacture well within the suggested Armijo phase date range of 1880 to 800 B.C.

The two base fragments are made from Jemez obsidian (FS 82-30 and FS 191-31). They were recovered from within the main activity area of Excavation Area 1. Both have the pronounced ears and concave

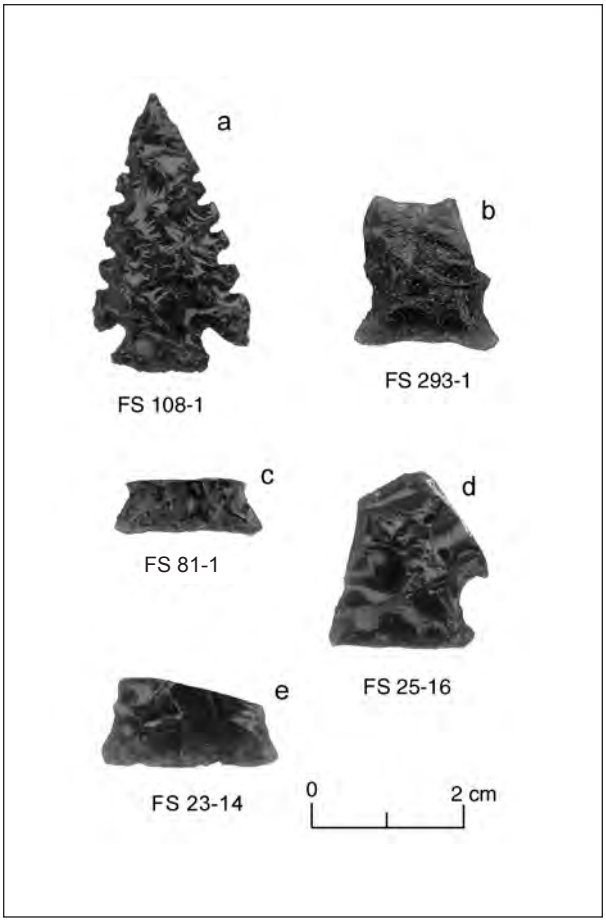

Figure 11. Dart points

Table 7. Summary of all formal tools recovered.

FS	Art. No.	Material	Texture	Tool Type	Length (mm)	Width (mm)	Thick (mm)	Weight (g)	Artifact Shape	Edge Angle 1	Edge Outline 1	Edge Damage 1	Edge Angle 2	Edge Outline 2	Edge Damage 2
4	19	obsidian	glassy	biface	11	19	6	1.2	not recorded	35	straight	rounding	-	-	-
19	10	chert	fine	scraper	31	27	6	5.5	not recorded	40	convex	absent	40	convex	absent
21	12	quartzitic sandstone	medium	biface	33	23	7	4.7	triangular	-	-	-	-	-	-
22	13	polvadera obsidan	glassy	biface	27	32	8	5.5	not recorded	55	convex	bidirectional scarring	45	convex	bidirectional scarring
23	14	obsidian	glassy	projectile point	23	19	6	3.0	not recorded	0	-	absent	0	not recorded	absent
25	16	obsidian	glassy	projectile point	11	23	6	1.7	not recorded	-	-	-	-	-	-
30	1	obsidian	glassy	projectile point	10	22	5	0.8	not recorded	-	straight	-	-	-	-
41	1	obsidian	glassy	projectile point	7	19	5	0.7	not recorded	-	undeter-mined	undetermined	-	undeter-mined	undetermined
41	18	pedernal chert	fine	projectile point	7	16	4	0.4	not recorded	-	undeter-mined	undetermined	-	undeter-mined	undetermined
54	1	chert	medium	scraper	87	38	23	121.8	crescent	70	undeter-mined	bidrectional scarring and rounding	-	-	-
69	1	pedernal chert	medium	biface	23	22	5	2.5	triangular	39	concave/ convex	absent	40	concave/ convex	absent
95	26	chert	fine	biface	22	32	6	3.4	not recorded	-	concave/ convex	bidirectional scarring and rounding	-	-	bidirectional scarring and rounding
108	1	obsidian	glassy	projectile point	37	17	5	2.5	triangular	33	serrated	-	33	serrated	-
118	77	obsidian	glassy	projectile point	8	14	4	0.4	not recorded	-	undeter-mined	undetermined	-	undeter-mined	undetermined
125	1	obsidian	glassy	biface	21	16	4	1.6	irregular	59	convex	unidirectional rounding and scarring	-	-	-
191	31	obsidian	glassy	3	4	12	3	0.1	not recorded	-	undeter-mined	undetermined	-	undeter-mined	undetermined
293	1	polvadera obsidian	glassy	3	19	17	7	2.3	not recorded	55	undeter-mined	undetermined	-	undeter-mined	absent
302	1	2	Fine	3	10	16	4	0.4	not recorded	-	undeter-mined	undetermined	-	undeter-mined	absent
327	1	2	Fine	2	37	33	9	3.3	irregular	53	straight	undirectional scarring/rounding	47	convex	bidirectional scarring and rounding

bases similar to the Armijo style point just described. Their presence suggests that dart foreshafts were refurbished at the site (dart points that had snapped at the haft were removed and replaced with new dart points). This seems especially probable given the abundant evidence for biface manufacture in Excavation Area 1.

The additional projectile point bases were recovered from the upper excavation or near surface levels within Excavation Area 1. FS 81-1 (Fig. 11c) and FS 118-77 are made from Polvadera obsidian, and FS 81-41 is made from mottled chert. Base widths are 19 mm, 16 mm, and 16 mm, respectively. These short fragments resemble whole dart points with short expanding bases. A straight or concave base with expanding sides is most common on En Medio style points (Thoms 1977). En Medio style points date roughly from 800 B.C. to A.D. 400. The presence of these En Medio style basal fragments suggests a later component overlying the earlier late San Jose-Armijo phase component found in the subsurface of Excavation Area 1. Basal fragments reflect refurbishing of foreshafts with new darts. Refurbishment is evident in the San Jose-Armijo and En Medio phase occupations, indicating the site's long-term use as a hunting camp.

Excavation Area 2

Excavation Area 2 had 88 chipped stone artifacts, most of which were recovered from the surface collections within Dogleash Collection Unit 2. The Excavation Area 2 assemblage was dominated by manufacturing flakes. Unlike Excavation Area 1, which showed a relatively balanced use of obsidian and chert, the majority of the Excavation Area 2 manufacturing flakes was obsidian. Miscellaneous chert, Pedernal chert, and basalt occurred, but in low frequency. Core-flakes were in the minority for all material classes except basalt. Most manufacturing flakes were fragmentary (n=49), with distal fragments being the most common. Dorsal cortex was lacking on 96.5 percent of the manufacturing flakes. Table 8 shows the distribution of artifact type by material type.

Most platform types reflected biface reduction: 24 of 37 flakes with platforms showed abrasion, multiple facets, retouch or other evidence of tool manufacture. Mean manufacturing flake size was 12 by 12 mm; no flake had a maximum dimension greater than 22 mm. Basically, the manufacturing flakes reflected late-stage reduction. There is little evidence that large or minimally reduced materials were brought to or reduced within Excavation Area 2.

Two biface fragments were recovered from the surface. FS 21-12 is the tip and distal portion of the blade from a medium-sized, middle-stage biface made from quartzitic sandstone. The dulled and rounded tip suggests that this tool was used as a knife. It is likely that it was made at a different location and brought to the site, because no quartzitic sandstone manufacturing flakes were recovered from Excavation Area 2. The proximal portion was not found, which suggests that the tool may have arrived at the site already broken. The second biface, FS 22-13, is a medium-sized, middle-stage tool with extensive facial retouch on one side, and mostly marginal retouch on the other. The rounded edges suggest that it was used for cutting. It is not well made and may be an unfinished tool that was ultimately used as a knife. Obsidian manufacturing flakes were abundant in Excavation Area 2, indicating that this tool could have been made on-site.

Excavation Area 3

The chipped stone assemblage (48 artifacts) from Excavation Area 3 was mainly from surface collection. Similarly to Excavation Area 2, the artifacts consisted mainly of obsidian manufacturing flakes, and included one biface and two projectile point fragments; core-flakes were in the minority. Table 9 shows the distribution of artifact type by material type.

All manufacturing flakes lacked dorsal cortex, and most (n=31) were fragmentary with distal and undetermined fragments being the most common. Biface reduction was evident from most platform types: nine of 14 flakes with platforms showed abrasion, multiple facets, retouch, or other evidence of tool manufacture. Mean manufacturing flake size was 13 by 11 mm; no flake had a maximum dimension greater than 17 mm. Basically, the manufacturing flakes reflected late-stage reduction. There is little evidence that large or minimally reduced materials were brought to or reduced within Excavation Area 3.

Two projectile point fragments and one undetermined late-stage biface fragment (all obsidian) were recovered from Excavation Area 3. The projectile point fragments consisted of a base (FS 25-16; Fig. 11d), and a base with a small piece of the proximal portion of the blade remaining (FS 23-14; Fig. 11e). FS 25-16 is a straight base with short expanding edges. The base is 23 mm wide and may have been 11 mm long. It is the largest base fragment recovered from the excavation, and is similar to the straight, expanding side stems of En Medio points, described for the upper levels of Excavation Area 1. It was snapped immediately below the haft indicating that it was removed from a dart foreshaft and left behind.

FS 23-14 is the lower portion of an En Medio style dart point. It has a straight base 19 mm long with an

Table 8. Excavation Area 2: artifact type by material type.

Count Row percent Column percent	Pedernal Chert	Other Chert	Obsidian	Basalt	Polvadera Obsidian	Quartzitic Sandstone	Totals
Core flake	1 12.5 25.0	3 37.5 27.3	- - -	3 37.5 75.0	1 12.5 2.7	- - -	8 9.1 -
Manufacturing flake	2 2.6 50.0	8 10.5 72.7	30 39.5 96.8	1 1.3 25.0	35 46.1 94.6	- - -	76 86.4 -
Angular debris	1 50.0 25.0	- - -	- - -	- - -	1 50.0 2.7	- - -	2 2.3 -
Biface	- - -	- - -	1 50.0 3.2	- - -	- - -	1 50.0 100.0	2 2.3 -
Totals	4 - 4.5	11 - 12.5	31 - 35.2	4 - 4.5	37 - 42.0	1 - 1.1	88 100 100

Table 9. Excavation Area 3: artifact type by material type.

Count Row percent Column percent	Other Chert	Obsidian	Polvadera Obsidian	Totals
Core flake	- - -	2 100.0 4.7	- - -	2 4.2 -
Manufacturing flake	2 5.0 100.0	35 87.5 81.4	3 7.5 100.0	40 83.3 -
Angular debris	- - -	3 100.0 7.0	- - -	3 6.3 -
Biface	- - -	1 100 2.3	- - -	1 2.1 -
Projectile point	- - -	2 100 4.7	- - -	2 4.2 -
Totals	2 - 4.2	43 - 89.6	3 - 6.3	48 100 100

expanding stem 8 mm long. The stem terminates in a shallow but broad corner-notch, which was the hafting element. This fragment exhibits numerous breaks and evidence of reworking, indicating that it was recycled or curated before being deposited in Excavation Area 3. Again, this tool is more evidence of the focus on refurbishing toolkits at this location.

The late-stage biface fragment may be the lateral portion of a triangular blade, but it is so fragmentary that it is difficult to orient. Undetermined fragments are consistent with the pattern of discard that reflects toolkit refurbishment from tools made on-site.

Excavation Area 4

Only 21 chipped stone artifacts were recovered from Excavation Area 4 (Table 10). This small assemblage differed from the other excavation areas in that nonobsidian core-flakes predominated. No manufacturing flakes were recovered, and mostly local materials were used. These two factors suggest that it was a more recent Coalition or Classic period component.

The 14 core-flakes showed relatively typical attribute distributions. Seven of the core-flakes were whole, and seven showed the full range of breakage. Platforms, when present, were mostly single-faceted, which is more typical of core reduction than the core-flakes found in Excavation Area 1. Seventy-one percent of the flakes were noncortical, which is slightly higher than the percentage found at similar sites in the Las Campanas area (Post 1996a:404-405). This higher percentage of noncortical flakes may reflect the distance that Pueblo foragers traveled from their village. Distance of travel may influence the form of raw materials selected for transport (Kelly 1988; Andrefsky 1994). Noncortical flakes are found less frequently at Northwest Santa Fe Relief Route sites, reflecting perhaps the proximity of raw material (Wolfman et al. 1989).

The scraper is made from a waxy red chert. It has marginal retouch along one edge of a core-flake. The edge was convex with an edge angle of 30 degrees. This tool may have been used for scraping and cutting. It measures 31 mm long by 27 mm wide by 4 mm thick.

Excavation Area 5

Forty-four chipped stone artifacts were recovered from Excavation Area 5. Table 11 shows the artifact type by material type distribution.

The Excavation Area 5 assemblage was dominated by manufacturing flakes. Unlike Excavation Area 1, which showed a relatively balanced use of obsidian and chert, most of the Excavation Area 5 manufacturing flakes were obsidian, as they were in Excavation Area 2 and 3 assemblages. Core flakes were in the minority. Most of the manufacturing flakes (n=22) were fragmentary, with distal and undetermined fragments being the commonest. Dorsal cortex was lacking on all of the manufacturing flakes. Biface reduction was evident from most platform types: 13 of 15 flakes with plat-

Table 10. Excavation Area 4: artifact type by material type.

Count Row percent Column percent	Madera Chert	Other Chert	Obsidian	Basalt	Quartzite	Polvadera Obsidian	Totals
Core flake	1 7.1 100.0	8 57.1 66.7	2 14.3 50.0	1 7.1 100.0	2 14.3 100.0	- - -	14 66.7 -
Angular debris	- - -	3 50.0 25.0	2 33.3 50.0	- - -	- - -	1 16.7 100.0	6 28.6 -
Scraper	- - -	1 100.0 8.5	- - -	- - -	- - -	- - -	1 4.8 -
Totals	1 - 4.8	12 - 57.1	4 - 19.0	1 - 4.8	2 - 9.5	1 - 4.8	21 100 100

Table 11. Excavation Area 5: artifact type by material type.

Count Row percent Column percent	Other Chert	Obsidian	Quartzitic Sandstone	Polvadera Obsidian	Totals
Core flake	- - -	1 50.0 6.7	1 50.0 100.0	- - -	2 4.5 -
Manufacturing flake	2 4.9 100.0	13 31.7 86.7	- - -	26 63.4 100.0	41 93.2 -
Angular debris	- - -	1 100.0 6.7	- - -	- - -	1 2.3 -
Totals	2 - 4.5	15 - 34.1	1 - 2.3	26 - 59.1	44 100 100

forms showed abrasion, multiple facets, retouch, or other evidence of tool manufacture. Mean manufacturing flake size was 13 by 12 mm; no flake had a maximum dimension greater than 20 mm. Basically, the manufacturing flakes reflect late-stage reduction. There is little evidence that large or minimally reduced materials were brought to or reduced within Excavation Area 5.

Ground Stone Artifacts

Two one-hand manos (FS 152 and FS 290) and a fragment of basin metate (FS 89) were recovered from Excavation Area 1. FS 152, found in Feature 6, was a gray friable, quartzitic sandstone one-hand mano used on both sides. It measured 15.5 cm long by 10 cm wide by 5 cm thick. It had a biconvex cross-section and unidirectional striations.

FS 290 was a gray-white quartzitic sandstone one-hand mano. It had a biconvex cross-section and was ground on both sides. It was complete and measured 12.5 cm long by 10.5 cm wide by 5.5 cm thick. It was lodged in a posthole (Feature 11) within the main activity area.

FS 89 was a well-indurated, medium-grained sandstone basin metate fragment. This medial portion had a pecked and ground interior with bidirectional striations from reciprocal-motion grinding. It measured 30 cm long by 15 cm wide by 19 cm thick.

Pottery

Pottery was collected from the surface of Excavation Area 4. The 22 sherds included San Lazaro Glaze-on-polychrome, indeterminate glazeware, Pindi Black-on-white, and utility wares. The pottery types and vessel forms and portions are listed in Table 12.

At least two temporal components were represented in the assemblage. Pindi Black-on-white pottery was first described in Stubbs and Stallings (1953:50). Distinguished by its abundant pumice temper, it exhibits Santa Fe Black-on-white design traits, but may have been locally produced at Pindi Pueblo (LA 1). Associated tree-ring dates suggest that Pindi Black-on-white was manufactured from A.D. 1325 to 1350, making it a good temporal indicator for the end of the Coalition period and the beginning of the Classic period in the southern Tewa Basin (Stubbs and Stallings 1953; Habicht-Mauche 1993).

The second temporal component was represented by the San Lazaro Glaze-on-polychrome bowl sherds, which had a design location and rim form consistent with Glaze C pottery. The hornblende latite temper suggested manufacture at San Marcos or Tonque Pueblo (Warren 1979). San Lazaro Glaze-on-polychrome could have been traded into Cieneguilla Pueblo (LA 19), which is along the Santa Fe River 5 km downstream from LA 61282. San Lazaro Glaze-on-polychrome is best dated between A.D. 1490 and 1515 (Warren 1979).

Table 12. Excavation Area 4: pottery types and vessel forms.

	Bowl Rim	Bowl Body	Jar Rim	Jar Body	Total
San Lazaro Glaze-on-polychrome	4	8	-	-	12
Indeterminate glazeware	1	2	-	-	3
Pindi Black-on-white	1	-	-	-	1
Indeterminate White ware	-	1	-	-	1
Utility ware	-	-	-	5	5
Total	6	11	-	5	22

CHAPTER 7

Palimpsest of Occupation at LA 61282: Information from the Zooarchaeological Materials

LINDA MICK-O'HARA

Introduction

This open-air Archaic site, excavated as part of the investigations along the Santa Fe Relief Route, has revealed evidence of several occupations. The slow depositional and sometimes deflational history of this upland environment has resulted in a palimpsest of occupations that are difficult to separate. In this section the faunal data, along with information from excavation notes and radiocarbon dates, will be used to attempt to separate the various occupations at LA 61282.

The original research design for this project included a number of general questions to be addressed by analysis of site structure and recovered materials at LA 61282 (Lent 1988). Several of these questions can be addressed through the analysis of the faunal remains recovered from the site. These questions relate to the functional differences between logistical and special use sites; the implication of a hunting and gathering strategy at the site; the increased occurrence of Armijo phase sites in the area; and the implications of multiple use at LA 61282 through time. These questions can be answered in part by analysis of the recovered zooarchaeological remains, which revealed patterns in the distribution of small- and large-bodied animals, and in the distribution of burned bone specimens.

Excavation at LA 61282 yielded 1253 bone fragments: 620 from screening, and 633 from flotation sampling. Although including bone chips recovered by flotation in the entire sample inflated mammal and small mammal categories, these bone fragments provided additional data and, in some cases, enhanced existing distribution patterns. All of the discussions that follow use the entire sample, but the primary excavated sample is used to emphasize the patterns that exist between features and in different activity levels.

Methodology

All faunal remains recovered during the excavation of LA 61282 were returned to the OAS for processing and analysis. Faunal materials were dry brushed to remove dirt from all surfaces so that any muscle attachments, surface features, and processing marks would be visible.

The remains were then identified to the most specific level possible using the comparative faunal materials housed at the OAS and at the Museum of Southwestern Biology, University of New Mexico, Albuquerque. Identification was also aided by guides to the taxonomic and element identification of mammals and birds (Olsen 1964, 1968; Gilbert 1985,1990). Guides were used only for preliminary identification and all specimens were specifically compared to osteological specimens for final identification.

Identification of all specimens included taxonomic level, element, portion, completeness, laterality, age, and developmental stage. In addition, each specimen was assessed for the presence of any environmental, animal, or thermal alteration. Finally, any butchering marks, such as cuts and impacts (Olsen and Shipman 1988), were noted along with any apparent modification for tool manufacture or use (Semenov 1964, Kidder 1932).

The data recorded for these variables were then entered into an SPSS database and used in the analysis of the faunal remains presented in this report.

Taxonomic Designations and Distribution of Faunal Remains

Taxonomic Designations

Excavation at LA 61282 opened up a horizontal area in order to define and investigate isolated features. Faunal remains were recovered both from features and from specifically numbered excavation areas dispersed around the features. Table 13 presents the identified faunal remains by taxonomic unit and feature association. Remains assigned to Feature 0 are specimens recovered from the excavation areas outside of specific features. The features have been associated with two activity levels or occupational surfaces. Faunal materi-

als are first presented for the site, and then by association with specific features and activity levels. The distributional analysis also includes an analysis of the amount and degree of burning apparent on all remains. These observations are somewhat biased by the large amount of burned small-mammal remains added from the flotation samples, but some intriguing patterning was observed.

The columns in Table 13 show the frequency count (N) for specimens identified as belonging to a specific category, and the percentage of each taxonomic category with respect to the total bone recovered. The inclusion of bone fragments recovered from flotation sampling, along with a number of highly fragmented specimens from the initial screened sample, has resulted in most of the total sample being identifiable only as far as belonging to the class of mammals, separated where possible into large, medium, and small mammal by the thickness of the cortical tissue and the projected circumference of individual long-bone fragments. Of the total specimens recovered, 1,193 fragments (95.2 percent) could only be assigned to the class of mammals, which reflects the highly fragmentary condition of the assemblage.

The remaining 60 bones (less than 5 percent of the sample) could be classified as belonging to one order, one family, two genera, and three species. Pronghorn (*Antilocapra americana*) bone was recovered primarily from Feature 16, and comprised 31.7 percent of the identifiable sample. Deer (*Odocoileus* sp.) bone, which consisted of seven specimens or 11.7 percent of the identifiable sample, occurred as single specimens within several features. Specimens assigned to the order Artiodactyla were highly fragmented and probably belong to the pronghorn or deer taxa. These three taxonomic categories suggest that large-mammal procurement was an important component of one or two of the occupations.

The remainder of the identifiable sample consisted of three specimens classifiable as belonging to the family Leporidae (rabbits), eight specimens of cottontail (*Sylvilagus audubonii*), and nine specimens of black-tailed jackrabbit (*Lepus californicus*). There was a specimen identified as *Canis* sp. and a single fragmentary bird bone that was assigned to the class of Aves. Small-mammal remains occur less frequently than large-mammal remains in the identifiable segment of the sample, but the small fragments included from the flotation sample weight the overall sample toward the presence of smaller body-sized taxa. Reversed proportions of small and large body-sized taxa in the general categories relative to the identified species may be characteristic of a highly fragmented assemblage (Mick-O'Hara 1994; Binford 1981b). Smaller elements, especially smaller mammal elements, tend to fragment more readily, which tends to inflate the small-mammal category. In these cases the fragmentation reveals more about processing and discard behavior at the site than about the size of animals taken.

Distribution of Faunal Remains

More zooarchaeological remains were recovered from features than from general excavation areas. The distribution pattern of small and large mammals provides some evidence of an occupational palimpsest (Binford 1983). Table 13 provides a breakdown of the recovered faunal materials by feature; remains from general excavation areas are assigned to Feature 0. Approximately one-fifth of the bone was recovered from general excavation areas. The small amount of bone scattered between isolated feature areas tends to support the integrity of those features, indicating limited horizontal disturbance and suggesting that occupations at the site were of sufficient duration to involve site maintenance activities, reducing the amount of scattered debris (Binford 1983).

Only five excavation units contained more than a few pieces of bone (Fig. 12): Excavation Units 5 (n=61), 19 (n=35), 20 (n=29), 21 (n=48), and 22 (n=25). The distribution of animal body sizes in the excavation units was similar to the pattern found in the feature areas. Excavation Units 5 and 22 contained mostly small-mammal remains, whereas Excavation Units 19 and 20 contained predominantly large-mammal remains; remains were mixed in Excavation Unit 21. The distribution in the excavation units of small- and large-bodied animals differs from that found in the features (Fig. 12). The most easily discernable pattern was found in Features 12 and 16, which were in Excavation Areas 19 and 20. The mostly large-mammal remains found in these features mirrored those found in the excavation units surrounding them, although small-mammal remains were also present (see also Table 13). Eighteen pronghorn specimens were found in Feature 16, a heavily burned refuse area. The one pronghorn specimen found in a refuse feature suggested that the animal was killed and processed in a single event. These excavation units and features containing a high percentage of large-mammal remains may represent a discrete occupation at LA 61282. This occupation may extend to the northwest and include at least parts of Feature 6, a discard area that contained a mixture of bone fragments from small- and large-bodied animals.

Small-mammal remains represented the majority of the bone recovered from Feature 1, a reused hearth area; Feature 2, a refuse area with hearth debris; Feature 3, a

Table 13. Faunal identification by taxonomic frequency.

	Feature																	
	0		1		2		3		5		6		9		10		11	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Mammals (indeterminate)	44	17.8	-	-	-	-	-	-	213	96.8	34	14.1	2	1.7	20	25.3	-	-
Small mammals	97	39.3	17	100.0	34	85.0	16	66.7	-	-	126	52.3	101	87.1	52	65.8	25	100.0
Medium mammals	32	13.0	-	-	-	-	-	-	7	3.2	25	104	4	3.4	2	2.5	-	-
Large mammals	59	23.9	-	-	5	12.5	4	16.7	-	-	47	19.5	6	5.2	1	1.3	-	-
Family Leporidae (rabbits)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syvilagus audubonii (desert cottontail)	3	1.2	-	-	-	-	-	-	-	-	5	2.1	-	-	-	-	-	-
Lepus californicus (black-tailed jackrabbit)	2	0.8	-	-	-	-	3	12.5	-	-	1	0.4	2	1.7	1	1.3	-	-
Canis sp. (dog, coyote, wolf)	1	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Order Artiodactyla (even-toed hoofed mammals)	6	2.4	-	-	-	-	-	-	-	-	2	0.8	-	-	-	-	-	-
Odocoileus sp. (deer)	2	0.8	-	-	-	-	1	4.2	-	-	1	0.4	1	0.9	-	-	-	-
Antilocapra americana (pronghorn)	1	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aves (birds)	-	-	-	-	1	2.5	-	-	-	-	-	-	-	-	-	-	-	-
Totals	247	100.0	17	100.0	40	100.0	24	100.0	220	100.0	241	100.0	116	100.0	79	100.0	25	100.0

	12		15		16		17		21		23		25		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Mammals (indeterminate)	-	-	2	100.0	21	9.7	-	-	-	-	-	-	2	100.0	338	27.0
Small mammals	6	33.3	-	-	86	39.8	2	100.0	2	100.0	2	100.0	-	-	566	45.2
Medium mammals	-	-	-	-	1	0.5	-	-	-	-	-	-	-	-	71	5.7
Large mammals	11	61.1	-	-	85	39.4	-	-	-	-	-	-	-	-	218	17.4
Family Leporidae (rabbits)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	0.2
Syvilagus audubonii (desert cottontail)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	0.6
Lepus californicus (black-tailed jackrabbit)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	0.7
Canis sp. (dog, coyote, wolf)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.1
Order Artiodactyla (even-toed hoofed mammals)	-	-	-	-	4	1.9	-	-	-	-	-	-	-	-	12	1.0
Odocoileus sp. (deer)	1	5.6	-	-	1	0.5	-	-	-	-	-	-	-	-	7	0.6
Antilocapra americana (pronghorn)	-	-	-	-	18	8.3	-	-	-	-	-	-	-	-	19	1.5
Aves (birds)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.1
Totals	18	100.0	2	100.0	216	100.0	2	100.0	2	100.0	2	100.0	2	100.0	1253	100

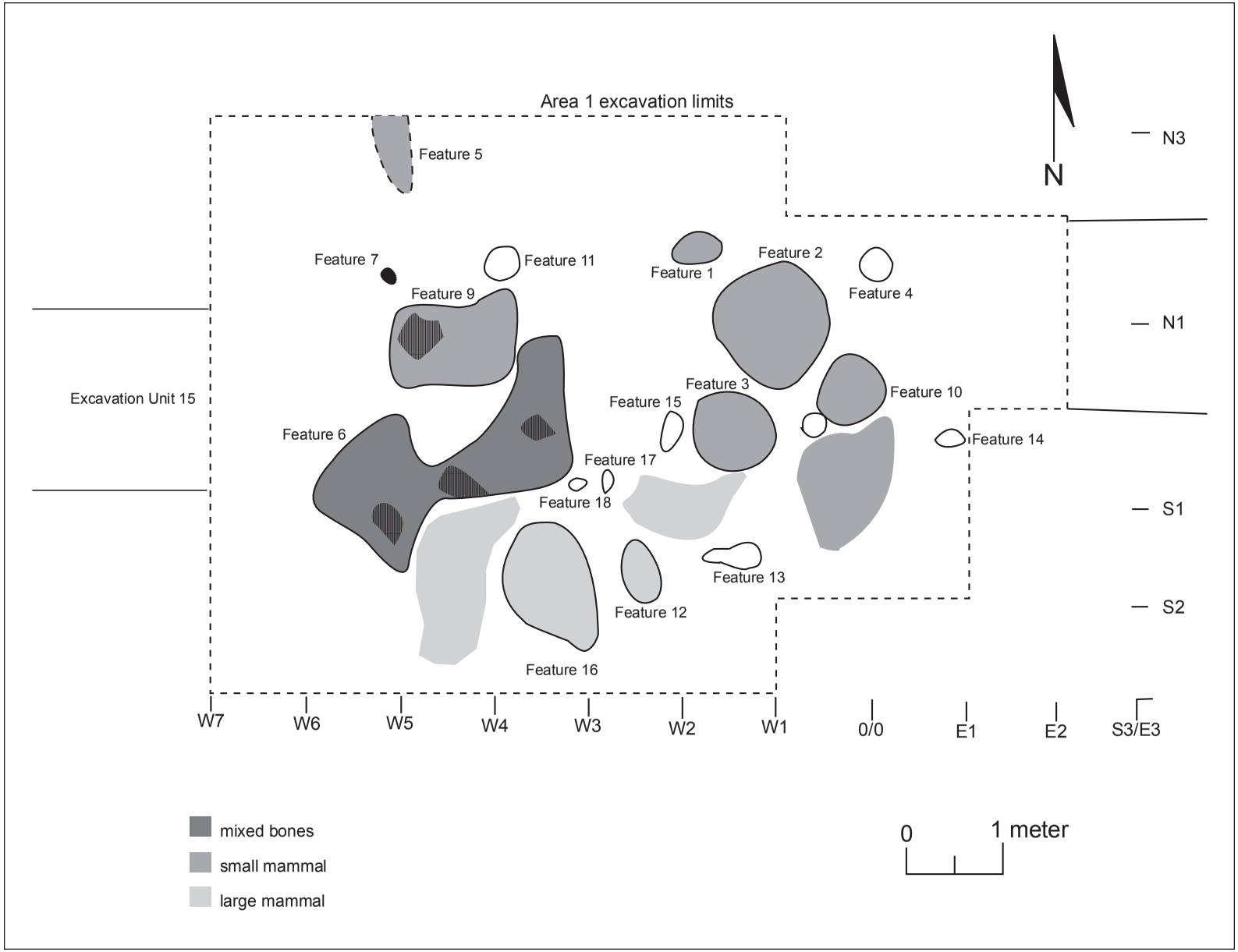

Figure 12. Distribution of animal bone in Excavation Area 1.

refuse pit; and Feature 10, a refuse pit. These features were associated with Excavation Units 5 and 25, which contained small and general mammal fragments; Excavation Unit 6 contained only medium and large mammal remains. These features may comprise another occupation at the site, one that concentrated on the capture and processing of lagomorphs and other small mammals, though fragments of large mammal bone occurred in Excavation Unit 6.

Small-mammal remains represent the majority of the bone fragments recovered from Features 6 and 9, and are considered remains from planned discard areas at LA 61282. These features and Feature 5 toward the north edge of the excavation area may be associated with both inferred occupation episodes or with a further special-use occupation of the same locale. The association of Features 6 and 9 with Features 1, 2, 3, 4, 5, and 11 in Activity Level 1 indicates that these features were all used during the same or depositionally close occupational episodes.

Patterns in the Burned Bone

In an attempt to better understand the patterns in the faunal remains recovered from LA 61282, all burning noted on the recovered bone was divided into three categories and plotted by excavation unit and feature association across the site. The categories were unburned, burned black, and calcined; Table 14 and Figure 13 show the distribution. These categories are relevant to the duration and intensity of exposure to a thermal source (Buikstra and Swegle 1989). Table 14 presents the degree of burning for each feature by taxonomic unit. Figure 13 shows the distribution of degrees of burning, with each feature shaded for the burning type exhibited on the largest percentage of bone for that area. Any features with minimal burning or a small number of associated bone fragments are not discussed below. The remaining features are discussed in relation to degree of burning and association with activity levels that have been postulated for the site.

Burned bone was recovered from a number of excavation units outside of features, but the greatest amount of burned bone was recovered from Excavation Units 5, 19, 20, 21, and 22, all of which contained both black and calcined bone fragments. This burned bone probably spread from feature areas (Schiffer 1976).

Feature 1, a probable hearth associated with Activity Level 1, contained only 17 pieces of small-mammal bone, but all were burned black to calcined. The recovery of bone from a hearth area suggests that some bone from meals was tossed into the hearth as part of maintenance activities at the site (Binford 1983). The degree of burning suggests that the bone was exposed to the heat of an active fire, resulting in loss of collagen from the bone. Collagen loss is incomplete in blackened bone and complete in calcined remains (Buikstra and Swegle 1989).

Feature 2, a refuse area associated with Feature 1 in Activity Level 1, contained some unburned bone (n=7), but 75.0 percent of the bone recovered from this feature was burned black (n=30), and 7.5 percent (n=3) was calcined. The mix of unburned and burned bone indicates that refuse from hearth areas and other processing areas was cleaned up and redeposited in Feature 2, supporting its identification as a refuse area. This kind of maintenance activity indicates that the site associated with Activity Level 1 was occupied long enough to warrant cleaning of the hearth and processing areas (Binford 1983).

Feature 3, a circular pit, contained similar amounts of unburned (n=11) and blackened (n=12) bone. This supports the interpretation of this feature as a refuse pit for both hearth remains and for unburned remains from processing and consumption. Feature 3, like Feature 2, may also be a dump associated with the use of Feature 1, a hearth area.

Feature 6, an amorphous stain speculatively associated with a structural area, produced 23.2 percent unburned bone (n=56), 59.3 percent blackened bone (n=143), and 17.4 percent calcined bone (n=42). Within this generally darkly stained feature were areas of more intense burning. These may have been hearth areas, but the faunal remains were provenienced only relative to the entire feature, and it is not possible at this point to speculate about more of the burned bone coming from these areas. The degree and type of burning suggest that this area served as a refuse dump from the cleaning of nearby hearth and activity areas.

Feature 9, an amorphous stain adjacent to Feature 6, is probably similar to Feature 6 in its use as a refuse area for maintenance activities at the site. Excavation notes for this feature suggest that it may have had at least two use surfaces. The greater incidence of unburned bone in this feature (34.5 percent, n=40), compared with Feature 6 (23.2 percent unburned, n=56), suggests a change in use for this part of the site over the sequence of occupations represented at LA 61282.

Features 1, 2, 3, 4, 5, 6, 8, and 9 were in a use level or activity level (Activity Level 1) that may reflect one to several occupations at the site. Radiocarbon dates from Feature 3 (2110 to 1775 B.C.) and from Feature 9 (1935 to 1645 B.C.) are close enough to have come from a single occupation, or they may indicate an occupational palimpsest. The bone from these features indicates that heavily fragmented faunal remains were

Table 14a. Burning on faunal remains by feature (Features 0, 1, 2, 3, 5, and 6).

	Feature																	
	0						1				2							
	Unburned		Black		Calcined		Black		Calcined		Unburned		Black		Calcined	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Mammals (indeterminate)	27	10.9	13	5.3	4	1.6	-	-	-	-	-	-	-	-	-	-	-	-
Small mammals	30	12.1	60	24.3	7	2.8	14	82.4	3	17.6	7	17.5	25	62.5	2	5.0		
Medium mammals	23	9.3	6	2.4	3	1.2	-	-	-	-	-	-	-	-	-	-	-	-
Large mammals	14	5.7	34	13.8	11	4.5	-	-	-	-	-	-	5	12.5	-	-		
Family Leporidae (rabbits)	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Sylvilagus audubonii (desert cottontail)	1	0.4	2	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lepus californicus (black-tailed jackrabbit)	2	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canis sp. (dog, coyote, wolf)	1	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Order Artiodactyla (even-toed hoofed mammals)	1	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odocoileus sp. (deer)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antilocapra americana (pronghorn)	1	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aves (birds)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	100	40.5	122	49.4	25	10.1	14	82.4	3	17.6	7	17.5	30	75.0	3	7.5		

	3						5						6					
	Unburned		Black		Calcined		Unburned		Black		Calcined		Unburned		Black		Calcined	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Mammals (indeterminate)	-	-	-	-	-	-	175	79.5	36	16.4	2	0.9	1	0.4	32	13.3	1	0.4
Small mammals	6	25.0	10	41.7	-	-	-	-	-	-	-	-	41	17.0	47	19.5	38	15.8
Medium mammals	-	-	-	-	-	-	7	3.2	-	-	-	-	4	1.7	20	8.3	1	0.4
Large mammals	4	16.7	-	-	-	-	-	-	-	-	-	-	5	2.1	40	16.6	2	0.8
Family Leporidae (rabbits)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sylvilagus audubonii (desert cottontail)	-	-	-	-	-	-	-	-	-	-	-	-	3	1.2	2	0.8	-	-
Lepus californicus (black-tailed jackrabbit)	-	-	2	8.3	1	4.2	-	-	-	-	-	-	-	-	1	0.4	-	-
Canis sp. (dog, coyote, wolf)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Order Artiodactyla (even-toed hoofed mammals)	-	-	-	-	-	-	-	-	-	-	-	-	1	0.4	1	0.4	-	-
Odocoileus sp. (deer)	1	4.2	-	-	-	-	-	-	-	-	-	-	1	0.4	-	-	-	-
Antilocapra americana (pronghorn)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aves (birds)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	11	45.8	12	50.0	1	4.2	182	82.7	36	16.4	2	0.9	56	23.2	143	59.3	42	17.4

Table 14b. Burning on faunal remains by feature (Features 10, 11, 12, 16, 17, and 21).

	Feature																	
	9						10				11			
	Unburned		Black		Calcined		Unburned		Black		Unburned		Calcined	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Mammals (indeterminate)	2	1.7	-	-	-	-	16	20.3	4	5.1	-	-	-	-
Small mammals	35	30.2	36	31.0	30	25.9	23	29.1	29	36.7	18	72.0	7	28.0
Medium mammals	-	-	4	3.4	-	-	-	-	2	2.5	-	-	-	-
Large mammals	1	0.9	3	2.6	2	1.7	1	1.3	-	-	-	-	-	-
Family Leporidae (rabbits)	-	-	-	-	-	-	3	3.8	-	-	-	-	-	-
Sylvilagus audubonii (desert cottontail)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lepus californicus (black-tailed jackrabbit)	1	0.9	1	0.9	-	-	1	1.3	-	-	-	-	-	-
Canis sp. (dog, coyote, wolf)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Order Artiodactyla (even-toed hoofed mammals)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odocoileus sp. (deer)	1	0.9	-	-	-	-	-	-	-	-	-	-	-	-
Antilocapra americana (pronghorn)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aves (birds)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	40	34.5	44	37.9	32	27.6	44	55.7	35	44.3	18	72.0	7	28.0

	12						16						17		21			
	Unburned		Black		Calcined		Unburned		Black		Calcined		Black		Unburned		Black	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Mammals (indeterminate)	-	-	-	-	-	-	10	4.6	11	5.1	-	-	-	-	-	-	-	-
Small mammals	6	33.3	-	-	-	-	12	5.6	56	25.9	18	8.3	2	100.0	1	50.0	1	50.0
Medium mammals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Large mammals	-	-	-	-	11	61.1	31	14.4	29	13.4	25	11.6	-	-	-	-	-	-
Family Leporidae (rabbits)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sylvilagus audubonii (desert cottontail)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lepus californicus (black-tailed jackrabbit)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canis sp. (dog, coyote, wolf)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Order Artiodactyla (even-toed hoofed mammals)	-	-	-	-	-	-	1	0.5	3	1.4	-	-	-	-	-	-	-	-
Odocoileus sp. (deer)	-	-	1	5.6	-	-	1	0.5	-	-	-	-	-	-	-	-	-	-
Antilocapra americana (pronghorn)	-	-	-	-	-	-	3	1.4	14	6.5	-	-	-	-	-	-	-	-
Aves (birds)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	6	33.3	1	5.6	11	61.1	58	26.9	114	52.8	44	20.4	2	100.0	1	50.0	1	50.0

sometimes discarded into hearths, and that occupation lasted long enough to necessitate hearth and activity area maintenance. The two use surfaces in Feature 9 suggest that some of these features may have accumulated refuse from more than one occupation. The mixing of burned and unburned faunal material may have resulted from multiple occupations, as may the size-grade separations seen between some of the features assigned to Activity Level 1.

Features 10, 12, 13, 14, 15, 16, 17, and 18 were in Activity Level 2, which represents an occupation later than Activity Level 1. Activity Level 2 may also reflect a sequence of occupations rather than a single event. Radiocarbon dates from Activity Level 2 (Feature 10) ranged from 1870 to 1450 B.C. These dates are close, but they may suggest more than a single occupational use of that feature. This variability within and between features enables exploration of the multiple uses of LA 61282.

Feature 10, a circular pit, had five stratigraphic levels reflecting three different episodes of use. Mixed burned and unburned materials in these strata suggest that it was a refuse pit. Small-mammal bone fragments accounted for most of the faunal sample from this feature; only one specimen was classified as a large-mammal bone fragment. Burning was evident on 44.3 percent (n=35) of the sample from Feature 10, with all of this burned black. Feature 10 seems to have been the receptacle for refuse from hearth areas and from general site clean-up.

Feature 11, a small circular pit north of Feature 9, contained only 25 pieces of bone (seven calcined, 18 unburned). This is similar to the other refuse features at the site, but the lack of bone exhibiting other levels of thermal alteration suggests that the few burned bones may relate to only one hearth cleaning episode. Buikstra and Swegle (1989:252) indicate that green or fleshed bone calcines more quickly, and results in more fracturing and spalling than dry bones. The calcined bone from this feature suggests that it was green bone discarded into a hearth rather than bone cleaned from areas some time after initial processing.

Feature 12, a small ash-filled pit associated with Activity Level 2, contained only 18 bone fragments (12 large-mammal, six small-mammal). All 12 pieces of large-mammal bone were burned black to calcined, suggesting that, as in Feature 11, it was green bone discarded into a hearth rather than bone cleaned from areas some time after initial processing.

Feature 16, a shallow ephemeral pit, also produced both burned and unburned bone. As in Feature 10, this feature appears to have been a refuse area for hearth and general site maintenance. As in Feature 12, however, blackened or calcined bone constituted 73.2 percent of the feature sample (n=158), which indicates refuse from processing. All the Pronghorn remains from the site were recovered from this feature, and the processing refuse from this feature was dominated by large-mammal remains, both of which suggest that its main function was large-mammal processing.

Discussion

LA 61282 produced only a modest faunal assemblage but the data do provide some insights into the accumulation of occupational debris that created this site. The patterning in the faunal assemblage supports the idea of multiple occupations and differential use of various features.

Although the size-grades of mammals overlap in various features at the site, there are some features in which either small-mammal or large-mammal (and certain specific large-mammal) remains clearly predominate. Small-mammal remains were recovered from most of the features investigated at LA 61282 associated with both Activity Areas 1 and 2. Small-mammal remains were recovered from all areas and strata, which suggests that small-animal procurement took place during most of the use episodes at the site. Large-mammal recovery was more concentrated: Features 12, 14, and 16 contained mostly large-mammal remains; in fact, Feature 16 contained the partial remains of a Pronghorn that was apparently killed, dressed, and eaten near the site.

The conclusion that this site was a location of multiple episodes of use is supported by features, such as Features 9 and 10, that exhibit multiple episodes of use; distributional separation of large and small animal remains; and maintenance activities involving green bone. At least one of these uses was as a special-use site involving the reduction of a single large mammal, a Pronghorn. The burning and fragmentation of bone associated with other features suggest that other episodes of use lasted long enough to necessitate the cleaning of hearth areas, and the cleaning of activity areas in which bone was discarded into refuse features. The conclusions derived from the site structure and faunal assemblage are further supported when other parameters thought to affect site frequency and placement in the area are considered.

Bayham (1979) suggests that climate during the Archaic period was an important influence on the character of human adaptation in the Southwest. The radiocarbon dates place this site at the end of a warmer, wetter episode during the altithermal period. This suggests that the transition zone in which LA 61282 is located may have been more productive and perhaps more extensive at the time of occupation than at other times

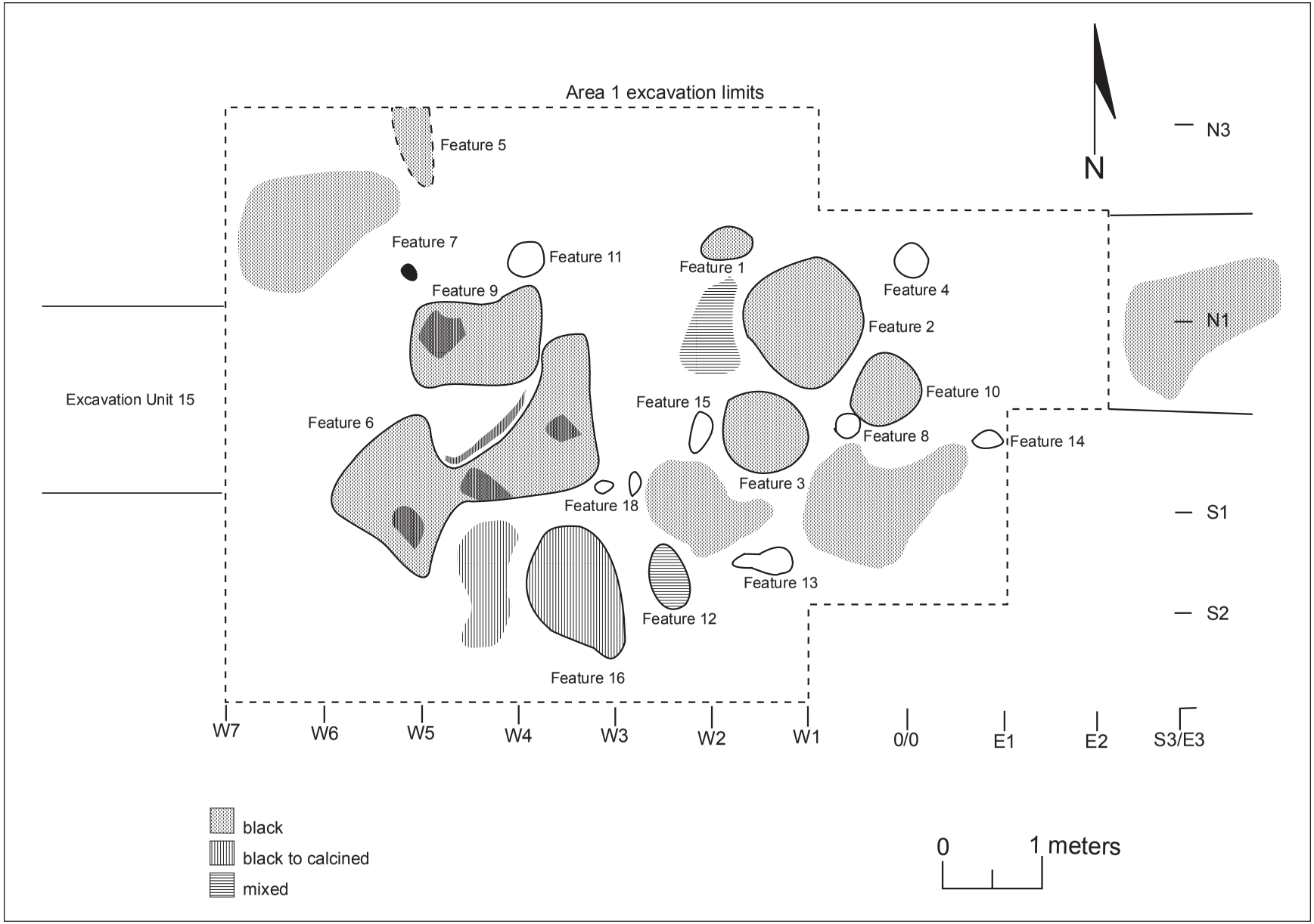

Figure 13. Distribution of burned bone in Excavation Area 1.

during the Archaic. If this argument is followed, the increase in the number and placement of Armijo phase sites was influenced by an increase in faunal and floral resources in this area. The large-game processing indicated during at least one episode at LA 61282 can be used to support this interpretation.

Increased site density during the Armijo phase and the multiple occupations evident at LA 61282 are suggested by other studies in this general area (Schmader 1994), but faunal assemblages showing the episodic use of small and large mammals in the area are lacking. Jelinek (1969:appendix) notes the emphasis on large-mammal procurement, plus the use of lagomorphs and other smaller animals, at the Tesuque By-Pass site. This is similar to what is seen in the smaller faunal assemblage from LA 61282, but the distributions seen at LA 61282 suggest that these animals were being procured during different occupational episodes at the site, while some occupations used a more generalized procurement strategy.

CHAPTER 8

Botanical Materials

MOLLIE S. TOLL

Introduction

Flotation and charcoal samples from LA 61282 add some perspective to the little-explored realm of plant use by humans during the Archaic period in the Santa Fe area. Early sites in this area have tended to be shallow and deflated, and lacking structures (all of which mitigate against preservation of perishables, even carbonized perishables). In addition to being rare, early Santa Fe area sites (and smaller limited-activity sites of all periods) suffer from lack of botanical analyses (Gossett and Gossett 1991; Schmader 1987), or from very low recovery of cultural botanical remains (this study; Dean 1993a, 1993b). Schmader's work on the southwestern edge of the city at Tierra Contenta (1994:12-14) documents the existence of structural sites dating to at least the Late Archaic and possibly earlier. He urges the careful examination and consideration of sites with extensive burn areas and an extensive stone tool kit as potentially representing more entrenched occupation than the term "campsite" would imply. A rich array of recovered weedy annual, grass, and perennial seeds at the Tierra Contenta sites points to broad-based subsistence activities, and encourages us to intensify the search for such information at other sites.

Methods

The seventeen soil samples collected during excavation were processed at the OAS using the simplified bucket version of flotation (see Bohrer and Adams 1977). Each sample (volume unknown) was immersed in a bucket of water, and heavy particles were allowed to settle for 30 to 40 seconds. The solution was then poured through a fine screen (mesh size approximately 0.35 mm) lined with a square of chiffon fabric, which captured floating and suspended organic material. The fabric was lifted out and laid flat on coarse-meshed 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× to 45×. All samples were examined in their entirety.

None of the flotation samples contained enough charcoal to allow identification of a 20-piece sample. Charcoal samples collected in the field (four from various levels in Feature 10, two from Feature 9, and one each from Features 15, 16, 21, and 24) were identified before radiometric analysis. Each piece was snapped to expose a fresh transverse section, and identified at 45x. Low-power, incident light identification of wood specimens does not often allow species- or even genus-level precision, but it can provide reliable information useful in distinguishing broad patterns of utilization of a major resource class.

Results

Recovery of botanical remains was poor: 14 of the 17 samples produced no plant parts at all (Table 15). Seeds in Feature 1 (a reused hearth), Feature 9 (an amorphous stain), and Excavation Unit 22 included unburned goosefoot, seepweed, and spurge (all probably noncultural contaminants). These taxa are weedy annuals that disperse myriad tiny seeds broadly across the landscape, which are often further rearranged by ants and rodents. Spring greens and goosefoot seeds have been widely used for human food, but seepweed and spurge have little nutritive or medicinal value. Establishing the identity of the single carbonized seed found in Feature 9 is important because it represents the only source of information about economic wild-plant use at the site, but it is only a fragment. This specimen is about 2 mm in greatest dimension (the whole may have been as large as 4 mm); the seed was flattened, about 0.5 mm thick, with a curved edge and traces of a rim. From Feature 3, a circular pit, burned fragments representing at least two piñon nutshells were recovered.

All recovered charcoal was coniferous, and was most abundant in Feature 10, a circular pit a little under a meter in diameter, with five stratigraphic layers representing three episodes of utilization. Piñon dominated in Stratum 5 and Level 6 of Feature 10, juniper dominated in Level 7, and approximately equal amounts of juniper and piñon were present in Stratum 3 (Table 16).

Features 3 (a circular pit) and 5 (a concentration of lithic artifacts) contained largely piñon wood, whereas Features 15, 21, and 24 (all oval pits) contained mostly juniper. Both samples from Feature 9 (an ashy stain) contained both juniper and piñon.

Discussion

Given the very poor preservation and recovery of botanical remains at LA 61282, it is both useful and reassuring to look at these results in concert with other Santa Fe area studies (Tables 17 and 18). Several observations can immediately be made. Recovery of cultural botanical materials is generally poor in the earlier sites; future studies might profitably focus on greater (rather than lesser) recovery efforts, such as larger individual soil samples, and scanning more samples. Density and diversity of economic plant remains both increase dramatically in sites of the Developmental, Coalition, and Classic periods. Until parameters of differential preservation at the shallow early sites versus deeper later sites are explored, it will not be possible to distinguish fully between differences in economic adaptation and preservation bias. Cultivars have been recovered to date in the Santa Fe area only from post-Archaic period sites. From smaller open sites, crop remains consist simply of low-frequency corn fragments; signs of farming become far more abundant (whole storage rooms stacked knee-deep with burned ears of corn) and diverse (including squash or pumpkin stems,

Table 15. Flotation and macrobotanical results.

Sample	Charred Seeds (Possibly Cultural)	Unburned Seeds (Probable Contaminants)		
		Chenopodium (Goosefoot)	*Suaeda* (Seepweed)	*Euphorbia* (Spurge)
FS 63, Feature 4 fill				
FS 88, Feature 1		1		
FS 123, Feature 6, Excavation Unit 19				
FS 134, Excavation Unit 22			1	
FS 142, Grid 16, Feature 6				
FS 146, Feature 6, Excavation Unit 13				
FS 153, Feature 9, Excavation Unit 13	one unidentifiable seed		1	3
FS 164, Feature 6, Excavation Unit 13				
FS 164, Feature 9, N1/2, Excavation Unit 13				
FS 189, Feature 10, Excavation Unit 2				
FS 200, Feature 11, N1/2, Excavation Unit 18				
FS 201, Feature 11, S1/2, Excavation Unit 12				
FS 206, Feature 10, Excavation Unit 2				
FS 284, Feature 6, NW 1/4, Excavation Unit 13				
FS 286, Level 4, Excavation Unit 5				
FS 287, Feature 2, Excavation Unit 6				
FS 288, Feature 3, SE 1/4, Excavation Unit 10		2		
Total (flotation)	1	3	2	3
FS 190, Feature 3 (macrobotanical)	two *Pinus edulis* nutshells			

rind, seeds, and flesh, and several hundred beans) in the deep rooms of the large, late pueblo at Arroyo Hondo. This pattern reflects partly a site-type difference in the conditions that allow for the deposition and preservation of more fragile remains, and partly a distinctly greater emphasis on the agricultural basis for sustaining a concentrated human population.

Sites of all periods reflect the desirable food and fuel resources of the ambient piñon-juniper woodland. Juniper seeds, berries, twig fragments, pine nutshell, umbos (conescales), and needles are found at nearly all area sites (less so at the lower elevation Airport Road, where vegetation approaches a Great Basin grassland formation, sacaton-saltbush-juniper association [Donart, Sylvester, and Hickey 1978]). Charcoal was collected largely from burn features at these sites, and generally represents fuel use. Some insight can be gained into availability and selection of construction materials from Arroyo Hondo tree-ring specimens, which show definite signs of depletion of prime construction elements (including ponderosa pine and douglas fir) over time. Age at cutting (and presumably size) decreases from an average of 75 years in the first component to 34 years in the second (Creamer 1993:139). We know from the detailed wood data obtained at Chaco Canyon that fuel and construction wood are likely to have very different selection trajectories (Toll 1985, 1987; Windes and Ford 1991). Thus, aggregating wood specimens from all functional contexts at Arroyo Hondo (Creamer 1993:Table 7.1) obscures important data; given that more than 95% of the site's juniper specimens come from a single Component II trash lens (likely originating as fuel, not building timbers), it is clear that trends in construction material use over time cannot be read from this single table. With the exception of a tiny fraction of riparian (cottonwood-willow) wood at Dos Griegos, coniferous wood is the primary fuel in all time periods. Even at Airport Road, where present-day junipers and especially piñons are considerably sparser, there is no sign of saltbush use, which suggests that density and duration of population pressure was not sufficient to impact availability of preferred fuel types.

Table 16. Species composition of wood.

FS	Provenience	Weight (g)	Composition (%)		
			Juniperus	*Pinus edulis*	Undetermined conifer
	Feature 10				
223	Stratum 3	2.07	48	52	0
228	Stratum 5	5.13	0	92	8
204	Level 6	7.19	14	71	15
208	Level 7	7.69	80	13	7
	Feature 10 total	22.08	37	54	9
53, 56	Feature 3	0.80	-	100	-
126	Feature 5	0.70	-	96	4
165, 179	Feature 9	1.28	29	66	5
243	Feature 15	0.36	22	78	-
250	Feature 16	0.35	9	91	-
267	Feature 21	1.31	100	-	-
263	Feature 24	0.50	98	2	-
	Site total	27.38	38	54	8

Summary

Cultural plant materials at the LA 61282 consisted of charcoal from burn features, two burned piñon nutshells, and a carbonized fragment of an unidentifiable seed. This paucity of informative plant remains is a reminder that preservation of perishables tends to be poor at early sites, especially when they are shallow and disturbed, and that extra effort may be required to recover very low frequency botanical artifacts. Given generally poorer spatial definition and differentiation in the earlier periods, this extra recovery effort will most likely take the form of larger volumes of soil processed for flotation. Fuel use at LA 61282 was wholly coniferous, despite local availability of saltbush and other shrubs, which were a major component of fuelwood in areas of the Colorado Plateau and Rio Grande Valley, where conifers are less abundant.

Other sites in the Santa Fe area exhibit broad similarities (regardless of chronological period) in the abundance of conifers used for for fuel, food, medicinal, and ceremonial purposes. Valuable perennial resources, including piñon nuts, a variety of cacti, yucca, and one instance of chokecherry, are more prominent (in terms of diversity and ubiquity) than in areas of lower elevation in the Southwest. Goosefoot is the most widespread economic annual, although there are regional appearances of purslane, winged pigweed, and bugseed in the Archaic era, and the addition of beeweed, groundcherry, and sunflower later on. Grasses are limited to *Sporobolus* (dropseed or alkali sacaton) at the south end of town, and Indian ricegrass in the Arroyo Hondo foothills. To date, all evidence of farming derives from the Developmental or later periods in the Santa Fe area.

Table 17. Comparative carbonized wood remains from Santa Fe area sites of the Archaic and other periods.

Project/Site	No. of Samples (total weight or no. of pieces)	*Juniperus*	*Pinus*	Other Species/ Comments
Archaic				
Airport Road	12 (27.38 g)	38%	54%*	8% undetermined conifer
Tierra Contenta[1]	3	dominant in two samples	dominant in one sample	
Later sites				
Agua Fria Schoolhouse[2]	4	dominant in two samples; co-dominant in one sample	dominant in one sample; co-dominant in one sample	
Arroyo Hondo[3]	(1108 pieces)	21%	37%*	33% ponderosa pine 4% douglas fir 6% other
Dos Griegos[4] (site 283-3)	5 (108 pieces)	18%	80%*	2% Salicaceae
Unknown age				
Santa Fe Bypass[5]	2 (40 pieces)	43%	53%*	4% undetermined conifer

**Pinus edulis* (piñon)

[1]McBride 1994

[2]Cummings 1989

[3]Creamer 1993:Table 7.1

[4]Cummings and Puseman 1992

[5]Toll 1989:Table 1

Table 18. Comparative carbonized flotation remains from Santa Fe area sites of the Archaic and other periods (percent of samples found in).

Project/Site (No. of Samples)	Annuals	Grasses	Trees	Other Perennials	Cultivars
Archaic					
Airport Road (17)	undetermined 6%		*Pinus edulis* nutshell (macrobotanical sample)		
Tierra Contenta[1] (40)	*Amaranthus* 3% cheno-am 30% *Chenopodium* 50% *Corispermum* 8% *Portulaca* 10% *Croton* 3%	Gramineae 3% *Sporobolus* 5%	*Juniperus* seeds 30% *Juniperus* twigs 25% *Pinus edulis* nutshell 3% *Pinus edulis* umbos 8%	*Platyopuntia* 3% *Opuntia* 3%	
Later sites					
Agua Fria[2] (5)	cheno-am 80% *Chenopodium* 40% *Portulaca* 20% *Cycloloma* 20% *Cleome* 20% undetermined 40%	Gramineae 20%	*Juniperus* twigs 100% *Pinus* needles 80% *Pinus* nutshell 40% *Pinus* umbos 60% *Pseudotsuga* needle 20% *Quercus* acorn cap 20%	*Echinocactus* 20% *Equisetum* stem 20%	*Zea* 80% (*Cucurbita* pollen)
Arroyo Hondo[3] (174)	cheno-am 34% *Portulaca* 16% *Cycloloma* 9% *Physalis* 5% *Cleome* 5% *Helianthus* 3%	*Oryzopsis* 7%	*Juniperus* berry 1% *Pinus* nutshell 4% *Pinus* umbos also present	*Echinocereus* 10% *Mammillaria* 2% *Opuntia* 2% *Yucca* 3% *Prunus* 1%	*Zea* 82% *Cucurbita* 5% *Phaseolus* 7%
Dos Griegos[4] (5)			*Pinus* barkscales 60%		*Zea* 40%
Santa Fe ByPass[5] (3)			(unburned *Pinus* needles)		
Unknown age					
Santa Fe Bypass[5] (4)			*Pinus* bark 25% unburned *Juniperus* twigs 75% *Juniperus* seeds or berries 50%		*Zea* 25%
Arroyo Frijoles[6] (2)			*Pinus edulis* needles 50% *Juniperus* scale leaves 50%		

Specimens are seeds unless otherwise specified.

[1]McBride 1994

[2]Cummings 1989

[3]Wetterstrom 1986:Table 34

[4]Cummings and Puseman 1992

[5]Toll 1989:Table 1

[6]Dean 1993

CHAPTER 9

Research Questions and Conclusions

Excavation at LA 61282 revealed an archaeological record more complex than that expected from the initial testing results. Subsurface cultural deposits were expected, but not the 24 pit features, discard areas, and artifact concentrations. This feature concentration was associated with a diverse assemblage of stone tools and tool manufacturing debris, as well as grinding implements, the most abundant Archaic period zooarchaeological assemblage reported for the Tewa Basin, and a range of radiocarbon dates that suggest occupation between 2000 and 1400 B.C. Surface artifacts occurred in five discrete concentrations that reflected differing temporal use of the site and changing land-use strategies from the Late Archaic to the middle Classic periods. As such, the excavation data provide the basis for considerable intrasite and intersite comparisons. Initial research questions covered population migration versus long-term and gradual local population growth; changes in site structure that might reflect changing settlement and subsistence organization in response to climatic or demographic pressures; the organization of the hunter-gatherer subsistence system relative to technology and facilities; and the utility of examining small sites in terms of settlement and subsistence organization, such as forager, collector, farmer/forager, or farmer/hunter, as they are inferred to have occurred in the past.

The LA 61282 temporal, feature, and artifact data will be summarized for each spatial or temporal component. These data will be compared within the context of LA 61282 and interpreted in terms of the relevant research questions. Then the LA 61282 data will be compared with other excavated sites in the Tewa Basin to address research questions on a more regional level.

Summary of Excavation Results

Investigation of five discrete artifact concentrations yielded no subsurface deposits at Excavation Areas 2, 3, and 4. Excavation Areas 2 and 3 failed to yield temporally diagnostic materials, but had artifact assemblages similar to those recovered from Excavation Areas 1 and 5. Excavation Area 4 also had pottery from the Coalition and Classic periods, in contrast to the predominantly Archaic occupations of Excavation Areas 1 and 5. Excavation Area 1 yielded 22 subsurface pit features or discard areas that radiocarbon date to the Armijo phase of the Oshara Tradition. Additionally, the surface and near-surface deposits of Excavation Area 1 yielded three En Medio style dart point bases that indicated a later component overlying the deeper Armijo phase component. Excavation Area 5 yielded two possible subsurface features, but little associated material. Potentially, there are at least seven temporal components represented in the LA 61282 artifact and feature assemblage. These seven components are briefly summarized as an introduction to a comparative analysis.

Excavation Area 1, En Medio Component

The identification of this Late Archaic component of Excavation Area 1 was based on the three surface projectile point bases associated with surface and near-surface tool manufacture and core reduction debris. Artifacts occurring in the upper excavation level of Excavation Area 1 were noted by field archaeologists, but the extent and nature of the cultural materials were not investigated in detail. The identification of this Late Archaic component, therefore, occurred in the lab after analysis was completed. In retrospect, there should have been a more thorough treatment of this cultural deposit, but the component can be separated from the earlier Armijo phase component and is available for the intrasite and intersite comparisons.

The chipped stone assemblage strongly emphasized tool manufacture employing Jemez obsidian and local raw materials. The relatively abundant debris in association with the three dart bases indicated a repeated occupation over a short period, which is supported by the highly similar form and size of the dart bases. The dart bases indicate that exhausted or broken dart points were discarded, and that dart foreshafts were refurbished with darts made on-site.

No thermal or pit features were encountered with the chipped stone debris. Their absence could mean that occupation focused on tool production or gearing up for the hunt with limited or no other subsistence or domestic activities. If features really were absent and not missed by hasty excavation, then this temporal component may remain from the logistical component of a residentially stable group. The base or residential camp was located near a permanent water source in conjunction with abundant fall plant resources. The abundance of obsidian suggests that this camp may be located closer to the Rio Grande, where obsidian could easily be procured from primary or secondary sources. The water-worn cortex on some of the obsidian indicates that it may have come from a secondary or redeposited gravel source.

Armijo Phase Excavation Area 1: Activity Level 1 Component

Activity Level 1 included Features 1, 2, 3, 4, 5, 6, 7, 8, 9, and 11. This feature cluster included four probable discard areas, two hearths, a possible posthole, and three undifferentiated pits that may have been temporary warming pits or limited-use hearths. Features 2, 5, 6, and 9 were discard areas; Features 6 and 9 were formed by multiple episodes. Faunal evidence indicates processing and consumption of small and large mammals, including *Sylvilagus audubonii*, *Lepus californicus*, *Odocoileus* sp., and *Antilocapra americanus*. Burned bone suggests that bone was discarded into an active fire as a maintenance behavior or to be used as fuel. The presence of abundant unburned bone microchips suggests bone processing or splintering with minute pieces swept into dormant hearths or directly into discard areas.

Feature 5 was highly unusual because of the more than 11,000 obsidian microchips associated with abundant unburned bone chips. Combined, the artifacts and bone suggest activity area or work space cleaning with the Feature 5 area selected for discard because it was outside the main activity space. Such planned discard is expected for longer term occupations when removal of sharp or dangerous items from activity space would have periodically occurred (Kent 1992). Features 3 and 11 were small hearths that could have been used to roast or dry meat, or for heating. Combined, the feature cluster in Activity Level 1 appears to be from multiple short-term residential occupations.

Excavation Area 1, Activity Level 1 was radiocarbon dated by wood charcoal recovered from Features 3 and 9 (Fig. 14). Feature 3 yielded a 2-sigma calibrated and corrected date range of 2110 to 1775 B.C. (Beta-95886). Feature 9 yielded a 2-sigma calibrated and corrected date range of 1935 to 1645 B.C. (Beta-95887). These date ranges overlap statistically, but are sufficiently different to suggest that Excavation Area 1, Activity Level 1 may represent an accumulation of material from multiple occupation episodes.

Armijo Phase Excavation Area 1: Activity Level 2 Component

Activity Level 2 included Features 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 24, and 25. This feature cluster was 5 to 8 cm below Activity Level 1, and included one formal reused hearth, two discard areas, eight small undifferentiated pits, and one possible structure outline. These features formed an arc south of the Activity Level 1 cluster. Farthest south was Feature 25, the possible structure outline. Staining, artifact density, and other indicators of occupation intensity were low near Feature 25, and increased to the north into the main cluster. Features 12 and 16 were discard areas that contained primarily large-mammal bone, though small-mammal bone was present. The bones were both burned and unburned, and suggested a similar pattern of use as described for Activity Level 1. The arc-shaped feature distribution is consistent with organized activity space meant to optimize feature use without interfering with activity area traffic. The Activity Level 2 feature cluster was similar to Activity Level 1, and reflected short-term domestic activity.

Only Feature 10 yielded enough wood charcoal for radiocarbon dating. Three samples were submitted from two different strata within Feature 10. Two samples (Beta-777672 and Beta-77673) yielded the same 2-sigma calibrated and corrected date range of 1745 to 1450 B.C. The third sample from Feature 10 (Beta-77671) yielded a 2-sigma calibrated and corrected date range of 1870 to 1520 B.C. These date ranges overlap statistically, suggesting that reuse of Feature 10 occurred over a short period. Short-interval reoccupation would result in the reuse of features or facilities as well as an accumulation of debris that would resemble more intensive or larger-scale occupation (Binford 1981a; Camilli 1989; Vierra 1985).

Excavation Area 2

Excavation Area 2 was a surface concentration of chipped stone artifacts. They were recovered from a 10-m diameter area, indicating that the assemblage could remain from a single occupation. Two partial bifaces were associated with the chipped stone debris, 86.4 per-

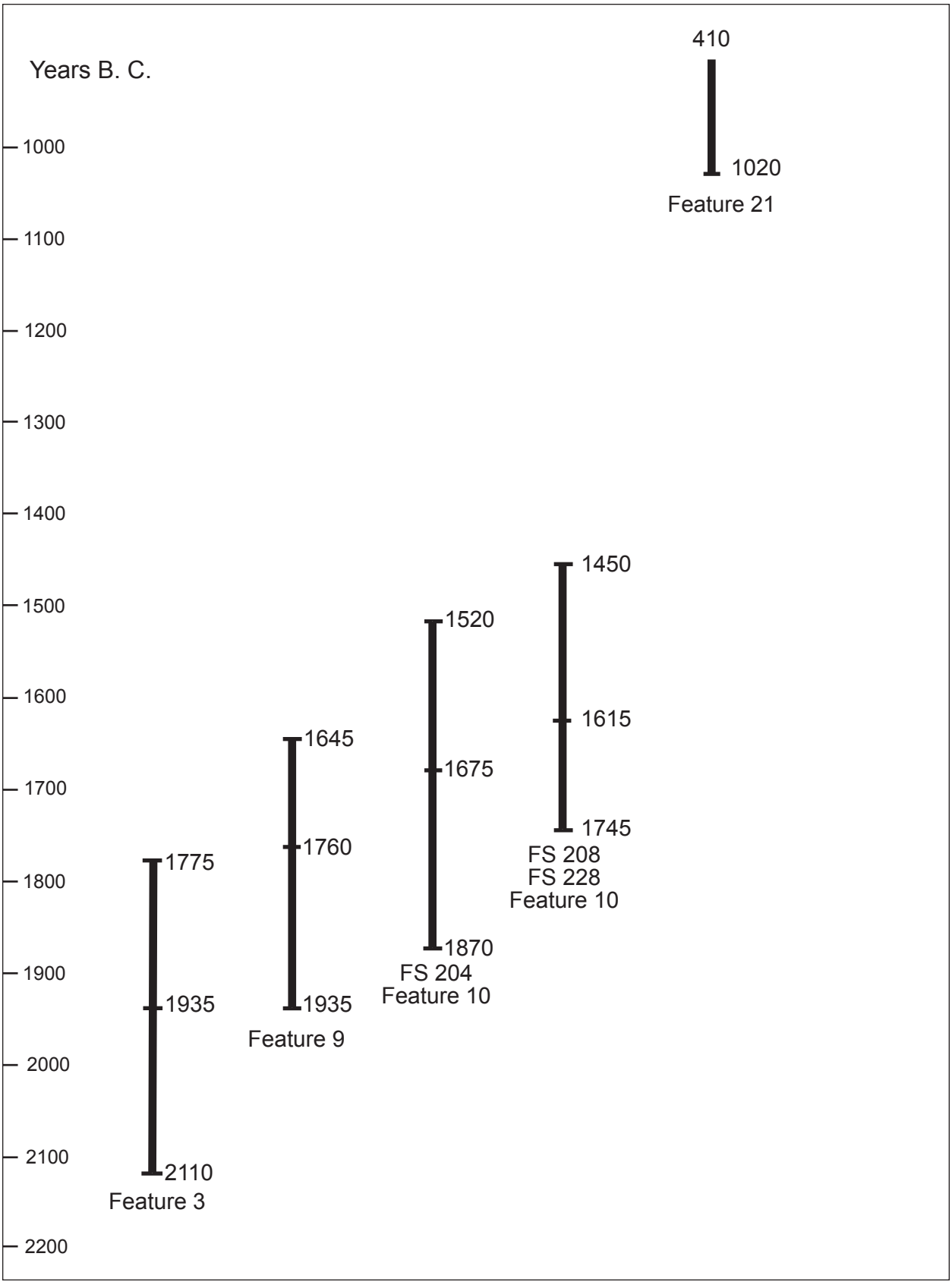

Figure 14. Radiocarbon dates (2-sigma calibrated).

cent of which was discard from tool manufacture. No temporally diagnostic artifacts were recovered from Excavation Area 2. Assemblage similarity with Excavation Area 1, En Medio Component, Excavation Area 3, and Excavation Area 4, suggests that Excavation Area 2 dates to the En Medio phase (800 B.C. to A.D. 400).

Excavation Area 3

Excavation Area 3 (12 m north to south, 10 m east to west) was 25 m north of Excavation Area 1. Only surface artifacts were recovered from this area: the 48 chipped stone artifacts included two En Medio style dart point fragments, a biface, and 83 fragments of tool manufacturing debris. The majority of the tool manufacturing debris was obsidian, as were the projectile point fragments and biface.

No thermal or pit features were found with the chipped stone debris, which could mean that occupation focused on tool production or gearing up for the hunt with limited or no other subsistence or domestic activities. If features really were absent, then this temporal component may remain from the logistical component of a residentially stable group. The base or residential camp was probably located nearer to a permanent water source in conjunction with abundant fall plant resources. The abundance of obsidian suggests that this camp may be located closer to the Rio Grande, where obsidian could easily be procured from primary or secondary sources.

Excavation Area 4

Excavation Area 4 was different from the other areas because of the occurrence of pottery and a predominance of core flakes. Twenty-one chipped stone artifacts and 22 potsherds were recovered from the surface. The pottery manufacture dates reflect occupation in the early fourteenth century A.D. and from A.D. 1490 to 1515; that is, two distinct temporal components with the earlier component associated with occupation of Pindi Pueblo to the north or Cienega Pueblo to the south. The San Lazaro Glaze-on-polychrome pottery could have originated from Cieneguilla Pueblo, which was inhabited into the early historic period. Distinctive of an occupation centered on the Santa Fe River is the predominance of locally available chert in the chipped stone assemblage. Also, the predominance of core flakes reflects a foraging strategy, where the foraging group returned to the village at night or after one or two nights of camping. No features or subsurface materials were found in this area.

Excavation Area 5

Excavation Area 5 was 20 m northeast of Excavation Area 2. Forty-four chipped stone artifacts were recovered from the surface. Two thermal features (Features 21 and 23) were exposed in a backhoe trench. No artifacts were associated with the features. Feature 21 yielded a radiocarbon date of 1020 to 410 cal B.C. (Beta-95877), which places it in the late Armijo or En Medio phases of the Oshara tradition. The association between the artifacts and features is unclear. The predominance of manufacturing flakes was similar to Excavation Areas 1, 2, and 3. The emphasis on the use of obsidian is also similar to Excavation Areas 2 and 3.

Excavation Area 5 had a low feature count, and a low-frequency artifact assemblage focused on tool manufacture using non-locally available raw materials. These two lines of evidence suggest that Excavation Area 5 was a repeatedly used logistical site that was occupied briefly during each episode. It differs from the other areas (except for Excavation Area 1) in that it had two subsurface thermal features. These indicated light burning and were not accompanied by a darkly stained halo that would indicate regular or long-term feature maintenance or remodeling. The features may indicate a longer occupation than occurred at Excavation Areas 2 and 3, but it also may reflect a failure to locate lightly burned buried features in those areas. The lack of additional cultural material associated with Features 21 and 23 may be a reflection of restricted recovery efforts rather than evidence of its absence.

In summary, the LA 61282 artifact assemblages and features remain from at least seven different occupation episodes. Excavation Areas 2, 3, and 5 appear to remain from short-term logistically organized trips focused on tool manufacture or maintenance and, by inference, hunting during the En Medio period of 800 B.C. to A.D. 400. Excavation Area 1 had a surface and near-surface component that was also from the En Medio period. This component, however, had an artifact assemblage similar to but more abundant than Excavation Areas 2, 3, and 5, suggesting repeated occupations that resulted in an accumulation of debris. Excavation Areas 1 and 5 had subsurface components with thermal features and discard areas, but a strong contrast in the abundance of features, artifacts, and discarded faunal remains. Excavation Area 5 had two thermal features and no associated artifacts; it radiocarbon dated to the En Medio phase, suggesting rough contemporaneity with the Excavation Area 2 and 3 deposits, with sufficient passage of time between occupations to allow soil to accumulate between the surface artifact assemblage and the subsurface features. Excavation Area 1 subsurface had two stratigraphically defined components with

radiocarbon dates from the same statistically defined population. These components had abundant evidence of biface manufacture, faunal resource processing and consumption, but very limited evidence of wild plant processing and no evidence of cultivation. In essence, the two Excavation Area 2 components were almost identical, suggesting planned reoccupation during a time when predicted success of hunting and foraging would be high. There were, however, no structural components associated with these occupations, indicating that occupants intended to stay for a short time before moving on.

Indigenous or Immigrant?

The question of population origin originally posed by Lent in 1988 is compelling, and directly relevant to the issue of the peopling of the northern Rio Grande. The origin of the Native American population in the northern Rio Grande (commonly known as Pueblo Indians) has long been an issue for culture historians. It had been assumed by many (Mera 1935; Wendorf and Reed 1955; Peckham 1984) that Pueblo ancestral populations migrated into the northern Rio Grande from the west or south. The null hypothesis of this assumption is that there was no resident population in the northern Rio Grande at the time of the first pueblo-like settlements along the Tesuque River. Investigators failed to adequately test the immigration proposition because they lacked the ability to accurately date non-ceramic sites, and lacked the driving interest to better describe and interpret non-ceramic or Archaic period sites.

A feature of this dichotomy between indigenous and immigrant populations is the belief that we can discern a difference in the two from the cultural materials, features, and deposits in the northern Rio Grande archaeological record. Deeply embedded in all cultural-historical sequences that span the transition from Archaic hunter-gatherers to sedentary Pueblo farmers is the co-occurrence of pottery, the bow and arrow, formal storage features, and substantial or semi-permanent architecture. In other areas of the Southwest, such as the Anasazi west or the Mogollon south, a chronological sequence of occurrence for these traits can be mapped through time if not evenly through space. When these clustered traits could not be found or occurred out of sequence, the belief in their cultural/temporal significance of was so strong that occupation hiatus, regional abandonment, or population void was invoked to explain the mysterious deviation from the expected pattern. Thus, a region as large as the northern Rio Grande, which lacked the salient traits of the known developmental sequence demonstrated for other areas, had to have been empty, abandoned, or used only casually by a small population.

Investigations in the 1980s and early 1990s did not further clarify the issue. No one investigator can strongly support either origin model for the modern Pueblo peoples. Critical gaps still and may always remain. From the LA 61282 evidence, conditions that preceded settlement by agricultural populations can be suggested.

The site structure for LA 61282 was interesting in how it related to settlement patterns and mobility. The site area defined by the artifact scatter limit covered the relatively large area of 12,000 square meters, within which were four spatially discrete Archaic period components from the Armijo and En Medio phases dating between 1900 and 400 B.C. The spatial components were distributed in a linear pattern along a north-south axis. Excavation Area 1, which had a density and array of pit features, and discard and activity areas not duplicated in the other areas, was repeatedly occupied during the early Armijo phase. Features overlapped, camp debris was intermixed, and discard areas accumulated with no apparent recognition of previous occupation; alternatively, the close proximity may have been intentional with some features being reused, resulting in a massive accumulation of camp debris. The En Medio phase components were not intensively examined, but they appear to be from shorter, less intensive occupations that supported hunting. These lesser components appear to be sequentially occupied logistical camps that were located so they did not overlap previous camps. This lack of overlap in the later components may reflect temporal distance between occupations with no reuse of previous debris or features, or a choice by Archaic hunters to avoid old camps in favor of new locations within the same general area.

Examination of a comparably sized camp (LA 84787) on a ridge top overlooking the Arroyo Calabasas in the Las Campanas area to the north reveals some surprising spatial similarities that may also have similar temporal dimensions. LA 84787 was a spatially extensive site covering almost 11,000 square meters. It had five spatially distinct occupation areas defined by surface chipped stone debris (Post 1996a:235-287). Area 2 had Armijo and En Medio style projectile points, and Area 3 had one San Pedro style projectile point. No radiocarbon dates were obtained, but an occupation date range of 1100 to 600 B.C. was suggested for the site (Post 1996a:280). What is interesting is the occupation pattern. Area 2 exhibited a near-surface occupation, evidenced by chipped stone and a few ground stone fragments. A subsurface component included thermal or processing features, abundant core reduction debris, and some ground stone. Stratigraphy, combined with projectile point styles, suggested an Armijo phase occupation overlain by an En Medio phase occupation. The abun-

dance of chipped stone debris and the thickness of the accumulated deposit suggested intensive and perhaps repeated Armijo phase occupations. For the remainder of the site, the three of the four artifact concentrations were distributed in a linear pattern from south to north from Area 2; the fourth area was offset to the west. The areas were separated by 20 to 40 m. These potential En Medio phase or later camps were reoccupied for short periods; Areas 3 and 4 yielded only simple hearths. LA 84787 seems to have the same spatial occupation pattern as LA 61282; parallels also exist in the occupation patterns of similar areas within the two sites. One area within each site was heavily used by Armijo phase populations, then was less intensively occupied by a later population with subsequent camps distributed to the north along the ridge line.

Do the three less intensively occupied loci at each site represent small-scale seasonal aggregation with accumulation of lithic debris resulting from multiple low-intensity occupations over a brief period (less than a generation), or are these sequentially occupied camps that reflect a change in settlement strategy from an earlier pattern to reoccupy previous camps in order to reuse facilities or raw material? The greatest contrast between LA 61282 and LA 84787 is in the artifact assemblages. LA 84787 assemblages consisted mostly of core-reduction debris dominated by expediently reduced local chert, quartzite, and other fine- and medium-grained materials. These lithic raw materials occur in the Ancha formation gravel in a spatially patchy distribution of cobbles and nodules. LA 84787 assemblages are interpreted as indicating a more balanced subsistence strategy, such as would characterize foraging; greater focus on wild plant resources is suggested, though direct evidence for plant processing was found infrequently in feature contexts. LA 61282 had a predominance of tool manufacture debris, most of which was obsidian not available locally. Ancha formation gravels were long removed from the Plains surface, leaving fewer sources of Madera chert. Since chert and obsidian were used in essentially the same way at LA 61282, the abundance of obsidian does not reflect a strong preference for obsidian for tool manufacture. Instead it suggests that site occupants were less knowledgeable about local raw material sources in the piedmont, did not travel upriver into the piedmont area, or had recently come from the Jemez Mountains where they had obtained obsidian for immediate use at LA 61282. This high frequency of obsidian coupled with the atypically high frequencies of faunal remains (including the large-mammal remains from the Excavation Area 1, Armijo phase components) indicates that occupants were anticipating gear needed for the hunt, and locating the site where access to large mammals would promote a successful hunt.

Raw material and manufacturing debris distributions for these two sites, each of which had at least five Archaic components from Armijo and En Medio phases, are at opposite ends of a continuum, yet they are only 12 km apart. Their environmental settings are not drastically different: LA 61282 was at the edge of, possibly in, the juniper-grass plains adjacent to the Santa Fe River; LA 84787 was on a ridge at the westernmost extent of the pinon-juniper piedmont overlooking the juniper-grass plains and the Santa Fe River valley. LA 61282 occupants brought obsidian from the Jemez Mountains rather than travel upriver to the local chert sources, and concentrated on hunting during all occupations. LA 84787 occupants used almost no obsidian, but left evidence of a subsistence strategy that was more balanced or that was more dependent on wild plants. Both sites show longevity and repetition in subsistence strategy, as inferred from the artifacts and other indirect subsistence evidence.

Are these different populations or the same population exploiting late summer and fall resources through a strategy of short-term residential mobility? Or do the sites represent different subsistence strategies exploiting changing biotic resources in response to climatic variability? These two interpretations are not mutually exclusive, and indicate that the northern Rio Grande was regularly occupied by groups having detailed knowledge of resource distribution and availability. Such knowledge would accumulate as a group returned to an area over generations spanning different climatic intervals. In other words, it is unlikely that the northern Rio Grande was ever abandoned for long, or that population migration can explain changing settlement and subsistence strategies. The late arrival of agriculture in the northern Rio Grande may have signalled the mixing of highly complex social and economic processes resulting in accommodation of new populations or technology by long-term, seasonally mobile populations. In other words, the northern Rio Grande was not a clean slate upon which an imported story of early Pueblo colonization and settlement was written.

Site Structure and Forager/Collector Models

The research design considers the potential archaeological evidence for different hunter-gatherer mobility strategies, and the implications of making inferences about technology, production, and site formation. Within the continuum of forager/collector site types, investigators have commonly resorted to a simple classification scheme based on occupation duration, intensity, and diversity of activities, and on the presence and physical attributes of certain kinds of facilities.

Forager/collector site types are typically subdivided into base camps, short-term residential camps, special activity or logistical sites, and resource extraction or procurement locations (Vierra 1985; Hudspeth 1997; Elyea and Hogan 1983). It is assumed that season, occupation duration, available raw materials, and range of activities determined the nature of the artifact assemblages and features that were left behind. Complicating factors such as reoccupation may have an effect on the frequency distribution of certain artifact or feature classes (Vierra 1985; Doleman and Vierra 1994; Camilli 1989; Dello Russo 1997). Furthermore, it has been demonstrated (Lent et al. 1986) that Pueblo and Archaic logistical camps have assemblages that are indistinguishable. Thus, it may be erroneous to assign an occupation date based on the composition of lithic artifact assemblages.

The assumption that artifacts and assemblages represent some aspect of the range of activities conducted at a site enables assessment of how the site components functioned in Archaic hunter-gatherer settlement and subsistence, and in ancestral Pueblo foraging practices. All the occupation components at LA 61282, except for Excavation Area 4, had artifact assemblages that emphasized tool production or maintenance. The assemblage at Excavation Area 4, which was ancestral Pueblo (A.D. 1200 to 1515), was dominated by core-reduction debris. Only Excavation Areas 1 and 5 had subsurface features; Excavation Area 1 showed the most diversity and greatest frequency. Only Excavation Area 1 yielded an assemblage of animal bone exhibiting a diverse species array, unburned and burned fragments, and patterned spatial distribution. Excavation Area 1 had formal discard areas that were close to the activity areas, suggesting sequential reuse or reoccupation.

Without much analysis we can construct a site hierarchy based on artifacts, features, and nonartifactual debris. Excavation Area 1, Armijo components 1 and 2, had a total of 21 features, consisting of discard areas, thermal features, reused pits, evidence of organized discard of refuse, abundant tool manufacture debris, abundant faunal remains, and limited evidence of plant processing. With high artifact frequency and moderate to high diversity, a limited and redundant range of features, and ubiquitous microchips of bone and chipped stone, these areas resemble habitation sites (as defined in Hudspeth 1997:187). These areas lack storage features, which the author feels are a lesser and almost invisible aspect of most northern Rio Grande hunter-gatherer sites, and would be more likely to occur at base camps. There is a heavy emphasis on hunting and meat processing—similar to sites in the Abiquiu area. However, the Abiquiu sites have fewer features, and the distribution of the chipped and ground stone debris has less pattern. Are differences in habitation sites from the two areas important and do they represent a continuum of variation that reflects subtle differences in subsistence strategies? Undoubtedly, as more site structure and settlement data are accumulated from excavations of northern Rio Grande Late Archaic sites, these differences may be significant as indicators of environmental and behavioral variability. For the moment it seems reasonable to classify the LA 61282 Armijo phase components as habitation sites, emphasizing their place in a seasonal mobility pattern that includes short-term occupations with shorter distances between sites, which might be expected for winter or late spring base camps.

Excavation Area 5, with its subsurface thermal features from the En Medio phase, may also represent a habitation site that was occupied once and never revisited. It had no associated artifacts or cultural deposit halo from accumulated use and maintenance of multiple thermal features. Obviously, the more a site is occupied the more visible it becomes (Cordell 1978; Binford 1981a). Greater visibility leads to site typologies based on the most heavily occupied sites. Such typologies exclude sites that may have been integrated into the mobility strategy in the same way, but were not repeatedly occupied, perhaps as the group established a new annual or lifetime territory (Vierra 1985; Kelly 1992).

Excavation Area 1, En Medio component, and Excavation Areas 2, 3, and 5 (surface artifacts) lacked features, but had highly specialized artifact assemblages geared to the production or maintenance of hunting tools. These low-diversity artifact assemblages closely approximated hunting camps or stations described for the Abiquiu area (Hudspeth 1997:192-193). Sites with little biface manufacturing debris sites are relatively rare in the Santa Fe River valley. For example, the Las Campanas project site database had 100 excavated sites, none of which yielded spatial or temporal components that emphasized hunting tool manufacture or maintenance (Post 1996b). Mixed core reduction and tool manufacturing assemblages were more common, reflecting a subsistence strategy geared to procuring and processing a broader range of resources within a patchy distribution. From this perspective, the LA 61282 hunting camps represent relatively unique assemblages in the Santa Fe River valley. Their uniqueness does not derive from the fact that they are from the Late Archaic period, and that they are rare, as was once believed (Peckham 1984). Instead, they represent an intrusion of a hunting strategy that may have been short-lived or extended south from the Pajarito Plateau and Jemez Mountains, where they are abundant (Acklen 1997).

Excavation Area 4 was different because of its focus on core reduction and the recovery of Santa Fe Black-on-white and Glaze C pottery. The co-occurrence of pottery and core reduction lithic technology fits the

normative pattern for low-elevation ancestral Pueblo foraging. This pattern is typified by a use of local material and an expedient, "unsophisticated" tool assemblage. Comparisons between Excavation Area 4 and the other excavation areas are easy because they are so different. Excavation Area 4 was dominated by core reduction debris, while Excavation Areas 2, 3, and 5 were dominated by tool manufacturing debris. This obvious dichotomy is used by investigators to contrast different hunting and foraging strategies for Archaic and Pueblo period populations. In the case of LA 61282, the difference appears to be real in that Archaic period dart point fragments were recovered with tool manufacturing debris, and pottery was recovered with core reduction debris.

Elsewhere in the Santa Fe area, such as Las Campanas and to the east along the northwest Santa Fe Relief Route right-of-way, sites with pottery and no other temporally diagnostic materials tend to associate with core reduction debris, as do sites lacking any temporal indicators. This does not mean that all nondiagnostic chipped stone scatters were Pueblo, but that there was a strong correlation between sites with pottery and sites without. Excavation Area 4 fits this characterization. Farther to the west along the Santa Fe River and Cienega Creek there are numerous low-frequency artifact scatters with Glaze pottery that are probably associated with the LA 14, Cieneguilla Pueblo (Condie 1991; Scheick and Viklund 1991). These small sites represent the expansion of Pueblo foraging into areas greater than 1 to 2 km from the village. These foraging sites were left by all villagers involved in daily or seasonal procurement of riparian and woodland resources. A pattern of foraging 5 to 7 km distant, and processing camps associated with Coalition period occupations of the Santa Fe River was well documented in the Las Campanas area (Post 1996a; Post 1996b). Furthermore, this pattern of sites consisting of core reduction debris was the main archaeological evidence found along the Santa Fe Relief Route (Wolfman et al. 1989). In the case of LA 61282 and the Santa Fe River, there does seem to be a strong correlation between sites with a predominance of core reduction debris and ancestral Pueblo settlement of the Santa Fe River. This pattern is strongly influenced by the range and distribution of resources, unlike an area such as the Jemez Mountains, which has abundant lithic raw material and prime large-mammal habitats. Differentiating between Pueblo and Archaic hunting in the Jemez Mountains may be difficult or impossible given the low depositional environments and the high likelihood of palimpsest distributions.

Foragers/collectors, residentially mobile/logistically mobile are characterizations with much inherent variability. They may characterize descriptively the archaeological record, but they have limited utility for addressing finer-grained issues of subsistence and settlement. LA 61282 displays considerable variability between temporal and functional components, and stands out within the regional structure of the Santa Fe River archaeological record. Similar sites—four hunting camps with distinct Archaic qualities—are not regularly found to the east along the Santa Fe River. Is it the environmental setting within a grassland-woodland-riparian transition that influences the distribution of such technological dichotomies, or do the sites reflect momentary events when large game was available in this area? The growing database for the Santa Fe River, especially with regard to excavated sites, may provide us with more complete empirical data with which to build theories and models to explain Archaic settlement variability.

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