PASEO GATEWAY:

Research Design and Data Recovery Plan for LA 55499 in Rio Rancho, New Mexico State Trust Land, Sandoval County, New Mexico

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Office of Archaeological Studies

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PASEO GATEWAY: RESEARCH DESIGN AND DATA RECOVERY PLAN FOR LA 55499 IN RIO RANCHO, SANDOVAL COUNTY, NEW MEXICO

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ADMINISTRATIVE SUMMARY

The Office of Archaeological Studies (OAS), responded to a request from Greg Campbell of Paseo Gateway LLC to prepare a data recovery plan for LA 55499 located within the Paseo Gateway urban development project in Rio Rancho, New Mexico. The Paseo Gateway project is involves commercial, light industrial, residential, and educational urban development. The site is currently on State Trust Land scheduled to be auctioned for the proposed residential and educational development.

LA 55499 is a sherd and lithic scatter of 200 to 500 artifacts covering almost 15,900 sq m. Two spatially distinct lithic artifact concentrations are associated with exposures of local lithic raw material consisting predominantly of chalcedony nodules. Local chalcedony dominates the chipped stone assemblage at this moderate-sized quarry site. Based on reduction strategies and sherds of temporally diagnostic pottery types, the quarry was used during the Archaic, Formative, and Historic periods. The testing program completed by OAS indicated that artifacts within the two concentrations were confined to the surface or upper 10 cm of loose, wind-blown sand. Artifact density is low to moderate in the wind-blown sand layer and no buried features or cultural deposits were identified. The site is important for how local lithic materials were assimilated into the subsistence strategies and mobility patterns of populations living near this area during the different time periods.

The following research design and data recovery plan provides cultural-historical and environmental context, site description, an assessment of data potential, and research questions with site-specific and regional scales. Field data recovery and laboratory analysis methodology link the archaeological site data potential to the research questions and scales of analysis and interpretation.

MNM Project No. 41.818 Rio Rancho
NM State Lands Survey Permit NM-01-027

CONTENTS

Figures

Tables

INTRODUCTION

The Office of Archaeological Studies (OAS) responded to a request from Greg Campbell of Paseo Gateway LLC to prepare a data recovery plan for LA 55499 located within the Paseo Gateway Project area (Figs. 1 and 2, Appendix 1). The project area is scheduled for residential, commercial, and educational development.

The site is located in Section 32, T 13N, R 3E, Sandoval County, New Mexico. The site is currently on State Trust Land that will be auctioned off and transferred for the proposed Paseo Gateway residential and educational development.

The data recovery plan provides cultural-historical, theoretical, and methodological context for the archaeological investigation of LA 55499. The site was originally recorded by Patrick Hogan (1986), and Charles Hannaford (2006a) tested the site along with five others located in Section 32 of the project area. Only LA 55499 was found eligible for nomination to the *National Register of Historic Places* under criterion d because the site is likely to yield information important to prehistory and history (36 CFR par 60.4 and in conformance with 4.10.15.16 [NMAC]). The research design applies only to this site.

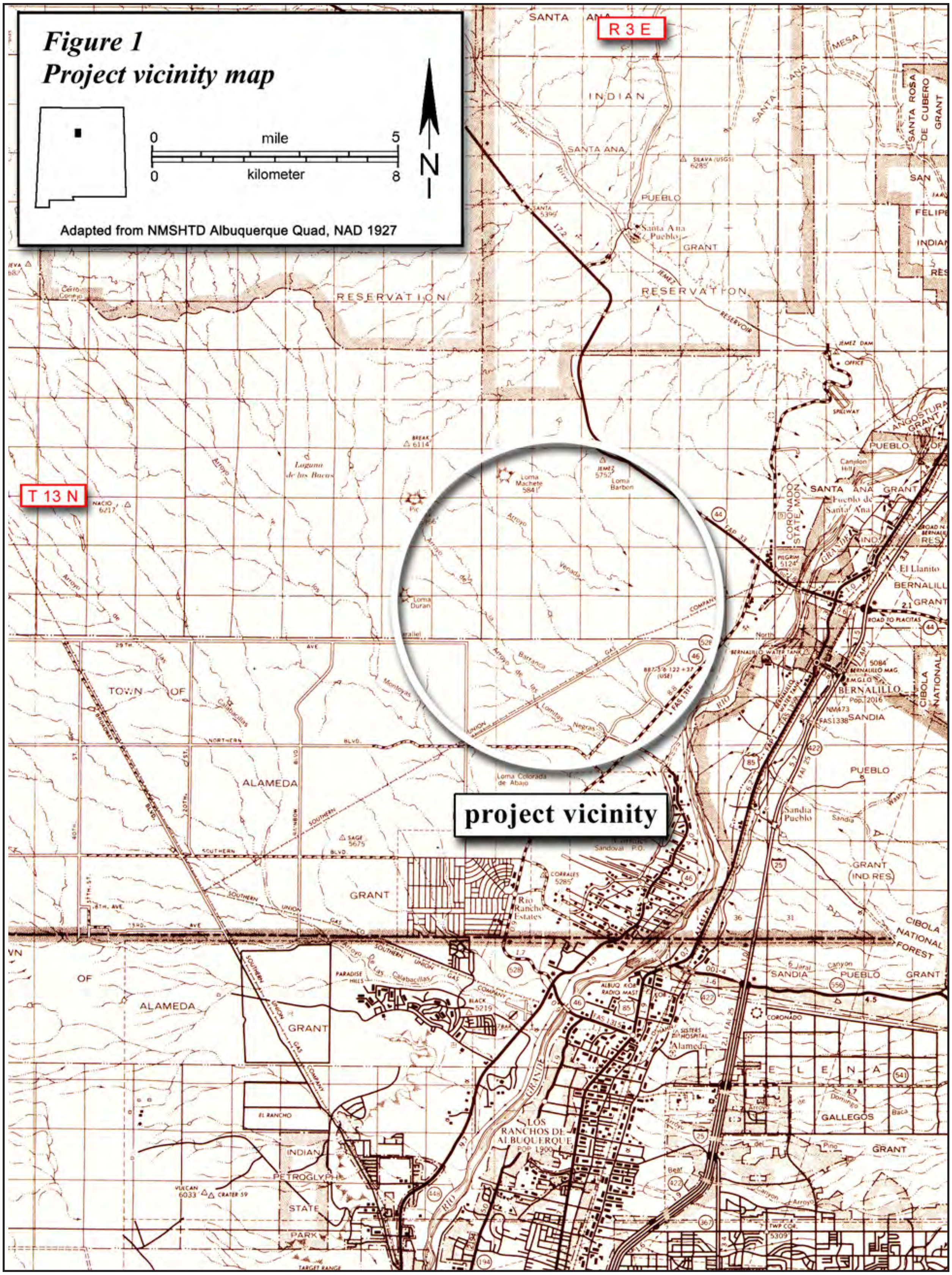

Figure 1
Project vicinity map

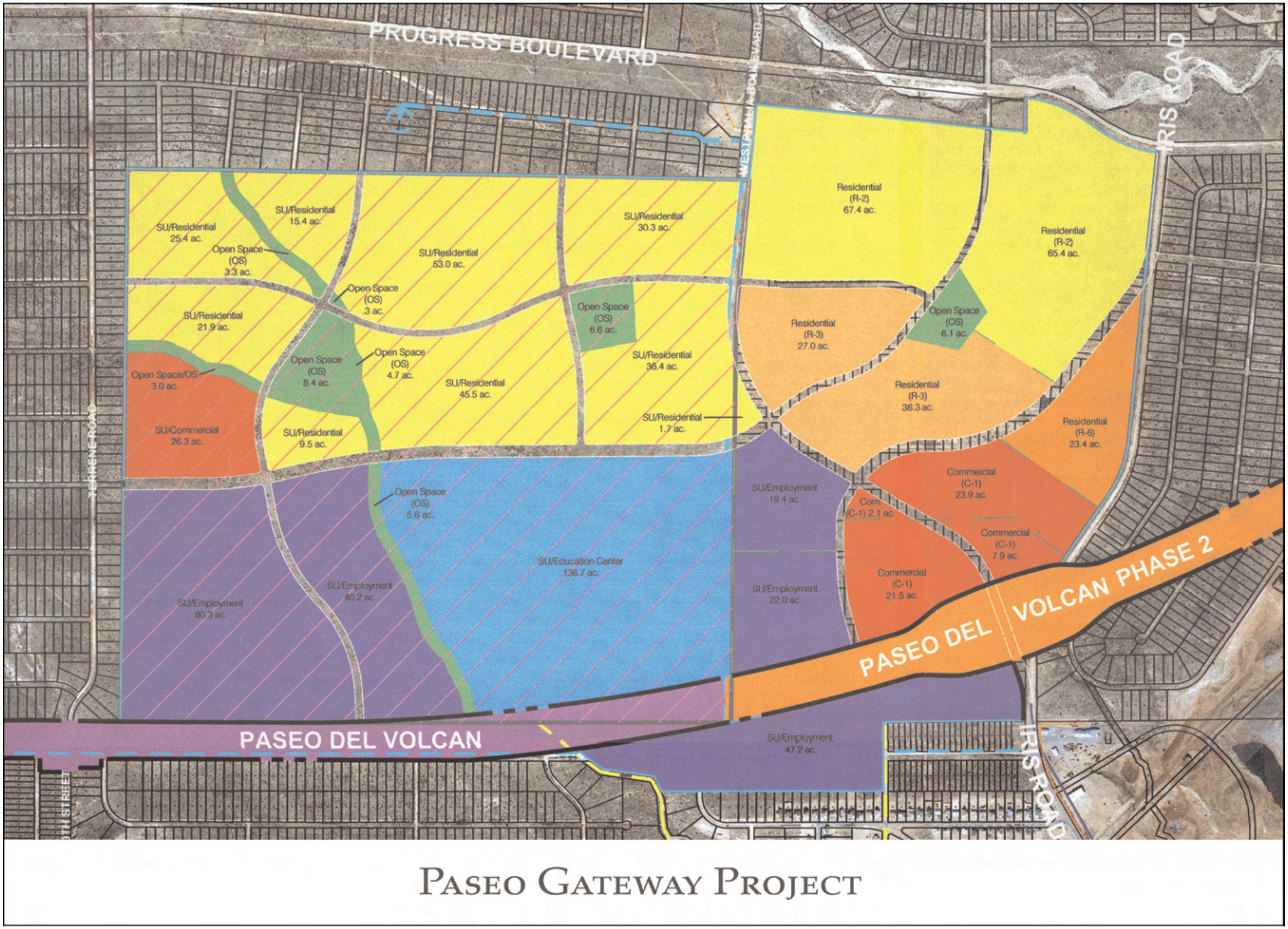

Figure 2. Paseo Gateway project area.

ENVIRONMENTAL SETTING

Natural Environment

The study area is situated on, or in the vicinity of, several large survey projects with detailed overviews of the regional natural environment (Hogan 1986; Brandi and Dilley 1998; Raymond et al. 2004). The following natural environmental setting is abstracted primarily from these sources.

LA 55499 area is within the Albuquerque Basin, which constitutes the central section of the Rio Grande Valley. The Albuquerque Basin is drained by two principal longitudinal streams, the Rio Puerco in the western part and the Rio Grande in the eastern part. The site vicinity lies along the eastern slope of Ceja Mesa, a north-south trending interfluve between the Rio Puerco and Rio Grande. Ceja Mesa is circumscribed by dissected slope terrain resulting in broad swales and intervening narrow ridge-line remnants. The altitude and relief on the east side of the Rio Grande is more pronounced, characterized by major uplifting reaching 10,678 ft at Sandia Crest. The general setting is within a system of intermittent drainages generally separated by higher hills and ridges. The small drainages have their origins in the higher elevations of Ceja Mesa to the north and west. Elevations in the study area range from 5,380 ft (1,640 m) to 5,500 ft (1,676 m). The site vicinity of the project area is dominated by a higher hill, which provides a panoramic view of the surrounding landscape (Fig. 3). The remaining topography is

Figure 3. General project overview.

characterized by lower, more gently rolling terrain sloping generally southward toward the Arroyo de la Barranca. The Arroyo de la Barranca is an intermittent drainage flowing into the Rio Grande about 6 miles from the project area.

The surficial soil deposits are dominated by the Haplargids-Calciorthids-Torripsamments Greater Soil Association. These soils occur on gently to strongly undulating plains. The soils are forming in coarse to moderately fine-textured alluvium. Sandy eolian sediments comprise a part of the parent materials. The soils commonly have sandy surface layers that are susceptible to wind erosion. Haplargids account for 35 percent of the soil association and occupy more level landscapes. Surface soil is a light brown loamy fine sand. The subsoils are a pale brown to light reddish brown sandy clay loam grading into a pinkish white loam, high in lime, at depths of 20 to 36 inches. Calciorthids make up 20 percent of the soil association. The soils commonly occur in swales or slight depressions. Surface soils are fine sand or fine sandy loam followed by underlying subsoils with a fine sandy texture and very high lime content. Torripsamments constitute 20 percent of the soil association. The soil occurs on gently sloping to rolling and dunal landscapes. Surface layers consist of light brown loamy sand followed by a deep layer of light brown loamy sand or sand. These sandy soils are only weakly calcareous.

The surface soils are generally underlain by the Santa Fe Formation. This geologic formation provides the bulk of the sediments filling the Albuquerque Basin. It contains a wide variety of gravels and cobbles, which are a readily available source of knappable material. Deposits with suitable raw materials are often exposed by deflation of the surface sands on higher ridges, as is the case for LA 55499.

The site vicinity has a semiarid environment. Rainfall averages 20–26 cm annually, mostly delivered in brief, violent summer storms. The annual frost-free period averages 180 days. The sandy soils support a mixed scrub-grassland vegetative cover including grama grass, galleta grass, dropseed, ricegrass, snakeweed, sand sage, fourwing saltbush, yucca, and cholla. A few widely spaced junipers are scattered across the project area. Fauna in the area currently include cottontail, jackrabbit, prairie dog, and coyote.

In summary, the site vicinity can be described as a resource area where higher ridges provided the prehistoric inhabitants with panoramic views of the surrounding landscape and exposures of potentially usable lithic resources. The local lithic resources aided the prehistoric inhabitants in hunting and gathering the various plant and animal resources in the area. Water was a critical resource affecting local settlement and subsistence. Water was available locally only during very wet periods from the surrounding small intermittent drainages. The Rio Grande flood plain, about 6 miles from the project area, is currently the only year-round water source. Planned water availability and usage would have been a prerequisite for exploiting the local resources by the prehistoric inhabitants. Finally, the mantle of eolian sand covering the study area is sensitive to blowing wind, which tends to howl during the spring months. Artifacts are subjected to a continual pattern of exposure and reburial over the course of time.

Cultural Environment

Land use in the surrounding area was largely restricted to ranching and grazing activities during the twentieth century. By 1960, the area was part of the Rio Rancho housing development project, one of the most widely marketed land-developing programs in the U.S. (Raymond et al. 2004:12). As a part of this land development, two-track roads in large grid patterns were constructed over the area. The roads allow access to large sections of the Paseo Gateway project area. The roads have been used to dump refuse on the tract and for recreational activities such as hiking, 4-wheeling, and target practice. The sites have most likely been exposed to surface relic collectors. The project area is bounded on the south by residential development and the newly constructed Paseo del Volcan roadway. Increased visitation of the project area is evidenced by the close proximity of new construction and urban development. In spite of this, except for the dirt tracks that cross the property, the project area is remarkably stable and intact.

Records Check

Archaeological site data from the NMCRIS files were summarized for a 1,300 m radius around LA 55499 (Table 1). These summarized data provide additional settlement context and an understanding of the range of temporal and functional site types that might contribute archaeological material to the project area. Ten projects have recorded archaeological sites in the sample area. Surveys range in size from about 19 acres up to the large 900-acre survey that identified six sites including LA 55499 (Hogan 1986). A total of 31 sites have been recorded in the sample area, representing 37 temporal components. The bulk of the sites outside of the original 900-acre survey block were recorded southwest of the project area in relation to a 160-acre landfill project, which reported 12 sites (Cunningham and Seymour1994), along with smaller utility and road-related projects.

Only two sites fall within the 500-m buffer zone around the investigated sites. LA 126402 and LA 55503 were located along the Paseo del Volcan Roadway at the south end of the project area. Both sites had diagnostic ceramics suggesting Formative period occupations within a broad AD 500 to 1600 time frame. Both artifact scatters were removed during the construction of the Paseo del Volcan roadway. The remaining 29 sites are mainly over 1,000 m from the current project area.

Nearly half of the components (16) are represented by unknown temporal components. These are mainly chipped stone scatters lacking diagnostic artifacts. In most cases the simple artifact scatters lack associated features; however four sites are associated with ash and oxidized soil. Two sites with unknown temporal components functioned as quarries of the local gravels. Of interest is a possible residential occupation represented by a pit feature at LA 107572. This site is about 1,300 m southeast of the project area and is one of only three sites in the surrounding area with possible residential occupations represented by either possible pit structures or small cobble structures.

No Paleoindian manifestations have been recorded in the sample area. The Archaic period is represented by five components. The sites are mainly artifact scatters along with one quarry and one site with thermal features. A shallow pit structure was recorded at LA 107577. This possible residential site dated from 1765 BC to 390 BC and is located about 1,100 m east of the project area. This is one of the rare residential sites in the sample area.

The Formative period is represented by 13 temporal components. The sites are mainly artifact scatters with diagnostic sherds showing Developmental period (3), Coalition-Classic period (1), Classic period (5), and long-term or unassigned period (4). The sites are primarily simple artifact scatters (9); four sites have associated hearths. LA 103053 has a cobble alignment, which may represent a small cobble structure. This small residential site dates to the Classic period and is about 1,300 m northeast of the project area.

Two sites have recent Anglo-Euroamerican manifestations represented by a hearth and a checkdam.

In summary, the recorded archaeological sites in the sample area are represented mainly by a repeated pattern of small artifact scatters recorded from the various time periods. These sites represent short-term special activity sites associated with the procurement of local lithic, plant, and animal resources. Only a few of the sites are associated with hearths or thermal features, representing additional resource processing and possible longer overnight or multi-night occupations. Lastly, only three sites have possible structures,

Table 1. Sites in the 500 to 1,000 m Buffer Zone

Site	Cultural Affiliation	Site Type	Comments
LA 18428	Unknown	Not recorded	
LA 18429	Unknown	Not recorded	
LA 55502	Unknown	Not recorded	
LA 55503	Formative 500 AD to 1600 AD	Not recorded	
	Formative 1 AD to 1600 AD		
LA 55506	Unknown	Not recorded	
LA 55507	Unknown	Unknown features and artifact scatter; quarry	
LA 55508	Archaic Unknown 5500 BC to AD 900	Not recorded	
LA 55509	Archaic 3300 BC to 1800 BC	Artifact scatter	
LA 55510	Unknown	Not recorded	
LA 102933	Unknown	Unknown features and artifact scatter	Midden; stained-soil
LA 103037	Unknown	Artifact scatter	
LA 103053	Formative AD 1300 to AD 1400	Artifact scatter and features	Possible small cobble structure
LA 107571	Unknown	Artifact scatter	
LA 107572	Unknown		
	Anglo-Euroamerican 1950 to 1994	Hearth and pit feature	
LA 107573	Formative AD 1395 to AD 1600	Artifact scatter and hearth	
LA 107574	Formative AD 675 to AD 1515	Artifact scatter and features	
	Anglo-Euroamerican AD 1933 to 1942	Checkdams	
LA 107576	Unknown	Artifact scatter	
LA 107577	Archaic 1765 BC to 390 BC	Artifact scatter and hearths	Shallow pit structure associated with Archaic component
	Formative AD 1325 to 1600	Artifact scatter and hearths	
	Unknown AD 1505 to 1950	Hearths	
LA 107578	Unknown	Artifact scatter and features	
LA 107579	Formative AD 1200 to 1425	Artifact scatter	
LA 107580	Unknown	Artifact scatter	
LA 107581	Unknown	Artifact scatter	
LA 107582	Archaic 1800 BC to AD 200	Artifact scatter; quarry	
LA 109582	Archaic 5500 BC to AD 200	Artifact scatter and features	
	Formative AD 1300 to 1600	Artifact scatter	Fire-cracked rock and ash with Archaic component
LA 124261	Formative AD 500 to 700	Artifact scatter	
LA 126402	Formative AD 600 to 1600	Artifact scatter	
LA 126403	Unknown	Artifact scatter	
LA 137319	Unknown	Artifact scatter and features	Exposed gravel quarried for lithic material; ash and oxidized soil
LA 146701	Formative AD 700 to 1100	Artifact scatter	
LA 146702	Formative AD 700 to 900	Artifact scatter	
LA 146703	Formative AD 1300 to 1550	Artifact scatter	

(NMCRIS records check by Hannaford 7/18/06) which suggest longer-term residential occupations. The absence of water in the study area, except for during the wettest periods, most likely hindered and restricted longer term residential occupations. The site and environmental data indicate that the area surrounding LA 55499 was a resource hinterland exploited over a long period of time.

CULTURE HISTORY AND PREVIOUS RESEARCH

Stephen S. Post

The Paseo Gateway project is in the western portion of the Albuquerque District within the Middle Rio Grande region, which has a culture history that spans the last 11,000 years (Cordell 1979; Stuart and Gauthier 1981). The archaeological past of the region is commonly divided into four broad periods—Paleoindian, Archaic, Pueblo, and Historic. The Pueblo period is typically subdivided into three periods of the Rio Grande Sequence as defined by Wendorf and Reed (1955): Developmental, Coalition, and Classic. Sites with cultural materials or deposits that post-date 1540 are commonly assigned to the post-contact or Historic period. Each of the major temporal periods is typified by changes in settlement and material culture patterns indicative of different cultural adaptations. Subdivisions of the prehispanic periods are based on successive changes in material culture and inferred social and economic developments. Characterization of the post-contact or Historic period relies on material culture and historical documents to infer and interpret social and economic interactions among Native American, Hispanic, and Anglo-American cultures.

The sites identified during recent archaeological inventories for the City of Rio Rancho and the New Mexico State Land Office date to the Archaic and ancestral Pueblo periods. For this reason, this brief overview mainly considers the prehistoric sequence for the area. The prehispanic culture-history has been adapted from Chapter 1: *Introduction, in Archeological Data Recovery at Five Sites along NM 44 in the Lower Jemez River Valley, Sandoval County, New Mexico* by Christine S. VanPool and Patrick Hogan (2003:1–9). The interested reader is referred to Cordell (1979), Anschuetz (1995), and Schmader (1994) for a more comprehensive and detailed discussion of the region's culture history.

Paleoindian (10,000 to 5500 BC)

Based on very limited archaeological evidence, archaeologists characterize Paleoindians in the Southwest as groups consisting of small bands of highly mobile hunters and their families, who preyed on extinct species of Pleistocene megafauna that survived into the early Holocene (e.g., mammoth, archaic bison, sloth, camelids, and Pleistocene horse). Recent investigations in other regions demonstrate that Paleoindian subsistence organization was more balanced than originally postulated, with regular hunting of smaller animals and gathering of wild plant resources. These findings raise the possibility that during this 4,500-year span, some Paleoindian groups in the Middle Rio Grande region also employed a more generalized and seasonally based subsistence strategy.

There are no known Paleoindian sites in the immediate project area, but five Paleoindian complexes have been identified along the Middle Rio Grande and west to the Rio Puerco of the East. Recognition of these five complexes is based on the occurrence of distinctive projectile point styles (Judge 1973). Sandia was named for deposits consisting of lithic and faunal remains purportedly found at Sandia Cave in association with a radiocarbon date of ca. 35,000 BC (Cordell 1979:10; Bradley et al. 1999:47). Identification of Sandia Complex sites outside the Albuquerque area is based on a distinctive, single-shouldered point that was also recovered from Sandia Cave. While some researchers believe that the Sandia Complex may evidence a pre-Clovis occupation in the New World (Adovasio 1993), other archaeologists argue that the Sandia artifacts are actually from mixed deposits, probably post-dating much of the Paleoindian occupation in the region (Haynes and Agogino 1986; Stevens and Agogino 1975).

At present, Clovis remains the oldest accepted and most securely dated Paleoindian complex in the American Southwest, dating between 10,000 and 9000 BC. Known mainly by the distinctive fluted Clovis spear points, other associated stone tools include gravers, shaft straighteners, and a variety of flaked stone scrapers (Collins 1999:35–71; Gunnerson 1987:10). Much of the data on Clovis occupations come from sites with stone artifacts in association with extinct megafauna such as mammoth, camel, bison, or horse. Clovis sites are rare, and only one has been documented in the Middle Rio Grande Valley (Dawson and Judge 1969; Judge 1973).

The Folsom and Midland complexes postdate the Clovis Complex throughout much of the western United States (Frison 1991; Wendorf et al. 1955). Both complexes date from 9000 to 8000 BC with the primary distinction derived from the presence of basal fluting on Folsom points and the absence of fluting on Midland points. Otherwise, their size range and morphology are similar (Frison 1991:50). To date, the Folsom Complex is the most common in the Middle Rio Grande Valley, with three excavated Folsom sites: the Rio Rancho site (Dawson and Judge 1969; Judge 1973); the Folsom component at Sandia Cave (Hibben 1941); and the Boca Negra site (Huckell 2002). Two of those sites, Rio Rancho and Boca Negra, are located near the edge of the Llano de Albuquerque in dual settings.

After about 8000 BC, fluted points were replaced by new varieties of laterally thinned, constricted-base, and indented-base projectile points. These point styles mark the beginning of the late Paleoindian period, generally called the Plano Tradition, which extends to 5500 BC. The laterally thinned point series includes the Plainview, Midland, Meserve, Milnesand, and Frederic types. These styles are diagnostic of the Plainview Complex, the earliest complex of the Plano Tradition, which have wide distribution on the Plains and intermountain regions. In the Middle Rio Grande Valley, Belen points may also be a Plainview variant (Judge 1973), although they are poorly dated. The Plainview Complex is followed by the indented-base series, which includes Firstview, Alberta, and points of the Cody Complex—Eden and Scottsbluff. Agate Basin and Hell Gap points are the constricted-base types. Of these, only Cody materials have been found in the Middle Rio Grande Valley (Judge 1973). Two Eden-style point fragments were found during the Venada survey 1.6 km north of the project area (Hogan 1986).

The end of the Paleoindian period coincides with the protracted demise of the early Holocene winter-dominant precipitation pattern and the onset of a drier and warmer, but temporally variable climatic regime similar to modern conditions. Irwin-Williams (1979) argues that by 5500 BC unfavorable climatic conditions in the Southwest forced bison herds onto the central and northern Plains, and with them terminal Paleoindian bands that maintained their focal hunting economy. In her view, the Colorado Plateau and Rio Grande Valley were left empty and eventually filled by hunter-gatherer groups migrating into the Southwest from the western Basin-and-Range Province. Irwin-Williams postulates a population replacement, rather than continuity between Paleoindian and later Archaic populations. However, other researchers (Cordell 1979; Judge 1982; Stuart and Gauthier 1981; Honea 1971; Acklen 1997; Post 2002) contend that the artifacts associated with the Early Archaic period simply reflect technological adjustments made by late Paleoindian populations in the Southwest to the changing plant and animal resource base.

Archaic (5500 BC to AD 400)

The Archaic period is defined as a Desert Culture adaptation that is similar over a large area, but different regional expressions exist that were determined by resource availability, distribution, and frequency that was widespread across western North America (Jennings 1957; Irwin-Williams 1967). Corresponding to climate desiccation that led to a redistribution of the modern bison herds onto the Plains, site types and distributions reflect seasonal movement of small bands exploiting a wide range of plant and animal resources. Group size and composition likely varied in response to changing economic opportunities, as smaller task groups periodically moved out from the residential camps to procure resources in more distant areas. Annual and lifetime territories were probably less extensive than Paleoindian ranges, but were sufficient to encompass riverine, basin-and-range, and plateau physiographic settings of the Rio Grande, Southern Rocky Mountains, and Colorado Plateau.

The temporal framework most commonly employed for the Archaic period in the Middle Rio Grande region is the Oshara Tradition as defined by Irwin-Williams (1973) for the Arroyo Cuervo district, a 520-sq-km area between the Rio Puerco and Jemez River. Select sites within the Northern Rio Grande, such as the Bajada site overlooking the northern margin of the Santo Domingo Basin, were also used by Irwin-Williams to characterize the Oshara Tradition (Hicks 1982; Post 2002). Central to Irwin-Williams's scheme are five phases, each associated with one or more distinctive projectile point style that represents successive adaptations to fluctuating climatic conditions between 5500 BC and AD 400, which culminated in the emergence of the Anasazi Tradition.

The idea that Southwestern Archaic traditions like the Oshara reflect in-place cultural developments within relatively restricted geographical areas is part of an ongoing debate in the literature (e.g., Berry and Berry 1986; Wills 1988; Matson 1991). The restricted geographic area for in situ development is disputed for methodological reasons and because the contention is inconsistent with ethnographic and ethnohistorical accounts of hunter-gatherer mobility strategies. Given the significant environmental changes that occurred during the middle and late Holocene, any cultural continuity maintained for six millennia probably operated at a pan-regional level. Thus, many archaeologists employ a three-part division of the Archaic that can be applied to the entire American Southwest—the Early Archaic period, the Middle Archaic period, and the Late Archaic/Early Agricultural period. Under this simplified temporal framework, the Oshara phases retain local significance for the Middle Rio Grande Valley.

Early Archaic

The Early Archaic period encompasses the two earliest Oshara phases, Jay (5500–4800 BC) and Bajada (4800–3200 BC). Jay sites in the Arroyo Cuervo District tend to have limited extent and shallow deposits with lithic assemblages that include Jay points (a large, stemmed, and slightly shouldered projectile point), a distinctive lanceolate bifacial knife, and numerous well-made side scrapers. Sites interpreted by Irwin-Williams (1973) as base camps occur around canyon heads near permanent water, while special activity sites are found near ephemeral ponds and on low mesas. Bajada site distribution suggests a similar settlement pattern. Also, the Bajada type site is a mesa-top site with abundant basalt outcrops from which a high frequency and diversity of tool types were manufactured, used, and discarded. The Bajada site indicates a strong tendency to reoccupy prime locations by Bajada phase groups. Bajada phase sites also may have cobble-filled hearths and earth ovens and lithic assemblages with a larger number of heavy chopping tools and crude side scrapers. Bajada points can be similar in size to Jay points but have increasingly well-defined shoulders, and their stems are basally thinned with indented bases.

Few Early Archaic sites in the Middle Rio Grande Valley have been excavated, and there is relatively little information about the subsistence strategies employed. Judge (1982:49) speculates that Jay and Bajada sites represent a continuation of the Paleoindian focal-hunting economy adapted to modern faunal resources. Irwin-Williams (1973), on the other hand, argues for a mixed spectrum of subsistence activities that included hunting of both large and small game. Although milling stones—the hallmark of the Archaic throughout western North America—have not been found at Early Archaic sites in the Arroyo Cuervo District, the presence of large chopping tools and crude flake side scrapers may indicate processing of fibrous plants. Evidence from Bajada sites in the Northern Rio Grande Valley suggest that Irwin-Williams's interpretation is more accurate (Hudspeth 1997; Post 2002).

No canyon-head sites, other than those investigated by Irwin-Williams, have been documented in the Middle Rio Grande region, but a number of smaller Early Archaic sites have been recorded in the Llano de Albuquerque between the Rio Puerco and Jemez River drainages. No Early Archaic sites are reported in the immediate vicinity of the project area.

Middle Archaic

The Middle Archaic period in the Middle Rio Grande region roughly coincides with the San Jose phase (3200–1800 BC) of the Oshara Tradition. According to Irwin-Williams, San Jose phase sites occur in locations similar to Early Archaic sites, but they increase in size and frequency. Base camps are more extensive, have dense accumulations of occupation debris, and cobble-filled hearths and earth ovens substantially increase in size and structure. Shallow-basin grinding slabs and one-hand manos also appear during the San Jose phase, suggesting greater reliance on wild plant seeds. This evidence suggests that resource procurement was more intensive than during the Early Archaic, with local populations systematically exploiting the most productive micro-environments of the region over the course of an annual cycle (Irwin-Williams 1973:7–9).

San Jose projectile points are morphologically similar to Bajada points, although they are smaller and have a shorter stem-to-blade ratio and serrated blades. Although diagnostic of the San Jose phase, San Jose points are not the only Middle Archaic projectile points found in the Middle Rio Grande region. Equally common are projectile point styles associated with the southern Cochise and northern Colorado Plateau traditions (Elyea 1999).

Regional patterns can be ascertained from four sites excavated in the lower Jemez River drainage during data recovery for the MAPCO Four Corners Loop Pipeline Project (Brown 1999a, 1999b). LA 109137, located in the Rio Salado drainage, consisted of a small structure remnant suggesting a residential camp, and archaeobotanical remains pointed to a summer occupation. The site yielded both a San Jose and a Bajada projectile point, although the occupation was radiocarbon dated to the Middle Archaic period. The other three sites consisted of isolated hearths, presumably marking short-term camps. One of these sites, LA 25851, yielded a San Rafael projectile point, a style most commonly associated with Middle Archaic sites on the northern Colorado Plateau.

Late Archaic

The Late Archaic period spans the interval during which cultigens were introduced into the American Southwest and agriculture emerged as a viable subsistence strategy, although late in the sequence in much of the Middle and Northern Rio Grande, with the exception of the Rio Puerco of the East and isolated instances in the Lower Jemez River Valley (Brown 1999a, 1999b) and Jemez Cave (Alexander and Reiter 1935). In northwestern New Mexico, the Late Archaic encompasses the Armijo and En Medio phases of the Oshara Tradition. Locally, the latest developments are assigned to the Rio Rancho and Alameda phases based on sites and associated cultural materials described by Reinhart (1967).

Irwin-Williams contends that the settlement pattern during the Armijo phase (ca. 1800–800 BC) was a continuation of the Middle Archaic subsistence focus on a broad-spectrum hunting and gathering strategy. The canyon-head sites near the most reliable seeps apparently attracted seasonal aggregations totaling, perhaps, 30–50 individuals. Dense accumulations of structural remains and occupation debris were found in association with maize. She suggests that maize made these seasonal aggregations possible because it supplied a small, but reliable seasonal surplus. Seasonal aggregation, in turn, probably stimulated, increased, and altered social interaction, eventually leading to the development of communal social and ceremonial activities (Irwin-Williams 1973:9–11). This interpretation is consistent with arguments that the introduction of maize would have also involved the introduction of the knowledge of how to plant and care for the crop, some of which would have been embedded in ritual-ceremonial information, and critical to raising it successfully (VanPool and Hogan 2003; Young 1989).

Between 800 BC and AD 400–600, 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, site structure, and site distributions. These changes are commonly attributed to the gradual adoption of cultigens (Wills 1988; Vierra 1985). As a result of a less mobile lifestyle and an increased dependence on cultigens, occupation duration increased, technological organization focused more on expedient tool manufacture, and the construction of more formal facilities, such as pit structures and storage pits (Vierra 1994; Stiger 1986; Fuller 1989; Irwin-Williams 1973). Chipped stone technology, which was dominated by biface manufacture before the En Medio phase, included increasingly more evidence of local raw material use and manufacture of expedient or less formal tools (Kelly 1988; Andrefsky 1994). To date, how and when these changes occurred in the Middle Rio Grande Valley is poorly understood because of the small number of excavated sites that have yielded maize in association 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). This situation is further complicated by past research orientations that focused on identifying cultural remains that were comparable to the more "typical" Basketmaker II sites described for the San Juan Basin and Colorado Plateau (Matson 1991).

Based on the Arroyo Cuervo site data, Irwin-Williams viewed the transition from Archaic to Anasazi as continuous. In Arroyo Cuervo, base camp locations shift from the heads of canyons to rockshelters, cliff bases, and dune ridges. Irwin-Williams (1973:11) interprets the shifts in settlement patterns and ground and chipped stone technology as indicating a broadening of the resource base and the development of a strongly seasonal economic cycle. Cultigens were grown as a seasonal supplement for a diet based primarily on game and wild plant foods. Irwin-Williams argues that a primary dependence on agriculture does not emerge until the Basketmaker III–Pueblo I period.

VanPool and Hogan (2003) summarize data from a number of projects involving excavations at Late Archaic sites in the Middle Rio Grande region in the past 20 years. Based on the project data, they suggest that rather than developing out of a single tradition, the Middle Rio Grande groups were influenced by or may have included groups that moved in from the south. They also suggest that some groups may have been more reliant on agriculture than proposed by Irwin-Williams's model. The projects include the Hawk-Rio Puerco (Gerow 1998) and Macbeth (Elyea 1995) data recovery projects in the Middle Rio Puerco Valley; the Unit 22 (Brandi and Dilley 1998; Dello-Russo 1999) and Hawk Battalion Facility (Hogan and Elyea n.d.) excavations on the western margins of the Middle Rio Grande Valley; and the MAPCO Four Corners Loop Project (Brown 1999a, 1999b).

Pertaining to the timing of the introduction of and early dependence on agriculture, excavations at San Luis de Cabezon (LA 110946) uncovered a possible agricultural village on the floodplain of the Rio Puerco 50 km northeast of the site vicinity. Excavations revealed eight house pits and dozens of extramural hearths and storage features. Radiocarbon assays target occupations dating between 1800 and 1265 BC. The site had structures, features, and layout closely resembling those of contemporary San Pedro phase agricultural villages in southeastern Arizona (Huckell 1990). Two San Pedro-style projectile points were recovered. This site evidence is consistent with arguments that much of the Basketmaker II occupation in the northern Southwest can be attributed to a population intrusion by early agricultural groups from the south (Berry 1982; Huckell 1987; Matson 1991). However, apart from San Luis de Cabezon, cultigens are not common at Late Archaic sites in the region until after about 200 BC or later (Elyea 1999; Dello-Russo 1999). Many Late Archaic groups in the region, therefore, appear to have remained hunter-gatherers through much of the period and, perhaps, as late as AD 900 (Post 2002).

In the lower Jemez River Valley, two Late Archaic structures were excavated at the Hawk Battalion Facility northwest of Bernalillo (Hogan and Elyea n.d.), and from their descriptions, at least some of the sites associated with the Santa Ana Complex (Agogino and Hester 1953) almost certainly included Late Archaic structures. Eleven sites with Late Archaic components were also excavated on the southwestern margins of the lower Jemez River Valley during data recovery for the MAPCO Four Corners Loop Pipeline (Brown 1999a). Most of these sites evidence multiple episodes of occupation. Four have one or more structures reflecting residential occupations. The remainder are short-term campsites marked by hearths or roasting pits.

Closer to LA 55499 were the Unit 22 (1.6 km west) and Unit 20 West (8 km northeast) excavations (Brandi and Dilley 1998). Investigation of seven sites within Unit 22 revealed a series of residential and foraging camps consisting of clusters of structures, thermal processing features, fire-cracked rock concentrations, and extensive lithic artifact scatters (Dello-Russo 1999). Using precipitation data from El Malpais climatic reconstruction (Grissino-Mayer 1995), Dello-Russo identifies three major climate regimes during the Late Archaic period; AD 81–257 pre-drought, AD 258–520 drought, and AD 521–660, post-drought (Dello-Russo 1999:50–54). Radiocarbon assays were pooled and adjusted for age-bias and Late Archaic occupation patterns are interpreted relative to mobility and subsistence strategies that responded to the changing climate regimes. In the Unit 22 area, all sites were classified as residential based on inferred structure remains. Five sites had components dating to the pre-drought period (LA 109100, LA 109105, LA 109108, LA 109109, and LA 109113), which overall was the period of most intense occupation in Unit 22 and the Unit 20 West parcel, which was also part of Dello-Russo's study. The Unit 22 sites were on dune ridges overlooking Arroyo Pantadeleon and its confluence with Arroyo de los Montoyas. During the drought period, only LA 109100 and LA 109114 were occupied, but both had residential components. These were small sites located at the arroyo confluence. They were not part of the large site complexes of the pre-drought period suggesting a change in occupation pattern and, perhaps, group identity. Post-drought occupations, which lead into the Early Developmental period introduction of pithouse-dwelling agricultural groups, showed no radiocarbon-dated occupation of the Unit 22 area. Occupation focus switches exclusively to the Unit 20, which was less than 3 km north of the Early Developmental period communities in the River's Edge area (Schmader 1994).

The Unit 22 and 20 West studies reaffirm the Late Archaic to Basketmaker III sequence proposed by Reinhart (1967). Reinhart divided this transitional time into the Rio Rancho and Alameda phases, in the interest of establishing cultural and adaptive continuity between Archaic and Basketmaker III or Early

Developmental period sites. However, Reinhart's attempt to link hunter-gatherers to the introduction and adoption of agriculture was weakened by the very limited evidence of maize cultivation and consumption, a result that matches the Unit 22 data quite closely (Reinhart 1967:466–468).

The Rio Grande Sequence or Pueblo Period (AD 500 to 1541)

The appearance and widespread use of pottery vessels provides a convenient marker for the end of the Archaic and the onset of the Formative period. The Formative period encompasses a continuum of changes in the development of Pueblo culture from its beginnings among early agricultural populations in the Southwest to Spanish contact. Two chronological sequences are commonly used to subdivide this period in the Middle Rio Grande region, the Pecos Classification (Kidder 1924) and the Rio Grande Sequence (Wendorf and Reed 1955). Operationally, the subdivisions of both sequences are defined by changes in pottery styles and, to a lesser extent, architectural forms. Both were originally conceived as developmental sequences charting the major changes in Pueblo culture. In current use, however, they serve primarily as a framework for roughly ordering sites in time. The Pecos Classification was used as the Formative (Agricultural) period chronological sequence for this project with the modifications and dates suggested by Cordell (1979) in her overview of the Middle Rio Grande region.

Early Developmental Period

The Early Developmental period of the Rio Grande Sequence subsumes the Basketmaker III (AD 400–700) and Pueblo I (AD 700–900) periods of Pecos Classification (Wendorf and Reed 1955). By combining these two Pecos periods, Wendorf and Reed (1955) openly acknowledge a different developmental scheme for the Middle and Northern Rio Grande regions. Their classification also subsumes Irwin-Williams's Trujillo and Sky Village phases (1973) and Reinhart's Alameda phase (1968). It is during this interval that the transition to a predominantly agricultural economy appears to have been completed in the Middle Rio Grande region (Schmader 1994:10). It is also emphasized by all researchers that this a time when material culture attributes characteristic of ancestral Pueblo culture appear, and long-lasting traditions are established (Wilson 2003).

The Early Developmental period is marked by the widespread production and use of pottery vessels. Among the early pottery types that typify this period are Lino Gray, White Mound Black-on-white, and San Marcial Black-on-white (Wilson 2003). Limited quantities of Mogollon Tradition types, such as Alma Plain, Alma Neckbanded, San Francisco Red, and Mogollon Red-on-brown may reflect the importation of trade items, movement of a Mogollon population into the region (Cordell 1979:42), and a blending of Anasazi and Mogollon groups (Stuart and Gauthier 1981:119; Wilson 2003).

In general, decorated pottery occurs in relatively low frequencies throughout the period with the initial small-scale introduction of Red Mesa Black-on-white and neckbanded gray ware pottery by AD 900. The occurrence of these types in some cases corresponds to the addition of surface rooms to the architectural repertoire.

Inventories of Early Developmental period sites are provided in numerous sources and will not be enumerated here (Gerow 1999; VanPool and Hogan 2003; Lakatos 2003; Schmader 1994). Early Developmental sites in the Middle Rio Grande Valley are generally located near water sources. They are occasionally found on the river floodplain (Cordell 1979:42–43; Hogan and Gerow 1990:27) but more often occur on dune-covered ridges, gravel bluffs, and low terraces adjacent to major intermittent tributaries of the Rio Grande. Residential sites typically have one to three pit structures with associated exterior hearths, roasting pits, and storage pits. Sites with more than three pithouses (e.g., LA 109129) are known, but consistently evidence multiple occupations. Surface storage and living rooms, common at Pueblo I sites in the Four Corners region, are rare in the Middle Rio Grande and do not appear until late in the Basketmaker III–Pueblo I period.

Pithouses vary in size and depth but are generally circular or oval with a four-post roof support system, a central hearth, and a ventilator system usually oriented to the east or southeast. The occurrence of other interior features, such as storage pits, warming pits, and pot rests, is also highly variable and may indicate differences in function or season of occupation (Gerow 1999; Lakatos 2003). Other architectural traits common at Basketmaker III sites in the Four Corners region, such as antechambers, benches, and deflectors, are rare in Middle Rio Grande Valley pithouses (Cordell 1979:42; Lakatos 2003). One evident Mogollon architectural trait is lateral entry ramps, which occur in about 8 percent of the excavated pithouses in the Middle Rio Grande Valley (Gerow 1999). Another is the occurrence of a regular central posthole pattern (Lakatos 2003). These differences in architectural attributes suggest no clear affinity with Anasazi or Mogollon architectural traits. Ceramic types are more closely aligned with the gray ware tradition of the Anasazi area. Mogollon brown wares have been recovered from most of the excavated sites, and they typically constitute less than 2 percent of the overall ceramic assemblages (Schmader 1994). However, differences in plain gray and brown ware pottery may reflect clay resources rather than cultural choices. Both Mogollon and Anasazi areas have a strong plain ware tradition that lasts for a longer time in the Mogollon area and along the Rio Grande Valley.

Locally, excavations in the River's Edge area in Rio Rancho over the last 40 years documented an occupation sequence spanning the inception of pit structure-pottery-maize-based adaptations to the development of dispersed villages with at least one possible ritual structure (Frisbie 1967; Schmader 1994). Combined with contemporaneous villages in the lower Jemez River Valley, and the Santo Domingo Basin, they formed a dispersed, low population community that interacted with populations in the Rio Puerco of the East, along the Rio San Jose, northern Mogollon Highlands, and eastern margins of the Colorado Plateau from AD 700 to 900.

Late Developmental Period

The Late Developmental period is dated between AD 900 and 1200 in the Middle Rio Grande region (Cordell 1979; Wendorf and Reed 1955). No major changes in settlement pattern occur during this period, but adobe surface structures become increasingly common and pithouse floor plans become more standardized with four roof support posts, an east-oriented ventilator, a central hearth, and plastered walls and floors (Lakatos 2003). In contrast to the San Juan region, in the Middle Rio Grande region, pit structures continue in use as habitations well into the Late Developmental period (Bradley et al.1999:53; Hammack et al.1982:126). Some differentiation in floor features and size suggest that some pit structures were residential and ritual (Lakatos 2003).

Diagnostic decorated pottery types and associated utility wares change during the Late Developmental period. Early in the period Red Mesa Black-on-white is most common, although rarely abundant. Local varieties are occasionally present, but most of the pottery derives from western sources. San Marcial Black-on-white continue in use into the middle 900s, while plain gray and neckbanded gray utility wares occur into the middle 1000s. During the 1000s, Red Mesa Black-on-white is joined by Cibola Tradition white wares, such as Gallup and Escavada Black-on-white, and early varieties of Socorro Black-on-white, which has a more southern manufacture origin. This mixing of Cibola White Wares and Socorro Black-on-white indicate that between 1000 and 1100, the Middle Rio Grande experienced some population influx from the two areas and expanded social and economic interaction (Lang 1982). Following AD 1100, Kwahe'e Black-on-white, a local mineral-paint decorated white ware, is common throughout the Middle and Northern Rio Grande Valley in association with indented corrugated and decreasing amounts of plain gray utility wares. Smudged and plain brown ware pottery is also very common during the 1100s (Lang 1982; Post 1994). Stylistically, Kwahe'e Black-on-white is similar to Cibola White Ware and Socorro Black-on-white, and may reflect the influences that migrant groups had on local pottery traditions (Lang 1982).

Relatively few Late Developmental sites have been documented in the Middle Rio Grande Valley. The paucity of sites may result in part from an identification problem. A number of excavated Early Developmental sites in the Middle Rio Grande region evidence continued occupation into the Late Developmental period (Anschuetz 1995; Cordell 1979; Hogan and Gerow 1990; Schmader 1994), although Red Mesa Black-on-white sherds were either absent or present in very limited quantities. Nevertheless, there is clearly a population decline in the lowland areas of the region, reflecting a shift in settlement location to higher elevations away from the river valleys.

Three pithouse sites in the lower Jemez River Valley have Late Developmental components—Zia 2 (Vytlacil and Brody 1958), LA 9193 (Allen 1970), and LA 25862 (Brown 1999a). Other notable Albuquerque area sites with Late Developmental components include the Coors Road site (Sullivan and Akins 1994), the Airport Hamlet site at the Albuquerque Sunport (Acklen 1995), and in the Tijeras Canyon area (Cordell 1980).

Coalition Period

The Coalition period is dated between AD 1200 and 1350 in the Middle Rio Grande. During this 150-year period, potters shifted from using mineral paints to organic paints early in the sequence and glaze-paint pottery was introduced late in the sequence (Lang 1982). One of the earliest organic-painted types in the region, Santa Fe Black-on-white, is the diagnostic ceramic type for the Coalition period (Mera 1935; Cordell 1979:44; Wendorf and Reed 1955). Equally characteristic of Coalition ceramic assemblages in the Northern Rio Grande region is the diversity of locally made wares. Many of these ceramic types, including Santa Fe Black-on-white, resemble wares manufactured in the San Juan region and Chaco Canyon. Wiyo Black-on-white, which appears in the latter half of the thirteenth century, has less certain affinities with pottery styles from the Four Corners region (Anschuetz 1995:32). In the Albuquerque District, the occurrence of Chupadero Black-on-white and Socorro Black-on-white suggests a southern affinity, while the presence of small quantities of St. Johns Polychrome indicates interaction with Pueblo groups in the Upper Little Colorado drainage of east-central Arizona (Cordell 1979:44).

Coalition period architecture echoes the regional heterogeneity of the ceramic assemblages. Pithouses continue to be used as dwellings, although the general trend is toward increasing the use of surface pueblos for both living and storage. In the Middle and Northern Rio Grande, clusters of small room blocks with kivas give way to large quadrangular surface pueblos built of adobe, often with above-ground kivas at the corners of the room block (Cordell 1989; Creamer 1993; Lange 1968; Stuart and Gauthier 1981). Coalition period structures in the Pajarito Plateau and Galisteo Basin areas, in contrast, tend to be smaller, linear room blocks of stone masonry (Anschuetz 1995).

Two major demographic changes are associated with the Coalition period throughout the Northern Rio Grande region. The first is a sharp increase in population evidenced by the increasing number and size of habitation sites. This change is most commonly interpreted as evidence of a population influx from the Four Corners region (Frisbie 1967;

Wendorf and Reed 1955), although Cordell (1979) argues that the increase is a result of internal growth. Current thinking attributes site frequency and size increases to a combination of migration and incipient population growth. The second trend is expansion of settlements into higher-elevation areas, and the concurrent resettlement of the river valleys in some areas. In the Albuquerque District, Tijeras Canyon is first occupied during this period, and Coalition period settlements have been documented in the Rio Grande Valley north of Corrales (Cordell 1979). Anschuetz (1984:34, 1987:158) argues that these settlements represent only seasonal occupations of a farming frontier district used intermittently by Pueblo groups from the Socorro District. Obviously, this observation merits further investigation.

Classic Period

The Classic period is dated between AD 1300 or 1350 and 1600 (Cordell 1979, 1989; Wendorf and Reed 1955). The Classic period is appropriately named because it marks a period of cultural florescence, with the construction of large, aggregated settlements and elaborate material culture in the Rio Grande Valley (Wendorf and Reed 1955). A distinctive change in pottery production occurs during this period as locals begin to make glaze-decorated, red- and yellow-slipped ceramics.

Marshall (1986, 1989) estimates that between 50 and 75 large pueblos, some with a thousand rooms, were built along the Middle Rio Grande Valley. Large pueblos were also built in higher elevations near reliable springs or seeps (Anschuetz 1984:40; Lintz et al. 1988:14:1). Numerous small, specialized sites are also present (Biella and Chapman 1979; Schmader 1994; Schmader and Hays 1986). These large pueblos reflect an increase in population, which may again be in part due to groups moving into the area from the San Juan Basin (Cordell 1979:103). With population aggregation into large settlements, the social system likely became somewhat unstable as a result of scalar stress and drought, leading to warfare and resource depletion (Cordell 1979:45; Hogan and Gerow 1990:30; Wendorf and Reed 1955). Crown (1994) argues that the Salado Polychromes, which are found across the Southwest, may have been part of a cult institution to minimize social instability during this period. Large villages in the vicinity of the LA 54599 that were inhabited during the late Pueblo and early Historic periods include Kuaua Pueblo (LA 187), Santiago Pueblo (LA 326), and Bandelier's Puaray (LA 717) in Bernalillo and Puaray Pueblo (Schroeder 1979; Vierra 1989). Foraging parties from these villages, which were 6 to 12 km from the site vicinity, may have gathered and processed plant resources leaving behind small-scale, but repeatedly occupied special activity sites. Ridges with lithic raw material outcrops from the Santa Fe Formation, similar to LA 55499, may have been targeted for quarrying and tool production in support of relatively long-distance foraging episodes. These villages were inhabited when Coronado passed through the region in 1541.

Historic Period (1540 to 1960)

The Historic period is briefly summarized because only one isolated historic period sherd was recovered during the LA 55499 testing project. The general area is peripheral to the Albuquerque and Bernalillo areas that were the focus of Spanish Colonial and later Anglo-American settlement. The major temporal periods are Spanish Colonial (1540 to 1821), Mexican (1821 to 1846), Territorial (1846–1912), and Statehood (1912 to present). The Spanish Colonial period can be subdivided into Contact (1540 to 1599), Early (1599 to 1680), Pueblo Revolt (1680 to 1692), and Middle to Late (1692 to 1821).

During the sixteenth century, travel and resource extraction by Pueblo residents may have continued until Spanish settlers began to exercise control over riparian and open or common lands by the middle 1600s. During the seventeenth century, *encomenderos* would have claimed rights to Pueblo labor and goods and would have exercised control over a considerable amount of land (Riley 1999). One possible hacienda site associated with Santiago Pueblo was suggested to be the remains of Juan Esteban de Fagoaga's ranch from the 1650s (Snow 1976:167).

Following the Pueblo Revolt in 1680 and Reconquest in 1692, Spanish Colonial settlements were quickly established in Bernalillo (1701), Albuquerque (1706), and the Alameda Grant (1710) (Westphall1983:277). The Alameda Grant was made for 89,346 acres (Sayles and Williams 1986). During the eighteenth century, land use and travel through the area west of the Rio Grande would have supported Spanish needs and small-scale, transient Pueblo activities. By the middle eighteenth century, additional communities, such as Las Huertas (1765) and Atrisco (1768), were established through Spanish town grants (Westphall 1983:277). The site vicinity would have been used for livestock grazing and resource extraction, since it was unsuitable for agriculture. These communities were well established when the Anglo-American entrepreneurs arrived with the opening of the Santa Fe Trail and the subsequent influx of Anglo-American settlers that followed the ratification of the Treaty of Guadalupe Hidalgo in 1848 (Westphall 1983:74).

The study area is due north of the Alameda Grant boundary. Most of the grant residents would have lived along the river, while common lands would have been used for grazing and retained a rural character throughout the Territorial period. The Alameda Grant was not confirmed by Congress and its lands reverted to private and public holdings.

In 1919, soon after New Mexico statehood and the establishment of public domain lands, the San Mateo Land Company purchased 33,000 acres (which would form the eventual basis for the City of Rio Rancho) for $0.19 per acre as an investment and sold the property several years later in 1948 to Brownfield & Koontz to become the "Koontz Ranch." Over 500 head of cattle grazed on the property. In 1959, the property was sold to Ed Snow, a local investor and developer. The land, located immediately north and west of the City of Albuquerque, continued to increase in value as the Albuquerque metropolitan area grew to just over 200,000 persons in 1960. However, much of the land retained its rural character.

In 1961, Rio Rancho Estates, Inc. (a.k.a. AMREP) purchased an estimated 55,000 acres as an investment. AMREP's success in New York City as a rose flower mail order business afforded the company the financial ability to purchase the property for approximately $10 million. In the years immediately following the purchase, a plan was created to subdivide the property into tens of thousands of lots and sell them using mass marketing and mail order techniques. AMREP platted and sold this land as Rio Rancho Estates in half-acre and one acre lots to thousands of absentee property owners through mail order sales in the 1960s and 1970s. AMREP sold 77,000 lots to 40,000 buyers for $200 million at $795 for one-half acre and $1,495 for one acre, while retaining over 25 percent of the acreage for future development.

In 1966, the 100th family moved into the community and by 1970, "Rio Rancho Estates" had grown to 91,000 acres with the purchase of an additional 35,000 acres of King Ranch property. AMREP continued its interest and involvement in the community and established its role in the development of the emerging city as builder, land developer, economic development coordinator, and leader in the construction of affordable housing (City of Rio Rancho, City History: http:/ci.rio-rancho.nm.us/Government/city_history.htm).

SITE DESCRIPTION

LA 55499

Cultural/Temporal Affiliation:
Three components, Archaic/Unknown, Formative/Unknown, Pueblo/Post-Pueblo Revolt.

Site Type: Moderate density artifact scatter/lithic quarry with sherds.

UTM Coordinates: See Appendix 1.

Environmental Setting: The site is located on a level hill top with a panoramic view of the region (Figs. 4 and 5). A mantle of loose eolian sand covers the site. Wind has deflated the sand in areas, exposing the lower Santa Fe lag gravels. Local vegetation consists mainly of scrub-grassland including sage, snakeweed, yucca, and various mixed grasses. Site elevation is 5,505 ft.

Land Status: State Trust Land to be auctioned and transferred for residential development.

Site Size: 180.1 by 137.8 m; 15,882.9 sq m.

Site Integrity: A dirt road runs north-south through the site and another dirt road branches off to the east. The roads allow direct access to the site, which has been the scene of hunting and target practice activities. The site has most likely been exposed to surface relic collecting. The site is subject to wind erosion, but is essentially intact. Rodent burrows were common in the strata examined with test pits.

Previous Work: Patrick Hogan originally described the site during the 1986 survey as a 60-by-40-m scatter of lithic debris along the crest of a low ridge. He analyzed a sample of some 32 chipped stone artifacts within an estimated total of 100+ artifacts. Artifacts includ-

Figure 4. LA 55499 view across Concentration 1.

Figure 5. LA 55499 view across Concentration 2.

ed tested cobbles, cores, and chipped stone debitage mainly of the local chalcedony. The sample assemblage consisted primarily of primary and secondary core flakes. Two sherds were also recorded including one indeterminate gray ware and one glaze ware. The site was interpreted as a lithic procurement area exploited by both Archaic and Puebloan groups.

The OAS expanded the site limits from 60-by-40 m to a much larger 180-by-40-m area during the 2005 site examination. This new site limit encompassed the primary artifact concentration at the north end of the site and extended the site limits primarily to the south to include isolated occurrences recorded by Hogan (1986). The OAS defined the isolated occurrence cluster as a discrete artifact concentration connected with the site occupation, rather than an accumulation of artifacts from isolated occupation episodes. Isolated occurrences in the expanded site area included IO-35 (1 core flake), IO-36 (2 gray corrugated sherds), IO-37 (1 core flake and 1 angular debris), IO-45 (8 gray ware sherds with basalt temper), and IO-46 (1 irregular core) (Hogan 1986). The OAS recorded 10 additional chalcedony core flakes in this southern locality along with a Historic period sherd tentatively identified as Tewa Polychrome. The presence of this historic period sherd added a third Spanish Colonial temporal component. A single glaze ware sherd was recorded, but the gray ware sherds were not relocated. The chalcedony and Santa Fe lag gravels exposed at this locality were probably quarried over a long period spanning Archaic through historic times.

Surface Artifacts: An intensive resurvey of the site by the OAS archaeologists during the current testing program identified 110 surface artifacts including mainly chipped stone artifacts (103 pieces of debitage and one biface), 5 sherds, and a basalt axe (Fig. 6). This intensive resurvey provided reliable representation of the range and frequency of surface artifacts. The artifacts are confined mainly within two artifact concentrations surrounded by more widely dispersed artifacts scattered across the

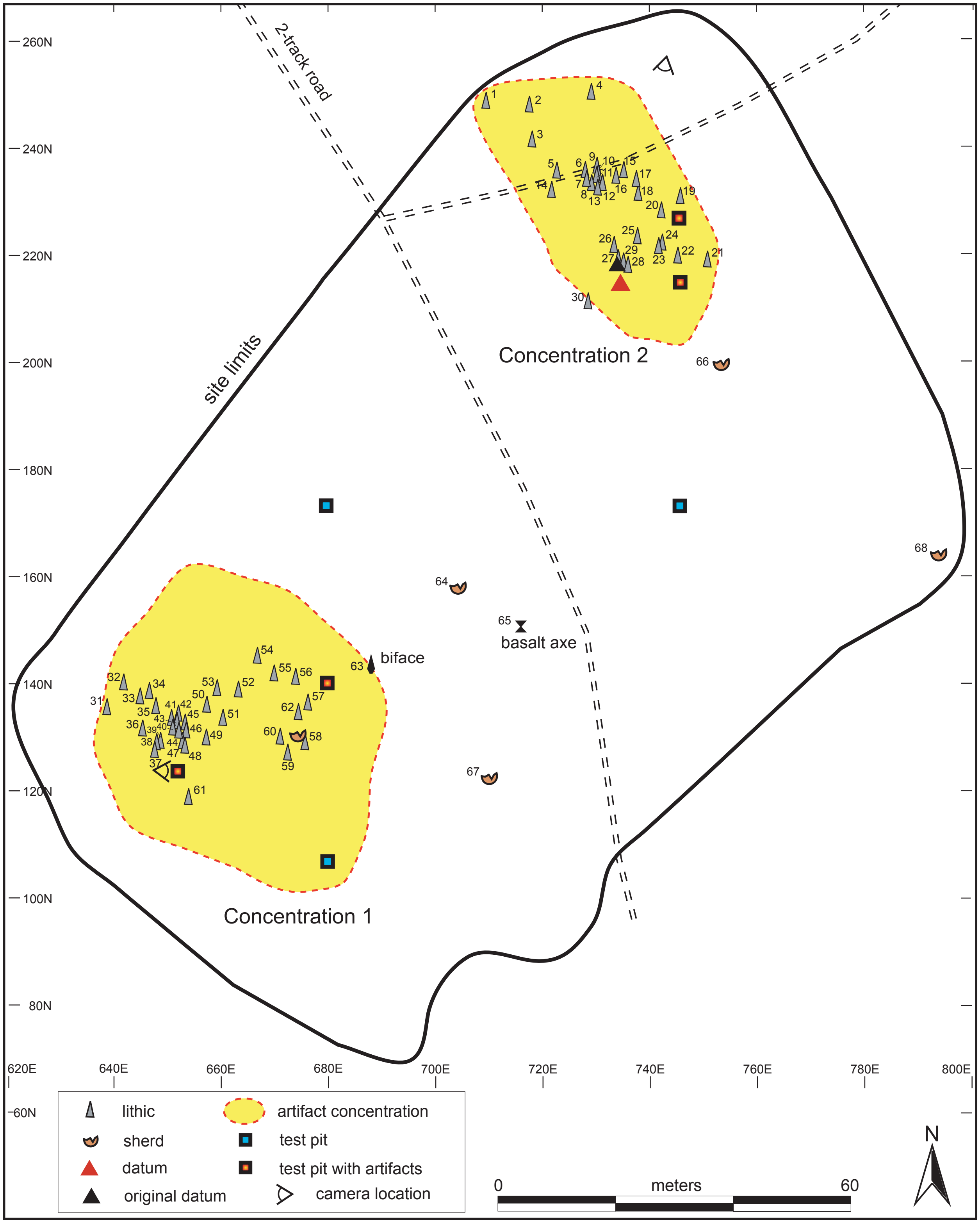

Figure 6. LA 55499 site plan.

site area. Concentration 2 measured about 50-by-20 m and is located east of the two-track road. Concentration 2 consisted of 30 chipped stone artifacts. An additional eight chipped stone artifacts, one glaze ware sherd, and one gray ware sherd were widely dispersed around the perimeter of the concentration. Concentration 1 measured about 50-by-50 m and was located west of the two-track road. Concentration 1 was composed of 51 chipped stone artifacts and one Historic period sherd. An additional 14 artifacts were more widely scattered around the perimeter of the artifact concentration. The two artifact concentrations are separated by about 70 m. No evidence of surface features was found during the intensive surface examination.

Concentration 1 was not included in the site boundary recorded by Hogan during the 1986 survey. However, the current site examination shows that at least 52 artifacts are located within the artifact concentration and an additional 40 artifacts occur within a 30-m zone around the concentration. This western site extension actually contains more artifacts than the original site area east of the two-track road. A sample of 31 (61 percent) of the 51 chipped stone artifacts comprising Concentration 1 were analyzed in the field (Table 2). The Concentration 1 assemblage is composed almost entirely of local chalcedony along with two chert core flakes. The assemblage is dominated by core flakes (28) followed by two pieces of angular debris and one multidirectional core. Chalcedony artifacts include core flakes, angular debris, and a multidirectional core. Cortex ranges from 0 percent (12) to 100 percent (1) coverage with most flakes of both the chert and chalcedony exhibiting 50 percent or less cortex coverage. Five flakes have cortical platforms evidencing the primary stages of core reduction, but most (17) have simple single facet platforms. Only two flakes have multifaceted striking platforms. Flakes range from 1.5 cm to 6.9 cm in length and over half (16) of the flakes are less than 3 cm in length. The sample assemblage is characterized by core reduction using mainly the local chalcedony, but none of the artifacts from Concentration 1 exhibited further modification or utilization as tools. A single biface (PP-63) was noted along the edge of the artifact concentration (Fig. 6). A triangular-shaped chalcedony flake was marginally retouched on both faces producing a rough and expedient projectile point. The projectile point measured 2.2 cm long by 1.7 wide by 0.3 cm thick (Fig. 7). The expedient point was not identified as to type or cultural affiliation.

Three sherds were pin-flagged in the vicinity of Concentration 1. Two sherds (PP-57 and PP62) are rim sherds from a single Puname Polychrome jar. The sherds have black and red mineral paint and basalt temper. One sherd (PP-62) is located within Concentration 1. This sherd had originally been identified as Tewa Polychrome during the OAS 2005 site examination. Puname Polychrome has a date of around 1760 to 1900. The remaining sherd (PP-64) was located about 10 m east of Concentration 1. This sherd was identified as a glaze ware body sherd. None of the gray ware sherds identified in the area by Hogan during the 1986 survey were relocated.

A single roughly shaped vesicular basalt axe was located about 10 m east of Concentration 1 (Fig. 8). The axe was manufactured from an unshaped piece of vesicular basalt with two shallow grooves ground on the lateral edges. The axe measured about 13 cm long by 10 cm wide by 5 cm thick. The axe is of unknown temporal affiliation.

Concentration 2 is located at the east end of the site and is the original site location recorded by Hogan during the 1986 survey. Hogan recorded some 36 artifacts at this location. A sample of 30 (100 percent) of the chipped stone artifacts pin-flagged within Concentration 2 were analyzed in the field during the current testing program. Unlike Concentration 1 where only scattered pieces of raw chalcedony are scattered across the surface, Concentration 2 is characterized by an exposure of abundant raw and unmodified chalcedony nodules. Test Pit 208N/740E placed within Concentration 2 had a surface

Table 2. LA 55499 Chipped Stone Surface Artifacts

PP	Material	Texture	Artifact type	Portion	Cortex %	Platform	Dorsal Scars	Length (cm)	Width (cm)	Thickness (cm)	Comments
Concentration 2											
1	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	1	1.9	2.2	1	Unutilized flake
2	Chalcedony	Fine-grained, flawed	Core flake	Whole	90	Cortical	0	2.8	2.9	1.3	Unutilized flake
3	Chalcedony	Fine-grained, flawed	Core flake	Distal	60	0	0	3.6	2.8	0.8	Unutilized flake
4	Chalcedony	Fine-grained, flawed	Core flake	Whole	100	Cortical	0	3.9	3	3.3	Unutilized flake
5	Chalcedony	Fine-grained, flawed	Core flake	Whole	30	Cortical	2	5.3	3.3	1.7	Unutilized flake
6	Chert	Medium-grained	Core flake	Proximal	30	Cortical	1	4	5.5	1	Unutilized flake
7	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	1	0.7	1.2	0.3	Unutilized flake
8	Chalcedony	Fine-grained, flawed	Core flake	Whole	40	Single facet	1	2.5	2.4	1	Unutilized flake
9	Chalcedony	Fine-grained, flawed	Multidirectional core	Whole	60	0	0	6.8	5.6	5.5	Unutilized core
10	Chalcedony	Fine-grained, flawed	Core flake	Whole	10	Single facet	1	4.5	3.8	1.4	Unutilized flake
11	Chalcedony	Fine-grained, flawed	Core flake	Whole	20	Multifacet	1	5	4.4	1.5	Unutilized flake
12	Chalcedony	Fine-grained, flawed	Core flake	Whole	50	Single facet	1	4.6	3.9	1.3	Unutilized flake
13	Chalcedony	Fine-grained, flawed	Core flake	Whole	50	Single facet	1	1.9	2.5	0.8	Unutilized flake
14	Chalcedony	Fine-grained, flawed	Multidirectional core	Whole	60	0	0	8	7.9	5.5	Unutilized core
15	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	2	3.8	2.3	0.8	Unutilized flake
16	Chert	Fine-grained	Core flake	Whole	0	Single facet	2	2.1	1.6	1	Unutilized flake
17	Chalcedony	Fine-grained, flawed	Core flake	Whole	20	Single facet	1	3	2.5	0.9	Unutilized flake
18	Chalcedony	Fine-grained, flawed	Core flake	Whole	100	Cortical	0	2.5	1.8	0.9	Unutilized flake
19	Chalcedony	Fine-grained, flawed	Core flake	Whole	90	Single facet	1	2.5	2.5	1.3	Unutilized flake
20	Chalcedony	Fine-grained, flawed	Core flake	Whole	50	Single facet	1	3	2.9	1.4	Unutilized flake
21	Chalcedony	Fine-grained, flawed	Core flake	Whole	10	Single facet	1	3.4	1.8	0.9	Unutilized flake
22	Quartzite	Medium-grained	Core flake	Whole	20	Multifacet	2	9.5	3.5	3.5	Unutilized flake
23	Chalcedony	Fine-grained, flawed	Core flake	Medial	10	0	1	2.5	2.1	0.9	Unutilized flake
24	Chalcedony	Fine-grained, flawed	Core flake	Whole	90	Single facet	1	4.5	3.5	1	Unutilized flake
25	Chalcedony	Fine-grained, flawed	Core flake	Whole	90	Single facet	1	3	4.9	1.5	Unutilized flake
26	Chalcedony	Fine-grained, flawed	Multidirectional core	Whole	50	0	0	8.4	8	5.5	Unutilized core
27	Chalcedony	Fine-grained, flawed	Angular debris	Whole	50	0	0	3.5	4.5	3	Unutilized angular debris
28	Chalcedony	Fine-grained, flawed	Core flake	Whole	10	Single facet	1	2.3	1.2	0.4	Unutilized flake
29	Chalcedony	Fine-grained, flawed	Core flake	Medial	0	0	1	1.6	1	0.3	Unutilized flake
30	Chalcedony	Fine-grained, flawed	Core flake	Whole	100	Cortical	0	1.9	1	0.3	Unutilized flake

Table 2. Continued.

PP	Material	Texture	Artifact type	Portion	Cortex %	Platform	Dorsal	Length	Width	Thickness	Comments
Concentration 1											
31	Chalcedony	Fine-grained, flawed	Core flake	Whole	90	Single facet	0	6.2	3.8	1.7	Unutilized flake
32	Chalcedony	Fine-grained, flawed	Core flake	Whole	30	Cortical	2	5.9	3.8	2	Unutilized flake
33	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Multifacet	3	3	1.9	0.6	Unutilized flake
34	Chalcedony	Fine-grained, flawed	Core flake	Whole	30	Single facet	1	2.5	2.4	1.3	Unutilized flake
35	Chalcedony	Fine-grained, flawed	Core flake	Whole	40	Multifacet	2	4.9	3.5	1.5	Unutilized flake
36	Chalcedony	Fine-grained, flawed	Multidirectional core	Whole	10	0	0	5.4	4.3	4	Unutilized core
37	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	2	1.5	2.1	0.9	Unutilized flake
38	Chalcedony	Fine-grained, flawed	Core flake	Proximal	50	Cortical	1	3.3	5.5	2	Unutilized flake
39	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	2	2.9	2	0.9	Unutilized flake
40	Chalcedony	Fine-grained, flawed	Core flake	Whole	50	Single facet	1	4	2.8	1.5	Unutilized flake
41	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	3	1.5	1.5	1	Unutilized flake
42	Chalcedony	Fine-grained, flawed	Angular debris	Whole	0	0	0	3.5	4.5	2.5	Unutilized angular debris
43	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	2	2.3	2	0.4	Unutilized flake
44	Chalcedony	Fine-grained, flawed	Core flake	Whole	10	Single facet	1	1.9	2.5	0.9	Unutilized flake
45	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	2	3.4	3.4	0.9	Unutilized flake
46	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	2	2.9	2.5	1.2	Unutilized flake
47	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	2	1.6	1.8	0.4	Unutilized flake
48	Chalcedony	Fine-grained, flawed	Core flake	Whole	90	Cortical	1	3.3	2.7	1.2	Unutilized flake
49	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	1	2.3	3	0.4	Unutilized flake
50	Chert	Fine-grained	Core flake	Whole	10	Single facet	2	3	2.4	0.4	Unutilized flake
51	Chalcedony	Fine-grained, flawed	Core flake	Whole	30	Single facet	1	2	1.9	0.5	Unutilized flake
52	Chert	Fine-grained	Core flake	Proximal	30	Cortical	1	1.5	2.4	1.6	Unutilized flake
53	Chalcedony	Fine-grained, flawed	Core flake	Whole	20	Single facet	2	4	4.1	2	Unutilized flake
54	Chalcedony	Fine-grained, flawed	Core flake	Medial	50	0	1	6.9	5.5	2.1	Unutilized flake
55	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	3	2	2	0.4	Unutilized flake
56	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Single facet	1	2.7	1.5	0.9	Unutilized flake
57	Chalcedony	Fine-grained, flawed	Core flake	Distal	50	0	1	4	3	1	Unutilized flake
58	Chalcedony	Fine-grained, flawed	Core flake	Whole	100	Cortical	0	3	2.5	0.9	Unutilized flake
59	Chalcedony	Fine-grained, flawed	Core flake	Whole	0	Crushed	3	2.9	1.9	0.5	Unutilized flake
60	Chalcedony	Fine-grained, flawed	Angular debris	Whole	50	0	.	2.5	2.5	1.5	Unutilized angular debris
61	Chalcedony	Fine-grained, flawed	Core flake	Distal	30	0	1	4.2	2	1	Unutilized flake

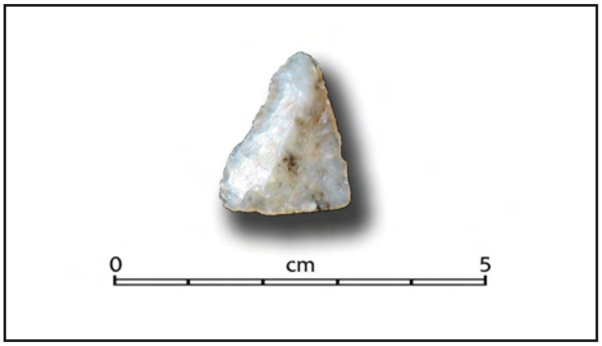

Figure 7. Projectile point.

density of 20 irregular chalcedony nodules within the 1-by-1-m grid. This grid gives an idea of the surface density of raw material covering the ground within Concentration 2. Only definite artifacts were pin-flagged during the current surface resurvey, but a close examination of each piece of raw material would undoubtedly increase the artifact frequency, especially with tested nodules and cores. The raw material size ranged from 5.0-by-4.0-by-3.0-cm to 13.0-by-6.0-by-6.0 cm. The chalcedony is fine grained, but very flawed. The artifact sample is essentially equivalent to the assemblage analyzed from Concentration 1, but with the addition of three multidirectional cores (Table 2). Chalcedony is the dominant (27) material type with smaller numbers of chert (2) and quartzite (1). Chalcedony artifacts include core flakes, angular debris, and multidirectional cores. The assemblage is composed primarily of core flakes (26) with single facet platforms (15) and two or fewer dorsal scars 17). Cortex ranges from 0 percent (4) to 100 percent (3) coverage with low frequencies from seven separate cortex categories. Artifacts range from 0.7 cm to 9.5 cm with just under half (14) of the artifacts measuring 3 cm long or less. The sample assem-

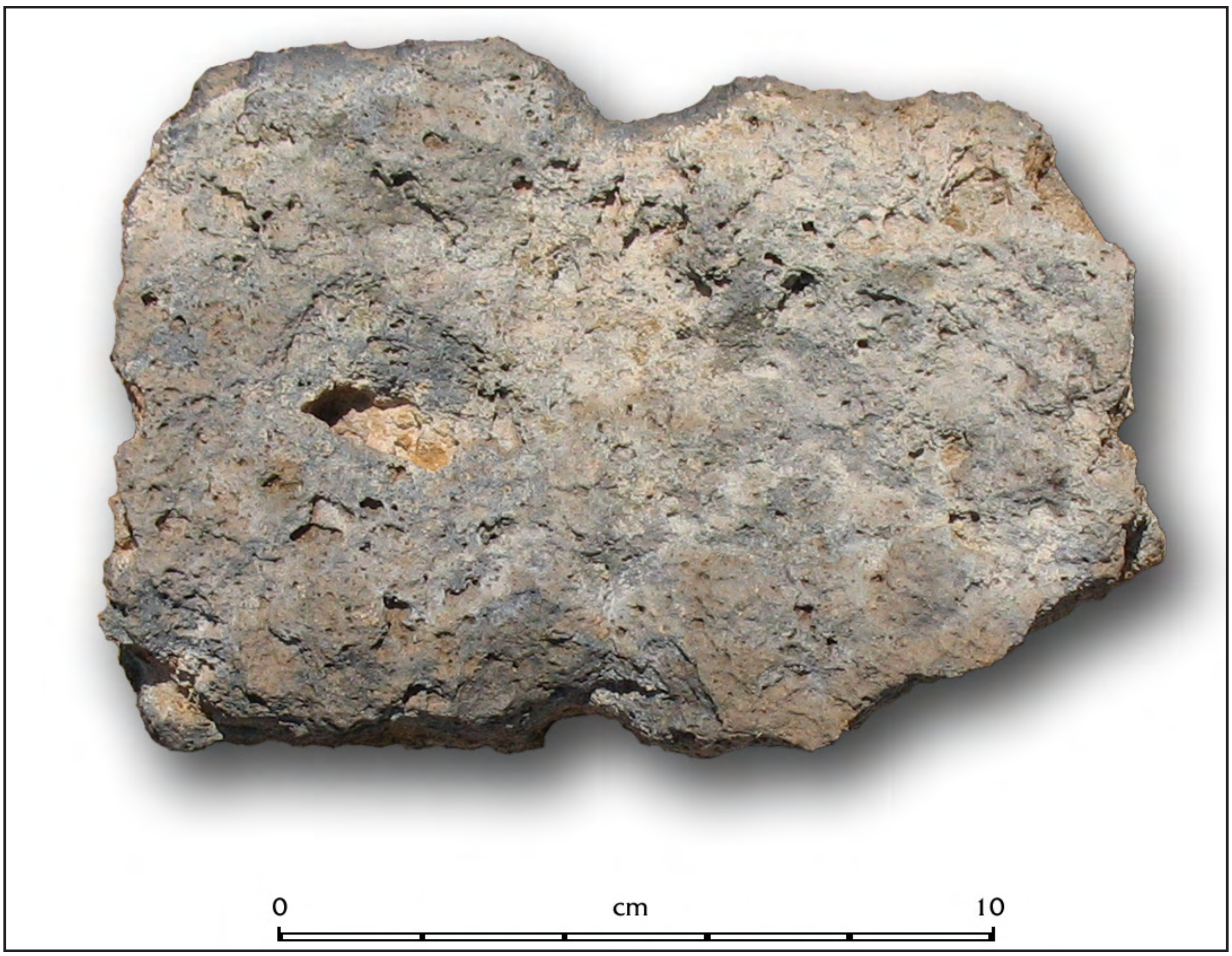

Figure 8. Basalt axe.

blage represented core reduction activities utilizing the local chalcedony exposed at the locality. Silicified wood, quartzite, and cherts were noted in the vicinity, but chalcedony dominates the exposed material types. None of the artifacts exhibited further utilization and no formal tools were found in this area of the site. Eight additional chipped stone artifacts were recorded on the surface within about a 30-m radius around Concentration 2.

Two sherds were pin-flagged in the vicinity of Concentration 2. An unidentified glaze ware jar body sherd is about 10 m to the south and an unidentified gray ware jar body sherd is about 60 m to the south. The sherds suggest Formative period use of the site, but the relationship of the sherds to the chipped stone assemblage remains problematic.

Test Unit Descriptions: Subsurface investigations included the excavation of seven 1-by-1-m test pits and six auger tests. All fill was screened through 1/8-inch mesh.

Test Pits. Seven 1-by-1-m test pits were excavated across the site. The purpose of the test pits was to determine the depth and range of cultural material within the artifact concentrations and across the general site away from the concentrations. This information will be useful should a data recovery plan be required for the site. The test pits were spaced about every 30 m along the 680E line and the 740E line, which provided transects across the primary east and west site areas.

Thirteen artifacts were recovered from four of the seven test pits (Table 3). Most (12) of the artifacts were recovered from the initial 10 cm of loose wind-blown sand characterizing Stratum 1. The single flake from Stratum 2 at a depth of 11 cm to 20 cm below the surface was from a rodent burrow. The test pits show that subsurface artifacts are relatively sparse and confined to the initial 10 cm of wind-blown sand. No subsurface charcoal, culturally derived deposits, or features were found in any of the test pits. The two test pits (208N/740E and 219N/740E) located along the south end of Concentration 2 accounted for 14 of the 16 artifacts. In contrast, only two artifacts were recovered from the three test pits (140N/680E, 110N/680E, and 125N/655E) located at the center and east end of Concentration 1. Both test pits (170N/680E and 170N/740E) located outside of the artifact concentrations yielded no subsurface artifacts or cultural deposits.

Auger Tests. An auger test was placed at the base of each of the seven test pits. The auger tests were excavated to a depth of 1.0 m below the surface and fill was screened through 1/8-inch mesh. No artifacts or cultural material were encountered in the auger tests. The auger tests showed that Stratum 3 represented by light-colored caliche-laden soil

Table 3. LA 55499 Test Unit Results

Test unit	Level				Artifact Total
	1	2	3	4	
110N/680E				--	0
125N/655E	1				1
140N/680E		1			1
170N/680E					0
170N/740E					0
208N/740E	7				7
219N/740E	4			--	4
Artifact Total	12	1	0	0	13

	Stratum 1
	Stratum 2
	Stratum 3

Figure 9. LA 55499, soil profile.

continued to a depth of at least 1.0 m below the surface.

Stratigraphy: The various test units document a consistent subsurface soil profile across the site (Fig. 9). Stratum 1 extends from the surface to a depth of 10 cm below the surface. Stratum 1 is a loose grained (7.5YR 6/4) eolian sand deposit. The site occupation is confined primarily to the surface and to this initial 10 cm of loose wind-blown sand. Cultural material is confined to low frequency artifacts with no evidence of charcoal or cultural staining. Stratum 2 is a compact strong brown (7.5YR 4/6) fine-grained sandy clay. The soil had a blocky consistency and required a pick for excavation. Stratum 2 contained numerous rodent burrows and the single flake recovered from Stratum 2 was from a disturbed rodent burrow context.. Stratum 2 contained moderate gravel content, and caliche flecks usually appeared at the base of Level 2. Stratum 2 continued to a depth of 20 cm to 30 cm below the surface. Stratum 3 began at a depth of 20 cm to 30 cm below the surface and continued to a depth of 1.0 m. Stratum 3 was characterized by a very compact fine-grained sandy silt, lighter pink (7.5YR 7/4) in color, with abundant caliche and moderate gravel content.

Subsurface Artifacts: Thirteen artifacts were recovered from four of the seven test pits (Table 4). The majority (11) of the artifacts were recovered from the two test pits excavated within Concentration 2. The subsurface chipped stone assemblage mirrors the surface assemblage. Chalcedony is the dominant material type along with one piece of silicified wood. All of the artifacts are represented by core reduction debitage in the form of core flakes, cores, and angular debris. None of the chalcedony debitage had utilized edges. The only tool is a silicified wood uniface found near the center of Concentration 1 in Test Pit 125N/655E. The artifact has facial and marginal flake scars along one surface and may have been used either as a knife or a scraper. No use-wear was evident. This was the only

Table 4. LA 55499 Chipped Stone Subsurface Artifacts

Grid unit	Level	Material	Texture	Artifact type	Portion	Cortex %	Platform	Dorsal Scars	Length (cm)	Width (cm)	Thickness (cm)	Comments
208N/ 740E	1	Chalcedony	Fine-grained	Multidirectional core	Whole	40	0	0	5.7	4.9	3.1	Unutilized core
		Chalcedony	Fine-grained	Core flake	Whole	90	Multifacet	2	2.6	2.8	1.5	Unutilized flake
		Chalcedony	Fine-grained, flawed	Core flake	Lateral	50	Absent	1	3.7	1.1	1	Unutilized flake
		Chalcedony	Fine-grained	Core flake	Whole	0	Crushed	3	2	1.4	0.3	Unutilized flake
		Chalcedony	Fine-grained	Core flake	Lateral	0	Single facet, abraded	2	2	1.1	0.6	Unutilized flake
		Chalcedony	Fine-grained	Angular debris	Whole	10	0	0	1.1	1.2	0.5	Unutilized angular debris
		Chalcedony	Fine-grained	Core flake	Distal	0	Absent	1	1.3	1.2	0.6	Unutilized flake
		Chalcedony	Fine-grained	Core flake	Medial	0	0	4	1.1	1.5	0.3	Unutilized flake
		Chalcedony	Fine-grained	Angular debris	Whole	20	0	0	1.1	0.8	0.4	Unutilized angular debris
219N/ 740E	1	Chalcedony	Fine-grained, flawed	Angular debris	Whole	10	Cortical	0	3.2	3.4	1.2	Unutilized angular debris
		Chalcedony	Fine-grained, flawed	Core flake	Distal	10	Collapsed	0	2.3	2	0.6	Unutilized angular debris
140N/ 680E	2	Chalcedony	Fine-grained, flawed	Angular debris	Whole	100	Collapsed	0	3	2.8	1.1	Unutilized angular debris
125N/ 655E	1	Silicified wood	Fine-grained	Early stage uniface	Whole	0	Multifacet, abraded	5	5.2	2.9	0.5	Uniface

piece of silicified wood found on the site.

Evaluation: Site testing shows that LA 55499 functioned as a quarry site where exposed local material types were procured by the site occupants. Surface artifacts totaled just over 100 chipped stone, ground stone, and ceramic artifacts. The artifacts are both widely scattered across the large site area and confined within two primary artifact concentrations separated by about 70 m. Concentration 1, located on a hilltop at the west edge of the site, was larger in size and artifact frequency, but contained fewer pieces of exposed raw material. Only scattered gravel and chalcedony nodules were noted in this site area. The hill provided a good view of the arroyo to the southwest. This area may have served as a locality where selected cores and flakes were procured from the main lithic exposure at Concentration 2, moved to Concentration 1 for further reduction, where the surrounding territory could be observed. In turn, Concentration 2 had a smaller surface area based on the distribution of raw material and artifacts. However, chalcedony in the form of irregular nodules is more abundant in the area. The locality also has good views of the surrounding territory which could be monitored while raw materials were obtained and partly reduced for eventual transport off-site. The two test pits in Concentration 2 show that somewhat higher artifact frequencies than is apparent on the surface may be expected in the initial 10 cm of loose wind-blown sand. In general, chipped stone artifacts across the site are characterized by simple core reduction activities centered around the exposures of local chalcedony and other secondary lag gravels. The majority of the chipped stone artifacts are of unknown cultural affiliation and the presence of sherds illustrate repeated use of the area during the Formative period and into the Historic period. Site testing verifies Hogan's original 1986 interpretation of a lithic quarry, where exposures of local raw materials were procured over a long period of time. Site occupation episodes were brief, based on the restricted range of the artifact types and the apparent absence of features. The fine-grained, but very flawed nature of the local chalcedony, resulted in the production of considerable debris in order to produce serviceable flakes or blanks. This labor investment may have been off-site. Low frequency of tools indicate that reduced raw materials were removed from the site for use at other locations as part of a land-extensive foraging pattern.

RECOMMENDATIONS

LA 55499 is a moderately sized lithic quarry important for understanding the quarrying and procurement of local lithic material. The site is recommended as potentally eligible for nomination to the *National Register of Historic Places* under criterion d because the site is likely to yield information important to prehistory and history (36 CFR par 60.4 and in conformance with 4.10.15.16 NMAC).

This site is likely to yield important information on long-term chipped stone procurement patterns from the Archaic period, and with repeated reuse, extending into the Formative and Historic periods. The site should be avoided as part of the planned development or a data recovery plan developed to recover potentially significant information from the site. At present, because the site cannot be avoided, Paseo Gateway LLC has elected to clear the site through data recovery.

RESEARCH DESIGN AND DATA RECOVERY PLAN

The following data recovery plan fulfills the requirements and follows the guidelines for Research Designs for Excavation Projects (4.10.16.13 NMAC). The research questions and scope of the field effort and laboratory analyses are consistent with a spatially extensive, low frequency, lithic procurement site with limited potential for buried intact cultural deposits or features, but potential for chronological, site structure and function, and the role of lithic procurement in regional subsistence systems. Research orientation and field and laboratory methodologies are partly adapted from Boyer et al. (2003), Lentz (2003), and Post and Hannaford (2005).

Site Characterization

Site testing determined that LA 55499 is a moderately sized quarry and lithic procurement site utilized over a long period of time. Site testing demonstrated that surface artifact frequencies number in the low 100s and that the majority of the artifacts are clustered within two artifact concentrations. Test pits excavated at LA 55499 and from five nearby tested sites show that cultural material is consistently confined to the upper, loose, 10-cm layer of wind-blown sand (Hannaford 2006a). Therefore, it is reasonable to assert that artifacts have been subjected to a repeated cycle of exposure and burial within this shallow wind-blown sand layer over a long period of time. Essentially no intact vertical relationships are expected to remain, although broader horizontal contexts may still be preserved. The exposed site on the high hilltop has been severely scoured by the wind. The wind has exposed the Santa Fe lag gravels, which were subsequently exploited by past site occupants. However, in this windblown setting, it is highly probable that most charcoal initially left in ephemeral hearths or thermal features was carried away by the wind long ago. No charcoal or fire-cracked rock was found in the test pits or on the site surface. In the absence of surficial evidence of features, surface stripping should expose any buried features, which are important for understanding the site. In general, the site is a composite of different activities associated with lithic procurement, reduction, and surrounding landscape monitoring that have been focused at two artifact concentrations. The artifact concentrations are expected to yield the best information on chronology, site function and structure, and regional subsistence patterns. Therefore, OAS investigation will focus systematic excavation in those two areas with mechanical stripping of intervening and perimeter areas used to identify outlying features or artifact concentrations. The intent of the following research and data recovery plan is to propose field investigations and analyses consistent with the data potential of the site.

Research Orientation

Broadly speaking, LA 55499 testing suggests that ceramic and lithic assemblages and site structure data in the form of artifact distributions and variability may only reflect general patterns within broad temporal horizons. While lacking fine-grained or discrete evidence of past activities, the site should still provide important information on long-term chipped stone procurement patterns from the Archaic period, and with repeated reuse, extending into the Formative and Historic periods. Because LA 55499 is best characterized as a multiple activity locus supporting lithic procurement for foraging and hunting parties and possibly some processing of gathered plants or successfully hunted game mammals, this research will rely on processual models of hunter-gatherer organization.

Basically, whether site occupants were Archaic hunter-gatherers or Pueblo forager-farmers, they may have employed similar strategies of lithic procurement and reduction in support of their subsistence activities. For this study, chronology, site structure, along with lithic artifact and other material culture assemblage data will be used to examine hunter-gatherer or hunter-gatherer-like organization that might reflect Archaic, Formative/Puebloan, or Historic Puebloan subsistence strategies.

In hunting and gathering studies (Binford 1979, 1980; Vierra 1985; Vierra and Doleman 1984), two primary hunter-gatherer organizational strategies appear to predominate: the forager and collector. In the forager system, a group "maps onto" exploitable resources through frequent residential moves and adjustments in group size. Within this system there are two identified site types: short-term residential base camps and logistical sites.

The residential site is the terminus for exploitative activities, and it is where the group resides when processing resources, maintaining and manufacturing tools, and performing other daily activities. The assemblages associated with this site type has been shown to be quite variable in content and includes debitage and implements associated with tool manufacture and maintenance, expended tools, and processing equipment. The internal site organization of a residential base should be differentially organized according to separate activity loci and residential units. In the foraging model, residential bases appear to exhibit relative redundancy of land use and are the location from which foraging groups depart. Lithic assemblages at residential bases may reflect embedded procurement of raw material from locally available sources, such as LA 55499.

Logistical sites are where specific activities take place. Sites of this category, particularly those generated during plant gathering and encounter hunting, may be archaeologically difficult to discern. On the other hand, sites created during intercept activities may also be used redundantly in the exploitation of the targeted resource. The assemblage associated with this type of site may include limited numbers of core reduction and tool production or maintenance debitage. Lithic raw material could have been obtained at LA 55499 and reduced for transport and further reduction at logistical hunting and gathering sites.

In a collector system, specialized task groups leave a residential location to procure a specific resource. Unlike the foragers, they know the location of a critical item and are not searching for resources on an encounter basis. Within a particular settlement system, geographical locations are seen as being more advantageous in fulfilling a site's functional requirement. It appears that logistical site locations are reoccupied more often than residential locations. Reuse may be tied to the specific locational requirements of these sites for resource exploitation and monitoring. Occupants of these sites can predict the location and time period when a resource can be utilized, as in the seasonal migration of a particular species. Residential sites appear to be reoccupied less frequently owing to greater flexibility in their locational options over the more rigid requirements of an intercept location. Evidence of lithic procurement by residentially mobile collectors would be more intensive core reduction and, perhaps, even portable biface production (Kelly 1988; Moore 2003). This strategy should leave a distinctive assemblage of core and biface reduction debris.

Temporal Context

What periods of occupation does the site represent? Can distinctions within and between Archaic, Formative/Puebloan, and Historic Pueblo be recognized within the two artifact concentrations? Are there recognizable temporal differences between the concentrations?

Dating of the site is fundamental for understanding regional patterns of social and subsistence organization, and the relationship of the site to larger aggregations. Also, if possible, the site must be placed in the appropriate temporal framework to detect regional trends and changes in social and subsistence patterns. Minimally, the recovery and analysis of the artifact assemblage will add to the general body of descriptive data concerning procurement, manufacture, and use of the local lithic material. Dating lithic scatters void of diagnostic artifacts and features can be problematic. Experiments have shown that, all other things being equal, there are few substantive differences in the lithic assemblages between "sedentary" and "non-sedentary" groups, mobility being the critical variable. In other words, mobile Pueblo groups may behave like Archaic or other mobile groups engaged in similar subsistence strategies removed from their primary agricultural pursuits. Thus, it may be difficult to define the time period when the site was occupied on the basis of the chipped stone assemblage alone. Therefore, data recovery will also focus on the recovery of additional diagnostic artifact types such as ceramics, which may aid in dating spatial components within concentrations and identification and comparison of temporal components between concentrations. Whether LA 55499 is contemporaneous with any of the regional larger settlements may ultimately be determined by chronometric studies (particularly radiocarbon or archaeomagnetic dating). The extensive hand excavation proposed for concentrations and mechanical excavation of intervening and perimeter areas will provide the best opportunity to recover artifacts for relative dating and identify and excavate features from which chronometric dating samples may be recovered.

Site Structure and Function

What is the range of activities represented by the artifact assemblage and features (if any are discovered)? Are there distributional differences of artifact types and features both within and between the two primary artifact concentrations that reflect activities associated with different lithic procurement and resource extraction strategies? What additional information do features exposed by mechanical blading outside of the primary artifact concentrations provide on site structure and function?

Site testing has revealed two primary artifact concentrations. Concentration 2 is located at the east end of the site and was originally recorded by Hogan during the 1986 survey. Concentration 2 is characterized by an exposure of abundant raw and unmodified chalcedony nodules. Test Pit 208N/740E placed within Concentration 2 had a surface density of 20 irregular chalcedony nodules within the 1-by-1-m grid. This grid gives an idea of the surface density of raw material covering the ground within Concentration 2 and provides an interesting contrast to the relatively low frequency (n=30) of lithic artifacts that were pin-flagged and recorded during the testing program. Concentration 2 seems to represent an area of exposed chalcedony and gravel, which were initially tested early in the procurement process for quality, suitability, and reliability. The majority of the material is of unknown, but probably Archaic affiliation. However, two sherds were pin-flagged in the vicinity of Concentration 2. An unidentified glaze ware jar body sherd is about 10 m to the south and an unidentified gray ware jar body sherd is about 60 m to the south. The sherds suggest Formative period use of the site, but the relationship of the sherds to the chipped stone assemblage remains unclear.

Concentration 1 is located about 70 m to the west and was not included in the site boundary originally recorded by Hogan during the 1986 survey. However, the OAS testing program pin-flagged 52 artifacts within the artifact concentration. This western site extension actually contains more artifacts than the site area that was defined originally. Concentration 1 is characterized by much lower frequencies of raw chalcedony, although chalcedony and other material types are exposed at the locality. The assemblage may represent material from Concentration 2 that was selected and carried to Concentration 1 for further reduction while monitoring a sweeping view of the landscape to the south. The only formal tool was a single triangular-shaped chalcedony flake with marginally retouched faces producing a rough and expedient projectile point (Fig. 7). The expedient point was not identified as to type or cultural affiliation. Three sherds were pin-flagged in the vicinity of Concentration 1. They include a single glaze ware dating to the Classic period (AD 1325 to 1600) and two Puname Polychrome sherds dating to the Historic period (AD 1760 to 1900). The sherds suggest time depth and reuse of the locality, but how the sherds are related to the lithic assemblage remains unknown.

Defining site structure will entail documenting the intrasite distribution of sherd and lithic artifacts and the reduction strategies and subsistence organization they reflect through the collection of a sample of artifacts from the two artifact concentrations. This will be accomplished by establishing a 25-by-25-m (625 sq m) collection area over the high artifact frequency core of artifact Concentration 1, which constitutes a 25 percent areal sample of the 50-by-50-m (2,500 sq m) artifact concentration. The 625 sq m will encompass most of the 51 surface artifacts originally pin-flagged at the locality. A 16-by-16-m (256 sq m) collection area will be established over the high artifact frequency core of Concentration 2, which constitutes a 25.6 percent areal sample of the1,000-sq-m concentration area. Again, the collection area should recover a high proportion of the 30 artifacts originally pin-flagged at the locality. Employing a 2-by-2-m grid, the surface artifacts will be relocated and collected, then the eolian top soil will be shovel stripped and screened recovering any buried artifacts within each concentration. To further search for buried features outside the concentrations, 11 percent of the site area will be mechanically stripped focusing on intervening and perimeter areas. If features are exposed, the surrounding area will be surface-stripped and screened to recover associated artifacts and feature excavated for morphological data and retrieval of chronometric and subsistence-related samples.

Through this program of extensive hand and mechanical excavation and systematic recovery of artifacts and excavation of features, site structure, along with the range and spatial arrangement of past activities, may be inferred. Analysis of lithic artifact type and reduction strategy variables combined with distribution frequencies should reveal patterns of lithic procurement, reduction, use, and their relation to other activities often associated with hunting and foraging. For example, clusters of biface reduction flakes may remain from local hunting activities or preparation for longer distance hunting forays. High frequencies of core flakes and angular debris to the exclusion of biface flakes or non-cortical core flakes may reflect heavy emphasis on lithic raw material procurement to the exclusion of other activities. These are examples of two inferences that may be drawn from assemblage and spatial distribution data. Additional inferences may become more apparent once the assemblage data are collected and spatial and statistical techniques are applied.

Regional Comparison

Prehistoric utilization of LA 55499 and the five nearby sites located in Section 32, which were evaluated during the OAS testing program, occurred over a long period of time and centered around the exploitation of lithic resources available in the higher hills near the center of the section. Wind tends to scour the sands exposing the underlying Santa Fe Formation cobbles and gravels. The exposed gravels contain a wide range of potentially useable lithic materials important to prehistoric and historic inhabitants of the area and region. The prehistoric inhabitants were particularly interested in the local chalcedony, but chert, silicified wood, quartzite, basalt, sandstone, and other lithic types appear in the deposits. The exposed lithic resources were valuable for the manufacture of both chipped and ground stone tools by people in the region.

The sites manifest a repeated pattern of prehistoric and historic period groups passing through the area and utilizing the locally exposed raw material types. The lithic material was probably procured during the pursuit of other subsistence activities including hunting and the gathering of plant resources. The sites can be viewed as repeated and redundantly used special activity locations occupied for brief periods. The sites and isolated occurrences near LA 55499 can be viewed as an accumulation from numerous episodes of material testing and reduction conducted over a long period of time (Hogan 1986). In general, the absence of water would have prevented more permanent occupation, except during the wettest climatic intervals. Residential sites from all time periods are generally concentrated along the Rio Grande about 6 miles south of the study area (Schmader 1994). Additional camps have been found in the more broken highlands with only intermittent water resources several miles to the west (Brandi and Dilley 1998). The LA 55499 study area would have served as a resource hinterland for these more permanent residential sites.

Comparison of the lithic assemblage recovered from LA 55499 with similar quarry sites and residential sites should provide an initial perspective on understanding long-term resource procurement and extraction strategies and patterns on Ceja Mesa and in the Middle Rio Grande Valley. Hannaford (2006b) recorded similar quarry sites (LA 152555, 152558, and 152559) along with more intensively occupied camps with features (LA 152556, LA 152557, and LA 152560) on the Lionsgate North project located less than 5 km southwest of the site. Investigations of seven sites within Unit 22 (7 km to the west) revealed a series of residential and foraging camps consisting of clusters of structures, thermal processing features, fire-cracked rock concentrations, and extensive lithic rock concentrations (Dello-Russo 1999). These assemblages should supply comparative information on how procured lithic materials arrived at more intensively occupied sites and were modified into tools involved with a range of activities.

DATA RECOVERY FIELD METHODS

This section provides a general overview of the techniques that will be used during data recovery investigations. Investigation of LA 55499 will focus on the recovery of material and exposure of buried features within the two identified artifact concentrations. Additional mechanical scraping will be conducted outside of the artifact concentrations. Field and laboratory methods are designed to collected site structure and artifact data that can be used to address the questions posed in the research design.

General Field Methods

Horizontal Provenience

The first step in excavation will be to reestablish the Cartesian grid system used during the testing phase. The north/south base line is aligned in relation to the UTM Grid with the primary datum at 208.41 N/730.42E. All horizontal and vertical measurements will be measured in relation to this primary datum.

Surface collection and surface stripping units linked to the grid system will be identified by the grid lines that intersect at their southwest corners. The basic excavation units will be 2-by-2-m squares. An increase in resolution to 1-by-1-m units will occur if features or specific living surfaces are encountered. If features are encountered, they will be treated as independent excavation units within the grid system with their own unique stratigraphic designations. When necessary, point-proveniencing of temporally diagnostic will be used or the Cartesian coordinate system for isolated artifacts found at the perimeter of the concentrations.

Surface artifacts will be collected in 2-by-2-m units within the 256 sq m sample area proposed for Concentration 1 and the 625 sq m sample area proposed for Concentration 2. Following the surface collection, the units will be surface-stripped of the 10-cm layer of loose windblown sand covering the site. The loose sand will be screened through 1/4 inch mesh, which will be reduced to 1/8 inch mesh if smaller biface flakes are observed. Small biface and retouch flakes were not encountered during the testing program when 1/8 inch mesh was employed. Surface stripping should expose any subsurface features and facilitate recognition of artifact distribution patterns left from lithic procurement and foraging and hunting activities. The sample excavation areas may expand as features or complex subsurface artifact distributions are encountered. The testing program established that artifacts are confined to the initial windblown sand layer and deeper explorations are not warranted at the site.

As surface stripping nears completion, a backhoe will be used to scrape the surface in areas between and peripheral to Concentrations 1 and 2. A 10-by-60-m strip will be scraped in the area between the artifact concentrations along with a longer 10-by-120-m strip along the eastern site margin to ensure there are no buried deposits. The1,800 sq m covers 11 percent of the 15,883 sq m site area. The purpose of the mechanical scraping is to search for subsurface features that would assist in answering the questions of temporal affiliation and site function. Hand-dug units (5.5 percent or 881 sq m) and mechanical units (11 percent or 1,800 sq m) will allow for archaeological investigation of about 16.5 percent of the site and a much higher proportion of Concentrations 1 and 2.

Vertical Provenience

Just as the grid system will be linked to the main datum, so will all vertical measurements. All measurements will be made in meters with 10.00 m designated for the site main datum. All elevations will be recorded relative to the site's main datum. Since it is often difficult to provide vertical control for an entire site with one datum, subdatums will be established as needed. Horizontal and vertical control of these points will be maintained relative to the main datum. Strata will be used as the main units of vertical excavation. Artifacts are confined primarily within one subsurface strata of loose windblown sand averaging about 10-cm thick. Additional stratigraphic units will be defined as needed, but deeper units are not anticipated. Stratigraphic documentation for any feature will be established through 10- or 20-cm level excavation of part of the feature to provide a profile. The profile will then guide removal of the remaining fill in natural stratigraphic units.

Mechanical Excavation

Exploratory mechanical blading is planned for two areas of the site outside of the primary artifact concentrations. These areas will be marked and tied into the grid system. Mechanical scraping will be accomplished with the smooth edged scraping blade of the backhoe. Archaeologists will monitor the removal of the surface layer in 5- to 10-cm-thick passes with the goal of exposing features, use surfaces, or subsurface deposits.

General Excavation Methods

Most artifacts will be recovered in two ways: visual inspection of levels as they are excavated and screening though variable-sized mesh. Other materials may be collected as bulk samples that can be processed in the laboratory rather than the field. Regardless of how cultural materials are collected, they will all be inventoried and recorded in the same way. Collected materials will be assigned a field specimen (FS) number which will be listed in a catalog and recorded on all related excavation forms and bags of artifacts. FS numbers will be tied to provenience, so that all materials collected from the same horizontal and vertical provenience units will receive the same FS number. The FS number will be the primary tool that will maintain the relationship between recovered materials and associated spatial information from excavation through analysis and curation.

Most artifacts will be recovered by systematically screening soil and sediment removed from excavation units. All soil and sediment from exploratory grids and features will be passed through screens. Two sizes of screen, 1/4-inch and 1/8-inch mesh, will be used. While many artifacts are usually large enough to be recovered by 1/4-inch mesh, some, such as smaller biface flakes, are too small to be retrieved by that size screen. These artifacts can provide important clues about the activities that occurred at a site. However, there is a trade-off in gaining this additional information. As the size of mesh decreases, the amount of time required to screen soil and sediment to recover artifacts increases. Sampling is a way to balance these concerns; thus, smaller mesh will only be used under certain circumstances. Rather than establishing specific guidelines for sampling by 1/8-inch mesh screens, it is considered better to leave this to the discretion of the site supervisor. However, as a minimum, all soil and sediment in certain types of features (for example hearths, ash pits, unburned pits, and fire-cracked rock concentrations) should be screened through 1/8-inch mesh. Other potential applications of this recovery method include culturally deposited strata and activity areas.

Should excavation expose features, other cultural materials, such as macrobotanical samples, will be recovered from bulk soil or sediment samples. In general, samples for flotation analysis will be collected from culturally deposited strata and features. Where adequate material is available within a provenience, samples should contain at least 2 liters of soil. Although unlikely to preserve in such an extreme eolian setting, macrobotanical materials like corn cobs, piñon shells, wood samples for identification, charcoal, etc., will be collected as individual samples whenever found. All botanical samples will be cataloged separately and noted on pertinent excavation forms.

Field collection of pollen will be determined by feature or stratigraphic context. First priority samples will be taken from lower structure and feature strata and floors. Preferred collection points should not exhibit evidence of post-occupation disturbance or mixing. Second priority samples will come from upper feature fill or proveniences that exhibit limited evidence of disturbance. A control sample will be collected from an off-site location to allow the pollen analyst to account for sample contamination with modern pollen. Sample contexts will include burned and unburned contexts and stratigraphic contexts in possible field or agricultural locations.

Up to ½ cup of soil will be collected from all features or internal feature strata for pollen or other macrobotanical analyses. These samples will be collected in coin envelopes and labeled with provenience information. Samples will be sealed in the field. They may be opened in the laboratory to determine if they have dried sufficiently for repackaging according to analyst instructions.

Specific Field Methods

Features. Features will constitute individual horizontal provenience units. Features will be assigned sequential numbers as they are encountered at a site. Feature numbers will be recorded on a feature log. Feature information will be recorded on a feature form describing, in detail, its shape, content, use history, construction detail, and inferred function. All features will be photographed, using 35-mm black-and-white film, documenting the excavation process. Other photographs, including 35-mm color slides and digital images, showing construction or excavation details, may be taken at the discretion of the excavator.

After defining the horizontal extent of a feature, such as a hearth or ash pit, it will be bisected. To efficiently define internal stratigraphy, one half of the feature will be excavated in a single level and fill screened using 1/8-inch mesh. A scaled profile of internal strata will be drawn. The second half will be removed by internal strata. Flotation and pollen samples will be recovered from each associated stratum and remaining fill will also be screened through 1/8-inch mesh. After all the fill has been removed, a second cross section, perpendicular to the soil profile, will be drawn illustrating the feature's vertical form. In addition, a scale plan of the feature showing the grid location, size, and location of profile lines will be drawn.

Special Situations

Human Remains. It is unlikely that human remains will be unearthed during the data recovery effort. However, should they be present at LA 55499, the OAS will activate Annual Unmarked Human Burial Excavation Permit ABE-07-027 and proceed as outlined in 4.10.11 NMAC, Issuance of Permits to Excavate Unmarked Burials in the State of New Mexico.

Unexpected Discoveries or Changes to the Data Recovery Plan. There is always a risk of finding unexpected deposits or features during an archaeological excavation; this is especially true for the project outlined in this plan since it is based solely on survey observations. If OAS encounters finds that have the potential to significantly increase or alter the scope and intent of this plan, then the project director or principal investigator will consult with the State Trust Archaeologist, and the State Historic Preservation Division. Conversely, if initial or ongoing data recovery efforts demonstrate that the site is less extensive or its data potential is significantly less than expected in terms of the quantity or diversity of artifacts, cultural materials, or cultural deposits, then OAS will develop a plan for reduced effort in consultation with State Trust Archaeologist and the State Historic Preservation Division.

ARTIFACT ANALYSES AND RESEARCH ISSUES

Chronometrics

Accurate dates are needed in every archaeological study to place sites in the proper context, both locally and regionally. Inaccuracies are built into many chronometric techniques, or perhaps more properly phrased, some methods may not actually reflect the age of the cultural event they are being used to date. In order to assign accurate occupational dates to a site, it is usually desirable to obtain as many types of chronometric data as possible. That way they can be used to cross-check one another and permit the researcher to identify and eliminate faulty dates. Given the topographic and geomorphological setting, chronometric dating will rely primarily on radiocarbon and archaeomagnetic dating samples. Relative dating may be supported by the recovery of temporally diagnostic ceramic and lithic artifacts.

Artifact Dating

Pottery and chipped stone artifact types are the most likely to provide relative dates for discerning general temporal components within Concentrations 1 and 2. Few ceramics and no diagnostic chipped stone artifacts were recovered during LA 55499 testing. If temporally diagnostic artifacts are found in association with artifact clusters or features, they will be used to tentatively develop a concentration and site chronological sequence.

The ceramic sequence for the Middle Rio Grande Valley is well known and has been extensively described (Mera 1935, 1940; Warren 1977, 1979; McKenna and Miles 1990). The most widely accepted ceramic manufacture dates will be used to assign relative dates to the concentrations or to loci within concentrations.

Some chipped stone artifacts also have the potential to provide relative dates. Projectile points, in particular, are often used for this type of dating (see, for instance, Thoms 1977; Turnbow 1997). Unfortunately, dates for specific projectile point styles are usually not well anchored. In most cases they can only be assigned to time spans measured in centuries or millennia rather than years or decades. Some styles were used for long periods of time, often overlapping a wide range of ceramic types and styles. In addition, projectile points were frequently collected from earlier sites and reused, "contaminating" later sites with earlier styles. Thus, this artifact category can only be used to provide very gross dates.

Radiocarbon Dating

Radiocarbon analysis has been used to date archaeological sites since the 1950s. While this process was initially thought to provide accurate absolute dates, several problems have cropped up over the years that now must be taken into account. The three most pervasive problems have to do with the ways in which wood grows and is preserved. Both animals and plants absorb a radioactive isotope of carbon (^{14}C) while they are alive. Immediately following death, ^{14}C begins decaying into ^{13}C at a known rate. Ideally, by simply measuring the proportion of each carbon isotope it should be possible to determine how long ago that entity stopped absorbing radioactive carbon. Since plant parts are often available on sites, this technique is usually applied to those types of materials. However, more recent research has revealed more complexities. For example, some plants use carbon in different ways. This variation can be taken into account by determining the type of plant being dated.

A more serious problem is encountered when wood or wood charcoal is submitted for dating (Smiley 1985). Only the outer parts of trees continue to grow through the life of the plant, hence only the outer rings and bark actively absorb new carbon. Samples of wood submitted for dating may contain numerous rings, each representing growth in a different year, and each "aging" in terms of isotope ratios with each passing year. Thus, rather than measuring a single event (when the tree died or was cut down), the radiocarbon assay of a series of growth rings averages isotope ratios from the entire span of growth represented in the sample. This often tends to overestimate the age of the material. Smiley (1985:385) notes that a large error in age estimation can occur in arid or high-altitude situations, where tree-ring density may be high and dead wood can preserve for long periods of time. Disparities as large as 1,000+ years were found in dates from Black Mesa, and there was an 80 percent chance that dates were overestimated by over 200 years and a 20 percent chance that the error was over 500 years (Smiley 1985:385–386).

The disparity in dates was even greater when fuel wood rather than construction wood was used for dating (Smiley 1985:372). This is because residents sought out dry wood for fuel, wood that could have been lying on the surface for several hundred years before it was burned. Again, the event being measured is the death of the plant, not when it was used for fuel. Also, wood combusts from the outside in, eliminating younger carbon of the outer rings and preserving the older carbon of the inner rings for dating.

One other problem with the use of this method is caused by solar activity. Sunspots cause fluctuations in atmospheric ^{14}C levels, and hence in the amount of radioactive carbon absorbed by living entities. This introduces error into the calculations, which is currently corrected by using a calibration based on decadal fluctuations in atmospheric ^{14}C as measured from tree-ring sequences (Suess 1986). While this problem may no longer be as significant as the others mentioned, it indicates that we are still learning about how this isotope is absorbed and decays, and that it is affected in many ways that were not originally considered.

Even considering these problems, radiocarbon analysis can provide relatively sensitive dates when properly applied. For example, annuals or twigs from perennials represent short periods of growth and can often be confidently used for radiocarbon dating. Construction wood can also be sampled in a way that measures the approximate cutting date rather than a series of growth years. This can be accomplished by submitting only bark and outer rings instead of sending in charcoal that contains inner rings. This is often difficult and time consuming, but this cautious practice provides dates that are much more reliable.

We will only submit radiocarbon samples in certain circumstances. Samples of fuel woods will not be submitted unless there are no other temporally sensitive materials available. The principal source of radiocarbon samples will be plant parts that can be given botanical identifications, that can be demonstrated to include one or only a few years of carbon accumulation, and that can be linked to the cultural event that is the target of the dating effort. Efforts will be made to minimize "old wood" effects, if only fuel wood samples are obtained from features.

Archaeomagnetic Dating

Archaeomagnetic dating analyzes the remanent magnetization in materials that were fired prehistorically. Those materials must contain particles with magnetic properties (ferromagnetic minerals), usually iron compounds like magnetite. Ferromagnetic minerals retain a remanent, or permanent, magnetization, which remains even after the magnetic field that caused it is removed (Sternberg 1990:13–14). When ferromagnetic materials are heated above a certain point (which varies by the type of compound), the remanent magnetization is erased and particles are remagnetized (Sternberg 1990:15). Samples of that material can be analyzed to determine the direction of magnetic north at the time of firing. Since magnetic north changes location over time and the pattern of its movement has been plotted for about the last 1,500 years in the Southwest, comparison with the archaeomagnetic plot can provide a reasonably accurate date. However, it should be remembered that only the last event in which the material was heated to the point where remagnetization could occur is being dated. Thus, a feature could have been in use over a span of decades, but only the last time that it was fired to the proper heat can be dated by this method.

Archaeomagnetic analysis can potentially contribute good temporal data for sites, providing the proper fired materials are encountered. When a structure burns it occasionally attains the necessary heat for remagnetization to occur, and these events can also be dated. However, as noted above, one must keep in mind the event that is actually being dated. An archaeomagnetic date from a pithouse hearth can not be used to place the construction of that structure in a temporal perspective because that is not the event being dated. Thus, archaeomagnetic samples can provide dates for the last use of certain features at a site, but cannot be used to determine when they were built.

Archaeomagnetic samples will be taken whenever possible. In most cases only hearths will be amenable to this type of analysis. However, if other burned soils are found in situ, samples of them may also be taken if they appear related to events that occurred during the time of occupation.

Chipped Stone Artifacts
James L. Moore

The primary contributions of chipped stone analyses derive from data on material selection, reduction technology, and tool use. These topics provide information about ties to other regions, mobility patterns, and site function. While material selection studies cannot reveal how materials were obtained, they can usually provide some indication of where they were procured. One of the most important concerns for economic and social organization is residential mobility, or how often people moved around the landscape. Hunter-gatherers tend to move their camps often, occupying many residential sites during the course of a year. In contrast, farmers tend to occupy a single residential site for one or more years at a time, though they may also use logistical camps to collect resources that occur at some distance from the main village. Analysis of chipped stone assemblages should allow us to examine mobility patterns exhibited by the occupants of these sites and to define degrees of residential mobility. By studying the reduction strategies employed by each component, it should be possible to compare how different cultural groups approached the problem of producing useable chipped stone tools from raw materials. These comparisons can contribute to discussions of ethnic group affiliation. The types of tools in an assemblage can be used to help assign a function, and to aid in assessing the range of activities that occurred at a site. Chipped stone tools provide temporal data in some cases, but unfortunately they are usually less time-sensitive than other artifact classes, like pottery and wood.

All chipped stone artifacts will be examined using a standardized analysis format (OAS 1994a). This analytical format includes a series of mandatory attributes that describe material, artifact type and condition, cortex, striking platforms, and dimensions. In addition, several optional attributes have been developed that are useful for examining specific questions. This analysis will include both mandatory and optional attributes.

Each chipped stone artifact will be examined using a binocular microscope to aid in defining morphology and material type, examine platforms, and determine whether it was used as a tool. The level of magnification will vary between 20x and 100x, with higher magnification used for wear-pattern analysis and identification of platform modifications.

Utilized and modified edge angles will be measured with a goniometer; other dimensions will be measured with a sliding caliper. Analytical results will be entered into a computerized database to permit more efficient manipulation of the data, and to allow rapid comparison with other databases on file at the OAS.

Attributes that will be recorded for all flakes, angular debris, cores, and tools include material type, material quality, artifact morphology, artifact function, amount of surface covered by cortex, portion, evidence of thermal alteration, edge damage, and dimensions. Other attributes are aimed specifically at examining the reduction process, and can only be obtained from flakes. They include platform type, platform width, evidence of platform lipping, presence or absence of opposing dorsal scars, and distal termination type.

Chipped stone artifacts should have been used for a wide range of tasks in both prehistoric and historic contexts. The variety of formally designed tools and used edges in an assemblage provides information on the range of activities performed at a site, and an assessment of these data can help determine how a site and its structures and features functioned in the settlement and subsistence system. The distribution of various classes of chipped stone artifacts across a site often provides clues concerning how different areas were used and can augment data provided by other analyses.

By tracking the occurrence of local and nonlocal raw material use, we should be able to define some of the ties this population had to other regions. Such ties can include indirect acquisition of lithic raw materials through exchange or direct procurement by logistical expedition. The condition of materials when they were brought to sites (early reduction stages) can provide information that will allow us to determine which of these processes is most likely, but such interpretations will be strongest if they are augmented with data from other classes of artifacts.

An assessment of strategies used to reduce lithic materials at a site often provides evidence of residential mobility or stability. Two basic reduction strategies have been identified in the Southwest. Efficient (also termed curated) strategies entail the manufacture of bifaces that served as both unspecialized tools and cores, while expedient strategies were based on the removal of flakes from cores for use as informal tools (Kelly 1985, 1988). Technology was usually related to lifestyle. Efficient strategies tended to be associated with a high degree of residential mobility, while expedient strategies were typically related to sedentism. The reason for this type of variation is fairly simple.

Groups on the move tended to reduce the risk of being unprepared for a task by transporting tools with them; such tools were transportable, multifunctional, and readily modifiable. Sedentary groups did not necessarily need to consolidate tools into a multifunctional, lightweight configuration (Andrefsky 1998:38).

Of course there are exceptions to this general statement. Highly mobile groups living in areas that contained abundant and widely distributed raw materials or suitable substitutes for stone tools would not need to worry about efficiency in lithic reduction (Parry and Kelly 1987). Where lithic materials suitable for chipping occurred only in the form of small nodules, efficient reduction may have been impossible and another strategy would have been used (Andrefsky 1998; Camilli 1988; J. Moore 1996). Neither of these exceptions applies to the study area.

Southwestern biface reduction strategies were similar to the blade technologies of Mesoamerica and Europe in that they focused on efficient reduction with little waste. While the initial production of large bifaces was labor intensive and resulted in much waste, the finished tools were easily and efficiently reduced. Efficient strategies allowed flint knappers to produce the maximum length of useable edge per biface. By maximizing the return from cores, they were able to reduce the volume of raw material required for the production of informal tools. This helped lower the amount of weight transported between camps. Neither material waste or transport cost were important considerations in expedient strategies; flakes were simply struck from cores when needed. Thus, analysis of the reduction strategy used at a site allows us to estimate whether site occupants were residentially mobile or sedentary.

Ground Stone Artifacts

Low frequencies of ground stone artifacts may be recovered from LA 55499. The following discussion provides a research context and methods for any ground stone artifacts that are recovered.

The primary but not exclusive contribution of ground stone analysis data will be through support of functional inferences. Ground stone artifacts usually are not abundant, but they provide unique data on subsistence. Such information can be derived either indirectly or directly. Tool size, form, and other general design characteristics are commonly used to infer function. However, many assumptions are made when such attributes are used to assign function to an artifact. An additional perspective on how ground stone tools functioned is to collect data that are directly related to use. The most commonly used methods of doing this include the analysis of wear patterns on surfaces and the recovery of residues (especially pollen).

Most ground stone artifacts in Southwestern assemblages are related to grinding foodstuffs or other raw materials. The design of passive and active grinding implements is assumed to be conditioned by the type of material being ground, the importance of grinding within the food preparation tasks, the intensity of episodes of grinding, and the mobility of the subsistence adaptation. Residentially mobile Archaic hunter-gatherers tended to use one-hand manos, basin or slab metates, and mortars. These are fairly generalized tools that can be used to grind a variety of generally fine-grained wild and domestic plant foods. However, these forms were not designed to rapidly and efficiently process large quantities of food. Ground stone tools used by Southwestern farmers were more specialized toward the processing of corn and usually included trough or through-trough metates and two-hand manos. Such tools allow large quantities of foods like corn to be processed more rapidly and efficiently (Lancaster 1983). Mano surface areas may also provide quantitative information concerning the degree of reliance on cultigens (Hard 1986). Coupled with other evidence, data on grinding surface area may support comparisons of the degree of agricultural dependence of different components. Although there is a general trend toward more efficient grinding tool design through time, the trend is not unilinear, and the introduction of small-seeded cultigens (such as wheat and barley) in historic period mission settlements appears to be accompanied by an increased use of one-hand manos.

Formally designed grinding tools are assumed to be related to the processing of seeds, especially corn. In the latter case this has been confirmed in many cases by both contextual evidence and residue studies (pollen and starch). However, grinding surfaces are multipurpose and can be used for both other food and nonfood materials. Items such as cholla pollen, clay, and pigments have been found on grinding surfaces as well as corn. Residue samples will be collected from grinding surfaces from secure contexts and from items with macroscopic evidence of residue presence.

The ground stone artifact category is defined by manufacturing technique as well as by the grinding function, and there are many diverse artifact types that can fall within this class. Axes can occur as either ground stone or chipped stone implements, and items such as polishing stones and ornaments can also fall within this class. Although theoretical bases for interpretations are poorly developed for most of these other types of artifacts, morphological and functional classifications are useful for component and feature interpretations. Residue analysis may also be carried out in some cases to either confirm or explore possible interpretations.

Ground stone artifact assemblages, especially grinding stones, can also contribute to questions of occupation duration and abandonment. Grinding implements can break and can routinely wear out through use and resurfacing. Discarded ground stone or ground stone that is reused in architecture can provide an indication of site longevity and reuse. Similarly, formally designed tools are often heavy and represent a significant investment of time and energy in manufacture. The decision to remove or to cache or abandon ground stone can contribute to interpretations of residential mobility, residential stability (relocation distances), and the social context of structure abandonments (Schlanger 1991).

Ground stone artifacts will be analyzed using a standardized methodology (OAS 1994b) which was designed to provide data on material selection, manufacturing technology, and use. Artifacts will be examined macroscopically, and results will be entered into a computerized database for analysis and interpretation. Several attributes will be recorded for each ground stone artifact, while others will only be recorded for certain tool types. Attributes that will be recorded for all ground stone artifacts include material type, material texture and quality, function, portion, preform morphology, production input, plan view outline, ground surface texture and sharpening, shaping, number of uses, wear patterns, evidence of heating, presence of residues, and dimensions. Specialized attributes that will be recorded in this assemblage include information on mano cross-section form and ground surface cross section.

By examining function(s) it is possible to define the range of activities in which ground stone tools were used. Because these tools are usually large and durable, they may undergo a number of different uses during their lifetime, even after being broken. Several attributes are designed to provide information on the life history of ground stone tools, including dimensions, evidence of heating, portion, ground surface sharpening, wear patterns, alterations, and the presence of adhesions. These measures can help identify post-manufacturing changes in artifact shape and function and can describe the value of an assemblage by identifying the amount of wear or use. Such attributes as material type, material texture and quality, production input, preform morphology, plan view outline form, and texture provide information on raw material choice and the cost of producing various tools. Mano and ground surface cross section are specialized measures aimed at describing aspects of form for manos and metates, since as these tools wear they undergo regular changes in morphology that can be used as relative measures of age.

Pollen washes will be conducted in the laboratory, necessitating certain precautions. Ground stone tools from trash deposits will be placed in plastic bags after removal from the ground and will be lightly brushed to remove loose soil. A thin cover of dirt will be left on tools found on floors until they are ready for photographing. Loose dirt will be removed prior to photographing, and the artifacts will be placed in plastic bags as soon as is feasible after that procedure is completed. Laboratory processing will proceed as follows: the entire surface of tools will be brushed before samples are collected. Using distilled water and a tooth brush, grinding surfaces will be scrubbed to collect embedded materials. The size of the area sampled will be measured and noted. Wash water will be collected and packaged for storage until samples are selected for analysis.

Native American Ceramics

Low frequencies of pottery made and used during a 1400-year time span may be recovered from LA 55499. The small assemblage size will limit the questions and interpretations based on ceramic type, form, manufacture technology, exchange, and geographical distribution. Therefore, the ceramic analysis scope will be limited to ceramic type and descriptive attributes relating to technology and tradition for site dating and use and function for site structure and function.

Ceramic Attributes

Attribute categories used in these investigations will be similar to those employed in recent OAS studies. These categories include temper type, paint type, surface manipulation, post-firing modification, and vessel form. Other types of data that will be recorded for smaller samples of sherds will involve more detailed characterizations of pastes through refiring and petrography. Design style and vessel construction methods have the potential to contribute to both refined dating inferences and to ethnicity discussions. If whole or substantially reconstructible vessels are recovered, vessel attributes (such as volume and use wear) will be recorded in addition to the sherd attributes described above.

Basic ceramic classification encodes a large amount of information. Ceramic types refer to groupings identified based on various combinations of paste and surface characteristics with known temporal, spatial, and functional significance. Sherds are initially assigned to specific traditions based on probable region of origin as indicated by paste and temper. They are then placed in a ware group on the basis of general surface manipulation and form. Finally they are assigned to temporally distinctive types previously defined within various tradition and ware groups.

Ceramic Traditions and Types

Expected low frequencies of pottery may not allow for a substantive evaluation of the accepted manufacture dates and regions, identification and analysis of pottery recovered from LA 55499. Therefore, the analysis will rely on well-established ceramic typologies used in the Middle and Northern Rio Grande Valley. These chronological sequence represented by these ceramic typologies are briefly summarized below.

The early Formative or Basketmaker III to Pueblo II period ceramic sequence is a combination of Southern Cibola and Cibola traditions (Hurst 2003; Warren 1977, 1982). From AD 500 to 900, the predominant ceramic types are Lino or plain gray and San Marcial Black-on-white. Gray wares are the most common and they exhibit the greatest variety of vessel forms. San Marcial Black-on-white occurs most commonly in bowl forms, although precursors of white ware jar forms are also present on residential sites. From AD 900 to 1100 or 1150, Cibola White Wares and various utility ware forms consisting of neckbanded, neck indented corrugated, and overall corrugated occur on pithouse sites and small hamlets. Cibola White Ware types include Red Mesa, Escavada, and Gallup Black-on-whites. Cibola White Ware styles. This mineral-paint wares were widely distributed and are usually correlated with the Anasazi Culture areas of the San Juan Basin and Eastern Colorado Plateau. In the early 1100s, Kwahe'e Black-on-white, a Middle and Northern Rio Grande mineral-paint black-on-white type is first produced. Between AD 1100 and 1225 it is the most common decorated type in the Middle and Northern Rio Grande with some presence in the Middle Rio Puerco Valley, as well. This type is distinctive to the Rio Grande Valley and is indicative of cultural differentiation along the Rio Grande when compared with the Anasazi Culture area to the west. Socorro Black-on-white is also common in the Albuquerque area at this same time (Lang 1982). While local production has not been demonstrated, its common presence on sites in the Albuquerque area suggests strong ties within the northern and southern villages within the Middle Rio Grande region.

At outset of the Rio Grande Coalition period, decorated pottery is predominantly carbon-painted with continued presence of mineral-paint Socorro Black-on-white until the end of the thirteenth century. Carbon-painted decorated pottery follows the Kwahe'e Black-on-white geographic distribution with expansion east of the Sangre de Cristo Mountains (Mera 1935). Santa Fe Black-on-white is the predominant type from AD 1200 to 1350 with local variants named Galisteo and Wiyo Black-on-white common in the late thirteenth and fourteenth centuries. In some northern areas, Santa Fe Black-on-white may have been produced into the early 1400s. On the Pajarito Plateau, it is replaced by Wiyo Black-on-white by the middle 1300s (Mera 1935; Habicht-Mauche 1993). In the Albuquerque area, local varieties of Galisteo and Wiyo Black-on-white are present until the early 1300s, when glaze-paint pottery appears and becomes popular by the middle 1300s.

From AD 1325 to 1650 or 1700, a glaze-paint pottery tradition develops and flourishes in the Middle Rio Grande. Based on changing bowl rim forms a temporal sequence outlined in the 1930s (Mera 1940) has aided archaeologists developing chronological sequences for settlement systems and for large village sites. The Glaze A–F rim profile scheme will be one of the main avenues for dating Pueblo IV components within Concentrations 1 and 2. Bowl and jar forms may be recovered from LA 55499.

Historic Pueblo pottery may also occur in low frequencies. Glaze-paint pottery continued production into the early to middle 1700s, with mineral-paint styles becoming prominent by the early to middle 1700s (Harlow and Lanmon 2003). Types made in the Santa Ana and Zia Pueblo areas include Puname Polychrome (AD 1700–1760), San Pablo and Ranchitos Polychromes (1760–1820), and Trios and Santa Ana Polychromes (1820–1920). While the manufacture date ranges for these types may be open to debate, the type descriptions will be useful for identifying historic period components within Concentrations 1 and 2.

Vessel Form and Portion and Site Function

Functional qualities of vessel assemblages can be inferred from sherd distributions in ware as well as form categories that reflect the shape and portion of a vessel. Vessel form identification is generally based on rim shape and the presence and location of polish and painted decorations. It is often easy to identify the basic form (bowl vs. jar) of body sherds from prehistoric vessels for many Southwestern regions by the presence and location of polishing.

Rim sherds will also contribute functional information through measurement of rim diameter. Rim diameter correlates with vessel size in many forms, and simultaneous measurement of rim arc (in degrees) can help quantify vessel assemblages. The former measure can contribute to interpretations of the nature of economic activities for each component, as well as the size of social groups involved in food preparation and consumption. The latter measure is the most efficient means of quantifying vessel contributions to components, and it can support interpretations of occupation duration as well as the intensity of different functions that result in vessel breakage.

Botanical Remains

Mollie S. Toll, Pamela McBride, and James L. Moore

Macrobotanical materials recovered from sites provide direct evidence of subsistence practices. Most of these floral materials will be recovered from flotation samples, but preserved vegetal material (such as charcoal, seeds, or even textile fragments) also can be recovered directly during excavation. Charred seeds can tell us what plants were included in the diet, both domestic and wild. Charcoal from hearths and trash deposits can be used to examine fuel wood gathering activities. Floral materials contained in architectural materials can be used to augment other types of botanical data, and samples from historic corrals provide information on the diet of livestock. These types of data not only tell us what plant foods site occupants were gathering, growing, or trading for, they also provide important information on what the local environment might have looked like.

Pollen analysis should be considered complementary rather than parallel to macrobotanical data from flotation samples. Pollen is preserved in very different contexts than carbonized seeds, is usually dominated by environmental rather than cultural sources, and has different contributions to make to the biological data corpus that informs on subsistence and environmental parameters. Whereas primary and secondary deposits from thermal features make up much of the useful flotation record (along with far less frequent catastrophic burn events), pollen does not survive burning or deposition in alkaline, water-holding features. Pollen's particular contribution lies in characterizing plant utilization activities that do not involve burning, such as milling bins, ground stone artifacts, storage features, coprolites, and living surfaces. On well-preserved interior floors, systematic intensive sampling (such as alternate grid units) of pollen and flotation can work well together to produce relatively detailed mapping of activity areas of household space. The potential contributions of pollen analysis are more restricted from strata such as trash fill, roof fall, and middens.

Prior to submitting pollen samples for analysis, they will be evaluated by the project director according to their potential to contribute information on research issues. The project director will rely on context evaluations provided by the excavators. Pollen analysis may be used to address issues of seasonality, environmental change, subsistence mix, post-depositional mixing, and social practices (as might be associated with human interments). The pollen analyst will need to determine the quality of the sample in terms of preservation, intermingling of modern, post-depositional, and subject pollen (pollen related to feature use). Sample sufficiency for addressing the range of related research questions will also be assessed and evaluated.

The potential contribution of botanical analyses is necessarily limited by the sampling universe of provenience types and preservation conditions that is encountered within the sites. Interpretable samples require confidently defined temporal and behavioral contexts. Prime among differentiated, potentially informative contexts are intact interior floor surfaces protected by fill and roof fall. Sampling multiple locations on interior floors contributes data for mapping cultural activities involving plant materials. This patterning informs on the organization of economic and cultural behavior on a household level. Analogous exterior surfaces, such as extramural work areas with associated cooking and storage features, are of equal interpretive interest but tend to have very poor preservation of perishable remains, and consequently do not merit intensive sampling. Primary deposits within features, architectural deposits, and refuse strata provide specific sampling opportunities.

Botanical studies of archaeological deposits will include flotation analysis of soil samples, species identification and (where appropriate) morphometric measurement of macrobotanical specimens, and species identification of wood specimens from both flotation and macrobotanical samples. Flotation is a widely used technique for separation of floral materials from the soil matrix. It takes advantage of the simple principle that organic materials (and particularly those that are nonviable or carbonized) tend to be less dense than water, and will float or hang in suspension in a water solution. Each soil sample is immersed in a bucket of water. After a short interval allows heavier sand particles to settle out, the solution is poured through a screen lined with "chiffon" fabric (approximately 0.35 mm mesh). The floating and suspended materials are dried indoors on screen trays, then separated by particle size using nested geological screens (4.0, 2.0, 1.0, and 0.5 mesh), before sorting under a binocular microscope at 7 to 45x.

This basic method has been in use since 1936, but did not become widely used for recovery of subsistence data until the 1970s. Seed attributes such as charring, color, and aspects of damage or deterioration are recorded to help in determining cultural affiliation vs. post-occupational contamination. Relative abundance of insect parts, bones, rodent and insect feces, and roots help to isolate sources of biological disturbance in the ethnobotanical record.

All macrobotanical remains collected during excavation will be examined individually, identified, repackaged, and cataloged. Condition (carbonization, deflation, swelling, erosion, damage) will be noted as clues to cultural alteration, or modification of original size dimensions. When less than half of an item is present, it will be counted as a fragment; more intact specimens will be measured as well as counted. Corn remains will be treated in greater detail. Width and thickness of kernels, cob length and mid-cob diameter, number of kernel rows, and several cupule dimensions will be measured following Toll and Huckell (1996). In addition, the following attributes will be noted: overall cob shape, configuration of rows, presence of irregular or undeveloped rows, and post-discard effects.

Faunal Remains

Nancy J. Akins

Based on the testing and low frequency of faunal remains recovered from other limited activity sites in the region, faunal remains may be present in very low frequencies. It is expected that any faunal remains will reflect small-scale hunting of open grassland species including cottontail rabbits and jackrabbits and artiodactyl species. This non-residential assemblage may contribute to our understanding of the seasonal logistics of the subsistence economy, including an assessment of the garden hunting model vs. longer distance hunting.

A growing body of data indicates that the initial strategy of Southwestern farmers was one of garden hunting. The garden hunting model, as proposed by Linares (1976:331), suggests that the abundance of some taxa found in archaeological assemblages is the direct result of farmers hunting in gardens and cultivated fields. Disturbing the primary vegetation for agricultural plots not only attracts and increases the biomass of some animals, but hunting in fields eliminates seasonality and scheduling conflicts while protecting fields from crop predators. As horticultural activity increases, so do the habitats that support higher densities of small mammals and their availability for human procurement. When communities become larger, more residentially stable, and more committed to horticulture, large animals increase in importance as hunters turn to scheduling hunting activities. Reliance on maize, which is low in two essential amino acids and niacin, increases the need for high-quality animal protein, at least seasonally (Speth and Scott 1989:71, 74).

Sedentary groups generally exploit a wider variety of animals than do mobile ones. They also depend more on smaller animals, and use more traps, ambushes, and long-distance hunts (Kent 1989:3). When hunting close to home, a wider range of animals is taken, including less-preferred smaller animals. To maximize their return, the farther a group travels to hunt, the narrower the range of species and the larger the size of the animal sought. Once the locally available large game has been depleted, hunters must travel greater distances to acquire these resources, relocate their settlements closer to more productive areas, or reduce their commitment to horticulture (Speth and Scott 1989:75, 78). Obviously, the ability to assess these models of faunal exploitation will depend on the frequency and preservation of the faunal remains.

Specimens recovered by project will be identified using the Office of Archaeological Studies comparative collection supplemented by those at the Museum of Southwest Biology, at the University of New Mexico. Recording will follow an established OAS computer coded format that identifies the animal and body part represented, how and if the animal and part was processed for consumption or other use, and how taphonomic and environmental conditions have affected the specimen. Variables for the analyses include a suite of provenience descriptions, taxon, element, completeness, a series of taphonomic observations, burning, butchering, and modification. Quantification conventions record elements and groups of conjoined elements in order to minimize the inflation of counts that can result from fragmentation and partial carcasses.

Human Remains

Nancy J. Akins

Human remains are not reasonably expected at LA 55499. Should any human remains be encountered, they will be excavated under the annual burial permit issued to the Office of Archaeological Studies. Following the permit provisions, if human remains are discovered the intent to use the annual permit, including a legal description of the location of the burial, the written authorization to remove the burial from the landowner, a description of the procedures to be implemented to identify and notify living relatives of the burials, certification that the law enforcement agency having jurisdiction in the area has been notified, a list of personnel supervising and conducting excavations of the human burial, and the NMCRIS LA Project/Activity Number for the permitted excavation will be submitted in writing to the State Historic Preservation Division (HPD) before excavation of the burial begins. The local law enforcement agency with jurisdiction over the area will be notified to contact the state medical investigator who will determine if the burial is of medico-legal significance. Within 45 days of completing the permitted excavation, recommendations for the disposition of human remains and funerary objects will be made to the HPD. These recommendations will take into consideration the comments of living persons who may be related to the burial and the wishes of the landowner. The plan will provide a proposed location for reburial or approved curatorial facilities and an inventory of funerary objects, other artifacts found in association, or collected in the course of excavation. The HPD, after consulting with the State Indian Affairs Department (IAD), will determine the appropriate disposition of the human remains and associated funerary objects. If a final report cannot be completed within a year of the completion of fieldwork, an interim report will be submitted along with an estimated completion date for a final report.

In addition to the provisions of the State Burial Law, the draft Department of Cultural Affairs Policy Regarding Tribal Consultation requires that OAS make a good faith effort to consult with Native American governments when actions could affect Native American human remains. Under this policy, in a discovery situation, OAS will augment the HPD and IAD consultations with informational letters to pueblos, tribes, or nations who have made a claim or have a history of interest in the geographic area where the human bone was discovered. If any of these groups expresses an interest in making a claim to the remains, OAS will assist them in initiating contact with the HPD/IAD.

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